# Bass Lake Hills Specific Plan Phase 1a Final Map Supplemental Traffic Analysis El Dorado County, California

Prepared for: BL Road, LLC

Prepared By



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### **EXECUTIVE SUMMARY**

El Dorado County, as lead agency, prepared and certified a Program Environmental Impact Report and Addendum for the Bass Lake Road Specific Plan area on March 17, 1992 and November 7, 1995, respectively(SCH#90020375). These documents determined that interim improvements to the Bass Lake Road interchange would be required to increase carrying capacity until the planned replacement of the interchange. This BLHSP Phase 1a Final Map Supplemental Traffic Analysis report supports the application for a Caltrans encroachment permit to implement those interim improvements. This report supplements traffic impact studies previously prepared to support Tentative Map Applications for the Bass Lake Hills Specific Plan Phase 1a development projects (Hawk View, Bell Ranch, and Bell Woods).

Analysis presented herein evaluates traffic operations under a ten-year (2028) planning scenario with and without interim improvements to the Bass Lake Road interchange. Caltrans and Federal Highway Administration policy requires that improvements within the US 50 right-of-way accommodate at least ten years of reasonably foreseeable growth. Traffic operations for 2017 without and with the BLHSP Phase 1a projects were also analyzed. The analysis considered levelof-service and signal warrants for existing plus project traffic per the requirements El Dorado County, and final conditions of approval for the Hawk View, Bell Ranch, and Bell Woods Tentative Map applications.

Three roadway configuration scenarios were considered:

- Scenario 1 consists of the existing roadway configuration, with side street stop control at both Bass Lake Road interchange intersections, and at the Bass Lake Road/Country Club Drive intersection.
- Scenario 2 signalizes the Bass Lake Road/EB US 50 ramp intersection with the existing geometry. The Bass Lake Road/Country Club Drive intersection is relocated to its ultimate location (approximately 1000' to the north) and signalized.
- Scenario 3 builds on scenario 2, adding a double left turn to the US 50 EB off-ramp, and striping a second northbound receiving lane on Bass Lake Road (underneath US 50). The second NB lane continues through the Bass Lake Road/US 50 WB ramp intersection. Both northbound lanes would then merge into a single lane, north of the Bass Lake Road interchange.

The analysis demonstrated that all study intersections operated at an acceptable level-of-service with the Scenario 2 roadway configuration for the existing 2017 plus project and ten-year 2028 plus project conditions.

The analysis also indicated that the planned auxiliary lanes between Silva Valley Parkway and Bass Lake Road should be considered for inclusion in the Ten-Year Capital Improvement Program when it is next updated.

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### 1.0: Introduction

### 1.1: Purpose

This report describes a ten-year traffic operations analysis of the Bass Lake Road interchange with implementation of interim improvements supporting nearby land development projects. The analysis will support a Caltrans encroachment permit for improvements required by the BLHSP Phase 1a projects (Hawk View, Bell Woods, and Bell Ranch) conditions of approval. Caltrans requires analysis of both the Bass Lake Road interchange and adjacent mainline segments of US 50. In addition, this report supports constructing interchange improvements concurrent with their need.

This study updates the January 2015 Ten-Year Bass Lake Road Interchange Interim Improvements Traffic Operations Analysis<sup>1</sup>. It scales back the number of dwelling units assumed to be built over the next ten years within the Bass Lake Hills Specific Plan (BLHSP) Phase 2 and 3a, and updates traffic forecasting.

The traffic analysis evaluated traffic operations under a ten-year (2028) planning scenario for interim improvements to the Bass Lake Road interchange that were identified in the Bass Lake Hills Phase 1a Traffic Impact Analysis (TIA). Because of the planned replacement of the Bass Lake Road interchange by 2035, any improvements constructed before 2035 are considered interim or "throwaway". Caltrans and Federal Highway Administration policy requires that improvements within the US 50 right-of-way accommodate at least ten years of reasonably foreseeable growth.

Traffic operations at two study intersections are presented. Study intersections are numbered 4 through 5 for consistency with the TIA that was formerly prepared on behalf of El Dorado County:

- #4 Bass Lake Road/US 50 Westbound ramps
- #5 Bass Lake Road/US 50 Eastbound ramps

Mainline merge, diverge, and basic segment analysis on US 50, on either side of the Bass Lake Road interchange, are also presented in this report for the 2017 Existing and Ten-Year 2028 scenarios.

### 1.2: Organization of this Report

This introductory section of this TIA report includes a background section on previously approved environmental mitigation measures that this study seeks to implement, and planned Traffic Impact Mitigation (TIM) Fee projects that would replace the Bass Lake Road interchange by 2035. The Existing Condition and Ten-Year Condition are discussed in the body of the report. Five sections (shown below) present the traffic forecasting and operations. A discussion section concludes this report.

<sup>&</sup>lt;sup>1</sup> TKTPM (2015) Ten-Year 2025 Bass Lake Road Interchange Interim Improvements Traffic Operations Analysis, T. Kear Transportation Planning and Management, Inc., January 2015.

- Existing (2017) study intersections without BLHSP Phase 1a traffic or planned improvements;
- Existing (2017) study intersections with BLHSP Phase 1a traffic under three improvement scenarios;
- Ten-year (2028) study intersections without BLHSP Phase 1a traffic or planned improvements;
- Ten-year (2028) study intersections with BLHSP Phase 1a traffic under three improvement scenarios;
- US 50 analysis without/with BLHSP Phase 1a traffic.

The three improvement scenarios considered with the addition of BLHSP Phase 1a traffic include:

- Scenario 1 consists of the existing roadway configuration, with side street stop control at both Bass Lake Road interchange intersections, and at the Bass Lake Road/Country Club Drive intersection.
- Scenario 2 signalizes the Bass Lake Road/EB US 50 ramp intersection with the existing geometry. The Bass Lake Road/Country Club Drive intersection is relocated to its ultimate location (approximately 1000' to the north) and signalized.
- Scenario 3 builds on scenario 2, adding a double left turn to the US 50 EB off-ramp, and striping a second northbound receiving lane on Bass Lake Road (underneath US 50). The second NB lane continues through the Bass Lake Road/US 50 WB ramp intersection. Both northbound lanes would then merge into a single lane, north of the Bass Lake Road interchange.

#### 1.3: Background

El Dorado County, as lead agency, prepared and certified a Program Environmental Impact Report and Addendum for the Bass Lake Road Specific Plan area on March 17, 1992 and November 7, 1995, respectively(SCH#90020375). These documents determined that improvements to the Bass Lake Road interchange would be required to increase carrying capacity until the planned replacement of the interchange. The improvements described in this report constitute those interim improvements and anticipated traffic operations through 2028. For reference, the planned interchange replacement and its timing are discussed below.

### Interchange Replacement Project (Phase 1)<sup>2</sup>

This is the first part of a TIM Fee funded project for the complete reconstruction of the Bass Lake Road interchange. This portion of the project includes a detailed study to determine the complete improvements needed, which include ramp widening, road widening, signals, the addition of a westbound auxiliary lane between Bass Lake and Silva Valley interchanges and replacement of the bridge for the Bass Lake Road underpass. Total cost (2010 dollars/year of expenditure dollars)

<sup>&</sup>lt;sup>2</sup> SACOG (2012) 2035 *Metropolitan Transportation Plan*, Appendix A project list, P15.



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is \$20,829,200 / \$34,913,028 with construction assumed to occur between fiscal year 2022/23 and fiscal year 2032/33.

### Interchange Replacement Project (Phase 2)<sup>3</sup>

This portion of the TIM Fee funded interchange improvement project is assumed to include additional ramp and road widenings; eastbound auxiliary lanes from Bass Lake Road to Cambridge Road interchanges; and widening of a portion of the westbound auxiliary lane at the westbound off ramp. Assumed ramp widenings include adding a second westbound off-ramp lane, an additional eastbound off-ramp turning lane, and adding an eastbound on-ramp HOV bypass lane. Total cost (2010 dollars/year of expenditure dollars) is \$23,640,000 / \$29,516,471 with construction also assumed to occur between fiscal year 2022/23 and fiscal year 2032/33.

### 1.4: Ten-year 2025 Bass Lake Road Interchange Interim Improvements Traffic **Operations Analysis**

The Ten-Year 2025 Bass Lake Road Interchange Interim Improvements Traffic Operations Analysis<sup>4</sup> analyzed traffic operations for 2025 without Project and 2025 with Project conditions to identify improvements that would accommodate buildout of the BLHSP projects. This analysis recommended the following:

- Restriping Bass Lake Road to include two northbound lanes between the US 50 WB ramp and US 50 EB ramp intersections
- Signalization of intersection #3: Bass Lake Road/Country Club Drive
- Signalization of intersection #5: Bass Lake Road/US 50 Eastbound ramps
- Queue improvements in both signalized intersections

The 2025 analysis was predicated upon buildout of BLHSP Phase 1a, and 523 units in BLHSP Phases 2 and 3 by 2025. In contrast, this traffic analysis assumes that only 90 units from Phase 2 and 3 are constructed by 2028 (in the Bass Lake North project).

### 1.5: Bass Lake Hills Phase 1a Final Map Supplemental Traffic Analysis Findings

The BLHSP Phase 1a Final Map Supplemental Traffic Analysis<sup>5</sup> analyzed traffic operations for 2017 without Project and 2017 with Project conditions. This supplemental analysis considered level-ofservice and signal warrants for existing plus project traffic per the requirements El Dorado County, and final conditions of approval for revisions to three tentative subdivision maps with

<sup>&</sup>lt;sup>5</sup> TKTPM (2017) BLHSP Phase 1a Final Map Supplemental Traffic Analysis, T. Kear Transportation Planning and Management, Inc., March 16, 2017.



<sup>&</sup>lt;sup>3</sup> SACOG (2012) 2035 Metropolitan Transportation Plan, Appendix A project list, P14.

<sup>&</sup>lt;sup>4</sup> TKTPM (2015) Ten-Year 2025 Bass Lake Road Interchange Interim Improvements Traffic Operations Analysis, T. Kear Transportation Planning and Management, Inc., January 2015.

corresponding one-year tentative map extensions. The same three roadway configuration scenarios were considered:

- Scenario 1 consists of the existing roadway configuration, with side street stop control at both Bass Lake Road interchange intersections, and at the Bass Lake Road/Country Club Drive intersection.
- Scenario 2 signalizes the Bass Lake Road/EB US 50 ramp intersection with the existing geometry. The Bass Lake Road/Country Club Drive intersection is relocated to its ultimate location (approximately 1000' to the north) and signalized.
- Scenario 3 builds on scenario 2, adding a double left turn to the US 50 EB off-ramp, and striping a second northbound receiving lane on Bass Lake Road (underneath US 50). The second NB lane continues through the Bass Lake Road/US 50 WB ramp intersection. Both northbound lanes would then merge into a single lane, north of the Bass Lake Road interchange.

The analysis demonstrated that under existing plus project conditions, all study intersections operated at an acceptable level-of-service with the Scenario 2 roadway configuration.

### 1.6: Preservation of Space for Future Interchange Improvements

The area within the future footprint of the reconstructed Bass Lake interchange is protected by the land use and zoning designations under the General Plan, the Bass Lake Hills Specific Plan, and the Bass Lake Hills Public Facilities Financing Plan. The region also lies outside of the community area boundary, which acts as an urban limit line. Except for the planned park-and-ride lot and interim roadway improvements, amendments to the general plan, specific plan and environmental documents for the Bass Lake Hills Specific Plan would be required prior to any commercial or residential structures within the area adjacent to the Bass Lake Road interchange. These protections ensure that adequate space for the ultimate interchange at this location is preserved.

## 2.0: Existing 2017 Without Improvements or BLHSP Phase 1a

Existing 2017 without the Project Condition traffic volumes for the Bass Lake Road interchange are based on counts collected during the week of January 24<sup>th</sup>, 2017. Turn movements without any BLHSP Phase 1a development is provided in **Figure 1**, along with the existing lane configuration and controls.

SimTraffic microsimulation was used to evaluate intersection and movement delay, and queueing, at the study intersections. Ten simulations were prepared for both the AM and PM peak-hours. Average delays and queues reported are for the average from all SimTraffic runs, and 95% queues are based on all SimTraffic runs. Estimated delay and level-of-service are presented in **Table 1**. AM and PM peak-hour queues are presented in **Table 2**. Intersection #3 is not shown in **Table 1** or **Table 2**, but was considered when performing SimTraffic microsimulation. Without the BLHSP Phase 1a development and the interim improvements proposed to mitigate the BLHSP Phase 1a development, 95<sup>th</sup> percentile queues on the US 50 EB off-ramp and WB off-ramp are anticipated to extend almost to the gore point during the afternoon. The US 50 eastbound ramp intersection and Country Club Drive intersection meet the peak-hour signal warrant<sup>6</sup>.

Table 1. 2017 Intersection Delay and Level-of-Service, without Interchange Improvements and without BLHSP Development

	2017 AM, No Pro	<u>ject</u>	2017 PM, No Pro	oject
Intersection	Delay (sec)	LOS	Delay (sec)	LOS
4. Bass Lake Rd. & US 50 WB Ramps*	0.2(5.4)	A(A)	33.2(376.0)	D(F)
5. Bass Lake Rd. & US 50 EB Ramps	4.0	Α	21.6	С

<sup>\*</sup>Two-way stop controlled intersections – Intersection average delay and level-of-service is reported first, followed by the delay and level-of-service for the worst minor street approach movement in parentheses.

Table 2. 2017 95% Queues, without Interchange Improvements and without BLHSP Development

Study Intersection	Approach	2017 AM (feet)	2017 PM (feet)
#4 US FO M/D Domes	WB Left-Thru-Right	12	820
#4 US 50 WB Ramps	NB Left-Thru	15	17
#F US FO FD Downs	EB Left-Thru-Right	90	401
#5 US 50 EB Ramps	SB Left-Thru	21	13

 $<sup>^{6}</sup>$  The Peak-Hour Signal Warrant (Warrant 3) was evaluated within the TIA for 2014, 2019, and 2035 conditions with and without the project.

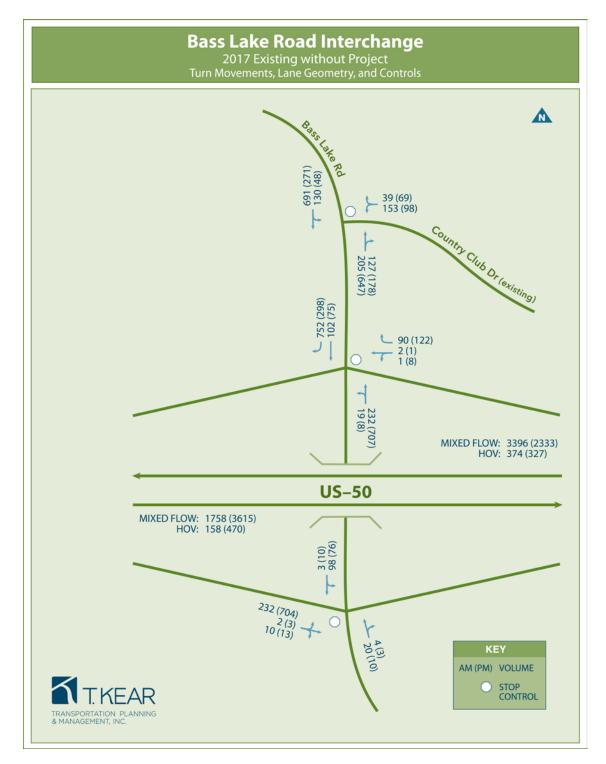


Figure 1. 2017 Volumes, Lanes, and Controls without Bass Lake Hills Development

## 3.0: Existing 2017 With BLHSP Phase 1a

Existing 2017 with Project Condition traffic volumes were calculated by adding the BLHSP Phase 1a project trips (Figure 2) to the Existing 2017 without the Project traffic volumes. Phase 1a traffic was taken directly from the project's traffic impact analysis<sup>7</sup>. Under Scenarios 2 and 3, where the Bass Lake Road/Country Club Drive intersection has been relocated and signalized, a floor of five trips was used to ensure that the eastbound movements, northbound left-turn movement, and southbound right-turn movement would adequately service the handful of homes and business located off Old Bass Lake Road<sup>8</sup>.

The turn movement forecast with BLHSP development and the existing lane configuration and controls is provided in Figure 3. The turn movement forecast with BLHSP development and improvements is provided in Figure 4 and Figure 5 (for scenarios 2 and 3 respectively).

Following the same process used for the without project scenario, SimTraffic microsimulation was used to evaluate intersection and movement delay, and queueing, at the study intersections. Ten simulations were prepared for both the AM and PM peak-hours. Average delays and queues reported are based on the average from all SimTraffic runs. Estimated delay and level-of-service are presented in Table 3. AM and PM peak-hour queues are presented in Table 4. Intersection #3 is not shown in Table 3 - Table 4, but was considered when performing SimTraffic microsimulation. Without the interim improvements proposed to mitigate the BLHSP Phase 1a development, both ramp intersections will operate at level-of-service F. During the afternoon, 95th percentile queues on the EB off-ramp is anticipated to extend to the gore point and queuing on the WB off-ramp is estimated to extend onto US 50 mainline. SimTraffic results are attached for reference.

<sup>&</sup>lt;sup>8</sup> There are approximately eight homes accessed from Old Bass Lake Road.



<sup>&</sup>lt;sup>7</sup> TKTPM (2014) Traffic Impact Analysis: Bass Lake Hills Phase 1a – Hawk View, Bell Woods, and Bell Ranch, T. Kear Transportation Planning and Management, Inc., July 30, 2014.

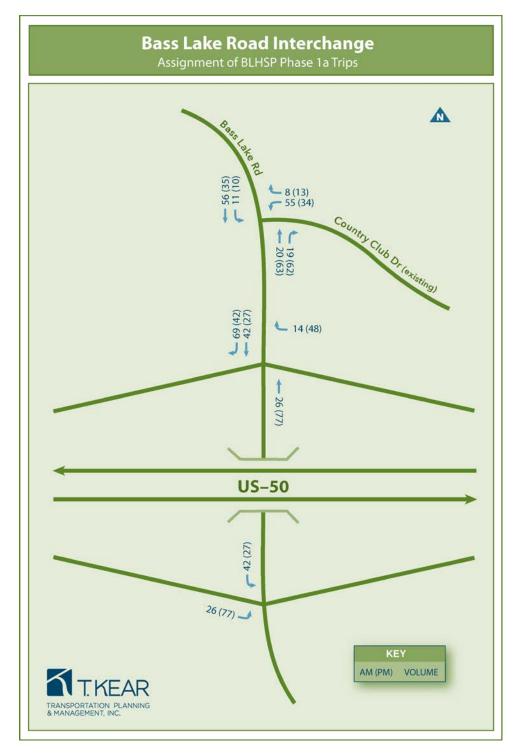


Figure 2. BLHSP Phase 1a Project Trips

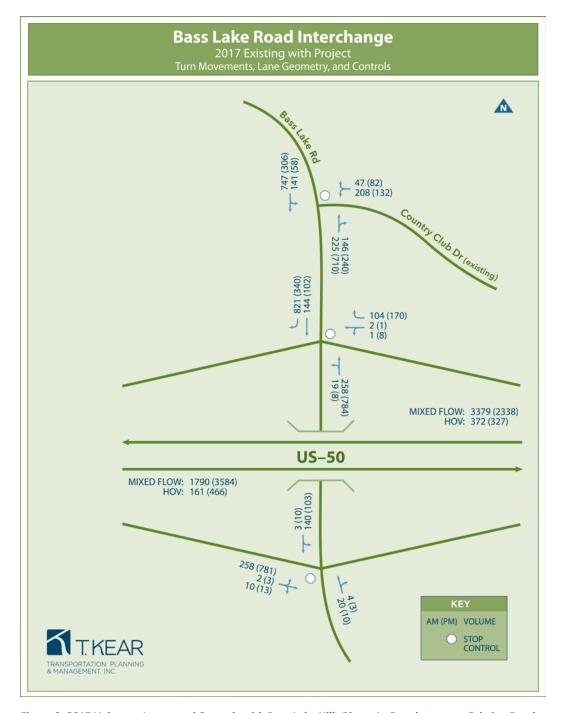


Figure 3. 2017 Volumes, Lanes, and Controls with Bass Lake Hills Phase 1a Development – Existing Roadway and Intersections Geometry, Existing Control

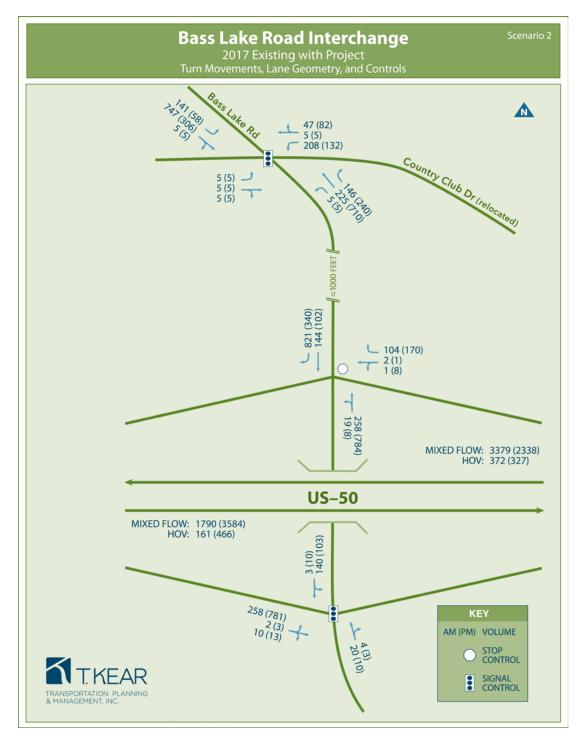


Figure 4. 2017 Volumes, Lanes, and Controls with Bass Lake Hills Phase 1a Development – Existing Roadway and Intersections Geometry, Signals at Intersection 3 and 5

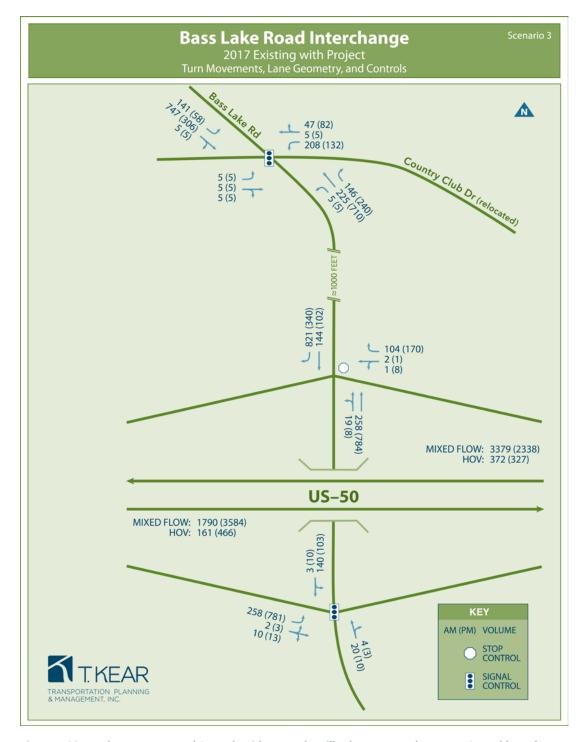


Figure 5. 2017 Volumes, Lanes, and Controls with Bass Lake Hills Phase 1a Development – 2 Northbound Lanes Under US 50 and Signals at Intersection 3 & 5

Table 3. 2017 Intersection Delay and Level-of-Service with and without Interchange Improvements (Scenario 1) and with BLHSP Development

	D(F)							
Existing roadway geometry, existing intersection geometry, and existing intersection controls  4. Bass Lake Rd. & US 50 WB Ramps*  O.2(5.4)  A(A)  33.2(376.0)  5. Bass Lake Rd. & US 50 EB Ramps  4.0  A  21.6  Scenario 1  Existing roadway geometry, existing intersection geometry, and existing intersection controls  4. Bass Lake Rd. & US 50 WB Ramps*  O.2(3.9)  A(A)  133.0(1921.9)  5. Bass Lake Rd. & US 50 EB Ramps  4.6  A  58.0  Scenario 2  Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Di intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with exist geometry  4. Bass Lake Rd. & US 50 WB Ramps*  O.1(3.5)  A(A)  O.1(17.9)	D(F) C s. F(F)							
4. Bass Lake Rd. & US 50 WB Ramps*  5. Bass Lake Rd. & US 50 EB Ramps  4.0  6. Scenario 1  Existing roadway geometry, existing intersection geometry, and existing intersection controls and a signalization of the Bass Lake Rd. & US 50 EB Ramps  6. Control 1  Existing roadway geometry, existing intersection geometry, and existing intersection controls and a signalization of the Bass Lake Rd. & US 50 EB Ramps  6. Control 2  Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Display intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with exist geometry  6. Bass Lake Rd. & US 50 WB Ramps*  7. Control 2  8. Control 2  9. Control 2  1. Control 3  1. Control 4  1. Control 3  1. Control 4  1. Contro	D(F) C s. F(F)							
5. Bass Lake Rd. & US 50 EB Ramps  Scenario 1  Existing roadway geometry, existing intersection geometry, and existing intersection controls  4. Bass Lake Rd. & US 50 WB Ramps*  0.2(3.9)  A(A)  133.0(1921.9)  5. Bass Lake Rd. & US 50 EB Ramps  4.6  A  58.0  Scenario 2  Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Drintersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with exist geometry  4. Bass Lake Rd. & US 50 WB Ramps*  0.1(3.5)  A(A)  0.1(17.9)	C s. F(F)							
Scenario 1  Existing roadway geometry, existing intersection geometry, and existing intersection controls  4. Bass Lake Rd. & US 50 WB Ramps*  O.2(3.9)  A(A)  133.0(1921.9)  5. Bass Lake Rd. & US 50 EB Ramps  4.6  A  58.0  Scenario 2  Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Dr. intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with exist geometry  4. Bass Lake Rd. & US 50 WB Ramps*  O.1(3.5)  A(A)  O.1(17.9)	s. F(F)							
Existing roadway geometry, existing intersection geometry, and existing intersection controls  4. Bass Lake Rd. & US 50 WB Ramps*  5. Bass Lake Rd. & US 50 EB Ramps  4.6  Scenario 2  Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Do intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with exist geometry  4. Bass Lake Rd. & US 50 WB Ramps*  0.1(3.5)  A(A)  0.1(17.9)	F(F)							
4. Bass Lake Rd. & US 50 WB Ramps* 0.2(3.9) A(A) 133.0(1921.9)  5. Bass Lake Rd. & US 50 EB Ramps 4.6 A 58.0  Scenario 2  Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Dr. intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with exist geometry  4. Bass Lake Rd. & US 50 WB Ramps* 0.1(3.5) A(A) 0.1(17.9)	F(F)							
5. Bass Lake Rd. & US 50 EB Ramps  4.6  Scenario 2  Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Di intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with exist geometry  4. Bass Lake Rd. & US 50 WB Ramps*  0.1(3.5)  A(A)  0.1(17.9)								
Scenario 2  Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Di intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with exist geometry  4. Bass Lake Rd. & US 50 WB Ramps*  0.1(3.5)  A(A)  0.1(17.9)	F							
Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Di intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with exist geometry  4. Bass Lake Rd. & US 50 WB Ramps*  0.1(3.5)  A(A)  0.1(17.9)								
intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with exist geometry  4. Bass Lake Rd. & US 50 WB Ramps*  0.1(3.5)  A(A)  0.1(17.9)	Scenario 2							
geometry  4. Bass Lake Rd. & US 50 WB Ramps* 0.1(3.5) A(A) 0.1(17.9)	Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Drive							
4. Bass Lake Rd. & US 50 WB Ramps* 0.1(3.5) A(A) 0.1(17.9)	intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with existing							
	, ,							
5. Bass Lake Rd. & US 50 EB Ramps 9.2 A 8.3	A(C)							
	Α							
Scenario 3								
Restriping Bass Lake Road to provide two northbound travel lanes from the eastbound US 50 offramp								
to just north of the US 50 westbound offramp, relocation and signalization of the Bass Lake								
Road/Country Club Drive intersection, signalization of the Bass Lake Road/US 50 eastbound ra	mp							
intersection with a double eastbound left turn (requiring a 240' eastbound left turn pocket)	intersection with a double eastbound left turn (requiring a 240' eastbound left turn pocket)							
4. Bass Lake Rd. & US 50 WB Ramps* 0.1(4.1) A(A) 0.1(10.1)								
5. Bass Lake Rd. & US 50 EB Ramps 8.2 A 5.6	A(B)							

Table 4. 2017 95% Queues, With and Without BLHSP Phase 1a Project Traffic

Study Intersection	Approach	2017 AM (feet)	2017 PM (feet)			
No BLHSP Phase 1a Development						
Existing roadway	geometry, existing intersection	on geometry, and existing in	tersection controls.			
#4 US 50 WB Ramps	WB Left-Thru-Right	12	820			
Scenario 1	NB Left-Thru	15	17			
#5 US 50 EB Ramps	EB Left-Thru-Right	90	401			
Scenario 1	SB Left-Thru	21	13			
	Scen	ario 1				
Existing roadway	geometry, existing intersection	on geometry, and existing in	tersection controls.			
#4 US 50 WB Ramps	WB Left-Thru-Right	16	1517			
Scenario 1	NB Left-Thru	17	10			
#5 US 50 EB Ramps	EB Left-Thru-Right	95	897			
Scenario 1	SB Left-Thru	19	11			
Scenario 2						
Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Drive						
intersection, signalizatio	n of the Bass Lake Road/US 5	0 Eastbound ramp intersecti	on with existing geometry			
#4 US 50 WB Ramps –	WB Left-Thru-Right	15	29			
Scenario 2	NB Left-Thru	21	7			
#5 US 50 EB Ramps –	EB Left-Thru-Right	153	315			
Scenario 2	SB Left-Thru	88	104			
Scenario 3						
Restriping Bass Lake Road to provide two northbound travel lanes from the eastbound US 50 off-ramp to just north of the US 50 westbound off-ramp, relocation and signalization of the Bass Lake Road/Country Club						
Drive intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with a double						
eastbound left turn (requiring a 240' eastbound left turn pocket)						
#4 US 50 WB Ramps –	WB Left-Thru-Right	19	28			
Scenario 3	NB Left-Thru	24	30			
#5 US 50 EB Ramps –	EB Left	129	205			
Scenario 3	SB Left-Thru	102	93			

### 4.0: Ten-Year 2028 Without Improvements or BLHSP Phase 1a

This section summarizes traffic forecasting procedures used to develop the 2028 without Project turning movements at study intersections, then discusses intersection level-of-service and queuing.

### 4.1: El Dorado County Travel Demand Model

Traffic forecasts for 2028 were derived from observed traffic counts and growth from the El Dorado County Travel Demand Model (TDM). Straight line interpolation was used to estimate 2017 to 2028 TDM growth. The TDM land use and road network assumptions were adapted to better reflect local conditions in 2028 at the Bass Lake Road interchange:

- Outside of the BLHSP area, land use within the El Dorado County Travel Demand Model
  was increased to ensure that build out of all approved Specific Plans<sup>9</sup> was accounted for.
  Land use was also checked, and increased where appropriate, to reflect the approved
  Town Center Apartments and Saratoga Estates projects. Land use was also increased to
  ensure that Serrano village J5 and J6 commercial and residential would be reflected as
  built out by 2028.
- Within the BLHSP area, existing land use levels were used to reflect the modeled 2028 trips, and traffic from planned BLHSP projects were manually added to the interpolated TDM estimates for 2028. Over the next ten years, development within the BLHSP area is assumed to include 371 dwelling units (281 units in the Phase 1a projects (Hawk View, Bell Woods, and Bell Ranch), and 90 units in the approved Bass Lake North Project). This represents an eight-fold increase in the average number of homes built and occupied each year since the BLHSP was adopted 10. Estimation of 2028 traffic without the BLHSP Phase 1a projects therefore required the Bass Lake North traffic to be manually added to the 2028 model estimates.

The projected ten-year turn movement forecast without any BLHSP development and without interchange improvements is provided in **Figure 6**, along with the existing lane configuration and controls. A detailed list of model enhancements is documented in **Appendix E** of this report. Because of the changes to the travel demand model, traffic forecasts prepared for this study are conservatively higher than those made using the November 2013 version of the El Dorado County TDM. The NCHRP 255 (Furness) adjustment was used to refine all turning movement forecasts.

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<sup>&</sup>lt;sup>9</sup> Ridgeview, Promontory, Carson Creek, Valley View, El Dorado Hills (Serrano)

<sup>&</sup>lt;sup>10</sup> In the 22 years since the 1995 approval of the BLHSP only 99 dwelling units have been constructed in one project (the Laurel Oaks project).

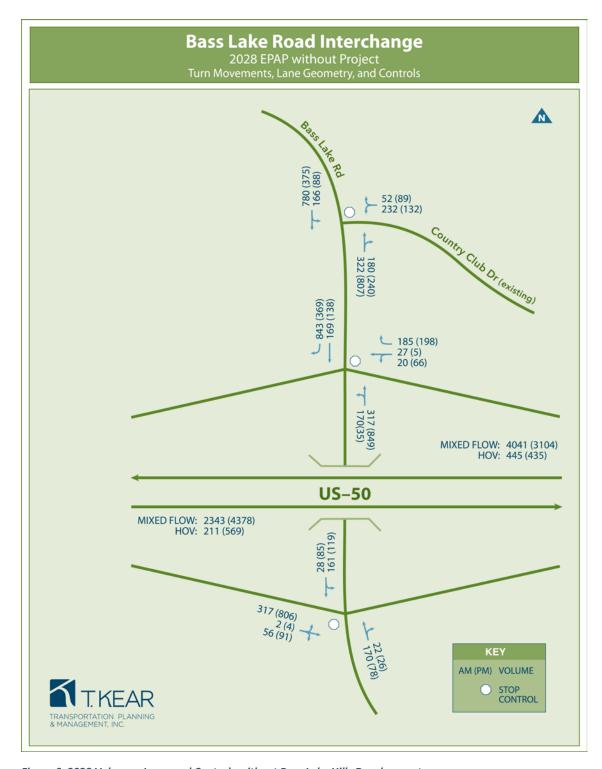


Figure 6. 2028 Volumes, Lane, and Controls without Bass Lake Hills Development

### 4.2: Intersection Level-of-Service and Queuing

SimTraffic microsimulation was used to evaluate intersection and movement delay, and queueing, at the study intersections. Ten simulations were prepared for both the AM and PM peak-hours. Average delays reported are the average from all SimTraffic runs, and the 95% queues are based on all SimTraffic runs.

Estimated delay and level-of-service are presented in Table 5. AM and PM peak-hour queues are presented in Table 6. Intersection #3 is not shown in Table 5 or Table 6, but was considered when performing SimTraffic microsimulation. Both ramp intersections will operate at level-of-service F and queuing on the westbound off-ramp and eastbound off-ramp during the afternoon is estimated to extend onto US 50 mainline without the interim improvements proposed to mitigate the BLHSP Phase 1a development. Without the BLHSP Phase 1a development and improvements, the EB off-ramp and WB off-ramp queues are anticipated to extend onto the US 50 mainline during the afternoon. The eastbound ramp intersection continues to meet the peak-hour signal warrant <sup>11</sup>. SimTraffic results are attached for reference.

Table 5. 2028 Intersection Delay and Level-of-Service, without Interchange Improvements and without BLHSP Development

·	2028 AM, No Pro	ject <u></u>	2028 PM, No Pro	oject
Intersection	Delay (sec)	LOS	Delay (sec)	LOS
4. Bass Lake Rd. & US 50 WB Ramps*	2.7(13.0)	A(B)	140.8(1197.3)	F
5. Bass Lake Rd. & US 50 EB Ramps	14.2	В	158.5	F

Two-way stop controlled intersections – Intersection average delay and level-of-service is reported first, followed by the delay and level-of-service for the worst minor street approach movement in parentheses.

Table 6. 2028 95% Queues, without Interchange Improvements and without BLHSP Development

Study Intersection	Approach	2028 AM (feet)	2028 PM (feet)
#4 LIC FO W/D Downson	WB Left-Thru-Right	133	1447
#4 US 50 WB Ramps	NB Left-Thru	72	44
#F UC FO FD Domes	EB Left-Thru-Right	224	1088
#5 US 50 EB Ramps	SB Left-Thru	55	35

<sup>&</sup>lt;sup>11</sup> The Peak-Hour Signal Warrant (Warrant 3) was evaluated within the TIA for 2014, 2019, and 2035 conditions with and without the project.

## 5.0: Ten-Year 2028 With Improvements and BLHSP Phase 1a 5.1: Turning Movement Forecast

Combining the 2028 without Project trip assignment information with the Bass Lake Hills Phase 1a turning movements from Figure 2 in Section 3.0 results in the estimated 2028 with Project turning movements, shown in Figure 7. Five project trips were added to intersection #3 when calculating the turning movements for the 2028 with Project and with Interchange improvement scenarios: Scenario 2) signals at intersection #3 and #5, and Scenario 3) 2 northbound lanes under US 50 and signals at intersection #3 and #5. The turning movements for these scenarios are provided in Figure 8 and Figure 9.

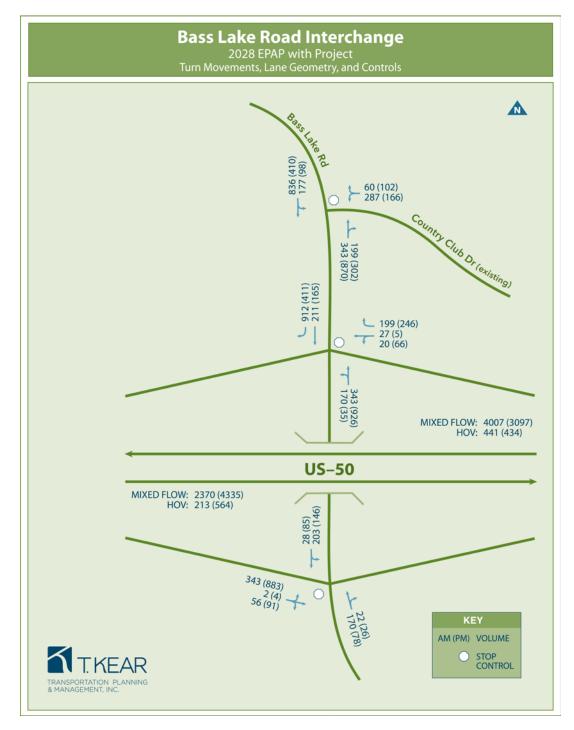


Figure 7. 2028 Volumes, Lane, and Controls with Bass Lake Hills Development – Existing Roadway and Intersections Geometry, Existing Control

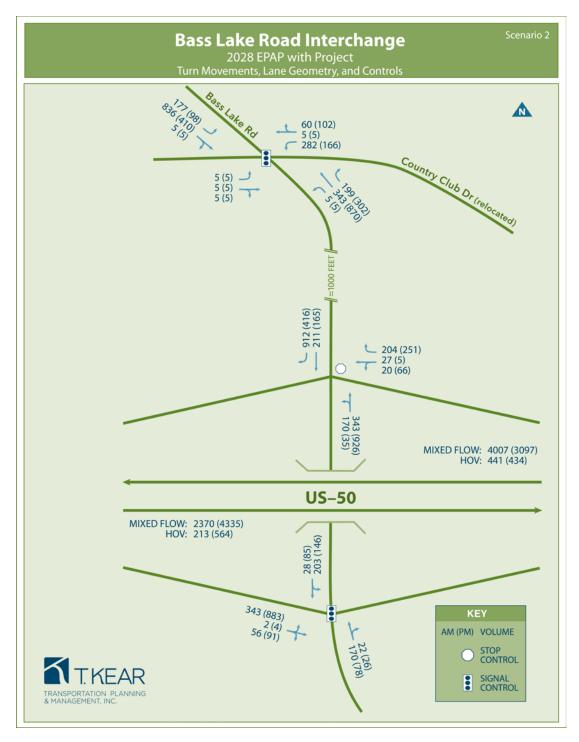


Figure 8. 2028 Volumes, Lane, and Controls with Bass Lake Hills Development – Existing Roadway and Intersections Geometry, Signals at Intersection 3 and 5

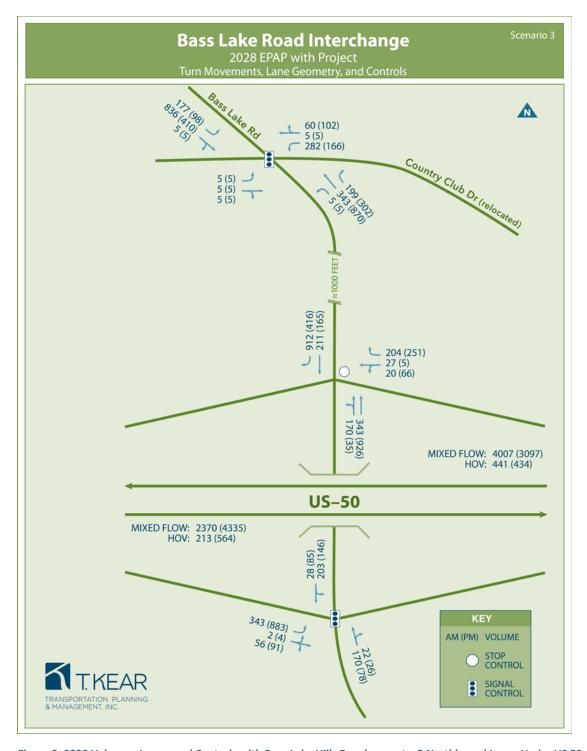


Figure 9. 2028 Volumes, Lanes, and Controls with Bass Lake Hills Development – 2 Northbound Lanes Under US 50 and Signals at Intersection 3 and 5

### 5.2: Intersection Level-of-Service and Queuing

Following the same process used for the without project scenario, SimTraffic microsimulation was used to evaluate intersection and movement delay, and queueing, at the three study intersections. Ten simulations were prepared for both the AM and PM peak-hours. Average delays reported are the average from all tens runs, and 95% queues are the 95<sup>th</sup> percentile based on all ten runs.

Estimated delay and level-of-service are presented in **Table 7** for both with and without improvement scenarios. AM and PM peak-hour queues are presented in **Table 8**. Intersection #3 is not shown in **Table 7** - **Table 8**, but was considered when performing SimTraffic microsimulation. Without the interim improvements proposed to mitigate the BLHSP Phase 1a development, both ramp intersections will operate at level-of-service F and queuing on the westbound off-ramp and eastbound off-ramp during the afternoon is estimated to extend onto US 50 mainline. The eastbound ramp intersection continues to meet the peak-hour signal warrant 12. SimTraffic results are attached for reference.

 $<sup>^{12}</sup>$  The Peak-Hour Signal Warrant (Warrant 3) was evaluated within the TIA for 2014, 2019, and 2035 conditions with and without the project.

Table 7. 2028 Intersection Delay and Level-of-Service with and without Interchange Improvements (Scenario 1) and with BLHSP Development

<u>2028 AM</u> <u>2028 PM</u>								
Intersection Delay (sec) LOS Delay (sec) LOS								
No Interchange Improvements, No BLHSP Phase 1a Development								
Existing roadway geometry, existing intersection geometry, and existing intersection controls.								
4. Bass Lake Rd. & US 50 WB Ramps* 2.7(13.0) A(B) 140.8(1197.3) F								
5. Bass Lake Rd. & US 50 EB Ramps	14.2	В	158.5	F				
Scenario 1								
Existing roadway geometry, existing intersection geometry, and existing intersection controls.								
4. Bass Lake Rd. & US 50 WB Ramps* 3.8(30.2) A(D) 144.7(1241.8) F(F)								
5. Bass Lake Rd. & US 50 EB Ramps 33.0 D 164.7 F								
Scenario 2								
Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Drive								
intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with existing								
geometry								
4. Bass Lake Rd. & US 50 WB Ramps* 2.1(10.0) A(A) 2.0(31.2) A(D)								
4. Bass Lake Rd. & US 50 WB Ramps*	2.1(10.0)	A(A)	2.0(31.2)	A(D)				
4. Bass Lake Rd. & US 50 WB Ramps* 5. Bass Lake Rd. & US 50 EB Ramps	2.1(10.0) 17.5	A(A) B	2.0(31.2) 21.7	A(D)				
			` '					
	17.5 Scenario 3	В	21.7	С				
5. Bass Lake Rd. & US 50 EB Ramps	17.5 Scenario 3 northbound travel land	B es from the	21.7 e eastbound US 50 o	C				
5. Bass Lake Rd. & US 50 EB Ramps  Restriping Bass Lake Road to provide two	17.5 Scenario 3 northbound travel land offramp, relocation a	B es from the	21.7 e eastbound US 50 o ation of the Bass Lak	C fframp ke				
5. Bass Lake Rd. & US 50 EB Ramps  Restriping Bass Lake Road to provide two to just north of the US 50 westbound	17.5  Scenario 3  northbound travel land offramp, relocation a ignalization of the Bass	B es from the nd signalize s Lake Road	21.7 e eastbound US 50 o ation of the Bass Lal d/US 50 eastbound i	C fframp ke ramp				
5. Bass Lake Rd. & US 50 EB Ramps  Restriping Bass Lake Road to provide two to just north of the US 50 westbound Road/Country Club Drive intersection, s	17.5  Scenario 3  northbound travel land offramp, relocation a ignalization of the Bass	B es from the nd signalize s Lake Road	21.7 e eastbound US 50 o ation of the Bass Lal d/US 50 eastbound i	C fframp ke ramp				

Table 8. 2028 95% Queues, With and Without BLHSP Phase 1a Project Traffic

Study Intersection	Approach	2028 AM (feet)	2028 PM (feet)			
No BLHSP Phase 1a Development						
Existing roadway geometry, existing intersection geometry, and existing intersection controls.						
#4 US 50 WB Ramps	WB Left-Thru-Right	133	1447			
Scenario 1	NB Left-Thru	72	44			
#5 US 50 EB Ramps	EB Left-Thru-Right	224	1088			
Scenario 1	SB Left-Thru	55	35			
	Scen	ario 1				
Existing roadway g	geometry, existing intersection	on geometry, and existing in	tersection controls.			
#4 US 50 WB Ramps	WB Left-Thru-Right	235	1397			
Scenario 1	NB Left-Thru	80	34			
#5 US 50 EB Ramps	EB Left-Thru-Right	375	949			
Scenario 1	SB Left-Thru	61	35			
Scenario 2						
Existing roadway geometry, relocation and signalization of the Bass Lake Road/Country Club Drive						
intersection, signalization	of the Bass Lake Road/US 5	0 eastbound ramp intersecti	on with existing geometry			
#4 US 50 WB Ramps –	WB Left-Thru-Right	56	190			
Scenario 2	NB Left-Thru	90	151			
#5 US 50 EB Ramps –	EB Left-Thru-Right	257	599			
Scenario 2	SB Left-Thru	199	232			
Scenario 3						
Restriping Bass Lake Road to provide two northbound travel lanes from the eastbound US 50 offramp to just						
north of the US 50 westbo	und offramp, relocation and	signalization of the Bass Lak	te Road/Country Club Drive			
intersection, signalization of the Bass Lake Road/US 50 eastbound ramp intersection with a double eastbound						
	left turn (requiring a 240'	eastbound left turn pocket)				
#4 US 50 WB Ramps –	WB Left-Thru-Right	60	146			
Scenario 3	NB Left-Thru	113	125			
#5 US 50 EB Ramps –	EB Left	182	258			
Scenario 3	SB Left-Thru	177	188			

### 6.0: Freeway Analysis

#### 6.1 Data

New traffic counts from the US 50 mainline were used in analysis of Existing 2017 condition. Counts were collected in January 2017, midweek, after schools had started for the year. To forecast Ten-Year 2028 US 50 mainline volumes, those counts were coupled with growth forecasts from the El Dorado County Travel Demand Model. Total flow in each direction was documented along with peak hour-factors, truck percentages, truck passenger car equivalencies, and HOV lane volumes. Traffic forecasts for US 50 were also based on data from the PeMS system. Forecasts based on the observed counts are lower than those that were based on the PeMS loop data. However, the loop data on US 50 in the study area is not considered reliable.

### 6.2: Existing 2017 Level-of-Service

Merge, diverge, and basic segments bounding the Bass Lake Road interchange were analyzed using Highway Capacity Manual (HCM) 2010 methods within the HCS software program. The levelof-service analysis for these segments considered the existing and potential impacts of upstream/downstream queuing at nearby intersections. Results are shown in Table 9 for westbound US 50 and Table 10 for eastbound US 50.

Most study segments are anticipated to operate acceptably at level-of-service D or better during AM peak-hours and PM peak-hours except the EB off-ramp, which is estimated to operate at level of service E. HCS calculation sheets are provided in the attachments for reference. The interchange improvements (Scenario 2 and 3) will improve the estimated level-of service on these segments to level-of-service D.

Table 9. Existing 2017 Westbound US 50 Segment Density and Level-of-Service without and with BLHSP Development

					Existing 2	2017 + BL	HSP
		Exis	ting 2017	7	Ph	iase 1a	
Study Segment	Analysis	Density	Speed	LOS	Density	Speed	LOS
Westbound US 50 Level-of-Service (AM)							
Bass Lake Rd to Silva Valley Pkwy	Basic	30.4	63.7	D	31.3	63.1	D
Bass Lake Rd On-Ramp	Merge	31.7	56.6	D	32.2	56.1	D
Bass Lake Rd Off-Ramp to On-Ramp	Basic	23.4	68.2	С	23.4	68.2	С
Bass Lake Rd Off-Ramp	Diverge	27.6	57.8	С	27.8	57.7	С
Cambridge Rd to Bass Lake Rd	Basic	23.4	68.2	С	23.6	68.1	С
Westbound US 50 Level-of-Service (PM)							
Bass Lake Rd to Silva Valley Pkwy	Basic	16.3	70.0	В	16.6	70.0	В
Bass Lake Rd On-Ramp	Merge	19.2	61.3	В	19.5	61.2	В
Bass Lake Rd Off-Ramp to On-Ramp	Basic	14.6	70.0	В	14.6	70.0	В
Bass Lake Rd Off-Ramp	Diverge	18.3	57.7	В	18.7	57.5	В
Cambridge Rd to Bass Lake Rd	Basic	15.1	70.0	В	15.5	70.0	В

Table 10. Existing 2017 Eastbound US 50 Segment Density and Level-of-Service without and with BLHSP Development

		Existing 2017			Existing 2017 + BLHSP Phase 1a					
Study Segment	Analysis	Density Speed LOS			Density	Speed	LOS			
Eastbound US 50 Level-of-Service (AM)										
Silva Valley Pkwy to Bass Lake Rd	Basic	13.0	70.0	В	13.2	70.0	В			
Bass Lake Rd Off-Ramp	Diverge	15.8	57.4	В	16.0	57.3	В			
Bass Lake Rd Off-Ramp to On-Ramp	Basic	11.7	70.0	В	11.7	70.0	В			
Bass Lake Rd On-Ramp	Merge	14.4	61.8	В	14.8	61.7	В			
Bass Lake Rd to Cambridge Rd	Basic	12.1	70.0	В	12.4	70.0	В			
Eastbound US 50 Level-of-Service (PM)										
Silva Valley Pkwy to Bass Lake Rd	Basic	31.5	62.9	D	32.5	62.2	D			
Bass Lake Rd Off-Ramp	Diverge	34.7	56.1	D	35.4	55.9	Е			
Bass Lake Rd Off-Ramp to On-Ramp	Basic	24.8	67.4	С	24.8	67.4	С			
Bass Lake Rd On-Ramp	Merge	27.4	59.2	С	27.6	59.1	С			
Bass Lake Rd to Cambridge Rd	Basic	24.6	67.5	С	24.9	67.4	С			

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### 6.3: Ten-Year 2028 Level-of-Service

Merge, diverge, and basic segments bounding the Bass Lake Road interchange were analyzed using Highway Capacity Manual (HCM) 2010 methods within the HCS software program. The levelof-service analysis for these segments considered the existing and potential impacts of upstream/downstream queuing at nearby intersections. Results are shown in Table 11 for westbound US 50 and Table 12 for eastbound US 50.

Most study segments are anticipated to operate acceptably, at level-of-service D or better, except two WB segments during AM peak-hours and two EB segments during PM peak-hours. HCS calculation sheets are provided in the attachments for reference. The interchange improvements (Scenario 2 and 3) will improve the estimated level-of service on these segments to level-ofservice D or better.

Table 11. Ten-Year 2028 Westbound US 50 Segment Density and Level-of-Service without and with BLHSP Development

					Ten-Year 2028 + BLHSP				
		Ten-Year 2028			Phase 1a				
Study Segment	Analysis	Density	Speed	LOS	Density	Speed	LOS		
Westbound US 50 Level-of-Service (AM)									
Bass Lake Rd to Silva Valley Pkwy	Basic	41.4	55.7	Е	42.8	54.8	Е		
Bass Lake Rd On-Ramp	Merge	37.5	50.0	Ε	38.0	49.0	F		
Bass Lake Rd Off-Ramp to On-Ramp	Basic	28.1	65.3	D	28.1	65.3	D		
Bass Lake Rd Off-Ramp	Diverge	32.9	57.4	D	33.1	57.4	D		
Cambridge Rd to Bass Lake Rd	Basic	29.6	64.3	D	29.7	64.2	D		
Westbound US 50 Level-of-Service (PM)									
Bass Lake Rd to Silva Valley Pkwy	Basic	21.3	69.2	С	21.6	69.0	С		
Bass Lake Rd On-Ramp	Merge	24.4	60.2	С	24.7	60.1	С		
Bass Lake Rd Off-Ramp to On-Ramp	Basic	19.7	69.7	С	19.7	69.7	С		
Bass Lake Rd Off-Ramp	Diverge	24.4	57.3	С	24.8	57.2	С		
Cambridge Rd to Bass Lake Rd	Basic	20.3	69.5	С	20.7	69.4	С		

Table 12. Ten-Year 2028 Eastbound US 50 Segment Density and Level-of-Service without and with BLHSP Development

		Ten-Year 2028 + BLF					LHSP		
		Ten-Year 2028			Phase 1a				
Study Segment	Analysis	Density	Speed	LOS	Density	Speed	LOS		
Eastbound US 50 Level-of-Service (AM)									
Silva Valley Pkwy to Bass Lake Rd	Basic	17.4	70.0	В	17.6	70.0	В		
Bass Lake Rd Off-Ramp	Diverge	21.2	57.0	С	21.4	56.9	С		
Bass Lake Rd Off-Ramp to On-Ramp	Basic	15.2	70.0	В	15.2	70.0	В		
Bass Lake Rd On-Ramp	Merge	18.8	61.3	В	19.2	61.3	В		
Bass Lake Rd to Cambridge Rd	Basic	16.1	70.0	В	16.4	70.0	В		
<u>Eastb</u>	ound US 50 Leve	l-of-Service	e (PM)						
Silva Valley Pkwy to Bass Lake Rd	Basic	44.5	53.7	Е	46.2	52.5	F		
Bass Lake Rd Off-Ramp	Diverge	41.8	55.6	F	42.5	55.4	F		
Bass Lake Rd Off-Ramp to On-Ramp	Basic	31.8	62.7	D	31.8	62.7	D		
Bass Lake Rd On-Ramp	Merge	32.9	55.9	D	33.1	55.7	D		
Bass Lake Rd to Cambridge Rd	Basic	32.3	62.3	D	32.7	62.0	D		

## 7.0: Findings

Without improvements at the Bass Lake Road interchange, the interchange will have deficient traffic operations by 2028 during the PM peak-hour. The proposed "Scenario 2" improvements resolve interchange level-of-service and queueing issues for the next ten years (through 2028). The proposed improvements consist:

- Relocation and signalization of the Bass Lake Road/Country Club Drive intersection (located outside of Caltrans' right-of-way).
- Signalization of Bass Lake Road/US 50 eastbound ramp intersection with existing geometry.

Only a portion of these improvements are located within the Caltrans' right-of-way.

#### 7.1: Intersection Level-of-Service

The following deficiencies are anticipated to occur with or without construction of any homes in the BLHSP area.

- The Bass Lake Road/US 50 WB ramp intersection is expected to operate at level-of-service
- The Bass Lake Road/US 50 EB ramp is expected to operate at level-of-service F.
- Queues on the Eastbound and Westbound offramps are expected to spill back onto the US 50 mainline.

With signalization of the Bass Lake Road/US 50 eastbound ramp intersection and relocation of the Bass Lake Road/Country Club Drive intersection, both intersections making up the Bass Lake Road interchange would operate at level-of-service D or better under existing 2017 and ten-year 2028 conditions.

#### 7.2: Queueing

Without interchange improvements both the Eastbound and Westbound offramp queues are anticipated to extend onto the US 50 mainline by 2028 regardless of development within the BLHSP area.

- Existing 2017: Without the BLHSP Phase 1a development and the proposed interim improvements, 95th percentile queues on the EB off-ramp and WB off-ramp are anticipated to extend almost to the gore point during the afternoon.
- Existing 2017+BLHSP Phase 1a: Without the interim improvements, 95<sup>th</sup> percentile queues on the EB off-ramp are anticipated to extend to the gore point during the afternoon, whereas queues on the WB off-ramp are anticipated to extend onto US 50 mainline.

- Ten-Year 2028: Without the BLHSP Phase 1a development and the proposed interim improvements, the EB off-ramp and WB off-ramp queues are anticipated to extend onto US 50 mainline during PM peak-hour.
- Ten-Year 2028+BLHSP Phase 1a: Without the interim improvements, queuing on the westbound off-ramp and eastbound off-ramp during the afternoon is estimated to extend onto US 50 mainline.

With the proposed interchange improvements, the 95<sup>th</sup> percentile eastbound offramp queue is anticipated to be reduced from about 1,090 feet to 600' feet, and the westbound offramp queue reduced from about 1,450 feet to 190 feet, ramp queues will be reduced under both the existing 2017 and ten-year 2028 conditions.

#### 7.3: US 50 Mainline

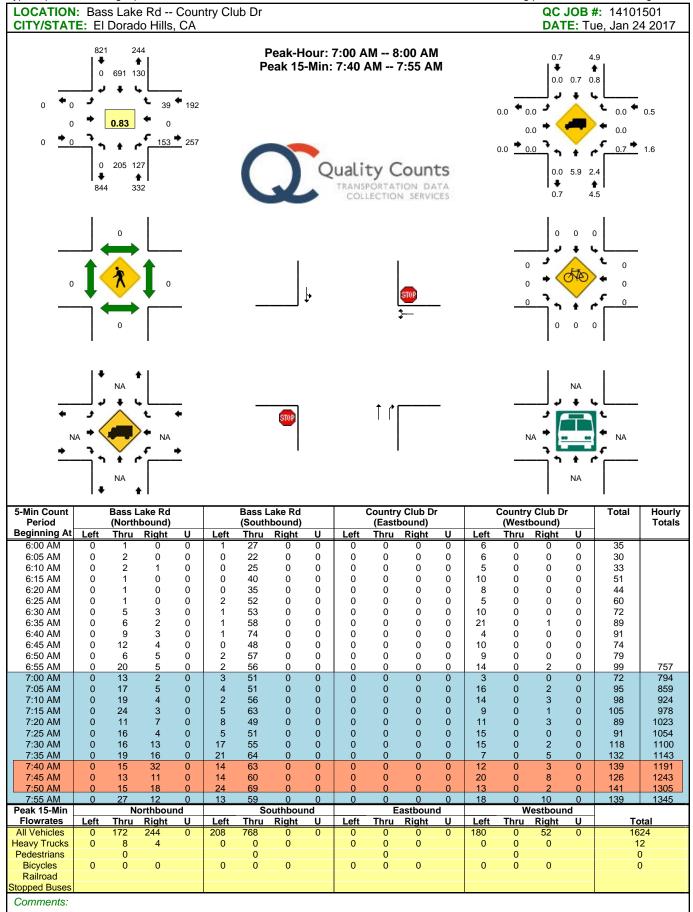
US 50 mainline level-of-service is anticipated to degrade to level-of-service F in the westbound direction during the AM peak hour and in the eastbound direction during the PM peak hour (based on a new January 2017 traffic count and ten-years of growth estimated from the travel demand model). Auxiliary lanes are not required by the BLHSP Phase 1a project conditions of approval, however the planned auxiliary lanes between Bass Lake Road and Silva Valley Parkway should be considered for inclusion in the Ten-Year Capital Improvement Program.

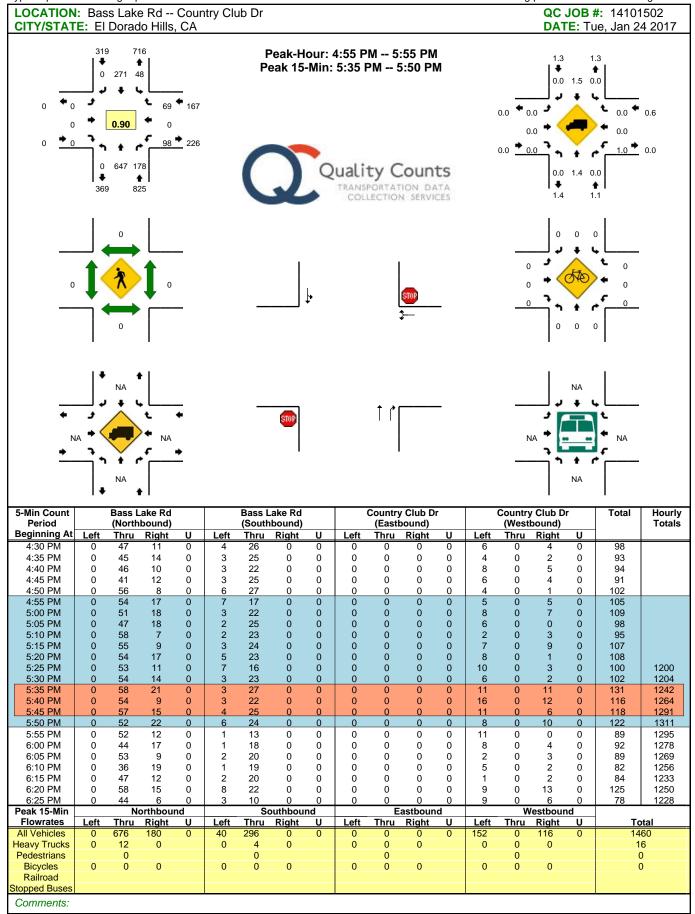
This US 50 mainline finding should not affect encroachment permits for signalization of the Bass Lake Road/EB ramp intersection because auxiliary lanes would not conflict with, or geographically overlap with, the proposed interchange improvements addressed by this analysis.

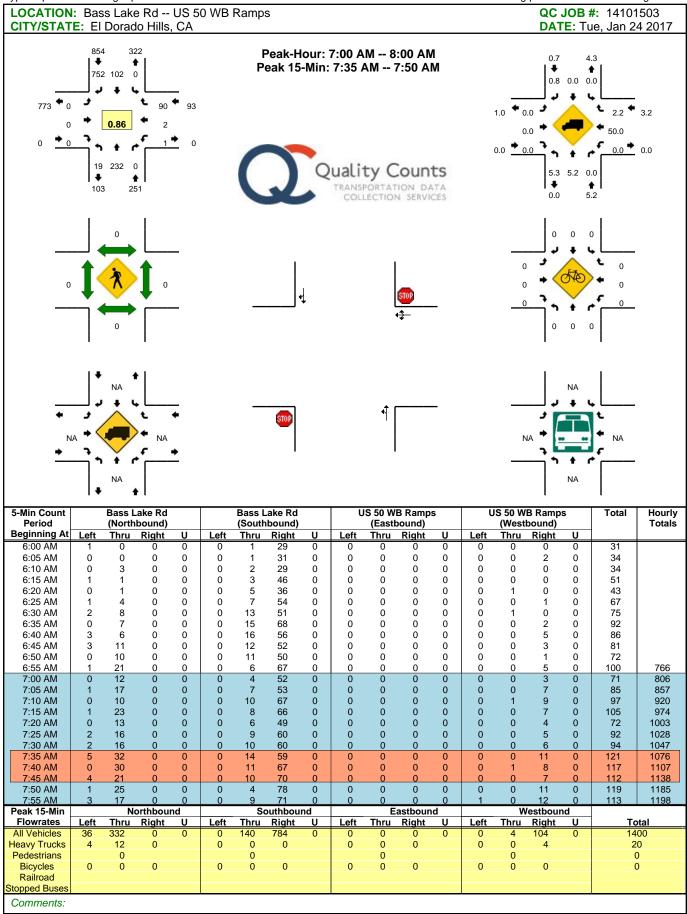
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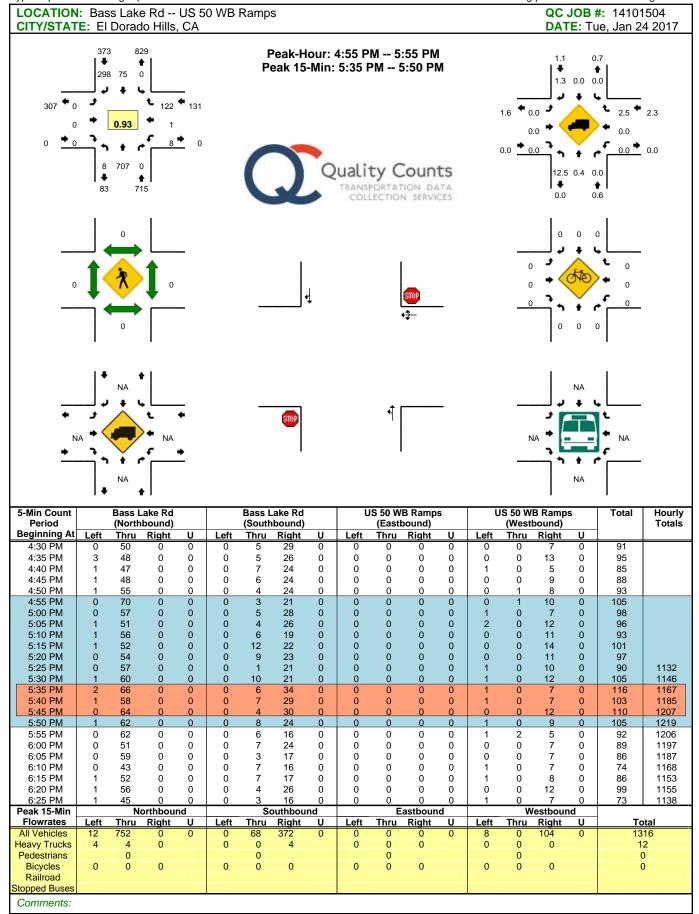


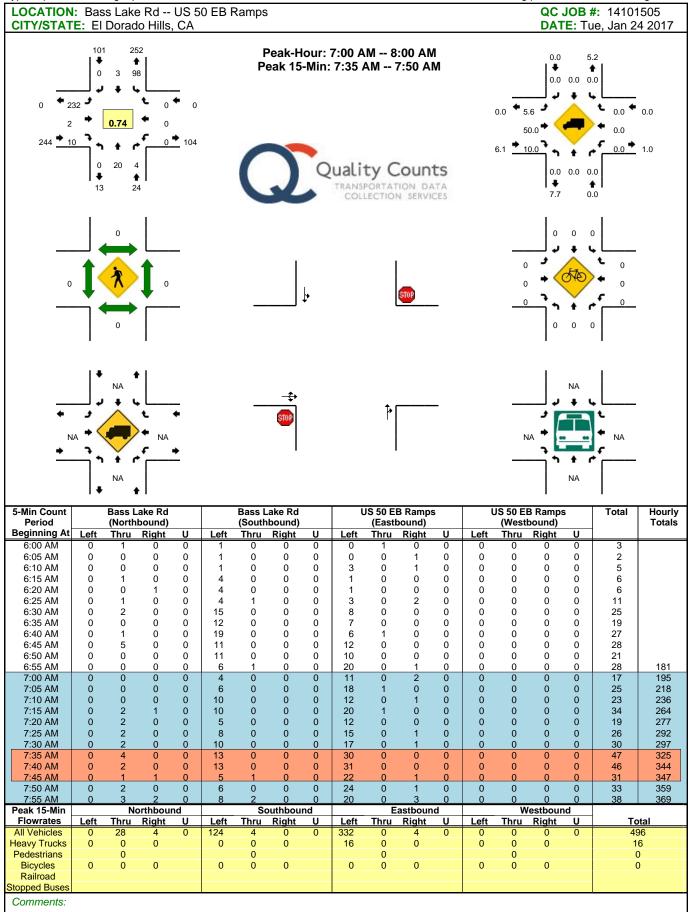
# Appendix A: Traffic Counts

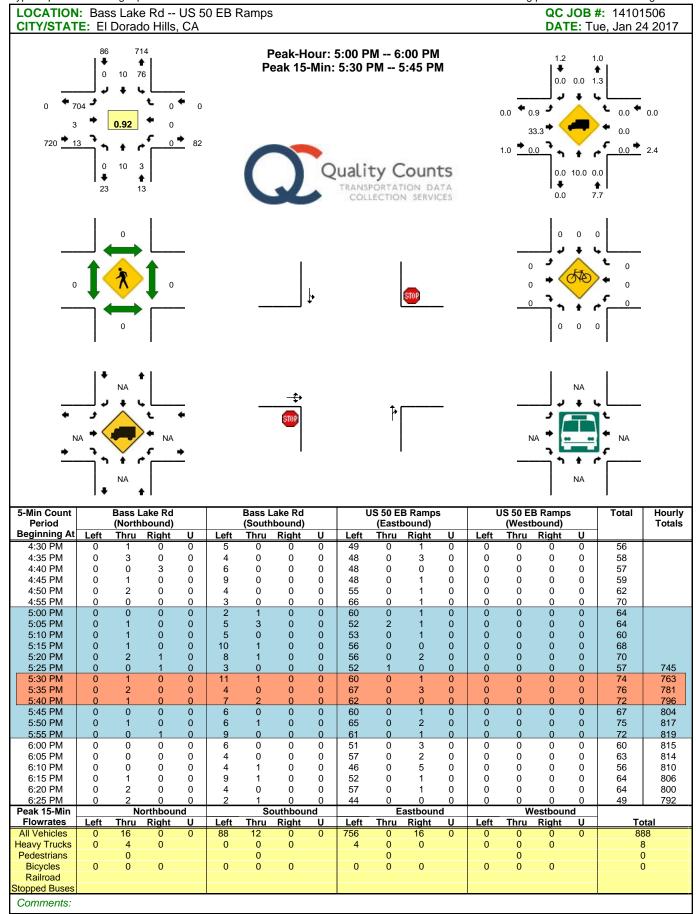














Location: SR 50 (Lincoln Hwy) - EB/WB - East of Marble Valley Rd

Site Code: 14280501 Date: 4/25/2017

		Westbound	
	Mixed Flow		
Time	Lanes	HOV Lane	Total
6:00 AM	153	15	168
6:05 AM	157	14	171
6:10 AM	175	7	182
6:15 AM	197	23	220
6:20 AM	197	29	226
6:25 AM	236	22	258
6:30 AM	235	29	264
6:35 AM	255	28	283
6:40 AM	254	36	290
6:45 AM	242	21	263
6:50 AM	242	22	264
6:55 AM	230	29	259
7:00 AM	238	20	258
7:05 AM	237	28	265
7:10 AM	257	31	288
7:15 AM	229	30	259
7:20 AM	238	29	267
7:25 AM	252	32	284
7:30 AM	252	43	295
7:35 AM	271	38	309
7:40 AM	245	33	278
7:45 AM	280	31	311
7:50 AM	243	31	274
7:55 AM	256	22	278
8:00 AM	258	30	288
8:05 AM	192	28	220
8:10 AM	236	34	270
8:15 AM	230	27	257
8:20 AM	200	25	225
8:25 AM	206	25	231
8:30 AM	220	30	250
8:35 AM	222	21	243
8:40 AM	204	29	233
8:45 AM	204	34	238
8:50 AM	185	24	209
8:55 AM	164	19	183
Total	8092	969	9061

		Eastbound	
	Mixed Flow		
Time	Lanes	HOV Lane	Total
6:00 AM	50	4	54
6:05 AM	44	1	45
6:10 AM	52	5	57
6:15 AM	52	3	55
6:20 AM	70	4	74
6:25 AM	71	2	73
6:30 AM	81	3	84
6:35 AM	105	11	116
6:40 AM	94	4	98
6:45 AM	91	8	99
6:50 AM	119	9	128
6:55 AM	77	6	83
7:00 AM	94	5	99
7:05 AM	101	10	111
7:10 AM	77	7	84
7:15 AM	114	10	124
7:20 AM	121	13	134
7:25 AM	137	14	151
7:30 AM	131	10	141
7:35 AM	150	15	165
7:40 AM	150	18	168
7:45 AM	165	14	179
7:50 AM	150	13	163
7:55 AM	124	10	134
8:00 AM	121	18	139
8:05 AM	94	12	106
8:10 AM	136	14	150
8:15 AM	116	12	128
8:20 AM	114	12	126
8:25 AM	114	10	124
8:30 AM	126	9	135
8:35 AM	106	8	114
8:40 AM	148	23	171
8:45 AM	150	6	156
8:50 AM	136	15	151
8:55 AM	139	10	149
Total	3920	348	4268

	Westbound	
Mixed Flow	VVCStSOund	
Lanes	HOV Lane	Total
2573	275	2848
2658	280	2938
2738	294	3032
2820	318	3138
2852	325	3177
2893	325	3218
2909	335	3244
2926	349	3275
2942	359	3301
2933	356	3289
2971	366	3337
2972	375	3347
2998	368	3366
3018	378	3396
2973	378	3351
2952	381	3333
2953	378	3331
2915	374	3289
2869	367	3236
2837	354	3191
2788	337	3125
2747	333	3080
2671	336	3007
2613	329	2942
2521	326	2847

	Eastbound	
Mixed Flow		
Lanes	HOV Lane	Total
906	60	966
950	61	1011
1007	70	1077
1032	72	1104
1094	79	1173
1145	88	1233
1211	100	1311
1261	107	1368
1306	111	1417
1362	125	1487
1436	131	1567
1467	135	1602
1514	139	1653
1541	152	1693
1534	154	1688
1593	161	1754
1595	163	1758
1588	162	1750
1565	158	1723
1560	157	1717
1516	150	1666
1514	155	1669
1499	147	1646
1485	149	1634
1500	149	1649



Location: SR 50 (Lincoln Hwy) - EB/WB - East of Marble Valley Rd

Site Code: 14280502 Date: 4/25/2017

		Westbound	
	Mixed Flow		
Time	Lanes	HOV Lane	Total
3:00 PM	162	25	187
3:05 PM	162	32	194
3:10 PM	182	31	213
3:15 PM	189	22	211
3:20 PM	183	30	213
3:25 PM	170	33	203
3:30 PM	165	23	188
3:35 PM	172	24	196
3:40 PM	154	27	181
3:45 PM	150	31	181
3:50 PM	147	26	173
3:55 PM	166	27	193
4:00 PM	150	18	168
4:05 PM	149	25	174
4:10 PM	163	35	198
4:15 PM	182	28	210
4:20 PM	172	26	198
4:25 PM	171	18	189
4:30 PM	154	20	174
4:35 PM	141	14	155
4:40 PM	162	23	185
4:45 PM	158	18	176
4:50 PM	135	18	153
4:55 PM	154	18	172
5:00 PM	151	19	170
5:05 PM	171	18	189
5:10 PM	189	25	214
5:15 PM	233	25	258
5:20 PM	179	24	203
5:25 PM	170	27	197
5:30 PM	165	27	192
5:35 PM	156	21	177
5:40 PM	175	28	203
5:45 PM	152	19	171
5:50 PM	137	22	159
5:55 PM	144	22	166
Total	5915	869	6784

		Eastbound	
	Mixed Flow		
Time	Lanes	HOV Lane	Total
3:00 PM	188	31	219
3:05 PM	216	46	262
3:10 PM	183	38	221
3:15 PM	220	40	260
3:20 PM	254	44	298
3:25 PM	219	29	248
3:30 PM	238	44	282
3:35 PM	244	39	283
3:40 PM	222	47	269
3:45 PM	269	57	326
3:50 PM	264	54	318
3:55 PM	220	32	252
4:00 PM	238	32	270
4:05 PM	247	35	282
4:10 PM	257	44	301
4:15 PM	279	36	315
4:20 PM	281	38	319
4:25 PM	239	33	272
4:30 PM	254	49	303
4:35 PM	257	45	302
4:40 PM	264	48	312
4:45 PM	274	32	306
4:50 PM	266	36	302
4:55 PM	266	40	306
5:00 PM	251	44	295
5:05 PM	243	38	281
5:10 PM	246	35	281
5:15 PM	258	45	303
5:20 PM	263	31	294
5:25 PM	262	40	302
5:30 PM	230	51	281
5:35 PM	208	42	250
5:40 PM	233	39	272
5:45 PM	229	43	272
5:50 PM	198	34	232
5:55 PM	221	34	255
Total	8701	1445	10146

	Westbound	
Mixed Flow		
Lanes	HOV Lane	Total
2002	331	2333
1990	324	2314
1977	317	2294
1958	321	2279
1951	327	2278
1940	323	2263
1941	308	2249
1930	305	2235
1899	295	2194
1907	291	2198
1915	278	2193
1903	270	2173
1891	261	2152
1892	262	2154
1914	255	2169
1940	245	2185
1991	242	2233
1998	240	2238
1997	249	2246
2008	256	2264
2023	263	2286
2036	268	2304
2030	269	2299
2032	273	2305
2022	277	2299

	Eastbound	
Mixed Flow		
Lanes	HOV Lane	Total
2737	501	3238
2787	502	3289
2818	491	3309
2892	497	3389
2951	493	3444
2978	487	3465
2998	491	3489
3014	496	3510
3027	502	3529
3069	503	3572
3074	478	3552
3076	460	3536
3122	468	3590
3135	480	3615
3131	483	3614
3120	474	3594
3099	483	3582
3081	476	3557
3104	483	3587
3080	485	3565
3031	482	3513
3000	473	3473
2955	484	3439
2887	482	3369
2842	476	3318

# Appendix B: SimTraffic Results

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)		0.1	0.1	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	0.0	0.0	0.1	0.0	0.1	0.0	1.0	1.1	
Total Del/Veh (s)		9.7	2.2	2.6	0.9	0.7	4.5	3.2	
Stop Del/Veh (s)		5.4	0.0	0.5	0.3	0.1	0.2	0.2	
Denied Entry Before	0	0	0	0	0	0	0	0	

### 5: Bass Lake Road & eastbound ramp Performance by movement

Movement	EBL	EBT	EBR	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)	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.2	
Total Delay (hr)	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.6	
Total Del/Veh (s)	7.0	7.2	5.1	0.3	0.0	2.0	0.5	5.1	
Stop Del/Veh (s)	4.0	3.2	3.4	0.0	0.0	0.1	0.0	2.7	
Denied Entry Before	0	0	0	0	0	0	0	0	

### **Total Zone Performance**

Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.2
Total Delay (hr)	1.7
Total Del/Veh (s)	209.9
Stop Del/Veh (s)	46.3
Denied Entry Before	0

### Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	SB
Directions Served	LTR	LT	R
Maximum Queue (ft)	21	29	42
Average Queue (ft)	1	2	2
95th Queue (ft)	12	15	32
Link Distance (ft)	1263	284	244
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

#### Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	SB
Directions Served	LTR	LT
Maximum Queue (ft)	117	36
Average Queue (ft)	54	4
95th Queue (ft)	90	21
Link Distance (ft)	900	284
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Zone Summary

Zone wide Queuing Penalty: 0

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	1.0	0.1	10.2	0.0	0.2	0.0	0.3	11.8	
Total Del/Veh (s)	376.5	266.0	284.1	2.5	1.1	8.0	3.5	34.5	
Stop Del/Veh (s)	376.0	264.6	283.5	0.5	0.4	0.2	0.2	33.2	
Denied Entry Before	0	0	0	0	0	0	0	0	

### 5: Bass Lake Road & eastbound ramp Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBL	SBT	All	
Denied Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
Denied Del/Veh (s)	0.6	0.6	0.6	0.1	0.1	0.0	0.0	0.6	
Total Delay (hr)	4.3	0.0	0.1	0.0	0.0	0.0	0.0	4.4	
Total Del/Veh (s)	21.4	27.0	20.8	0.6	0.0	2.1	0.9	19.0	
Stop Del/Veh (s)	17.8	21.6	18.9	0.0	0.0	0.3	0.4	15.7	
Denied Entry Before	0	0	0	0	0	0	0	0	

### **Total Zone Performance**

Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.5
Total Delay (hr)	16.2
Total Del/Veh (s)	1425.9
Stop Del/Veh (s)	1318.7
Denied Entry Before	0

### Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB
Directions Served	LTR	LT
Maximum Queue (ft)	777	34
Average Queue (ft)	362	2
95th Queue (ft)	820	17
Link Distance (ft)	1263	284
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	SB
Directions Served	LTR	LT
Maximum Queue (ft)	491	29
Average Queue (ft)	194	1
95th Queue (ft)	401	13
Link Distance (ft)	900	284
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Zone Summary

Zone wide Queuing Penalty: 0

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.0	0.1	0.0	0.1	0.0	1.0	1.2
Total Del/Veh (s)	5.6	8.0	2.2	2.7	0.9	8.0	4.7	3.3
Stop Del/Veh (s)	3.8	3.9	0.0	0.7	0.4	0.1	0.2	0.2
Denied Entry Before	0	0	0	0	0	0	0	0

# 5: Bass Lake Road & eastbound ramp Performance by movement

Movement	EBL	EBT	EBR	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)	0.3	0.3	0.2	0.1	0.1	0.0	0.0	0.2	
Total Delay (hr)	0.6	0.0	0.0	0.0	0.0	0.1	0.0	0.7	
Total Del/Veh (s)	7.7	9.3	5.1	0.3	0.0	2.0	0.6	5.4	
Stop Del/Veh (s)	4.6	4.6	3.5	0.0	0.0	0.1	0.0	2.9	
Denied Entry Before	0	0	0	0	0	0	0	0	

### **Total Zone Performance**

Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.3
Total Delay (hr)	1.9
Total Del/Veh (s)	222.8
Stop Del/Veh (s)	53.7
Denied Entry Before	0

### 2017 AM - Scenario 1: Without Improvements, With BLHSP Phase 1a Development

### Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	SB	SB
Directions Served	LTR	LT	T	R
Maximum Queue (ft)	30	36	8	46
Average Queue (ft)	3	3	0	2
95th Queue (ft)	16	17	8	29
Link Distance (ft)	1263	284	244	244
Upstream Blk Time (%)				
Queuing Penalty (veh)				

Storage Bay Dist (ft)

Storage Blk Time (%)

Queuing Penalty (veh)

#### Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	SB
Directions Served	LTR	LT
Maximum Queue (ft)	126	40
Average Queue (ft)	60	3
95th Queue (ft)	95	19
Link Distance (ft)	900	284
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Zone Summary

Zone wide Queuing Penalty: 0

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.7	
Total Del/Veh (s)	3.4	6.3	1.3	2.8	1.1	0.7	2.0	1.7	
Stop Del/Veh (s)	1.5	3.5	0.0	0.7	0.2	0.0	0.0	0.1	
Denied Entry Before	0	0	0	0	0	0	0	0	

# Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	SB
Directions Served	LTR	LT	R
Maximum Queue (ft)	27	39	16
Average Queue (ft)	2	3	1
95th Queue (ft)	15	21	17
Link Distance (ft)	1263	284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			200
Storage Blk Time (%)			
Queuing Penalty (veh)			

#### ·

# 5: Bass Lake Road & eastbound ramp Performance by approach

Approach	EB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.3	0.1	0.0	0.2
Total Delay (hr)	1.2	0.1	0.3	1.6
Total Del/Veh (s)	14.1	18.4	6.9	12.0
Stop Del/Veh (s)	10.5	15.6	5.6	9.2
Denied Entry Before	0	0	0	0

# 2017 AM - Scenario 2: Signalized EB Ramp with BLHSP Phase 1a Development

# Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	NB	SB
Directions Served	LTR	TR	LT
Maximum Queue (ft)	176	53	109
Average Queue (ft)	94	20	44
95th Queue (ft)	153	49	88
Link Distance (ft)	900	289	284
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

### 4: Bass Lake Road & westbound ramp Performance by movement

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)		0.2	0.2	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.7	8.0	
Total Del/Veh (s)		7.2	1.3	2.6	1.1	0.3	2.7	2.1	
Stop Del/Veh (s)		4.1	0.0	0.5	0.2	0.0	0.1	0.1	
Denied Entry Before	0	0	0	0	0	0	0	0	

# Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	SB
Directions Served	LTR	LT	R
Maximum Queue (ft)	30	45	111
Average Queue (ft)	3	3	6
95th Queue (ft)	19	24	64
Link Distance (ft)	1251	278	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			300
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

BLHSP Phase 1a Final Map

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SimTraffic Report

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# 5: Bass Lake Road & eastbound ramp Performance by approach

Approach	EB	NB	SB	All
Denied Delay (hr)	0.2	0.0	0.0	0.2
Denied Del/Veh (s)	1.9	0.1	0.0	1.2
Total Delay (hr)	0.9	0.1	0.4	1.4
Total Del/Veh (s)	10.8	11.3	9.9	10.5
Stop Del/Veh (s)	8.3	8.9	8.1	8.2
Denied Entry Before	0	0	0	0

# Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	EB	NB	SB
Directions Served	L	LTR	TR	LT
Maximum Queue (ft)	179	149	50	137
Average Queue (ft)	66	23	17	50
95th Queue (ft)	129	88	44	102
Link Distance (ft)		899	284	278
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	240			
Storage Blk Time (%)	0	0		
Queuing Penalty (veh)	0	0		

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Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	1.1	0.1	29.1	0.0	0.0	0.0	0.0	30.3	
Denied Del/Veh (s)	498.7		608.9	0.0	0.0	0.0	0.0	80.5	
Total Delay (hr)	2.7	0.2	44.5	0.0	0.3	0.0	0.3	47.9	
Total Del/Veh (s)	1912.6		1509.7	2.8	1.1	1.0	4.1	133.6	
Stop Del/Veh (s)	1921.9		1518.6	0.7	0.5	0.1	0.1	133.0	
Denied Entry Before	0	0	0	0	0	0	0	0	

### 5: Bass Lake Road & eastbound ramp Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBL	SBT	All	
Denied Delay (hr)	1.1	0.0	0.0	0.0	0.0	0.0	0.0	1.1	
Denied Del/Veh (s)	5.0	3.1	4.2	0.1	0.1	0.0	0.0	4.4	
Total Delay (hr)	12.5	0.0	0.2	0.0	0.0	0.0	0.0	12.8	
Total Del/Veh (s)	55.6	49.5	52.8	0.7	0.0	2.0	0.8	49.7	
Stop Del/Veh (s)	58.0	49.2	56.4	0.0	0.0	0.1	0.1	51.6	
Denied Entry Before	0	0	0	0	0	0	0	0	

### **Total Zone Performance**

Denied Delay (hr)	31.5
Denied Del/Veh (s)	110.8
Total Delay (hr)	60.7
Total Del/Veh (s)	2837.9
Stop Del/Veh (s)	2851.6
Denied Entry Before	0

# 2017 PM - Scenario 1: Without Improvements, With BLHSP Phase 1a Development

### Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	SB	SB
Directions Served	LTR	LT	T	R
Maximum Queue (ft)	1302	14	4	23
Average Queue (ft)	1147	1	0	1
95th Queue (ft)	1517	10	4	23
Link Distance (ft)	1263	284	244	244
Upstream Blk Time (%)	67			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

#### Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	SB
Directions Served	LTR	LT
Maximum Queue (ft)	849	18
Average Queue (ft)	449	1
95th Queue (ft)	897	11
Link Distance (ft)	900	284
Upstream Blk Time (%)	11	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Zone Summary

Zone wide Queuing Penalty: 0

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	0.0	0.0	0.1	0.0	0.3	0.0	0.1	0.6	
Total Del/Veh (s)	20.0	22.8	1.6	2.3	1.2	0.4	1.5	1.4	
Stop Del/Veh (s)	17.9	17.4	0.0	0.2	0.1	0.0	0.0	0.1	
Denied Entry Before	0	0	0	0	0	0	0	0	

# Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB
Directions Served	LTR	LT
Maximum Queue (ft)	34	11
Average Queue (ft)	7	0
95th Queue (ft)	29	7
Link Distance (ft)	1263	284
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

# 5: Bass Lake Road & eastbound ramp Performance by approach

Approach	EB	NB	SB	All
Denied Delay (hr)	0.2	0.0	0.0	0.2
Denied Del/Veh (s)	0.7	0.1	0.0	0.6
Total Delay (hr)	3.1	0.1	0.6	3.7
Total Del/Veh (s)	13.5	24.0	19.1	14.4
Stop Del/Veh (s)	6.9	21.6	17.0	8.3
Denied Entry Before	0	0	0	0

# Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	NB	SB
Directions Served	LTR	TR	LT
Maximum Queue (ft)	413	49	127
Average Queue (ft)	193	13	55
95th Queue (ft)	315	40	104
Link Distance (ft)	900	289	284
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

2017 PM - Scenario 3: 2 NB Lanes Under US 50, Signalized EB Ramp, With BLHSP Phase 2017 Development of the control of the cont

# 4: Bass Lake Road & westbound ramp Performance by movement

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	0.0	0.0	0.1	0.0	0.4	0.0	0.2	0.7	
Total Del/Veh (s)	12.4	9.4	1.6	2.7	1.8	0.2	1.6	1.6	
Stop Del/Veh (s)	10.1	6.7	0.0	0.2	0.1	0.0	0.0	0.1	
Denied Entry Before	0	0	0	0	0	0	0	0	

# 2017 PM - Scenario 3: 2 NB Lanes Under US 50, Signalized EB Ramp, With BLHSP Phase 2017 Development of the control of the cont

# Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	NB
Directions Served	LTR	LT	Т
Maximum Queue (ft)	30	74	32
Average Queue (ft)	7	3	0
95th Queue (ft)	28	30	6
Link Distance (ft)	1251	278	278
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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2017 PM - Scenario 3: 2 NB Lanes Under US 50, Signalized EB Ramp, With BLHSP Phase 2017 Development of the control of the cont

# 5: Bass Lake Road & eastbound ramp Performance by approach

Approach	EB	NB	SB	All
Denied Delay (hr)	0.5	0.0	0.0	0.5
Denied Del/Veh (s)	2.3	0.1	0.0	2.0
Total Delay (hr)	1.9	0.1	0.5	2.5
Total Del/Veh (s)	8.2	16.7	16.6	9.3
Stop Del/Veh (s)	4.2	14.4	14.5	5.6
Denied Entry Before	1	0	0	1

# Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	EB	NB	SB
Directions Served	L	LTR	TR	LT
Maximum Queue (ft)	262	230	39	118
Average Queue (ft)	119	46	10	51
95th Queue (ft)	205	146	35	93
Link Distance (ft)		899	284	278
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	240			
Storage Blk Time (%)	1	0		
Queuing Penalty (veh)	3	1		

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Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	0.1	0.1	0.3	0.2	0.2	0.1	1.8	2.7	
Total Del/Veh (s)	14.8	17.4	5.3	3.2	1.9	1.2	9.0	5.9	
Stop Del/Veh (s)	11.5	13.0	2.4	1.0	0.5	0.1	4.2	2.7	
Denied Entry Before	0	0	0	0	0	0	0	0	

### 5: Bass Lake Road & eastbound ramp Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBL	SBT	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
Denied Del/Veh (s)	0.3	0.7	0.3	0.2	0.2	0.0	0.0	0.2	
Total Delay (hr)	1.6	0.0	0.3	0.0	0.0	0.1	0.0	2.0	
Total Del/Veh (s)	17.0	18.1	14.3	0.6	0.2	3.1	1.4	9.3	
Stop Del/Veh (s)	14.2	13.0	12.8	0.0	0.0	1.1	0.2	7.4	
Denied Entry Before	0	0	0	0	0	0	0	0	

### **Total Zone Performance**

Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.3
Total Delay (hr)	4.8
Total Del/Veh (s)	388.7
Stop Del/Veh (s)	233.9
Denied Entry Before	0

### Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	SB	SB
Directions Served	LTR	LT	T	R
Maximum Queue (ft)	210	112	24	260
Average Queue (ft)	46	27	1	98
95th Queue (ft)	133	72	13	285
Link Distance (ft)	1263	284	246	246
Upstream Blk Time (%)				2
Queuing Penalty (veh)				10
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

#### Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	SB
Directions Served	LTR	LT
Maximum Queue (ft)	265	66
Average Queue (ft)	111	24
95th Queue (ft)	224	55
Link Distance (ft)	900	284
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Zone Summary

Zone wide Queuing Penalty: 10

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### 4: Bass Lake Road & westbound ramp Performance by movement

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	15.3	1.2	49.8	0.0	0.0	0.0	0.0	66.3	
Denied Del/Veh (s)	889.3	1070.2	871.0	0.0	0.0	0.0	0.0	167.6	
Total Delay (hr)	12.9	1.0	37.4	0.0	0.3	0.0	0.4	52.0	
Total Del/Veh (s)	1103.5	1181.2	1012.4	3.0	1.3	1.4	4.8	140.3	
Stop Del/Veh (s)	1120.3	1197.3	1028.1	0.9	0.5	0.0	0.2	140.8	
Denied Entry Before	0	0	0	0	0	0	0	0	

### 5: Bass Lake Road & eastbound ramp Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBL	SBT	All	
Denied Delay (hr)	69.0	0.4	8.0	0.0	0.0	0.0	0.0	77.4	
Denied Del/Veh (s)	300.6	352.6	302.8	0.1	0.1	0.0	0.0	240.1	
Total Delay (hr)	27.4	0.2	3.1	0.0	0.0	0.1	0.0	30.9	
Total Del/Veh (s)	138.8	136.2	136.6	0.8	0.1	3.0	1.8	107.4	
Stop Del/Veh (s)	158.5	154.3	157.8	0.0	0.0	1.0	0.7	122.5	
Denied Entry Before	4	0	1	0	0	0	0	5	

#### **Total Zone Performance**

Denied Delay (hr)	143.7
Denied Del/Veh (s)	397.3
Total Delay (hr)	82.8
Total Del/Veh (s)	2923.4
Stop Del/Veh (s)	3083.7
Denied Entry Before	5

Movement	WB	NB	SB	SB
Directions Served	LTR	LT	T	R
Maximum Queue (ft)	1301	77	10	42
Average Queue (ft)	1242	10	0	2
95th Queue (ft)	1447	44	9	34
Link Distance (ft)	1263	284	244	244
Upstream Blk Time (%)	90			0
Queuing Penalty (veh)	0			0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

# Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	SB
Directions Served	LTR	LT
Maximum Queue (ft)	957	50
Average Queue (ft)	899	9
95th Queue (ft)	1088	35
Link Distance (ft)	900	284
Upstream Blk Time (%)	93	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Zone Summary

Zone wide Queuing Penalty: 0

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### 4: Bass Lake Road & westbound ramp Performance by movement

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	0.2	0.2	0.8	0.2	0.2	0.1	1.7	3.3	
Total Del/Veh (s)	33.5	25.8	13.6	3.4	2.0	1.4	8.7	7.0	
Stop Del/Veh (s)	30.2	21.4	10.5	1.2	0.6	0.1	3.8	3.8	
Denied Entry Before	0	0	0	0	0	0	0	0	

### 5: Bass Lake Road & eastbound ramp Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBL	SBT	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
Denied Del/Veh (s)	0.4	0.6	0.4	0.2	0.2	0.0	0.0	0.3	
Total Delay (hr)	3.0	0.0	0.5	0.0	0.0	0.2	0.0	3.7	
Total Del/Veh (s)	29.6	37.0	25.3	0.7	0.2	3.4	1.9	15.7	
Stop Del/Veh (s)	27.6	33.0	24.7	0.0	0.0	1.2	0.3	14.2	
Denied Entry Before	0	0	0	0	0	0	0	0	

#### **Total Zone Performance**

Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.3
Total Delay (hr)	7.1
Total Del/Veh (s)	530.1
Stop Del/Veh (s)	388.2
Denied Entry Before	0

# 2028 AM - Scenario 1: Without Improvements, With BLHSP Phase 1a Development

### Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	SB	SB
Directions Served	LTR	LT	T	R
Maximum Queue (ft)	306	107	33	259
Average Queue (ft)	77	31	2	86
95th Queue (ft)	235	80	19	264
Link Distance (ft)	1263	284	246	246
Upstream Blk Time (%)				1
Queuing Penalty (veh)				9
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

#### Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	SB
Directions Served	LTR	LT
Maximum Queue (ft)	472	74
Average Queue (ft)	164	27
95th Queue (ft)	375	61
Link Distance (ft)	900	284
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Zone Summary

Zone wide Queuing Penalty: 9

### 4: Bass Lake Road & westbound ramp Performance by movement

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	0.1	0.1	0.2	0.2	0.4	8.0	5.5	7.3	
Total Del/Veh (s)	16.2	17.9	2.8	4.5	3.5	11.4	20.9	13.0	
Stop Del/Veh (s)	13.4	13.9	0.6	1.3	0.5	3.3	9.6	5.5	
Denied Entry Before	0	0	0	0	0	0	0	0	

Movement	WB	NB	SB	SB
Directions Served	LTR	LT	Т	R
Maximum Queue (ft)	169	152	800	300
Average Queue (ft)	41	48	178	136
95th Queue (ft)	108	114	660	364
Link Distance (ft)	1257	283	940	
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			2	
Storage Bay Dist (ft)				200
Storage Blk Time (%)				16
Queuing Penalty (veh)				35

# 5: Bass Lake Road & eastbound ramp Performance by approach

Approach	EB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.4	0.3	0.1	0.3
Total Delay (hr)	2.4	1.5	1.6	5.5
Total Del/Veh (s)	19.4	25.3	21.9	21.5
Stop Del/Veh (s)	14.5	20.9	19.0	17.3
Denied Entry Before	0	0	0	0

Movement	EB	NB	SB
Directions Served	LTR	TR	LT
Maximum Queue (ft)	310	213	230
Average Queue (ft)	163	99	109
95th Queue (ft)	262	172	190
Link Distance (ft)	899	289	283
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

2028 AM - Scenario 3: 2 NB Lanes Under US 50, Signalized EB Ramp, With BLHSP Phase 10 Developm

### 4: Bass Lake Road & westbound ramp Performance by movement

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	0.1	0.1	0.1	0.2	0.3	0.1	2.9	3.8	
Total Del/Veh (s)	12.8	14.1	1.9	4.4	2.9	1.9	10.8	6.8	
Stop Del/Veh (s)	10.3	10.2	0.0	1.2	0.5	0.7	6.7	3.7	
Denied Entry Before	0	0	0	0	0	0	0	0	

Movement	WB	NB	NB	SB	SB	B1
Directions Served	LTR	LT	T	T	R	Т
Maximum Queue (ft)	77	160	65	392	306	423
Average Queue (ft)	29	40	3	118	160	49
95th Queue (ft)	60	113	41	399	385	266
Link Distance (ft)	1251	278	278	306		576
Upstream Blk Time (%)		0	0	4	4	0
Queuing Penalty (veh)		0	0	47	0	2
Storage Bay Dist (ft)					300	
Storage Blk Time (%)				3	6	
Queuing Penalty (veh)				30	14	

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2028 AM - Scenario 3: 2 NB Lanes Under US 50, Signalized EB Ramp, With BLHSP Phase 10 Developm

# 5: Bass Lake Road & eastbound ramp Performance by approach

Approach	EB	NB	SB	All
Denied Delay (hr)	0.3	0.0	0.0	0.3
Denied Del/Veh (s)	2.1	0.3	0.2	1.1
Total Delay (hr)	1.6	1.0	1.4	4.0
Total Del/Veh (s)	13.2	18.0	19.2	15.9
Stop Del/Veh (s)	10.2	14.0	16.2	12.7
Denied Entry Before	0	0	0	0

# 2028 AM - Scenario 3: 2 NB Lanes Under US 50, Signalized EB Ramp, With BLHSP Phase 2018 Development

# Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	EB	NB	SB
Directions Served	L	LTR	TR	LT
Maximum Queue (ft)	226	207	200	217
Average Queue (ft)	102	49	78	98
95th Queue (ft)	182	140	149	177
Link Distance (ft)		899	284	278
Upstream Blk Time (%)			0	0
Queuing Penalty (veh)			0	0
Storage Bay Dist (ft)	240			
Storage Blk Time (%)	1	0		
Queuing Penalty (veh)	2	1		

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### 4: Bass Lake Road & westbound ramp Performance by movement

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	20.3	1.6	74.4	0.0	0.0	0.0	0.0	96.3	
Denied Del/Veh (s)	1107.6	1140.4	1088.7	0.0	0.0	0.0	0.0	235.0	
Total Delay (hr)	12.3	0.9	39.0	0.0	0.3	0.0	0.4	52.9	
Total Del/Veh (s)	1225.3	1138.4	1161.0	2.7	1.3	1.3	4.6	144.3	
Stop Del/Veh (s)	1241.8	1156.0	1176.7	0.7	0.5	0.1	0.3	144.7	
Denied Entry Before	1	0	1	0	0	0	0	2	

### 5: Bass Lake Road & eastbound ramp Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBL	SBT	All	
Denied Delay (hr)	133.0	0.5	13.4	0.0	0.0	0.0	0.0	146.9	
Denied Del/Veh (s)	517.0	416.2	493.5	0.2	0.2	0.0	0.0	416.0	
Total Delay (hr)	28.6	0.1	3.0	0.0	0.0	0.1	0.0	31.8	
Total Del/Veh (s)	143.7	141.9	140.6	0.8	0.1	2.9	1.7	110.3	
Stop Del/Veh (s)	164.7	160.6	162.7	0.0	0.0	8.0	0.6	126.1	
Denied Entry Before	21	0	4	0	0	0	0	25	

#### **Total Zone Performance**

Denied Delay (hr)	243.2
Denied Del/Veh (s)	602.0
Total Delay (hr)	84.7
Total Del/Veh (s)	3081.1
Stop Del/Veh (s)	3253.0
Denied Entry Before	27

Movement	WB	NB	SB	SB
Directions Served	LTR	LT	T	R
Maximum Queue (ft)	1305	58	18	71
Average Queue (ft)	1261	7	1	3
95th Queue (ft)	1397	34	9	43
Link Distance (ft)	1263	284	244	244
Upstream Blk Time (%)	94			0
Queuing Penalty (veh)	0			0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

#### Intersection: 5: Bass Lake Road & eastbound ramp

Movement	EB	NB	SB
Directions Served	LTR	TR	LT
Maximum Queue (ft)	959	6	44
Average Queue (ft)	926	0	9
95th Queue (ft)	949	6	35
Link Distance (ft)	900	289	284
Upstream Blk Time (%)	100		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

#### Zone Summary

Zone wide Queuing Penalty: 0

### 4: Bass Lake Road & westbound ramp Performance by movement

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.1	
Total Delay (hr)	2.0	0.1	4.4	0.0	0.8	0.1	0.4	8.0	
Total Del/Veh (s)	106.8	100.2	63.6	4.3	3.2	2.7	3.7	14.9	
Stop Del/Veh (s)	101.7	94.1	58.3	1.4	0.6	0.5	0.1	11.7	
Denied Entry Before	0	0	0	0	0	0	0	0	

Movement	WB	NB	SB	SB
Directions Served	LTR	LT	T	R
Maximum Queue (ft)	644	247	44	30
Average Queue (ft)	284	34	3	1
95th Queue (ft)	606	145	28	22
Link Distance (ft)	1257	283	941	
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		3		
Storage Bay Dist (ft)				200
Storage Blk Time (%)				
Queuing Penalty (veh)				

# 5: Bass Lake Road & eastbound ramp Performance by approach

Approach	EB	NB	SB	All
Denied Delay (hr)	0.5	0.0	0.0	0.5
Denied Del/Veh (s)	1.8	0.3	0.0	1.4
Total Delay (hr)	9.8	2.6	3.6	15.9
Total Del/Veh (s)	34.7	82.1	55.6	42.2
Stop Del/Veh (s)	19.4	77.6	51.7	29.7
Denied Entry Before	0	0	0	0

Movement	EB	NB	SB
Directions Served	LTR	TR	LT
Maximum Queue (ft)	872	213	286
Average Queue (ft)	489	110	164
95th Queue (ft)	789	208	274
Link Distance (ft)	899	289	283
Upstream Blk Time (%)	2	1	2
Queuing Penalty (veh)	0	0	4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

2028 PM - Scenario 3: 2 NB Lanes Under US 50, Signalized EB Ramp, With BLHSP Phase 10 Developm

# 4: Bass Lake Road & westbound ramp Performance by movement

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.3	0.2	0.3	0.0	0.0	0.0	0.0	0.0	
Total Delay (hr)	0.5	0.0	0.3	0.0	1.0	0.0	0.2	2.1	
Total Del/Veh (s)	25.6	27.3	3.5	4.9	3.9	0.4	1.7	3.9	
Stop Del/Veh (s)	22.7	23.1	1.0	1.0	0.6	0.0	0.0	1.3	
Denied Entry Before	0	0	0	0	0	0	0	0	

Movement	WB	NB	NB
Directions Served	LTR	LT	T
Maximum Queue (ft)	216	210	132
Average Queue (ft)	59	24	7
95th Queue (ft)	146	125	74
Link Distance (ft)	1251	278	278
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		2	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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# 5: Bass Lake Road & eastbound ramp Performance by approach

Approach	EB	NB	SB	All
Denied Delay (hr)	0.6	0.0	0.0	0.6
Denied Del/Veh (s)	2.3	0.2	0.0	1.7
Total Delay (hr)	3.5	0.7	2.0	6.2
Total Del/Veh (s)	12.5	24.6	29.1	16.5
Stop Del/Veh (s)	7.4	21.3	25.6	11.8
Denied Entry Before	1	0	0	1

# 2028 PM - Scenario 3: 2 NB Lanes Under US 50, Signalized EB Ramp, With BLHSP Phase 2018 Development

# Intersection: 5: Bass Lake Road & eastbound ramp

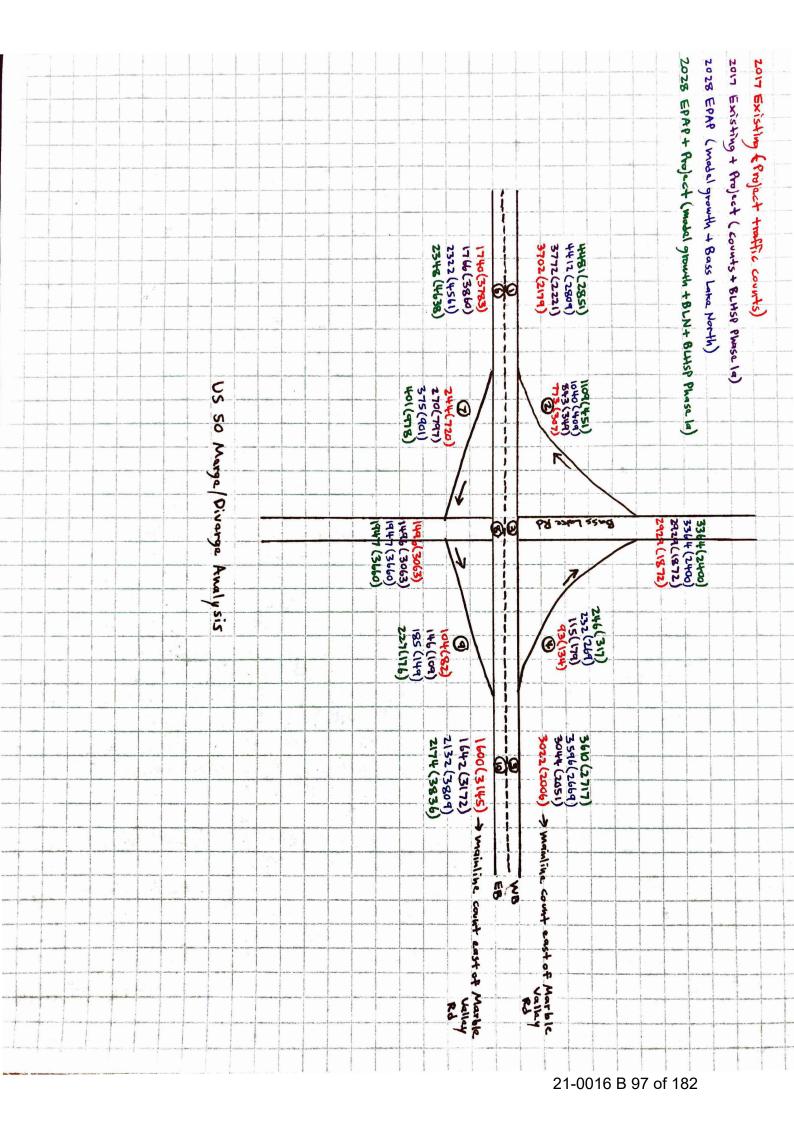
Movement	EB	EB	NB	SB
Directions Served	L	LTR	TR	LT
Maximum Queue (ft)	280	259	157	218
Average Queue (ft)	172	110	59	113
95th Queue (ft)	258	229	117	188
Link Distance (ft)		899	284	278
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)	240			
Storage Blk Time (%)	2	0		
Queuing Penalty (veh)	9	1		

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# Appendix C: Mainline Volume Calculations

	US 50	Merge	Divar	92	Avaly	sis		-					-
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Scanarios													
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2017 Ex		P-33			* *								
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	PAP + Pro	4											
2028 61	1 1 10	Jack											
Segment													
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	s Lake R			"ay	rany_							-	
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	s Lake Rd	1 1 1		On-	ramp								
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	EB (AM			-	-			*					
	is Lake Rd			1 bkn	7			-					
	s Lake Rd			-									
	s Lake Rd	1 1 2	120	3N-1	amp								
	s Lake Rd											-	
U Das	is Lake R	3 TO COL	101.09	. <b>Ko</b>	-			-		-			
				-							-		
	1 4 1												



Appendix D: HCS Results

	BASIC FRE	EWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2017 Existing AM		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Ran Pkwy	VB np/Silva Valley do County
	P Phase 1a Fi		Analysis Teal	2011	
✓ Oper.(LOS)			Des.(N)	☐Plar	ning Data
Flow Inputs					
Volume, V AADT	3702	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.96 1	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade -6.00% Length Up/Down %	0 Grade 1.20mi -6.00	
Calculate Flow Adjus	tments				
f <sub>p</sub>	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$		
Speed Inputs			Calc Speed Adj and I	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N	2	ft ft	f <sub>LW</sub>		mph mph
Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	70.0	ramps/mi mph mph	TRD Adjustment FFS	70.0	mph mph
LOS and Performance	e Measures		Design (N)		
Operational (LOS) v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>p</sub> ) S	N x f <sub>HV</sub> <sub>1938</sub> 63.7	pc/h/ln mph	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF \text{ x})$ $x f_p)$ $S$	N x f <sub>HV</sub>	pc/h/ln mph
D = v <sub>p</sub> / S LOS	30.4 D	pc/mi/ln	D = v <sub>p</sub> / S Required Number of Lanes	s, N	pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design l	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11

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	RA	MPS AND	<b>RAMP JUN</b>	CTIONS W	ORKSH	EET						
General Info				Site Infor								
Analyst Agency or Compa	TKT			eeway/Dir of Tr		US 50 WE Bass Lake						
Date Performed	•	2/2017		risdiction		El Dorado						
Analysis Time Per		7 Existing AM	Ar	nalysis Year		2017						
	n BLHSP Phase	e 1a Final Map										
nputs		1							<u> </u>			
Jpstream Adj Rar	np	1 1	ber of Lanes, N	2					Downstre	am Adj		
		Ramp Numbe		1					Ramp			
☐ Yes ☐	On	Acceleration L	ane Length, L <sub>A</sub>	700					☐Yes	On		
✓ No	Off	Deceleration L	ane Length L <sub>D</sub>						✓ No	Off		
		Freeway Volui	me, V <sub>F</sub>	2929						_		
<sub>-up</sub> = ft		Ramp Volume	, V <sub>R</sub>	773					L <sub>down</sub> =	ft		
/ <sub>u</sub> = veł	a/b	Freeway Free	-Flow Speed, S <sub>FF</sub>	70.0					V <sub>D</sub> =	veh/h		
v <sub>u</sub> – vei	1/11	Ramp Free-Fl	ow Speed, S <sub>FR</sub>	35.0					D			
Conversion	to pc/h Un	der Base	Conditions		,							
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>H</sub> v	,	f <sub>p</sub>	v = V/PHI	x f <sub>HV</sub> x f <sub>p</sub>		
Freeway	2929	0.96	Rolling	2	0	0.97		1.00		3143		
Ramp	773	0.96	Rolling	2	0	0.97		1.00		829		
UpStream												
DownStream		Marga Arasa					Div	Arasa				
Estimation		Merge Areas			Estimat	tion of v	/	erge Areas				
		(5.)			Lotimat			. 0.4	\ <u> </u>			
	$V_{12} = V_{F}$		40 =>					+ (V <sub>F</sub> - V <sub>R</sub> )				
-EQ =		uation 13-6 or	•		L <sub>EQ</sub> =		•	uation 13-		=		
P <sub>FM</sub> =			ion (Exhibit 13-6)		P <sub>FD</sub> =			ng Equatio	n (Exhibit 1	3-7)		
/ <sub>12</sub> =	3143	•			V <sub>12</sub> =		pc/			\		
V <sub>3</sub> or V <sub>av34</sub>	-		13-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>	0.700	•	h (Equation 1	3-14 or 13-1	17)		
	,700 pc/h? <b>☐ Y</b> €							′es ☐ No				
	$.5 * V_{12}/2 \square Ye$		3-16, 13-18, or					′es	. 12 16 1	2 10 or		
Yes,V <sub>12a</sub> =	13-19		5-10, 13-10, 01		If Yes,V <sub>12a</sub> :	=	13-1		1 13-10, 1	3-10, UI		
Capacity Cl	hecks	,			Capacit	ty Chec	ks	,				
	Actual	C	apacity	LOS F?			Actual	Cap	acity	LOS F?		
					$V_{F}$			Exhibit 13-8	3			
$V_{FO}$	3972	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V <sub>R</sub>		Exhibit 13-8	3			
. 0					V <sub>R</sub>			Exhibit 13-	-			
	las Maras I	<u>                                     </u>					Diverse	10				
-iow Enteri	ing Merge II Actual		Desirable	Violation?	FIOW EI	Act		e Influen Max Desi		Violation		
V <sub>R12</sub>	3972	Exhibit 13-8	4600:All	No	V <sub>12</sub>	Acti		xhibit 13-8	Table	violatiOH		
evel of Se	rvice Deteri			110		f Servic		rminatio	n (if not	· <b>F</b> )		
	5 + 0.00734 v <sub>R</sub> +				+			)86 V <sub>12</sub> - 0.		1)		
$D_{R} = 3.473$	===	0.0070 <b>v</b> 12 0.0				pc/mi/ln)	- 0.00	12 0.				
	bit 13-2)						1-21					
· · · · · · · · · · · · · · · · · · ·		LOS = (Exhibit 13-2)  Speed Determination										
Speed Dete					<del>  '                                   </del>							
$M_S = 0.479$ (Exibit 13-11)						D <sub>S</sub> = (Exhibit 13-12)						
	oh (Exhibit 13-11)				S <sub>R</sub> = mph (Exhibit 13-12)							
	h (Exhibit 13-11)				S <sub>0</sub> = mph (Exhibit 13-12)							
•	oh (Exhibit 13-13)					nph (Exhibit						
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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T			
General Information			Site Information				
Analyst Agency or Company Date Performed Analysis Time Period Project Description BLHS	TKTPM TKTPM 10/2/2017 2017 Existing SP Phase 1a F		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Rar	Off-Ramp/On-Ramp El Dorado County		
✓ Oper.(LOS)	or rhase la r		)oo (NI)	□ Dle	nning Data		
Flow Inputs		L	Pes.(N)	Ріа	nning Data		
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	2929	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.94 5 0 Level mi			
			Up/Down %				
Calculate Flow Adjus	tments						
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2 1)] 0.976			
Speed Inputs			Calc Speed Adj and	FFS			
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	2 70.0	ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph		
LOS and Performanc	e Measures	<u> </u>	Design (N)				
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x l x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1597 68.2 23.4 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x f}_p)$ $S$ $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln		
Glossary			Factor Location				
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11		

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		RAMP	S AND RAM	IP JUNCTI	ONS WO	ORKS	HEET					
General Info	rmation			Site Infor								
Analyst Agency or Compar Date Performed	TKTF	PM	Jı	reeway/Dir of Tr unction urisdiction			WB ake Rd ado County	,				
Analysis Time Peri		Existing AM	A	nalysis Year		2017						
Project Description	BLHSP Phase	1a Final Map										
Inputs		F	h									
Upstream Adj	Ramp	Ramp Numbe	ber of Lanes, N r of Lanes, N	2 1					Downstrea Ramp	m Adj		
☐Yes	On	Acceleration L	ane Length, L						□Yes	On		
✓No	Off		ane Length L <sub>D</sub>	500					✓ No	Off		
I =	ft	Freeway Volu		3022					L <sub>down</sub> =	ft		
L <sub>up</sub> =	ıı	Ramp Volume	**	93					down			
V <sub>u</sub> =	veh/h		-Flow Speed, $S_{FF}$ ow Speed, $S_{FR}$						$V_D =$	veh/h		
0	1/-		110	35.0								
Conversion	to pc/n Und	ger Base	Conditions	1	ĺ							
(pc/h)	(Veh/hr)	PHF	Terrain	%Truck	%Rv		$f_{HV}$	f <sub>p</sub>	v = V/PHF	x f <sub>HV</sub> x f <sub>p</sub>		
Freeway	3022	0.96	Rolling	2	0	0.971		1.00	324	12		
Ramp	93	0.96	Rolling	2	0	0	.971	1.00	10	0		
UpStream		$\vdash$				_						
DownStream		Merge Areas						L Diverge Areas				
Estimation o		morgo rirous			Estima	tion c		or or go rai ou o				
	V <sub>12</sub> = V <sub>F</sub>	(P)						: V <sub>R</sub> + (V <sub>F</sub> - V <sub>F</sub>	.)P			
- = =		tion 13-6 or	13-7)		l =			Equation 13-1				
-EQ = O _		Equation (	•		L <sub>EQ</sub> = P <sub>FD</sub> =		-	000 using Equ	•			
P <sub>FM</sub> = V <sub>12</sub> =	pc/h	Equation (i	-Allibit 15 0)		V <sub>12</sub> =			242 <b>pc/h</b>	iation (Exilic	13-7)		
V <sub>3</sub> or V <sub>av34</sub>	•	Faustion 13	-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>			pc/h (Equatio	n 13 1 <i>1</i> or	12 17)		
Is V <sub>3</sub> or V <sub>av34</sub> > 2,7		-	14 61 16 17)			>27		Yes ☑ No	11 10-14 01	10-17)		
Is $V_3$ or $V_{av34} > 2.5$												
			-16, 13-18, or		Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ Yes No pc/h (Equation 13-16, 13-18, or 13-							
f Yes,V <sub>12a</sub> =	13-19)	•			19)							
Capacity Ch	ecks				Capaci	ty Ch	ecks					
	Actual	C	apacity	LOS F?	ļ ,,		Actual	<del></del>	pacity	LOS F		
					V <sub>F</sub>		3242	Exhibit 13-8	+	No		
$V_{FO}$		Exhibit 13-8			$V_{FO} = V$	<sub>F</sub> - V <sub>R</sub>	3142	Exhibit 13-8	4800	No		
					V <sub>R</sub>		100	Exhibit 13-1		No		
Flow Enterin	<del></del>	V .		_	Flow E			rge Influen				
1.7	Actual	<del>1</del>	Desirable	Violation?	.,		Actual	Max Desirab		Violation		
V <sub>R12</sub>	<u> </u>	Exhibit 13-8			V <sub>12</sub>		3242	Exhibit 13-8	4400:All	No		
Level of Ser					Level o			termination	•	-)		
$D_R = 5.475 + 0$		0.0078 V <sub>12</sub> -	· 0.00627 L <sub>A</sub>					.0086 V <sub>12</sub> - 0.	009 L <sub>D</sub>			
D <sub>R</sub> = (pc/mi/ln)						D <sub>R</sub> = 27.6 (pc/mi/ln)						
OS = (Exhibit	<u> </u>						bit 13-2)					
Speed Deter					Speed							
$M_S = $ (Exibit					ı "	-	xhibit 13	•				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 57.8 mph ( <b>Exhibit 13-12</b> )							
	(hibit 13-11)				$S_0$ = N/A mph (Exhibit 13-12)							
S = mph (Ex	(hibit 13-13)				S = 5	7.8 mpł	(Exhibit	13-13)				
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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T		
General Information			Site Information			
Analyst TKTPM Agency or Company TKTPM Date Performed 10/2/2017 Analysis Time Period 2017 Existing AM Project Description BLHSP Phase 1a Final Map			Highway/Direction of Trave From/To Jurisdiction Analysis Year	l US 50 WB Cambridge Rd/Off-Ramp El Dorado County 2017		
✓ Oper.(LOS)	or rhase ra r		)oo (N)	□ Dlor	nning Data	
Flow Inputs		L	Des.(N)		Illing Data	
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	3022	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.96 1 0 Rolling mi		
70.51 X 10.75		V 311/11	Up/Down %	,,,,		
Calculate Flow Adjus	tments					
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 )] 0.985		
Speed Inputs			Calc Speed Adj and	FFS		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N	2	ft ft	$f_{LW}$		mph	
Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	70.0	ramps/mi mph mph	f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph	
LOS and Performanc	e Measures	<b>;</b>	Design (N)			
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS		pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x } f_p)$ S $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1	

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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T		
General Information			Site Information			
Analyst	TKTPM		Highway/Direction of Trave	US 50 E	ΞB	
Agency or Company	TKTPM		From/To		alley Pkwy/Off-	
Date Performed	10/2/2017		Jurisdiction	Ramp Fl Dora	do County	
Analysis Time Period	2017 Existin	g AM	Analysis Year	2017	ao ooaniy	
Project Description BLHS	SP Phase 1a F	inal Map	•			
✓ Oper.(LOS)			Des.(N)	☐ Plar	nning Data	
Flow Inputs						
Volume, V	1740	veh/h	Peak-Hour Factor, PHF	0.96		
AADT		veh/day	%Trucks and Buses, $P_T$	1		
Peak-Hr Prop. of AADT, K			%RVs, P <sub>R</sub>	0		
Peak-Hr Direction Prop, D			General Terrain:	Grade		
DDHV = AADT x K x D		veh/h	Grade -6.00% Length	1.20mi		
			Up/Down %	-6.00		
Calculate Flow Adjus	tments		<u> </u>			
f <sub>p</sub>	1.00		E <sub>R</sub>	1.2		
Ε <sub>Τ</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$			
Speed Inputs		Calc Speed Adj and FFS				
Lane Width		ft	Guio opoca 7 taj ana 1			
Rt-Side Lat. Clearance		ft	f		mnh	
Number of Lanes, N	2		f <sub>LW</sub>		mph	
Total Ramp Density, TRD	_	ramps/mi	f <sub>LC</sub>		mph	
	70.0	•	TRD Adjustment		mph	
FFS (measured)	70.0	mph	FFS	70.0	mph	
Base free-flow Speed, BFFS		mph				
LOS and Performanc	e Measure	S	Design (N)			
			Design (N)			
<u>Operational (LOS)</u>			Design LOS			
$v_p = (V \text{ or DDHV}) / (PHF x I)$	N x f <sub>HV</sub> 911	pc/h/ln	$v_p = (V \text{ or DDHV}) / (PHF x)$	N x f		
x f <sub>p</sub> )	011	po/11/111	$x f_p$	· · · · · HV	pc/h/ln	
S	70.0	mph	S		mnh	
$D = v_p / S$	13.0	pc/mi/ln			mph	
LOS	В		$D = v_p / S$		pc/mi/ln	
			Required Number of Lanes	S, N		
Glossary			Factor Location			
N - Number of lanes	S - Spe	ed	E <sub>R</sub> - Exhibits 11-10, 11-12		f <sub>I W</sub> - Exhibit 11-8	
V - Hourly volume	D - Dens	-	E <sub>T</sub> - Exhibits 11-10, 11-11,	11-13	f <sub>LC</sub> - Exhibit 11-9	
v <sub>p</sub> - Flow rate		e-flow speed	f <sub>n</sub> - Page 11-18	-	TRD - Page 11-11	
LOS - Level of service	BFFS - Ba	ase free-flow	LOS, S, FFS, v <sub>p</sub> - Exhibits	11-2	Tago 11311	
speed	hourvolues		11-3	ı I- <b>∠</b> ,		
DDHV - Directional design	nour volume	anud	VOD DOVOTM Verreion C.50			

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TKTP	PM	S AND RAM Fr. Ju	Site Information	mation	US 50						
ТКТР ТКТР					112 50	ΓD					
Analyst TKTPM Agency or Company TKTPM Date Performed 10/2/2017 Analysis Time Period 2017 Existing AM					Bass L						
	Existing AM	Ju Ar	Analysis Year		2017						
BLHSP Phase	1a Final Map										
amp			N 2 1						m Adj		
On	Acceleration L	ane Length, L						□ Voc	On		
_	Deceleration L	ane Length L <sub>D</sub>	500					✓ No	Off		
		•						L <sub>down</sub> =	ft		
								down			
ו חיחיב								V <sub>D</sub> =	veh/h		
		110	35.0								
	der Base (	<u>Conditions</u>		•			1				
(Veh/hr)	PHF	Terrain	%Truck	%Rv	_		'		<u> </u>		
	_										
244	0.96	Rolling	2	0	0.	9/1	1.00	26	2		
	<del>                                     </del>		<del>                                     </del>								
<u></u>	Merge Areas						iverge Areas				
	(D)						\/ ± (\/ \/	\D			
		40.7\		(5 (1 40 40 40 40)							
		-									
_	Equation (E	.xnibit 13-6)									
•				1			-				
	-	·14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)							
				Is V <sub>3</sub> or V <sub>av</sub>	<sub>v34</sub> > 1.5						
	•	·16, 13-18, or		If Yes, V <sub>12a</sub> :	=			13-16, 13-	18, or 13-		
							9)				
		anacity	LOS E2	Capacit	ty CII		Car	nacity	LOS F		
Actual		араспу	1031:	\ <u>\</u>					No		
ı	F.,k!k!! 10.0							+	+		
i	EXNIDIL 13-8							+	No		
									No		
	1			Flow Er							
Actual	1	Desirable	Violation?			1			Violation'		
							Exhibit 13-8		No		
								•	=)		
)0734 v <sub>R</sub> + (	0.0078 V <sub>12</sub> -	0.00627 L <sub>A</sub>			$D_R = 4$	1.252 + 0.	.0086 V <sub>12</sub> - 0.0	009 L <sub>D</sub>			
)				D <sub>R</sub> = 1	5.8 <b>(pc</b>	/mi/ln)					
3-2)						-					
· · · · · · · · · · · · · · · · · · ·							on .				
•											
DIT 13-11)	$S_R^{=}$ mph (Exhibit 13-11) $S_0^{=}$ mph (Exhibit 13-11)					S <sub>R</sub> = 57.4 mph (Exhibit 13-12)					
· ·				$S_0$ = N/A mph (Exhibit 13-12) S = 57.4 mph (Exhibit 13-13)							
ibit 13-11) ibit 13-13)						-	•				
	V (Veh/hr) 1740 244 V <sub>12</sub> = V <sub>F</sub> (Equa using pc/h pc/h (I 0 pc/h? ☐ Yes Pc/h (I 13-19) Cks Actual	Ramp Number Acceleration L Deceleration L Freeway Volume Freeway Free- Ramp Free-Flo Ppc/h Under Base ( V (Veh/hr) PHF 1740 0.96 244 0.96  Merge Areas  V12 = V <sub>F</sub> (P <sub>FM</sub> ) (Equation 13-6 or using Equation (Epc/h pc/h (Equation 13-13-19)  Cks Actual Call Call Exhibit 13-8  I Merge Influence A Actual Max Exhibit 13-8  I Merge Influence (I DO734 V R + 0.0078 V12 - 13-2)  Inination	Ramp Number of Lanes, N Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> Freeway Volume, V <sub>F</sub> Ramp Volume, V <sub>R</sub> Freeway Free-Flow Speed, S <sub>FR</sub> Ramp Free-Flow Speed, S <sub>FR</sub> Ramp Free-Flow Speed, S <sub>FR</sub> Popc/h Under Base Conditions  V (Veh/hr) PHF Terrain  1740 0.96 Rolling  244 0.96 Rolling  Merge Areas  V12  V12 = V <sub>F</sub> (P <sub>FM</sub> ) (Equation 13-6 or 13-7) using Equation (Exhibit 13-6) pc/h pc/h (Equation 13-14 or 13-17) pc/h?	Ramp Number of Lanes, N  Acceleration Lane Length, L  Deceleration Lane Length, L  Ramp Volume, V  Ramp Volume, V  Ramp Volume, V  Ramp Free-Flow Speed, S  Ramp Volume, V  Ramp Volume, V  Ramp Free-Flow Speed, S  Ramp Vulation  Ramp Free-Flow Speed, S  Ramp Volume, V  Ramp Free-Flow Speed, S  Ramp Vulation  Ramp	Ramp Number of Lanes, N 1 Acceleration Lane Length, $L_A$ Deceleration Deceleration Deceleration Properties Deceleration Decelerati	On	Ramp Number of Lanes, N 1  Acceleration Lane Length $L_A$ Deceleration Lane Length $L_B$ Freeway Volume, $V_F$ Ramp Volume, $V_F$ Perbona Free-Flow Speed, $S_{FF}$ Paramp	Con   Acceleration Lane Length, L <sub>A</sub>   Deceleration Lane Length, L <sub>A</sub>   Deceleration Lane Length, L <sub>A</sub>   Deceleration Lane Length L <sub>D</sub>   500   Freeway Yolume, V <sub>F</sub>   1740   Ramp Volume, V <sub>R</sub>   244   Freeway Free-Flow Speed, S <sub>FF</sub>   70.0   Ramp Free-Flow Speed, S <sub>FR</sub>   35.0   Pc/h Under Base Conditions   V(v/hirl)   PHF   Terrain   %Truck   %Rv   f <sub>HV</sub>   f <sub>p</sub>   1740   0.96   Rolling   2   0   0.971   1.00   1.00   1.00      Merge Areas   Diverge Areas   Diverge Areas   Diverge Areas   V12   Estimation of v12   V12 = V <sub>F</sub> + (V <sub>F</sub> - V <sub>F</sub> + V <sub>F</sub> - V <sub>F</sub>   1867   pc/h   (Equation 13-6 or 13-7)   Using Equation (Exhibit 13-6)   pc/h   (Equation 13-14 or 13-17)   V3 or V <sub>30/34</sub> ≥ 2.700 pc/h;   Yes   No   Is V3 or V <sub>30/34</sub> ≥ 2.700 pc/h;   Yes   No   Is V3 or V <sub>30/34</sub> ≥ 1.5 * V <sub>12</sub>   Yes   No   If Yes, V <sub>12a</sub> =   1867   pc/h   (Equation 13-16, 13-18, or   13-19)   Pc/h   (Equation 13-16, 13-18, or   13-19)   Cos   Exhibit 13-8   Exhibit 13-8   V <sub>F</sub>   1867   Exhibit 13-8   V <sub>F</sub>   262   Exhibit 13-8   (Exhibit 13-8   Exhibit 13-8   Exhibit 13-8   Exhibit 13-8   (Exhibit 13-8   V <sub>12</sub>   1867   Exhibit 13-8   (Exhibit 13-8   Exhibit 13-8   Exhibit 13-8   (Exhibit 13-8   E	On   Acceleration Lane Length, L <sub>A</sub>   Off   Deceleration Lane Length L <sub>D</sub>   500   Freeway Volume, V <sub>F</sub>   1740   V <sub>D</sub> =   Ramp Volume, V <sub>F</sub>   244   V <sub>D</sub> =   Ph/h   Ramp Volume, V <sub>F</sub>   244   V <sub>D</sub> =   Ph/h   Ramp Free-Flow Speed, S <sub>FF</sub>   70.0   V <sub>D</sub> =   Ph/h   Ramp Free-Flow Speed, S <sub>FF</sub>   35.0   V <sub>D</sub> =   Ph/h   Ramp Free-Flow Speed, S <sub>FF</sub>   35.0   V <sub>D</sub> =   Ph/h   Ramp Free-Flow Speed, S <sub>FF</sub>   35.0   V <sub>D</sub> =   Ph/h   Ramp Free-Flow Speed, S <sub>FF</sub>   35.0   V <sub>D</sub> =   Ph/h   Ramp Free-Flow Speed, S <sub>FF</sub>   35.0   V <sub>D</sub> =   Ph/h   Ramp Free-Flow Speed, S <sub>FF</sub>   35.0   V <sub>D</sub> =   Ph/h   Ramp Free-Flow Speed, S <sub>FF</sub>   35.0   V <sub>D</sub> =   Ph/h   Ramp Free-Flow Speed, S <sub>FF</sub>   35.0   V <sub>D</sub> =   Ph/h   Ramp Free-Flow Speed, S <sub>FF</sub>   35.0   V <sub>D</sub> =   Ph/h   Ph/h		

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T			
General Information			Site Information				
Analyst TKTPM Agency or Company TKTPM Date Performed 10/2/2017 Analysis Time Period 2017 Existing AM Project Description BLHSP Phase 1a Final Map			Highway/Direction of Travel US 50 EB From/To Off-Ramp/On-Ramp Jurisdiction El Dorado County Analysis Year 2017				
	or rhase la r		) (NI)		nning Data		
✓ Oper.(LOS)			Des.(N)	□Piai	nning Data		
Flow Inputs Volume, V AADT	1496	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.94 5			
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0 Level mi			
Calculate Flow Adjus	tments						
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_{R}$ $f_{HV} = 1/[1+P_{T}(E_{T}-1) + P_{R}(E_{R}-1)]$	1.2 1)] 0.976			
Speed Inputs			Calc Speed Adj and	FFS			
Lane Width Rt-Side Lat. Clearance		ft ft	f <sub>LW</sub>		mph		
Number of Lanes, N	2		f <sub>LC</sub>		mph		
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph		
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph		
LOS and Performanc	e Measures	;	Design (N)				
<u>Operational (LOS)</u> v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> )	N x f <sub>HV</sub> 816	pc/h/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x x f_p)$	N x f <sub>HV</sub>	pc/h/ln		
S D = v <sub>p</sub> / S LOS	70.0 11.7 B	mph pc/mi/ln	S D = v <sub>p</sub> / S Required Number of Lanes	s, N	mph pc/mi/ln		
Glossary			Factor Location				
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11		

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		RA	MPS AND	RAMP JUNG	CTIONS W	ORKSH	EET				
Genera	I Infor				Site Infor						
Analyst		TKTF			eeway/Dir of Tr		US 50	EB			
Agency or (	Company	TKTF	PM	Ju	nction		Bass L	ake Rd			
Date Perfor	med	10/2/	/2017	Ju	risdiction		El Dorado County				
Analysis Tir	me Period	2017	Existing AM	An	nalysis Year		2017				
Project Des	scription	BLHSP Phase	1a Final Map								
Inputs											
Upstream A	Adj Ramp		Freeway Numb	ber of Lanes, N	2					Downstre	am Adj
_	_		Ramp Number	r of Lanes, N	1					Ramp	-
Yes	☐ On	I	Acceleration L	ane Length, L <sub>A</sub>	700					□Yes	On
✓ No	Off	:	Deceleration L	ane Length L <sub>n</sub>							
INO			Freeway Volur	- 5	1496					✓ No	Off
-up =	ft		Ramp Volume		104					L <sub>down</sub> =	ft
up				·/ VR -Flow Speed, S <sub>ee</sub>							
/ <sub>u</sub> =	veh/h		•		70.0					$V_D =$	veh/h
				ow Speed, S <sub>FR</sub>	35.0						
Conver	sion to	_ <del>_</del>	<u>der Base (</u>	Conditions	1	<u> </u>				1	
(pc/	/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	1	$f_{HV}$	$f_p$	v = V/PHI	$= x f_{HV} x f_{p}$
Freeway		1496	0.96	Rolling	2	0	n	.971	1.00		1605
Ramp		104	0.96	Rolling	2	0	_	.971	1.00		112
UpStream		101	0.70	rtoming		Ů	<b>—</b>		1.00		112
DownStrea	am		1 1								
			Merge Areas					Di	verge Areas		
Estima	tion of	V <sub>12</sub>				Estimation of v <sub>12</sub>					
		V <sub>12</sub> = V <sub>F</sub>	(P)						R + (V <sub>F</sub> - V <sub>F</sub>	.)P	
_			ation 13-6 or	. 12 7)		(5 (1 40 40 40 40)					
-EQ =				•							
<sub>FM</sub> =				ion (Exhibit 13-6)		P <sub>FD</sub> = using Equation (Exhibit 13-7)					
/ <sub>12</sub> =		1605	•			V <sub>12</sub> =			c/h		
$V_3$ or $V_{av34}$				13-14 or 13-17)		$V_3$ or $V_{av34}$ pc/h (Equation 13-14 or 13-17) Is $V_3$ or $V_{av34} > 2,700$ pc/h? $\square$ Yes $\square$ No					
Is $V_3$ or $V_{av}$	v34 > 2,70	0 pc/h?	s 🗹 No			Is V <sub>3</sub> or V <sub>av</sub>	$_{134} > 2.7$	'00 pc/h? 🗌	Yes 🗌 No		
Is V <sub>3</sub> or V <sub>av</sub>	<sub>v34</sub> > 1.5 *	V <sub>12</sub> /2 □Ye				Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ Yes  No					
f Yes,V <sub>12a</sub>	=			3-16, 13-18, or		If Yes,V <sub>12a</sub> =	=		c/h (Equatio	n 13-16, 1	3-18, or
		13-19)	)						-19)		
Capaci	ty Che	1		anacity	100.00	Capacit	y CII		Co	pacity	100.53
		Actual		apacity	LOS F?	\/		Actual	Exhibit 13-	<del>'                                    </del>	LOS F?
						V <sub>F</sub>					_
$V_{F}$	:О	1717	Exhibit 13-8		No	$V_{FO} = V_{F}$	: - V <sub>R</sub>		Exhibit 13-		
						V <sub>R</sub>			Exhibit 13	i-	
Flow F	ntorine	Morae Ir	efluonos A				oto viv	na Divor	10		
-IOW EI	ntering	Actual	nfluence A	Desirable	Violation?	FIOW EI		Actual	<b>ge Influer</b> Max Des		Violation?
V <sub>R1</sub>		1717	Exhibit 13-8	4600:All	No	V <sub>12</sub>		Actual	Exhibit 13-8	liable	violation:
					INU		f Cor	vice Det	erminatio	n (if not	<i>E</i> 1
			mination (i								<i>F)</i>
			0.0078 V <sub>12</sub> - 0.0	10021 L <sub>A</sub>					0086 V <sub>12</sub> - 0	.uus L <sub>D</sub>	
IX.	4.4 (pc/m	•				I	oc/mi/l	•			
	3 (Exhibit 1					LOS = (E	Exhibit	13-2)			
Speed	Detern	nination				Speed I	Deter	minatio	n		
$M_S = 0$	).294 (Exil	oit 13-11)				$D_s = (E_s)^T$	Exhibit 1	13-12)			
S <sub>R</sub> = 61.8 mph (Exhibit 13-11)						S <sub>R</sub> = mph (Exhibit 13-12)					
$S_n = N/A \text{ mph (Exhibit 13-11)}$						$S_0$ = mph (Exhibit 13-12)					
U		S = mph (Exhibit 13-13)									
	-	Exhibit 13-13)								0	0/0/05/7
pyright © 2	:u13 Unive	rsity of Florida, A	All Rights Reserve	ea		HCS2010 <sup>TI</sup>	vi Versi	on 6.50	,	Generated: 1	0/2/2017 2:4

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Т	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description <i>BLH</i> S	TKTPM TKTPM 10/2/2017 2017 Existing P Phase 1a F		Highway/Direction of Trave From/To Jurisdiction Analysis Year	On-Ran	EB np/Cambridge Rd do County
✓ Oper.(LOS)	r riiase ia i	· _	loc (NI)	□ Dlor	ning Data
Flow Inputs			es.(N)	□Plai	nning Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	1600	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0.96 1 0 Rolling mi	
Calculate Flow Adjus	tments		Оргдожн 70		
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 1)] 0.985	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	2 70.0	ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performance	e Measures	<u> </u>	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x t x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS		pc/h/ln mph pc/mi/ln	Design (N) Design LOS  v <sub>p</sub> = (V or DDHV) / (PHF x x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1
DDHV - Directional design l Copyright © 2013 University of Florid		rved	HCS 2010 <sup>TM</sup> Version 6.50	Gener	rated: 10/2/2017 2:43 F

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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Т	
General Information			Site Information		
Analyst Agency or Company Date Performed	TKTPM TKTPM 10/2/2017		Highway/Direction of Trave From/To Jurisdiction	On-Ran Pkwy	NB np/Silva Valley do County
Analysis Time Period	2017 Existing		Analysis Year	2017	
Project Description BLHS  Oper.(LOS)	SP Phase 1a F		Des.(N)	□ Dlar	nning Data
Flow Inputs			765.(14)	∟га	Illing Data
Volume, V AADT	2179	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.96 1	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade -6.00% Length Up/Down %	0 Grade 1.20mi -6.00	
Calculate Flow Adjus	tments			0.00	
f <sub>p</sub> E <sub>⊤</sub>	1.00 1.5		$E_{R}$ $f_{HV} = 1/[1+P_{T}(E_{T}-1)+P_{R}(E_{R}-1)]$	1.2	
•	1.0		- 11V		
Speed Inputs Lane Width		ft	Calc Speed Adj and I		
Rt-Side Lat. Clearance Number of Lanes, N	2	ft	f <sub>LW</sub>		mph
Total Ramp Density, TRD	2	ramps/mi	f <sub>LC</sub> TRD Adjustment		mph mph
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph
LOS and Performanc	e Measures		Design (N)		
Operational (LOS) $v_p = (V \text{ or DDHV}) / (PHF \times V)$ $x f_p$ $S$ $D = v_p / S$ LOS	N x f <sub>HV</sub> 1141 70.0 16.3 B	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x } f_p)$ S $D = v_p / S$		pc/h/ln mph pc/mi/ln
Oleana			Required Number of Lanes	5, IN	
Glossary  N - Number of lanes  V - Hourly volume  v <sub>p</sub> - Flow rate  LOS - Level of service  speed  DDHV - Directional design	BFFS - Ba		Factor Location $E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18  LOS, S, FFS, $v_p$ - Exhibits  11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

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		RA	MPS AND	RAMP JUNG	CTIONS W	ORKSH	EET				
Genera	I Infor				Site Infor						
Analyst		TKTF	PM	Fr	eeway/Dir of Tr		US 50	WB			
Agency or (	Company	TKTF	PΜ	Ju	nction		Bass L	ake Rd			
Date Perfor	rmed	10/2/	/2017	Ju	risdiction		El Dor	ado County			
Analysis Tiı	me Period	2017	Existing PM	Ar	nalysis Year		2017	,			
Project Des	scription	BLHSP Phase	: 1a Final Map								
Inputs											
Upstream <i>F</i>	Adj Ramp		Freeway Numb	ber of Lanes, N	2					Downstre	am Adj
•	•		Ramp Number	r of Lanes, N	1					Ramp	•
Yes	☐ On	I	Acceleration L	ane Length, L <sub>A</sub>	700					□Yes	On
✓ No	Off	f	Deceleration L	ane Length L <sub>D</sub>							
INO			Freeway Volur	- 5	1872					☑ No	Off
-up =	ft		Ramp Volume		307					L <sub>down</sub> =	ft
up				· VR -Flow Speed, S <sub>FF</sub>							
/ <sub>u</sub> =	veh/h		1		70.0					$V_D =$	veh/h
				ow Speed, S <sub>FR</sub>	35.0						
Conver	'sion to	· -	<u>der Base (</u>	Conditions	1	<u> </u>					
(pc/	/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		$f_{HV}$	$f_p$	v = V/PHI	$= x f_{HV} x f_{p}$
Freeway		1872	0.96	Rolling	2	0	n	.971	1.00		2009
Ramp		307	0.96	Rolling	2	0	_	.971	1.00	<del>                                     </del>	329
UpStream			<del>                                     </del>								
DownStrea											
			Merge Areas					Di	verge Areas		
Estima	tion of	'V <sub>12</sub>				Estimat	tion o	of v <sub>12</sub>			
		V <sub>12</sub> = V <sub>F</sub>	(P <sub>EM</sub> )					V <sub>12</sub> = V	<sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub>	)P <sub>ED</sub>	
=		.= .	ation 13-6 or	13-7)		l =			Equation 13-		(3)
- <sub>EQ</sub> =				ion (Exhibit 13-6)		L <sub>EQ</sub> = D _		•	sing Equatio		•
FM =				IOIT (EXHIBIT 13-0)		P <sub>FD</sub> =				MI (EXHIDIC I	J-1)
/ <sub>12</sub> =		2009	•			V <sub>12</sub> =		•	c/h	1044 404	. ¬\
V <sub>3</sub> or V <sub>av34</sub>				13-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>			c/h (Equation 1	13-14 OF 13-	17)
0 4		0 pc/h?							Yes No		
Is V <sub>3</sub> or V <sub>a</sub>	<sub>v34</sub> > 1.5 *	V <sub>12</sub> /2 □Ye				Is V <sub>3</sub> or V <sub>av</sub>	<sub>/34</sub> > 1.5		Yes No		
f Yes,V <sub>12a</sub>	=			3-16, 13-18, or		If Yes,V <sub>12a</sub> =	=		c/h (Equatio	n 13-16, 1	3-18, or
Capaci		13-19)	<u> </u>			Capacit			-19)		
зарасп	ty One	Actual	C	apacity	LOS F?	Capacit	y On	Actual	Ca	pacity	LOS F?
		7 totaai	Ť	араску	20011	V <sub>F</sub>	$\neg$	Hotaai	Exhibit 13-		20011
							- \		Exhibit 13-	_	
$V_{F}$	:O	2338	Exhibit 13-8		No	$V_{FO} = V_{F}$	- v <sub>R</sub>				
						V <sub>R</sub>			Exhibit 13 10	-	
Flow F	nterino	Merge Ir	nfluence A	rea		Flow Fr	nterii	na Diver	ge Influer	ice Area	<u> </u>
1011 2	11011119	Actual		Desirable	Violation?	1 1011 21	_	Actual	Max Des		Violation?
V <sub>R</sub> .	10	2338	Exhibit 13-8	4600:All	No	V <sub>12</sub>	$\top$		Exhibit 13-8		
			mination (i				f Sor	vice Det	erminatio	n (if not	• <b>F</b> 1
			0.0078 V <sub>12</sub> - 0.0						0086 V <sub>12</sub> - 0	•	• • •
			5.0070 V <sub>12</sub> - 0.0	70027 L <sub>A</sub>					7000 v <sub>12</sub> - 0	.003 LD	
IX.	19.2 (pc/m	•				., .,	oc/mi/l	•			
	3 (Exhibit 1							t 13-2)			
Speed	Detern	nination						minatio	n		
$M_{\rm S} = 0$	).312 (Exit	oit 13-11)				$D_s = (E_s)^T$	Exhibit 1	13-12)			
•	1.3 mph (	(Exhibit 13-11)				$S_R = m$	nph (Ex	hibit 13-12)			
13	-	Exhibit 13-11)				$S_0 = m$	nph (Ex	hibit 13-12)			
U		(Exhibit 13-13)				Ů		hibit 13-13)			
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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T				
General Information			Site Information					
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2017 Existing		Highway/Direction of Travel US 50 WB From/To Off-Ramp/On-Ramp Jurisdiction EI Dorado County Analysis Year 2017					
,	P Phase 1a F		A (A I)		i			
✓ Oper.(LOS)		<u> </u>	es.(N)	□Plar	nning Data			
Flow Inputs	4070	1. //.	Deale Herm Frederic DUE	0.04				
Volume, V AADT	1872	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.94 5				
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0 Level mi				
Calculate Flow Adjus	tments							
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2 1)1 <i>0</i> .976				
Speed Inputs			Calc Speed Adj and					
			Caic Speed Adj allu	113				
Lane Width		ft						
Rt-Side Lat. Clearance	0	ft	$f_{LW}$		mph			
Number of Lanes, N	2	, .	$f_{LC}$		mph			
Total Ramp Density, TRD	70.0	ramps/mi	TRD Adjustment		mph			
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph			
LOS and Performance	e Measures	<b>;</b>	Design (N)					
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1021 70.0 14.6 B	pc/h/ln mph pc/mi/ln	Design (N) Design LOS  v <sub>p</sub> = (V or DDHV) / (PHF x x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lane		pc/h/ln mph pc/mi/ln			
Glossary			Factor Location					
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	, 11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11			
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		RAMP	S AND RAM	IP JUNCTI	ONS WC	RKS	HEET			
General Infor	mation	TO UM	<u> </u>	Site Infor		71110				
Analyst Agency or Company Date Performed Analysis Time Perioc	TKTF TKTF 10/2/ I 2017	PM 2017 Existing PM	J	reeway/Dir of Tr unction urisdiction analysis Year		US 50 Bass L El Dora 2017				
Project Description Inputs	BLHSP Phase	Ta Final Map								
_		Fraaway Num	ber of Lanes, N	2					<u> </u>	
Upstream Adj R	amp	Ramp Numbe		1					Downstrea Ramp	am Adj
□Yes □	On	1	ane Length, L <sub>A</sub>	'					Yes	□On
✓ No	Off		ane Length L <sub>D</sub>	500					✓No	Off
L <sub>up</sub> = f	t	Freeway Volune Ramp Volume		2006 134					L <sub>down</sub> =	ft
V <sub>u</sub> = v	eh/h		-Flow Speed, S <sub>FF</sub> ow Speed, S <sub>FR</sub>						V <sub>D</sub> =	veh/h
Conversion to	o nc/h Hn		110	35.0						
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF	x f <sub>HV</sub> x f <sub>p</sub>
Freeway	2006	0.96	Rolling	2	0	0.	971	1.00	21	52
Ramp	134	0.96	Rolling	2	0	0.	971	1.00	1	44
UpStream						$\perp$				
DownStream								iverge Areas		
Estimation of		merge rii cus			Estimat	tion c		iverge rii cus		
	V <sub>12</sub> = V <sub>F</sub>	( P)						V <sub>R</sub> + (V <sub>F</sub> - V	_\P	
l = 0 =		ation 13-6 or	13-7)		l =			Equation 13-	–	3)
L <sub>EQ</sub> = P <sub>FM</sub> =		Equation (E	•		L <sub>EQ</sub> = P <sub>FD</sub> =		-	000 using Eq		
V <sub>12</sub> =	pc/h	_qua (2			V <sub>12</sub> =			500 <b>do</b> llig <b>_q</b> 52 <b>pc/h</b>	dation (EXII	1511 15 7)
V <sub>3</sub> or V <sub>av34</sub>	•	Equation 13	-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>			pc/h (Equation	on 13-14 o	r 13-17)
Is $V_3$ or $V_{av34} > 2,70$		•	,			, <sub>24</sub> > 2,7		Yes ☑ No		,
Is $V_3$ or $V_{av34} > 1.5$					0 4.			Yes ☑ No		
If Yes,V <sub>12a</sub> =		Equation 13	-16, 13-18, or		If Yes,V <sub>12a</sub> :			c/h (Equation	13-16, 13	-18, or 13-
Capacity Che	cks				Capacit	ty Ch	ecks			
	Actual	С	apacity	LOS F?			Actual	_	pacity	LOS F?
					V <sub>F</sub>		2152	Exhibit 13-	8 4800	No
$V_{FO}$		Exhibit 13-8			$V_{FO} = V_{F}$	- V <sub>R</sub>	2008	Exhibit 13-	8 4800	No
					$V_R$		144	Exhibit 13-1	0 2000	No
Flow Entering		ir .			Flow Er			ge Influen		
	Actual	<del>                                     </del>	Desirable	Violation?			Actual	Max Desira		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>		2152	Exhibit 13-8	4400:All	No
Level of Serv					+			terminatio		<i>F</i> )
$D_R = 5.475 + 0.$		0.0078 V <sub>12</sub> -	0.00627 L <sub>A</sub>					0086 V <sub>12</sub> - 0	.009 L <sub>D</sub>	
D <sub>R</sub> = (pc/mi/ln	•				I .,	8.3 <b>(pc</b>	•			
LOS = (Exhibit						•	oit 13-2)			
Speed Deterr	nination				Speed I					
$M_S = $ (Exibit 13)	3-11)				, and the second	-	xhibit 13-	-		
$S_{R}^{=}$ mph (Exh	ibit 13-11)				I '''		(Exhibit	· ·		
	ibit 13-11)				1 *	-	(Exhibit 1	•		
• • •	ibit 13-13)						(Exhibit	13-13)		
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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T				
General Information			Site Information					
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2017 Existing P Phase 1a F		Highway/Direction of Travel US 50 WB From/To Cambridge Rd/Off-Rad Jurisdiction El Dorado County Analysis Year 2017					
✓ Oper.(LOS)		D	es.(N)	Plar	nning Data			
Flow Inputs								
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	2006	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.96 1 0 Rolling mi				
Calculate Flow Adjus	tmonte		Up/Down %					
$f_p$ $E_T$	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 1)] 0.985				
Speed Inputs			Calc Speed Adj and					
Lane Width Rt-Side Lat. Clearance		ft ft			mph			
Number of Lanes, N Total Ramp Density, TRD	2 70.0	ramps/mi	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment		mph mph			
FFS (measured) Base free-flow Speed, BFFS		mph mph	FFS	70.0	mph			
LOS and Performanc	e Measures	<u> </u>	Design (N)					
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1060 70.0 15.1 B	pc/h/ln mph pc/mi/ln	Design (N) Design LOS  v <sub>p</sub> = (V or DDHV) / (PHF x  x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes		pc/h/ln mph pc/mi/ln			
Glossary			Factor Location					
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1			
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Site Information  Highway/Direction of Tra From/To Jurisdiction Analysis Year  Des.(N)  Peak-Hour Factor, PHF WTrucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain:	Silva Valle Ramp El Dorado 2017	ey Pkwy/Off-
Highway/Direction of Tra From/To Jurisdiction Analysis Year  Des.(N)  Peak-Hour Factor, PHF WTrucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain:	Silva Valle Ramp El Dorado 2017 Plann 0.96	ey Pkwy/Off- County
Peak-Hour Factor, PHF way Wrucks and Buses, P <sub>T</sub> way RVs, P <sub>R</sub> General Terrain:	0.96 1	ing Data
Peak-Hour Factor, PHF www.y WTrucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain:	0.96 1	ing Data
%Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain:	1	
%Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain:	1	
General Terrain:	7)	
Length	Grade 1.20mi	
·		
E <sub>R</sub>	1.2	
Calc Speed Adj and	I FFS	
f <sub>LW</sub> f <sub>LC</sub>		mph mph
FFS	70.0	mph mph
Design (N)		
x f <sub>p</sub> ) S	x N x f <sub>HV</sub>	pc/h/ln mph
$D = v_p / S$	es, N	pc/mi/ln
Factor Location		
E <sub>T</sub> - Exhibits 11-10, 11-1 f <sub>p</sub> - Page 11-18	1, 11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11
	General Terrain: Grade $-6.00\%$ Length $E_R$ $f_{HV} = 1/[1+P_T(E_T-1)+P_R(E_R)]$ Calc Speed Adj and $f_{LW}$ $f_{LC}$ TRD Adjustment $FFS$ Design (N) $Design LOS$ $V_p = (V \text{ or DDHV}) / (PHF)$ $X f_p)$ $S$ $D = V_p / S$ $Required \text{ Number of Lan}$ Factor Location $E_R - \text{Exhibits } 11-10, 11-1$ $E_T - \text{Exhibits } 11-10, 11-1$ $f_p - \text{Page } 11-18$ $LOS, S, FFS, V_p - \text{Exhibits}$	General Terrain: Grade Grade -6.00% Length $1.20mi$ Length $1.20mi$ Up/Down $-6.00$ $E_{R}                                    $

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		RAMP	S AND RAM	IP JUNCTI	ONS WO	ORKS	HEET			
General Infor	mation			Site Infor						
Analyst Agency or Company Date Performed	TKTF	PM	Ju	reeway/Dir of Tr unction urisdiction		US 50 Bass L El Dora		,		
Analysis Time Period		Existing PM	Aı	nalysis Year		2017				
Project Description	BLHSP Phase	1a Final Map								
Inputs		F	hanaf Lanaa N							
Upstream Adj R	amp	Ramp Numbe	ber of Lanes, N r of Lanes, N	2 1					Downstrea Ramp	m Adj
□Yes	On	Acceleration L	ane Length, L <sub>A</sub>						□Yes	☐ On
✓ No	Off		ane Length L <sub>D</sub>	500					✓No	Off
L <sub>up</sub> = f	t	Freeway Volume		3783					L <sub>down</sub> =	ft
$L_{up} = f$	L	Ramp Volume	• • • • • • • • • • • • • • • • • • • •	720					down	
V <sub>u</sub> = ve	eh/h		Flow Speed, S <sub>FF</sub>						V <sub>D</sub> =	veh/h
	// / /		ow Speed, S <sub>FR</sub>	35.0						
Conversion to		der Base (	Conditions	T	1				1	
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	_	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF	x f <sub>HV</sub> x f <sub>p</sub>
Freeway	3783	0.96	Rolling	2	0		971	1.00	405	
Ramp	720	0.96	Rolling	2	0	0.	971	1.00	77	3
UpStream DownStream		<del>                                     </del>								
Downstream		Merge Areas						Diverge Areas		
Estimation of		<b>.</b>			Estima	tion o				
	V <sub>12</sub> = V <sub>F</sub>	(P.,.)						V <sub>R</sub> + (V <sub>F</sub> - V <sub>I</sub>	-)P-p	
-F0 =		ation 13-6 or	13-7)		L=0 =			Equation 13-1		1
- <sub>EQ</sub> = - <sub></sub> =		Equation (E	•		L <sub>EQ</sub> = P <sub>FD</sub> =		-	000 using Eq	-	
S <sub>FM</sub> = V <sub>12</sub> =	pc/h	Equation (	EXHIBIT 13 0)		V <sub>12</sub> =			000 <b>using Eq</b> i 059 <b>pc/h</b>	uation (Exilia	JIL 13-7)
V <sub>12</sub> - V <sub>3</sub> or V <sub>av34</sub>	•	Equation 13	-14 or 13-17)		V <sub>12</sub> – V <sub>3</sub> or V <sub>av34</sub>			pc/h (Equatio	n 12 11 or	12 17)
v <sub>3</sub> or v <sub>av34</sub> Is V <sub>3</sub> or V <sub>av34</sub> > 2,70		-	-14 01 13-17)			< 2.7		Yes ☑ No	)   13-14 U	13-17)
Is $V_3$ or $V_{av34} > 2,70$ Is $V_3$ or $V_{av34} > 1.5$								Yes ✓ No		
			-16, 13-18, or					_ res ເ⊻⊓໙ oc/h (Equation	13-16 13-	18 or 13-
f Yes,V <sub>12a</sub> =	13-19)	•	10, 10 10, 01		If Yes,V <sub>12a</sub>		1	9)	10 10, 10	10, 01 10
Capacity Che	cks				Capaci	ty Ch	ecks			
	Actual	С	apacity	LOS F?			Actual	Ca	pacity	LOS F
					V <sub>F</sub>		4059	Exhibit 13-8	3 4800	No
$V_{FO}$		Exhibit 13-8			$V_{FO} = V$	<sub>F</sub> - V <sub>R</sub>	3286	Exhibit 13-8	4800	No
					$V_R$		773	Exhibit 13-1	0 2000	No
Flow Entering	Merge In	fluence A	rea	•	Flow E	nterin	g Dive	rge Influen	ce Area	•
	Actual	ir .	Desirable	Violation?			Actual	Max Desiral		Violation
$V_{R12}$		Exhibit 13-8			V <sub>12</sub>	4	1059	Exhibit 13-8	4400:All	No
Level of Serv	ice Detern	nination (	if not F)	•	Level o	f Ser	vice De	terminatio	n (if not l	=)
$D_R = 5.475 + 0.$						D <sub>R</sub> = 4	1.252 + 0	.0086 V <sub>12</sub> - 0.	009 L <sub>D</sub>	
		12			$D_R = 3$	34.7 (pc		12	5	
O <sub>R</sub> = (pc/mi/ln	•						oit 13-2)			
	13-2)							<u> </u>		
OS = (Exhibit					Speed	Deter				
OS = (Exhibit of Speed Determine)	nination				<b>Speed</b> D = 0					
Speed Determ M <sub>S</sub> = (Exhibit 13	<b>nination</b> 3-11)				$D_s = 0$	).498 <b>(</b> E	xhibit 13	-12)		
$S_{\rm COS} = (Exhibit)$ Speed Determine $M_{\rm S} = (Exibit)$ 13 $S_{\rm R} = (Exhibit)$ 13	mination 3-11) ibit 13-11)				$D_{S} = 0$ $S_{R} = 5$	).498 <b>(E</b> i6.1 mph	xhibit 13 (Exhibit	-12) 13-12)		
$Speed$ Determined $M_S = (Exhibit 13)$ $S_R = (Exhibit 13)$ $S_R = mph (Exhibit 13)$ $S_0 = mph (Exhibit 13)$	<b>nination</b> 3-11)				$D_{s} = 0$ $S_{R} = 5$ $S_{0} = N$	0.498 (E 66.1 mph J/A mph	xhibit 13	-12) 13-12) 13-12)		

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T		
General Information			Site Information			
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2017 Existing		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Rar	f-Ramp/On-Ramp Dorado County	
	SP Phase 1a F		) (NI)	□ Die	nning Data	
✓ Oper.(LOS)			Des.(N)	∟Pia	nning Data	
Flow Inputs Volume, V AADT Peak-Hr Prop. of AADT, K	3063	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub>	0.94 5 0		
Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	General Terrain: Grade % Length Up/Down %	Level mi		
Calculate Flow Adjus	tments					
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2 1)] 0.976		
Speed Inputs			Calc Speed Adj and	FFS		
Lane Width Rt-Side Lat. Clearance Number of Lanes, N	2	ft ft	f <sub>LW</sub>		mph mph	
Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	70.0	ramps/mi mph mph	TRD Adjustment FFS	70.0	mph mph	
LOS and Performanc	e Measures	<u> </u>	Design (N)			
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x l x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS		pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x } f_p)$ S $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln	
Glossary			Factor Location			
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1	

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		RAI	MPS AND	RAMP JUNG	CTIONS W	ORKSH	EET				
Genera	I Infor				Site Infor						
Analyst		TKTF	PM	Fr	eeway/Dir of Tr		US 50	EB			
Agency or (	Company	TKTF			nction		Bass L				
Date Perfor	. ,	10/2/	/2017	Ju	risdiction		El Dora	ado County			
Analysis Tir	me Period	2017	Existing PM	Ar	nalysis Year		2017	,			
Project Des	cription	BLHSP Phase	1a Final Map								
Inputs											
Upstream A	\dj Ramp		Freeway Num	ber of Lanes, N	2					Downstre	am Adj
			Ramp Number	r of Lanes, N	1					Ramp	
☐Yes	☐ On	l	Acceleration L	ane Length, L <sub>A</sub>	700					□Yes	On
✓ No	Off	f	Deceleration L	ane Length L <sub>D</sub>						✓No	Off
			Freeway Volu	me, V <sub>F</sub>	3063					INO	
-up =	ft		Ramp Volume	, V <sub>D</sub>	82					L <sub>down</sub> =	ft
				Flow Speed, S <sub>FF</sub>	70.0					l.	
/ <sub>u</sub> =	veh/h		1	ow Speed, S <sub>FR</sub>	35.0					V <sub>D</sub> =	veh/h
Conver	sion t	o nc/h Un		Conditions	33.0						
		<i>γ</i>			0/	0/ D		<u>,                                      </u>		\/DLI	
(pc/	n)	(Veh/hr)	PHF	Terrain	%Truck	%Rv		f <sub>HV</sub>	f <sub>p</sub>	V = V/PH	x f <sub>HV</sub> x f <sub>p</sub>
Freeway		3063	0.96	Rolling	2	0	0.	971	1.00	3	3286
Ramp		82	0.96	Rolling	2	0	0.	971	1.00		88
UpStream							_				
DownStrea	ım		Marga Arasa								
Estima	tion of		Merge Areas			Estimat	ion o	of v	verge Areas		
_Stillia						LStillat	.1011 0				
		$V_{12} = V_F$	(P <sub>FM</sub> )					$V_{12} = V$	' <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub>	()P <sub>FD</sub>	
-EQ =		(Equ	ation 13-6 or	13-7)		L <sub>EQ</sub> =		(E	Equation 13-	-12 or 13-1	3)
P <sub>FM</sub> =		1.000	using Equat	ion (Exhibit 13-6)		P <sub>FD</sub> =		u	sing Equatio	n (Exhibit 1	3-7)
/ <sub>12</sub> =		3286	pc/h			V <sub>12</sub> =		р	c/h		
V <sub>3</sub> or V <sub>av34</sub>		0 pc/l	h (Equation <sup>-</sup>	13-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>		р	c/h (Equation 1	13-14 or 13-1	17)
	,,,,, > 2,70	0 pc/h?		•			,34 > 2,7		Yes No		
0 4		V <sub>12</sub> /2 □ Ye							Yes No		
				3-16, 13-18, or					c/h (Equatio		3-18, or
Yes,V <sub>12a</sub>		13-19)				If Yes,V <sub>12a</sub> =		13	-19)` '	•	,
Capaci	ty Che	cks	5			Capacit	y Ch	ecks			
		Actual	С	apacity	LOS F?			Actual	<del></del>	pacity	LOS F?
						$V_{F}$			Exhibit 13-	8	
$V_{F}$	·O	3374	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V <sub>R</sub>		Exhibit 13-	8	
						V <sub>R</sub>			Exhibit 13	-	
<del>.      </del>		<u> </u>	<u> </u>					5.	10		
-low El	ntering		ofluence A		Violation?	Flow Er	_		ge Influer		
\/		Actual 3374	Exhibit 13-8	Desirable 4600:All	Violation? No	V <sub>12</sub>	+	Actual	Max Des Exhibit 13-8	Гаріе	Violation?
V <sub>R1</sub>					INO		<u> </u>	riaa Dad		/:£ a f	
			mination (i						erminatio	•	( <b>F</b> )
			0.0078 V <sub>12</sub> - 0.0	10627 L <sub>A</sub>					0086 V <sub>12</sub> - 0	.009 L <sub>D</sub>	
IX.	27.4 (pc/m	•				I	oc/mi/lı	•			
	C (Exhibit					<u> </u>	Exhibit	•			
Speed	Detern	nination				Speed I			n		
$M_{\rm S} = 0$	).386 (Exil	oit 13-11)				$D_s = (E_s)^T$	Exhibit 1	3-12)			
9		Exhibit 13-11)				$S_R = m$	ph (Exh	nibit 13-12)			
13		Exhibit 13-11)					ph (Exh	nibit 13-12)			
U		Exhibit 13-13)				ľ		nibit 13-13)			
	-		All Rights Passan	ed.			-			Generated: 1	0/2/2017 2:5
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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Т				
General Information			Site Information					
Analyst Agency or Company Date Performed Analysis Time Period Project Description BLHS	TKTPM TKTPM 10/2/2017 2017 Existing SP Phase 1a F		Highway/Direction of Travel US 50 EB From/To On-Ramp/Cambridge Jurisdiction El Dorado County Analysis Year 2017					
✓ Oper.(LOS)	or rhase ra r		es.(N)	□ Dlar	nning Data			
Flow Inputs			C5.(IV)	□ Flai	Illing Data			
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	3145	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0.96 1 0 Rolling mi				
Calculate Flow Adjus	tmonts		Op/Down %					
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 1)] 0.985				
Speed Inputs			Calc Speed Adj and	FFS				
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD	2 70.0	ft ft ramps/mi	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment		mph mph mph			
FFS (measured) Base free-flow Speed, BFFS		mph mph	FFS	70.0	mph			
LOS and Performanc	e Measures	<b>S</b>	Design (N)					
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x i x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1663 67.5 24.6 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS v <sub>p</sub> = (V or DDHV) / (PHF x x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes		pc/h/ln mph pc/mi/ln			
Glossary			Factor Location					
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11			
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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed	TKTPM TKTPM 10/2/2017		Highway/Direction of Trave From/To Jurisdiction	Off-Ran Pkwy	VB np/Silva Valley do County
Analysis Time Period  Project Description BLHS	2017 Existing SP Phase 1a F	g+Project AM	Analysis Year	2017	
✓ Oper.(LOS)	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		Pes.(N)	☐ Plar	nning Data
Flow Inputs			• ,		<u> </u>
Volume, V AADT	3772	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.96 1	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade -6.00% Length Up/Down %	0 Grade 1.20mi -6.00	
Calculate Flow Adjus	tments				
f <sub>p</sub> ⊏	1.00 1.5		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.0		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$		_
Speed Inputs		-	Calc Speed Adj and I	-F5	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N	2	ft ft	f <sub>LW</sub>		mph
Total Ramp Density, TRD		ramps/mi	f <sub>LC</sub> TRD Adjustment		mph mph
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph
LOS and Performance	e Measures	<b>S</b>	Design (N)		
Operational (LOS) v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> )	N x f <sub>HV</sub> 1974	pc/h/ln	Design (N) Design LOS v <sub>p</sub> = (V or DDHV) / (PHF x	N x f <sub>HV</sub>	pc/h/ln
S D = v <sub>p</sub> / S LOS	63.1 31.3 D	mph pc/mi/ln	x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes	s, N	mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11

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	RA	MPS AND	<b>RAMP JUN</b>	CTIONS W	ORKSH	EET				
General Info		• /	10 1111	Site Infor						
Analyst Agency or Compan Date Performed Analysis Time Peric	TKTI y TKTI 10/2/		Jı Jı	reeway/Dir of Tr unction urisdiction nalysis Year		US 50 W Bass Lak El Dorad 2017	ce Rd			
Project Description				-						
Inputs										
Jpstream Adj Ram <sub>l</sub>	)	Freeway Num Ramp Numbe	ber of Lanes, N r of Lanes, N	2 1					Downstre Ramp	am Adj
□ Yes □ O	'n	Acceleration L	ane Length, L <sub>A</sub>	700					□Yes	On
☑ No □ O	ff	Freeway Volu	Lane Length L <sub>D</sub> me, V <sub>F</sub>	2929					☑ No	Off
<sub>-up</sub> = ft		Ramp Volume	, V <sub>R</sub> -Flow Speed, S <sub>FF</sub>	843 70.0					L <sub>down</sub> =	ft
/ <sub>u</sub> = veh/		Ramp Free-Fl	ow Speed, S <sub>FR</sub>	35.0					V <sub>D</sub> =	veh/h
Conversion	1	<u>der Base (</u>	Conditions		1	-				
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		IV			F x f <sub>HV</sub> x f <sub>p</sub>
Freeway	2929	0.96	Rolling	2	0	0.9		1.00		3143
Ramp UpStream	843	0.96	Rolling	2	0	0.9	/1	1.00		904
DownStream		1				_				
50WHO (LOGH)		Merge Areas		<u>!</u>			Div	verge Areas	<u>!</u>	
Stimation o		<b>.</b>			Estimat	tion of	V <sub>12</sub>	<b>*</b>		
	V <sub>12</sub> = V <sub>F</sub>	(P)						<sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub>	)P	
=		ation 13-6 or	13_7)		l =			Equation 13-		13)
EQ =			ion (Exhibit 13-6)		L <sub>EQ</sub> = D _		-	sing Equation		-
/ <sub>FM</sub> = /			IOII (EXIIIDIL 13-0)	1	P <sub>FD</sub> =				MI (EXIIIDIL I	J-1)
/ <sub>12</sub> =	3143	•	10 11 10 17		V <sub>12</sub> =			c/h -//- /5	10.14 10.4	17\
/ <sub>3</sub> or V <sub>av34</sub>			13-14 or 13-17)	)	V <sub>3</sub> or V <sub>av34</sub>	2.70	-	c/h (Equation 1	13-14 01 13-	17)
Is $V_3$ or $V_{av34} > 2.7$								Yes No		
Is $V_3$ or $V_{av34} > 1.5$			10 10 10		Is V <sub>3</sub> or V <sub>av</sub>	<sub>v34</sub> > 1.5 ^		Yes No	- 10 10 1	0.40
Yes,V <sub>12a</sub> =	pc/n 13-19)		3-16, 13-18, or		If Yes,V <sub>12a</sub> :	=	рс 13-	c/h (Equatio 19)	n 13-16, 1	3-18, or
Capacity Ch		/			Capacit	ty Che		,		
, ,	Actual	С	apacity	LOS F?			Actual	Ca	pacity	LOS F?
					$V_{F}$			Exhibit 13-	8	
$V_{FO}$	4047	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V <sub>R</sub>		Exhibit 13-	8	
- FO	1017	EXHIBIT 13 0		140		- 1		Exhibit 13	-	
					V <sub>R</sub>			10		
low Enterin	<del> </del>	_		T	Flow E			ge Influen		
\/	Actual	1	Desirable	Violation?	.,	Ac	tual	Max Desi	irable T	Violation?
V <sub>R12</sub>	4047	Exhibit 13-8	4600:All	No	V <sub>12</sub>			Exhibit 13-8	 	
ALIAL AT CAP	vice Deterr							erminatio		: <b>F</b> )
	+ 0.00734 v <sub>R</sub> +	0.0078 V <sub>12</sub> - 0.0	00627 L <sub>A</sub>			$D_R = 4.2$	252 + 0.0	086 V <sub>12</sub> - 0	.009 L <sub>D</sub>	
D <sub>R</sub> = 5.475					$D_R = (I_R)$	pc/mi/ln)				
$D_{R} = 5.475$ $D_{R} = 32.2 \text{ (pc/s)}$							2 2)			
$D_{R} = 5.475$ $D_{R} = 32.2 \text{ (pc/s)}$					LOS = (I	Exhibit 1	3-2)			
$D_{R} = 5.475$ $D_{R} = 32.2 \text{ (pc/s)}$	t 13-2)				LOS = (I <b>Speed</b> I			າ		
$D_R = 5.475$ $D_R = 32.2 (pc/n)$ $D_R = D (Exhibit)$ <b>Speed Deter</b>	t 13-2)				Speed		ination	1		
$D_R = 5.475$ $D_R = 32.2 \text{ (pc/s)}$ $D_R = 32.2 \text{ (pc/s)}$ $D_R = D \text{ (Exhibit)}$	t 13-2)  mination  kibit 13-11)				<b>Speed</b> D <sub>s</sub> = (E	Detern	nination 12)	1		
$D_{R} = 5.475$ $D_{R} = 32.2 \text{ (pc/n}$ $D_{S} = D \text{ (Exhibition of the context)}$ $D_{R} = 0.495 \text{ (Exhibition of the context)}$ $D_{R} = 0.495 \text{ (Exhibition of the context)}$ $D_{R} = 0.495 \text{ (Exhibition of the context)}$	t 13-2)  mination  kibit 13-11)  (Exhibit 13-11)				<b>Speed</b> $D_s = (E_s)$	<b>Detern</b> Exhibit 13	nination 12) it 13-12)	1		
$D_{\rm R} = 5.475$ $D_{\rm R} = 32.2  ({\rm pc/r})$ $D_{\rm R} = 32.2  ({\rm pc/r})$ $D_{\rm R} = 0  ({\rm Exhibi})$ $D_{\rm R} = 0.495  ({\rm Exhibi})$	t 13-2)  mination  kibit 13-11)				$\begin{array}{ccc} \textbf{Speed I} \\ \textbf{D}_{\text{S}} = & (\textbf{I} \\ \textbf{S}_{\text{R}} = & \textbf{m} \\ \textbf{S}_{0} = & \textbf{m} \end{array}$	<b>Detern</b> Exhibit 13- nph (Exhib	nination 12) it 13-12) it 13-12)	1		

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description BLHS	TKTPM TKTPM 10/2/2017 2017 Existing SP Phase 1a F	g+Project AM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Rar	WB mp/On-Ramp ado County
✓ Oper.(LOS)	or rhase ia r		Des.(N)	□ Pla	nning Data
Flow Inputs			)es.(IV)	г іа	Tilling Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	2929	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0.94 5 0 Level mi	
Calculate Flow Adjus	tments		·		
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2 )] 0.976	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	2 70.0	ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performanc	e Measures	<u> </u>	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x   x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1597 68.2 23.4 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x } f_p)$ S $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11
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		RAMP	S AND RAI	MP JUNCTI	ONS WO	RKS	HEET			
General Infor	mation	10 1111	<u> </u>	Site Infor						
Analyst Agency or Company Date Performed Analysis Time Period	TKTF TKTF 10/2/: 2017	PM 2017 Existing+Proje	J	Freeway/Dir of Tr Junction Jurisdiction Analysis Year		US 50 Bass L El Dora 2017				
Project Description Inputs	BLHSP Phase	ia Finai Map								
		Erooway Num	ber of Lanes, N	2						
Upstream Adj R	amp	Ramp Numbe		1					Downstrea Ramp	am Adj
□Yes □	On		ane Length, L	'					l '	
	lor		ane Length L <sub>n</sub>	500					☐Yes	On
✓ No	Off	Freeway Volu	• 5	3044					☑ No	Off
L <sub>up</sub> = ft	ft Ramp Volume, V <sub>R</sub>								L <sub>down</sub> =	ft
	Freeway Free-Flow Speed S								\/ -	vab/b
$V_u = V_0$	= veh/h Ramp Free-Flow Speed, S <sub>FR</sub>								V <sub>D</sub> =	veh/h
Conversion to	pc/h Und		113							
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF	x f <sub>HV</sub> x f <sub>p</sub>
Freeway	3044	0.96	Rolling	2	0	0.	971	1.00	32	<u>1</u> 66
Ramp	115	0.96	Rolling	2	0	0.	971	1.00	1:	23
UpStream DownStream						+				
Downsteam	<u> </u>	Merge Areas					I	iverge Areas		
Estimation of		3			Estima	tion c		<b>.</b>		
$L_{EQ} = $ $P_{FM} = $ $V_{12} = $ $V_{3} \text{ or } V_{av34}$	using pc/h	tion 13-6 or Equation(E	•		L <sub>EQ</sub> = P <sub>FD</sub> = V <sub>12</sub> =		(E 1.0 32	$V_R + (V_F - V_I)$ Equation 13-1 000 using Equation 66 pc/h	l2 or 13-13 uation (Exhi	bit 13-7)
$^{3}$ 3 or $^{3}$ $^{4}$ $^{3}$ $^{4}$ $^{$	0 pc/h?	s  □ No s  □ No Equation 13	-16, 13-18, or		Is V <sub>3</sub> or V <sub>av</sub>	<sub>v34</sub> > 1.5 =	00 pc/h? * V <sub>12</sub> /2 p	pc/h (Equation  Yes ☑ No  Yes ☑ No  c/h (Equation  ))		
Capacity Che	1			1	Capaci	ty Ch				
	Actual		apacity	LOS F?	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		Actual	_	pacity	LOS F?
.,		F 1 11 11 40 0			V <sub>F</sub>		3266	Exhibit 13-8		No
V <sub>FO</sub>		Exhibit 13-8			$V_{FO} = V_{FO}$		3143	Exhibit 13-8	_	No
<u> </u>		<u> </u>			V <sub>R</sub>		123	Exhibit 13-1		No
Flow Entering	Actual	ir .	A <b>rea</b> Desirable	Violation?	FIOW EI	-	Actual	<b>rge Influen</b> Max Desiral		Violation?
V <sub>R12</sub>	ACIUAI	Exhibit 13-8	Desirable	Violations	V <sub>12</sub>		3266	Exhibit 13-8	4400:All	No
Level of Serv	ice Detern		if not F		<del></del>			terminatio		
$D_R = 5.475 + 0.1$								0086 V <sub>12</sub> - 0.		,
$D_R = (pc/mi/ln)$		12	-Д			-к 7.8 (рс		12	ото — <sub>О</sub>	
LOS = (Exhibit 1					l ''		oit 13-2)			
Speed Detern					Speed			n		
$M_S = $ (Exibit 13 $S_R = $ mph (Exh					$D_{S} = 0$ $S_{R} = 5$	.439 (E 7.7 mph	xhibit 13- (Exhibit (Exhibit 1	12) 13-12)		
	ibit 13-13)	All Rights Reserv	ved			7.7 mph	(Exhibit	13-13)	enerated: 10/2	2/2017 2:57 F

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Т	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description BLHS	TKTPM TKTPM 10/2/2017 2017 Existing SP Phase 1a F	g+Project AM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	Cambrid	VB dge Rd/Off-Ramp do County
✓ Oper.(LOS)	or rhase ra r		Des.(N)	□ Dlar	nning Data
Flow Inputs			765.(IV)		Illing Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	3044	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.96 1 0 Rolling mi	
			Up/Down %		
Calculate Flow Adjus	tments				
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 )] 0.985	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N	2	ft ft	f <sub>LW</sub> f <sub>LC</sub>		mph mph
Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	70.0	ramps/mi mph mph	TRD Adjustment	70.0	mph mph
LOS and Performanc	e Measures	5	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x l x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1609 68.1 23.6 C	pc/h/ln mph pc/mi/ln	Design (N)  Design LOS  v <sub>p</sub> = (V or DDHV) / (PHF x x f <sub>p</sub> )  S  D = v <sub>p</sub> / S  Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Т	
General Information			Site Information		
Analyst	TKTPM		Highway/Direction of Trave	I US 50 E	EB
Agency or Company	TKTPM		From/To	Silva Va	alley Pkwy/Off-
Date Performed	10/2/2017		Jurisdiction	Ramp Fl Dora	do County
Analysis Time Period		g+Project AM	Analysis Year	2017	ao ooaniy
Project Description BLHS	SP Phase 1a F	inal Map			
✓ Oper.(LOS)			es.(N)	☐ Plar	nning Data
Flow Inputs					
Volume, V	1766	veh/h	Peak-Hour Factor, PHF	0.96	
AADT		veh/day	%Trucks and Buses, P <sub>T</sub>	1	
Peak-Hr Prop. of AADT, K			%RVs, P <sub>R</sub>	0	
Peak-Hr Direction Prop, D			General Terrain: Grade -6.00%	Grade	
DDHV = AADT x K x D		veh/h	Length	1.20mi	
			Up/Down %	-6.00	
Calculate Flow Adjus	tments				
$f_p$	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	)] 0.995	
Speed Inputs			Calc Speed Adj and I		
Lane Width		ft	Caro opoda / taj arra :		
Rt-Side Lat. Clearance		ft			
Number of Lanes, N	2	11	f <sub>LW</sub>		mph
Total Ramp Density, TRD	2	rompo/mi	f <sub>LC</sub>		mph
	70.0	ramps/mi	TRD Adjustment		mph
FFS (measured) Base free-flow Speed,	70.0	mph	FFS	70.0	mph
BFFS		mph			
LOS and Performanc	e Measures	<u> </u>	Design (N)		
			Design (N)		
<u>Operational (LOS)</u>			Design LOS		
$v_p = (V \text{ or DDHV}) / (PHF x)$	N x f <sub>HV</sub> 924	pc/h/ln	$v_p = (V \text{ or DDHV}) / (PHF x)$	N x funz	
x f <sub>p</sub> )	<b>5</b>	p 3/11/111	x f <sub>p</sub> )	HV	pc/h/ln
S	70.0	mph	S		mph
D = v <sub>p</sub> / S	13.2	pc/mi/ln	$D = v_p / S$		pc/mi/ln
LOS	В		Required Number of Lanes	· NI	ролили
Classer			<u> </u>	, IN	
Glossary	0 0		Factor Location		
N - Number of lanes	S - Spee		E <sub>R</sub> - Exhibits 11-10, 11-12		f <sub>LW</sub> - Exhibit 11-8
V - Hourly volume	D - Dens	-	E <sub>T</sub> - Exhibits 11-10, 11-11,	11-13	f <sub>LC</sub> - Exhibit 11-9
v <sub>p</sub> - Flow rate		e-flow speed	f <sub>p</sub> - Page 11-18		TRD - Page 11-11
LOS - Level of service speed	BFFS - Ba	ase free-flow	LOS, S, FFS, v <sub>p</sub> - Exhibits	11-2,	
DDHV - Directional design	hour volume		11-3		
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		RAMP	S AND RAN	<u>/IP JUNCTI</u>	<u>ONS W</u> O	<u>RKSI</u>	<u>IEET</u>			
General Info	rmation			Site Infor	mation					
Analyst	TKTF	PM	F	reeway/Dir of Tr	avel	US 50 E	B			
agency or Compan	ny TKTF	PM	J	unction		Bass La	ke Rd			
Date Performed	10/2/	/2017	J	urisdiction		El Dora	do County	1		
analysis Time Perio	od 2017	Existing+Proje	ct AM A	Analysis Year		2017				
Project Description	BLHSP Phase	1a Final Map								
nputs										
Upstream Adj	Damn	Freeway Num	per of Lanes, N	2					Downstrea	am Adi
Opsilealii Auj	Kanip	Ramp Number	of Lanes, N	1					Ramp	ani Auj
☐Yes	On		ane Length, L <sub>₄</sub>	•					_	
			- 7	F00					∐Yes	On
✓ No	Off	Deceleration L	- 5	500					✓ No	Off
	_	Freeway Volur	•	1766						<b>C</b> 1
L <sub>up</sub> =	ft	Ramp Volume	, V <sub>R</sub>	270					L <sub>down</sub> =	ft
		Freeway Free-	Flow Speed, S <sub>FF</sub>	70.0					V <sub>D</sub> =	veh/h
$V_{u} = $	veh/h	Ramp Free-Flo	ow Speed, S <sub>ED</sub>	35.0					v <sub>D</sub> –	VC11/11
Conversion	to nc/h l ln	•	· 11X							
	V PC/II OII		Jonations	1	T T	Т.		1 . 1		
(pc/h)	(Veh/hr)	PHF	Terrain	%Truck	%Rv	f	HV	f <sub>p</sub>	v = V/PHF	x t <sub>HV</sub> x f <sub>p</sub>
Freeway	1766	0.96	Rolling	2	0	0.9	71	1.00	18	395
Ramp	270	0.96	Rolling	2	0	0.9		1.00		90
JpStream	+	1		<del>                                     </del>		<del>                                     </del>				
DownStream	1	1		1						
		Merge Areas					l	Diverge Areas		
Estimation o	of V <sub>12</sub>				Estimat	ion o	F V <sub>12</sub>			
	<u></u>	(D )						- \/ _ + (\/ _ \/	\D	
	$V_{12} = V_F$				l.			$= V_R + (V_F - V_F)$		
EQ =		ation 13-6 or	•		L <sub>EQ</sub> =			Equation 13-1		-
P <sub>FM</sub> =	using	Equation (E	xhibit 13-6)		P <sub>FD</sub> =		1.	.000 using Equ	uation (Exh	ibit 13-7)
/ <sub>12</sub> =	pc/h				V <sub>12</sub> =		1	895 <b>pc/h</b>		
$V_3$ or $V_{av34}$	pc/h (	Equation 13-	14 or 13-17)		$V_3$ or $V_{av34}$		0	pc/h (Equation	n 13-14 o	r 13-17)
Is $V_3$ or $V_{av34} > 2.7$	/00 pc/h?	s 🗆 No			Is V <sub>3</sub> or V <sub>av</sub>	<sub>34</sub> > 2,70	0 pc/h? [	☐Yes ☑ No		
Is $V_3$ or $V_{av34} > 1.5$								 ☐Yes ☑ No		
0 4.0.			16, 13-18, or		0 0	0.		oc/h (Equation	13-16, 13	-18. or 13
Yes,V <sub>12a</sub> =	13-19)		.0, .0 .0, 0.		If Yes,V <sub>12a</sub> =	=		9)		.0, 00
Capacity Ch	ecks				Capacit	y Che	cks			
•	Actual	C	apacity	LOS F?			Actual	Ca	pacity	LOS F
			•		V <sub>F</sub>		1895	Exhibit 13-8	1	No
$V_{FO}$		Exhibit 13-8			$V_{FO} = V_{F}$	- \/	1605	Exhibit 13-8		No
*FO		LATIIDIL 13-0			-	- <b>v</b> R		_	+	
					V <sub>R</sub>		290	Exhibit 13-1		No
Flow Enterin	ng Merge In	ifluence A	rea		Flow En	terin	g Dive	rge Influen	ce Area	
	Actual		Desirable	Violation?		A	ctual	Max Desirab	ole	Violation
$V_{R12}$		Exhibit 13-8			V <sub>12</sub>	1	395	Exhibit 13-8	4400:All	No
Level of Ser	vice Deterr	nination (i	f not F	-	+	Serv	ice De	termination	n (if not	F)
D <sub>R</sub> = 5.475 + 0								.0086 V <sub>12</sub> - 0.		,
	• • • • • • • • • • • • • • • • • • • •	12	A					12 0.	υ U	
	•					6.0 <b>(pc/</b> i	•			
) <sub>R</sub> = (pc/mi/l	( 1 <b>3-</b> 2)				+	(Exhib				
$O_R = \frac{1}{100}$ (pc/mi/l $OS = \frac{1}{100}$ (Exhibit	-				Speed L	Deterr	ninatio	on		
$O_R = \frac{1}{100}$ (pc/mi/l $OS = \frac{1}{100}$ (Exhibit	-									
O <sub>R</sub> = (pc/mi/l OS = (Exhibit Speed Deter	rmination				D <sub>s</sub> = 0.	454 <b>(E</b> x	hibit 13	-12)		
$O_R = (pc/mi/l)$ OS = (Exhibit) OS = (Exhibit) OS = (Exhibit)	rmination 13-11)				J.	-		-		
$D_{\rm R}$ = (pc/mi/l $D_{\rm R}$ = (Exhibit) $D_{\rm R}$ = (Exhibit) $D_{\rm R}$ = (Exhibit) $D_{\rm R}$ = mph (Exhibit)	rmination 13-11) khibit 13-11)				$S_R = 57$	7.3 mph	(Exhibit	13-12)		
$D_{\rm R}$ = (pc/mi/l $D_{\rm R}$ = (Exhibit $D_{\rm R}$ = (Exhibit $D_{\rm R}$ = (Exhibit $D_{\rm R}$ = mph (Exhibit $D_{\rm R}$ = mph (Exhibit)	rmination 13-11)				$S_{R} = 57$ $S_{0} = N/$	7.3 mph /A mph (		13-12) 13-12)		

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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	ΪT	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description <i>BLH</i> S	TKTPM TKTPM 10/2/2017 2017 Existing SP Phase 1a F	g+Project AM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Rar	EB mp/On-Ramp ado County
✓ Oper.(LOS)	or rhase ta i		Des.(N)	□ Dle	nning Data
Flow Inputs			765.(IV)	∟Гіа	Illillig Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	1496	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.94 5 0 Level mi	
Calculate Flow Adjus	tmonte		Up/Down %		
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2 1)] 0.976	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	2 70.0	ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performanc	e Measures	5	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 816 70.0 11.7 B	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x } f_p)$ S $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11

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		RAI	MPS AND	RAMP JUN	<u>CTIONS</u> W	ORKSH	<u>EET</u>			
Genera	l Inforr				Site Infor					
Analyst		TKTF	PM	Fr	eeway/Dir of Tr	avel	US 50 EB			
Agency or (	Company	TKTF	PM	Ju	ınction		Bass Lake Rd			
Date Perfor		10/2/			ırisdiction		El Dorado Coun	ty		
Analysis Tir			Existing+Proje	ct AM Ar	nalysis Year		2017			
	scription	BLHSP Phase	1a Final Map							
Inputs			1							
Jpstream A	Adj Ramp			ber of Lanes, N	2				Downstre	eam Adj
			Ramp Number	r of Lanes, N	1				Ramp	
Yes	☐ On		Acceleration L	ane Length, L <sub>A</sub>	700				□Yes	On
✓ No	☐ Off		Deceleration L	ane Length L <sub>D</sub>					I No	_
			Freeway Volui	me, V <sub>F</sub>	1496				✓ No	Off
- <sub>up</sub> =	ft		Ramp Volume		146				$L_{down} =$	ft
				Flow Speed, S <sub>FF</sub>	70.0				L.	
√ <sub>u</sub> =	veh/h			ow Speed, S <sub>FR</sub>	35.0				$V_D =$	veh/h
0	! 4-	/l-      -			33.0					
Jonver	SION to	y pc/n Uni	der Base (	Conditions	1		<del></del>	1		
(pc/	/h)	v (Veh/hr)	PHF	Terrain	%Truck	%Rv	$f_{HV}$	f <sub>p</sub>	v = V/PH	$F \times f_{HV} \times f_{F}$
Freeway		1496	0.96	Rolling	2	0	0.971	1.00		1605
Ramp		146	0.96	Rolling	2	0	0.971	1.00		157
UpStream				J						
DownStrea	am									
			Merge Areas					Diverge Areas	S	
Estima	tion of	v <sub>12</sub>				Estimat	ion of v <sub>12</sub>			
		V <sub>12</sub> = V <sub>F</sub>	(P <sub>EM</sub> )				V <sub>12</sub> =	V <sub>R</sub> + (V <sub>F</sub> - \	/ <sub>B</sub> )P <sub>ED</sub>	
L <sub>EQ</sub> =			ation 13-6 or	13-7)		L <sub>EQ</sub> =	12	(Equation 1		13)
P <sub>FM</sub> =				ion (Exhibit 13-6)		P <sub>FD</sub> =		using Equa		
<sub>12</sub> =		1605		ion (Eximol 10 0)		V <sub>12</sub> =		pc/h		,
12 / <sub>3</sub> or V <sub>av34</sub>			•	13-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>		pc/h (Equatio	n 12 14 or 12	17)
	> 2.700	-		13-14 01 13-17)			> 2.700 pc/b2			17)
		pc/h? TYe					34 > 2,700 pc/h?			
		V <sub>12</sub> /2 □ Ye		3-16, 13-18, or			$_{34} > 1.5 * V_{12}/2$			12 10 or
f Yes,V <sub>12a</sub>	=	13-19)		5-10, 13-10, 01		If Yes,V <sub>12a</sub> =	= .	- pc/ii (⊑quai 13-19)	1011 13-10, 1	13-10, 01
Capaci	tv Che					Capacit	y Checks	10 10)		
		Actual	С	apacity	LOS F?		Actua	(	Capacity	LOS F
			1 1	1 3		V <sub>F</sub>		Exhibit 1		
		47.0			l	$V_{FO} = V_{F}$	- \/	Exhibit 1		
$V_{F}$	·o	1762	Exhibit 13-8		No		*R	Exhibit 1		
						V <sub>R</sub>		10	13-	
Flow E	nterina	Merae In	fluence A	rea		Flow Er	ntering Dive	erae Influe	ence Area	<del></del>
	Ĭ	Actual		Desirable	Violation?	T	Actual		esirable	Violation
$V_{R1}$	12	1762	Exhibit 13-8	4600:All	No	V <sub>12</sub>		Exhibit 13-8		
		ce Detern	nination (i		1		f Service D			t F)
			0.0078 V <sub>12</sub> - 0.0				D <sub>R</sub> = 4.252 +		<u> </u>	/
	4.8 (pc/mi/		00.0 • 12 0.0	A			• •	12	D	
	-						oc/mi/ln)			
	3 (Exhibit 1					<u> </u>	Exhibit 13-2)	-		
Speed	Determ	ination				<del>  '                                   </del>	Determinati	ion		
$M_S = 0$	).295 (Exib	it 13-11)				$D_s = (E_s)^T$	Exhibit 13-12)			
	1.7 mnh /[	Exhibit 13-11)				$S_R = m$	ph (Exhibit 13-12	2)		
	) 1.7 HIPH (I	_AIIIDIL IO III				18				
$S_R = 6$						1 ''	ph (Exhibit 13-12	2)		
$S_R = 6$ $S_0 = 1$	I/A mph (E	Exhibit 13-11) Exhibit 13-13)				$S_0 = m$	ph (Exhibit 13-12 ph (Exhibit 13-13			

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T			
General Information			Site Information				
Analyst Agency or Company Date Performed Analysis Time Period Project Description <i>BLHS</i>	TKTPM TKTPM 10/2/2017 2017 Existin SP Phase 1a F	g+Project AM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	On-Ran	On-Ramp/Cambridge Rd El Dorado County		
✓ Oper.(LOS)	or rhase ta i		Des.(N)	□ Dlor	nning Data		
Flow Inputs			765.(IV)		Illing Data		
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	1642	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.96 1 0 Rolling mi			
Onlandate Flandation	11-		Up/Down %				
Calculate Flow Adjus  fp  ET	1.00 2.5		$E_{R}$ $f_{HV} = 1/[1+P_{T}(E_{T}-1) + P_{R}(E_{R}-1)]$	2.0			
Speed Inputs	2.0		Calc Speed Adj and				
Lane Width		ft	- Care opeca / taj ana i				
Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	2 70.0	ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph		
LOS and Performanc	e Measures	<u> </u>	Design (N)				
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x l x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS		pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x } f_p)$ S $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln		
Glossary			Factor Location				
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1		

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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst	TKTPM		Highway/Direction of Trave	I US 50 V	VB
Agency or Company	TKTPM		From/To		np/Silva Valley
Date Performed	10/2/2017		Jurisdiction	Pkwy El Dorad	do County
Analysis Time Period		g+Project PM	Analysis Year	2017	
Project Description BLHS	SP Phase 1a F	inal Map			
✓ Oper.(LOS)			es.(N)	Plar	ning Data
Flow Inputs					
Volume, V	2221	veh/h	Peak-Hour Factor, PHF	0.96	
AADT		veh/day	%Trucks and Buses, P <sub>T</sub>	1	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D			%RVs, P <sub>R</sub> General Terrain:	0 Grade	
• *		la //a	Grade -6.00%		
DDHV = AADT x K x D		veh/h	Length	1.20mi	
			Up/Down %	-6.00	
Calculate Flow Adjus	tments				
$f_p$	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	)] <i>0.995</i>	
Speed Inputs			Calc Speed Adj and I	FFS	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	$f_{LW}$		mph
Number of Lanes, N	2		f <sub>LC</sub>		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	•
Base free-flow Speed,			ILLO	70.0	mph
BFFS		mph			
LOS and Performanc	e Measures	<u> </u>	Design (N)		
Operational (LOS)			<u>Design (N)</u>		
$v_p = (V \text{ or DDHV}) / (PHF x)$	N x f		Design LOS		
x f <sub>p</sub> )	1163	pc/h/ln	$v_p = (V \text{ or DDHV}) / (PHF x)$	$Nxf_{HV}$	pc/h/ln
S	70.0	mph	x f <sub>p</sub> )		po/11/111
D = v <sub>p</sub> / S	16.6	pc/mi/ln	S		mph
LOS	70.0 B	рс/пп/п	$D = v_p / S$		pc/mi/ln
LUS	Ь		Required Number of Lanes	s, N	
Glossary			Factor Location		
N - Number of lanes	S - Spee	ed	E Evhibite 11 10 11 10		f Eyhihit 11 0
V - Hourly volume	D - Dens		E <sub>R</sub> - Exhibits 11-10, 11-12	11 12	f <sub>LW</sub> - Exhibit 11-8
v <sub>n</sub> - Flow rate		e-flow speed	E <sub>T</sub> - Exhibits 11-10, 11-11,	11-13	f <sub>LC</sub> - Exhibit 11-9
LOS - Level of service		ase free-flow	f <sub>p</sub> - Page 11-18	44.0	TRD - Page 11-11
speed			LOS, S, FFS, v <sub>p</sub> - Exhibits	11-2,	
DDHV - Directional design	hour volume		11-3		
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		RAI	MPS AND	<b>RAMP JUN</b>	CTIONS W	ORKSH	EET				
Genera	l Infori		3	<b></b>	Site Infor						
Analyst Agency or ( Date Perfor Analysis Tir	Company med	TKTF TKTF 10/2/:	PM	Jı Jı	reeway/Dir of Tr unction urisdiction nalysis Year		US 50 V Bass La El Dora 2017				
	cription	BLHSP Phase	1a Final Map								
Inputs											
Jpstream A	Adj Ramp		Freeway Num Ramp Numbe	ber of Lanes, N r of Lanes, N	2 1					Downstre Ramp	am Adj
Yes	☐ On			ane Length, L <sub>A</sub>	700	0 Yes					On
✓ No	☐ Off		Freeway Volui	Lane Length L <sub>D</sub> me, V <sub>F</sub>	1872					☑ No	Off
up =	ft		Ramp Volume	, V <sub>R</sub> -Flow Speed, S <sub>FF</sub>	349 70.0					L <sub>down</sub> =	ft
/ <sub>u</sub> =	veh/h		1	ow Speed, S <sub>FR</sub>	35.0					V <sub>D</sub> =	veh/h
Conver	sion to	pc/h Und	der Base (	Conditions	,						
(pc/	'h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		f <sub>HV</sub>	f <sub>p</sub>	v = V/PHI	x f <sub>HV</sub> x f <sub>p</sub>
Freeway		1872	0.96	Rolling	2	0		971	1.00		2009
Ramp		349	0.96	Rolling	2	0	0.9	971	1.00		374
JpStream DownStrea	am.						+				
JOWII Sti Ca			Merge Areas		<u> </u>			Di	verge Areas		
Stima	tion of	V <sub>12</sub>	3			Estima	tion o	f v <sub>12</sub>			
		V <sub>12</sub> = V <sub>F</sub>	( P)						<sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub>	\P	
_ =			ation 13-6 or	13_7)		l =			Equation 13-		3)
EQ =		-		ion (Exhibit 13-6)	١	L <sub>EQ</sub> = P =		-	sing Equation		-
' <sub>FM</sub> = ' _		2009		IOTT (EXTIIDIT 13-0)	)	P <sub>FD</sub> =			o/h	MI (EXIIIDIL I	3 7)
/ <sub>12</sub> =				10 11 10 17	`	V <sub>12</sub> =		•	c/h (Equation 1	12 14 or 12 1	١٦١
or V <sub>av34</sub>	> 2.700			13-14 or 13-17	)	V <sub>3</sub> or V <sub>av34</sub>	. 27	-		13-14 01 13-	17)
		) pc/h? Yes							Yes No		
		V <sub>12</sub> /2		3-16, 13-18, or					Yes ☐ No c/h (Equatio	n 12 16 1	2 10 or
Yes,V <sub>12a</sub>	=	13-19)		5-10, 13-10, 01		If Yes,V <sub>12a</sub>	=		-19)	11 13-10, 1	J-10, OI
Capaci	ty Che	cks				Capacia	ty Che	ecks	·		
		Actual	С	apacity	LOS F?			Actual		pacity	LOS F?
						$V_{F}$			Exhibit 13-	8	
$V_{F}$	.	2383	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V <sub>R</sub>		Exhibit 13-	8	
•	Ĭ					V <sub>R</sub>			Exhibit 13	- ]	
			<u> </u>					D'	10	<u> </u>	
-iow Ei	ntering	Actual	fluence A	Desirable	Violation?	FIOW EI	-	g Diverg	<b>ge Influer</b> Max Desi		Violation?
V <sub>R1</sub>		2383	Exhibit 13-8	4600:All	No	V <sub>12</sub>	+ '	ictuai	Exhibit 13-8	iable	v iolation?
			nination (		NO		f Son	ico Dot	erminatio	n (if not	. <b>_</b> 1
			).0078 V <sub>12</sub> - 0.0			-			0086 V <sub>12</sub> - 0		1)
			7.0070 V <sub>12</sub> - 0.0	00027 L <sub>A</sub>					7000 V <sub>12</sub> - 0	.003 L <sub>D</sub>	
11	9.5 (pc/mi.					., ,,	pc/mi/lr	•			
	3 (Exhibit 1						Exhibit				
		ination						<u>minatio</u>	<u> </u>		
$M_{\rm S} = 0$	.314 (Exib	it 13-11)				_ ~	Exhibit 1				
$S_R = 6$	1.2 mph (I	Exhibit 13-11)				I ''		ibit 13-12)			
$S_0 = N$		xhibit 13-11)				$S_0 = m$	nph (Exh	ibit 13-12)			
5 = 6	1.2 mph (I	Exhibit 13-13)				S = m	nph (Exh	ibit 13-13)			

General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period		g+Project PM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Ran	VB np/On-Ramp do County
	SP Phase 1a F				
✓ Oper.(LOS)			Des.(N)	∐Plar	nning Data
Flow Inputs	4070		D 1 11 E 1 DIE		
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	1872	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.94 5 0 Level mi	
Calculate Flow Adius	tmonto		Up/Down %		
Calculate Flow Adjus	1.00		E <sub>R</sub>	1.2	
f <sub>p</sub> E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$		
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	$f_{LW}$		mph
Number of Lanes, N	2		f <sub>LC</sub>		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS		mph		70.0	тіріі
LOS and Performanc	e Measures		Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x t x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1021 70.0 14.6 B	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x } f_p)$ S $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

TKTP TKTP 10/2/2 2017 BLHSP Phase	M M		Site Infor	mation					
TKTP TKTP 10/2/2 2017	M		reeway/Dir of Tra	-					
10/2/2 2017		lı .	,	avel	US 50	WB			
2017	2017		unction			ake Rd			
			urisdiction			ado County	1		
BLHSP Phase	Existing+Proje	ct PM A	nalysis Year		2017				
	Ta Final Map								
	Freeway Num	ber of Lanes, N	2						
iiib l	Ramp Number		1					Downstrea Ramp	m Adj
A	•		I					l '	_
								On	
O11		- 5	500					<b>☑</b> No	Off
	Freeway Volui	•	2051					l. =	ft
		• • • • • • • • • • • • • • • • • • • •						-down	
n/n i								V <sub>D</sub> =	veh/h
		110	35.0						
	ler Base (	Conditions	i	1					
•	PHF	Terrain	%Truck	%Rv		$f_{HV}$	$f_p$	v = V/PHF	$x f_{HV} x f_{p}$
2051	0.96	Rolling	2	0	0	.971	1.00	220	)1
179	0.96	Rolling	2	0	0	.971	1.00	19	2
		-							
	lerge Areas			Ectimo	tion (		Diverge Areas		
				ESUIIIa	uon				
(Equa	tion 13-6 or	13-7)		L <sub>EQ</sub> =		(	Equation 13-1	2 or 13-13)	
using	Equation (E	Exhibit 13-6)		P <sub>FD</sub> =		1.	000 using Equ	uation (Exhib	it 13-7)
pc/h				V <sub>12</sub> =		22	201 <b>pc/h</b>		
pc/h (E	Equation 13	-14 or 13-17)		$V_3$ or $V_{av34}$		0	pc/h (Equation	on 13-14 or	13-17)
				Is V <sub>3</sub> or V <sub>av</sub>	<sub>v34</sub> > 2,	700 pc/h? [	☐Yes ☑ No		
V <sub>12</sub> /2 □ Yes	s □ No			Is V <sub>3</sub> or V <sub>av</sub>	<sub>v34</sub> > 1.5				
	Equation 13-	-16, 13-18, or		If Yes,V <sub>12a</sub>	=			13-16, 13-	18, or 13-
							9)		
	С	apacity	LOS F?		ty On	r	Ca	pacity	LOS F
		-		V <sub>E</sub>			<del></del>		No
	Evhihit 13-8							+	No
	EXHIBIT 13 0						_		No
Maraala	fluoros A	<b>***</b>							NU
			Violation?	FIOW E					Violation
7 lotadi		Desirable	Violation.	Via				r -	No
ce Detern		if not F							
									<i>)</i>
	12	A					11200 112 0.	- <b></b> D	
3-2)						•			
							<u> </u>		
					-		•		
· ·					-	•	· ·		
•				1	-	•	•		
bit 13-13) sity of Florida, A				$S = 5$ $HCS2010^{TM}$		-		enerated: 10/2/	
	v (Veh/hr) 2051 179  V12  V12  V12 = VF (Equal using pc/h (Equal u	h/h Freeway Free- Ramp Free-File  P pc/h Under Base ( V (Veh/hr) PHF   2051 0.96   179 0.96    Merge Areas  V12  V12 = VF (PM) (Equation 13-6 or using Equation (Epc/h pc/h (Equation 13-13-19)  P pc/h Yes No pc/h (Equation 13-13-19)  CKS  Actual C  Exhibit 13-8  Merge Influence A Actual Max Exhibit 13-8  CE Determination (Epc/h pc/h Pc/h (Equation 13-13-19)  CKS  Actual Max Exhibit 13-8  CE Determination (Epc/h pc/h Pc/h (Equation 13-13-19)  CH Private Priva	Ramp Free-Flow Speed, S <sub>FR</sub>   Dech Under Base Conditions     V	h/h   Freeway Free-Flow Speed, S <sub>FF</sub>   70.0   Ramp Free-Flow Speed, S <sub>FR</sub>   35.0   PC/h Under Base Conditions   V	Freeway Free-Flow Speed, SFR   35.0	Freeway Free-Flow Speed, S <sub>FF</sub>   70.0   Ramp Free-Flow Speed, S <sub>FR</sub>   35.0     Poc/h Under Base Conditions   V   (Veh/hr)   PHF   Terrain   %Truck   %Rv     2051   0.96   Rolling   2   0   0     179   0.96   Rolling   2   0   0     Merge Areas   Estimation   V   V12 = VF (PFM)     (Equation 13-6 or 13-7)   Using Equation (Exhibit 13-6)   PFD     pc/h   pc/h   Y12 = No   Is V3 or	Freeway Free-Flow Speed, S   To, 0   Ramp Free-Flow Speed, S   Ramp Free-Flow Speed Service Development Speed Determination, Speed, S   Ramp Free-Flow Spee	h/h Freeway Free-Flow Speed, S <sub>FR</sub> 35.0  **Poc/h Under Base Conditions**  V (Veh/hr) PHF Terrain %Truck %Rv fHV fp  2051 0.96 Rolling 2 0 0.971 1.00  179 0.96 Rolling 2 0 0.971 1.00  **Merge Areas**  **Poc/h Under Base Conditions**  **V12**  **W12**  **V12**  **V2**  **V2**  **V30**  **V30**  *V30**  *	h/h Freeway Free-Flow Speed, S <sub>FF</sub> 35.0    No   No   No   No   No   No   No   N

General Information			Site Information				
Analyst Agency or Company Date Performed Analysis Time Period		g+Project PM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	VB Ige Rd/Off-Ramp Io County			
	SP Phase 1a F		A (A1)		with a Data		
✓ Oper.(LOS)  Flow Inputs		L	Pes.(N)	Pian	ining Data		
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	2051	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.96 1 0 Rolling mi			
Oala lata Flan Aulina	1 1 -		Up/Down %				
<u>Calculate Flow Adjus</u> <sup>f</sup> p E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 1)] 0.985			
Speed Inputs			Calc Speed Adj and	FFS			
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS  LOS and Performance Operational (LOS)		ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS  Design (N) Design (N) Design LOS	70.0	mph mph mph mph		
$v_p = (V \text{ or DDHV}) / (PHF x I)$ $x f_p$ S $D = v_p / S$ LOS	70.0 15.5 B	pc/h/ln mph pc/mi/ln	$v_p = (V \text{ or DDHV}) / (PHF x x f_p)$ S D = $v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln		
Glossary			Factor Location				
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1		

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	BASIC FRI	EWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2017 Existing	ŋ+Project PM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	Silva Va Ramp	EB Illey Pkwy/Off- do County
	P Phase 1a Fi	_	·		
✓ Oper.(LOS)			Des.(N)	Plar	ning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K	3860	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub>	0.96 1 0	
Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	General Terrain: Grade -6.00% Length Up/Down %	Grade 1.20mi -6.00	
Calculate Flow Adjus	tments				
f <sub>p</sub>	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$		
Speed Inputs			Calc Speed Adj and F	-FS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N	2	ft ft	$f_{LW}$ $f_{LC}$		mph mph
Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	70.0	ramps/mi mph mph	TRD Adjustment FFS	70.0	mph mph
LOS and Performance	e Measures	i	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>p</sub> ) S D = v <sub>p</sub> / S	N x f <sub>HV</sub> 2020 62.2 32.5	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x f}_p)$ S	N x f <sub>HV</sub>	pc/h/ln mph
Los	D	·	D = v <sub>p</sub> / S Required Number of Lanes	s, N	pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design I	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11

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		RAMP	S AND RAM	P JUNCTI	ONS WO	RKS	HEET			
General Infor	mation			Site Infor	mation					
Analyst	TKTI	PM	Fr	eeway/Dir of Tr	avel	US 50	EB			
Agency or Company	TKTI	PM		nction		Bass L	ake Rd			
Date Performed		/2017		risdiction			ado County			
Analysis Time Period		Existing+Proje	ect PM Ar	nalysis Year		2017				
Project Description Inputs	BLHSP Phase	i Ta Finai Map								
		Erooway Num	nber of Lanes, N	2						
Upstream Adj R	Ramp	1 1		_					Downstrea	ım Adj
□Yes□	On	Ramp Numbe		1					Ramp	
	_ 011	1	ane Length, L <sub>A</sub>						☐Yes	On
✓ No	Off	1	Lane Length L <sub>D</sub>	500					✓No	Off
	_	Freeway Volu	•	3860					<b>I</b> .	
$L_{up} = f$	t	Ramp Volume	e, V <sub>R</sub>	797					L <sub>down</sub> =	ft
V, = v	eh/h	Freeway Free	e-Flow Speed, S <sub>FF</sub>	70.0					V <sub>D</sub> =	veh/h
V <sub>u</sub> – V	Ramp Free-Flow Speed, S <sub>FR</sub>								1.0	
Conversion t	o pc/h Un	der Base	Conditions						•	
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF	x f <sub>HV</sub> x f <sub>p</sub>
Freeway	3860	0.96	Rolling	2	0	0.	971	1.00	41	41
Ramp	797	0.96	Rolling	2	0	0.	971	1.00	85	55
UpStream			Ŭ							
DownStream										
Fatimatian a		Merge Areas			Catimat			Diverge Areas		
Estimation of					Estimat	ion c				
	$V_{12} = V_F$	(P <sub>FM</sub> )					V <sub>12</sub> =	· V <sub>R</sub> + (V <sub>F</sub> - \	/ <sub>R</sub> )P <sub>FD</sub>	
L <sub>EQ</sub> =	(Equa	ation 13-6 or	13-7)		L <sub>EQ</sub> =		(1	Equation 13-	12 or 13-13	)
P <sub>FM</sub> =	using	Equation (	Exhibit 13-6)		P <sub>FD</sub> =		1.	000 using E	quation (Exhi	bit 13-7)
V <sub>12</sub> =	pc/h				V <sub>12</sub> =		41	41 pc/h		
$V_3$ or $V_{av34}$	pc/h (	Equation 13	-14 or 13-17)		$V_3$ or $V_{av34}$		0	pc/h (Equat	ion 13-14 or	13-17)
Is $V_3$ or $V_{av34} > 2,70$	00 pc/h? <b>☐ Ye</b>	s 🗌 No			Is $V_3$ or $V_{av34} > 2,700$ pc/h? $\square$ Yes $\square$ No					
Is $V_3$ or $V_{av34} > 1.5$	* V <sub>12</sub> /2	s 🗌 No			Is $V_3$ or $V_{av34} > 1.5 * V_{12}/2$ Yes $\checkmark$ No					
If Yes,V <sub>12a</sub> =	pc/h ( 13-19		-16, 13-18, or		If Yes,V <sub>12a</sub> =	=		c/h (Equatio	n 13-16, 13-	18, or 13-
Capacity Che		)			Capacity Checks					
	Actual		Capacity	LOS F?		,	Actual		apacity	LOS F?
			, ,		V <sub>F</sub>		4141	Exhibit 13		No
$V_{FO}$		Exhibit 13-8			V <sub>FO</sub> = V <sub>F</sub>	- V <sub>2</sub>	3286	Exhibit 13	-8 4800	No
- FO		EXHIBIT TO 0			V <sub>R</sub>		855	Exhibit 13-		No
Flour Frotonia		-fl	\		,"					NO
Flow Entering	<b>g ivierge ir</b> Actual	i	<b>Vrea</b> Desirable	Violation?	FIOW ET		Actual	rge Influe Max Desira		Violation?
\ <u>\</u>	Actual	Exhibit 13-8	Desirable	Violation:	V <sub>12</sub>	_	4141	Exhibit 13-8	4400:All	No
V <sub>R12</sub> Level of Serv	ioo Dotori		if not El					termination		
					1					<u>-)                                    </u>
$D_R = 5.475 + 0.00$	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$									
D <sub>R</sub> = (pc/mi/lr		$D_R = 35.4 \text{ (pc/mi/ln)}$								
LOS = (Exhibit		LOS = E (Exhibit 13-2)								
Speed Deteri	Speed Determination						minatio	on		
$M_S = (Exibit 1)$	3-11)				D <sub>s</sub> = 0.505 (Exhibit 13-12)					
S <sub>R</sub> = mph (Exh	nibit 13-11)				$S_R = 55$	5.9 mph	(Exhibit	13-12)		
	nibit 13-11)				$S_0$ = N/A mph (Exhibit 13-12)					
	nibit 13-13)				S = 55	5.9 mph	(Exhibit	13-13)		
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General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period		g+Project PM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	EB np/On-Ramp do County	
•	SP Phase 1a F				
✓ Oper.(LOS)			Des.(N)	∐Plar	nning Data
Flow Inputs			D 1 11 E 1 DIE		
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	3063	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.94 5 0 Level mi	
			Up/Down %		
Calculate Flow Adjus	tments				
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_R$ $f_{HV} = \frac{1}{[1 + P_T(E_T - 1) + P_R(E_R - 1)]}$	1.2 1)] 0.976	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f		mph
Number of Lanes, N	2		f <sub>LW</sub>		•
Total Ramp Density, TRD		ramps/mi	f <sub>LC</sub> TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS		mph	FFS	70.0	mph
LOS and Performanc	e Measures	}	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1670 67.4 24.8 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF \text{ x})$ $x f_p)$ $S$ $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

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		RAI	MPS AND	RAMP JUN	<u>CTIONS</u> W	<u> </u>	<u>EET</u>			
Genera	l Infori				Site Infor					
Analyst		TKTF	PM	Fr	eeway/Dir of Tr	avel	US 50 EB			
Agency or (	Company	TKTF	PΜ	Ju	inction		Bass Lake Rd			
Date Perfor		10/2/			risdiction		El Dorado Coun	ty		
Analysis Tir			Existing+Proje	ct PM Ar	nalysis Year		2017			
	scription	BLHSP Phase	1a Final Map							
Inputs			ı							
Jpstream A	Adj Ramp			oer of Lanes, N	2				Downstre	am Adj
			Ramp Number	of Lanes, N	1				Ramp	
Yes	☐ On		Acceleration L	ane Length, L <sub>A</sub>	700				□Yes	On
✓ No	☐ Off		Deceleration L	ane Length L <sub>D</sub>						_
			Freeway Volui	ne, V <sub>F</sub>	3063				✓ No	Off
- <sub>up</sub> =	ft		Ramp Volume	•	109				$L_{down} =$	ft
•				Flow Speed, S <sub>FF</sub>	70.0				L.	
√ <sub>u</sub> =	veh/h		Ramp Free-Flo		35.0				$V_D =$	veh/h
0		/l-      -			33.0					
Jonver	rsion to	y pc/n Uni	der Base (	Conditions	ì	1	<del></del>	1	1	
(pc/	/h)	v (Veh/hr)	PHF	Terrain	%Truck	%Rv	$f_{HV}$	f <sub>p</sub>	v = V/PH	$F x f_{HV} x f_{p}$
Freeway		3063	0.96	Rolling	2	0	0.971	1.00	1	3286
Ramp		109	0.96	Rolling	2	0	0.971	1.00		117
UpStream		-		<u> </u>						
DownStrea	am									
			Merge Areas					Diverge Areas	S	
Estima	tion of	v <sub>12</sub>				Estimat	ion of v <sub>12</sub>			
		V <sub>12</sub> = V <sub>F</sub>	(P <sub>EM</sub> )				V <sub>42</sub> =	= V <sub>R</sub> + (V <sub>F</sub> - V	V <sub>B</sub> )P <sub>ED</sub>	
L <sub>EQ</sub> =			tion 13-6 or	13-7)		L <sub>EQ</sub> =	12	(Equation 1		13)
_				on (Exhibit 13-6)				using Equa		-
P <sub>FM</sub> =				OII (EXIIIDIL 13-0)		P <sub>FD</sub> =		pc/h	tion (Exhibit	3 1)
/ <sub>12</sub> =		3286	•	10.44 40.47		V <sub>12</sub> =		•	. 10 14 10	17\
V <sub>3</sub> or V <sub>av34</sub>		-		13-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>	2.700 //. 0		n 13-14 or 13-	17)
		pc/h? Ye					<sub>34</sub> > 2,700 pc/h?			
is V <sub>3</sub> or V <sub>a</sub>	<sub>1v34</sub> > 1.5 ^	V <sub>12</sub> /2 □ Ye		40 40 40		Is V <sub>3</sub> or V <sub>av</sub>	$v_{34} > 1.5 * V_{12}/2$			10.40
f Yes,V <sub>12a</sub>	=	pc/n 13-19)		-16, 13-18, or		If Yes,V <sub>12a</sub> =	= .	pc/h (Equat 13-19)	tion 13-16, 1	13-18, or
Canaci	ty Che					Canacit	y Checks	10-19)		
<i>зараоп</i>	t <b>y 0</b> 7701	Actual		apacity	LOS F?	Capaon	Actua	(	Capacity	LOS F
		Hotaui	<del>l i</del>	аравку	20011	V <sub>F</sub>	710100	Exhibit 1		
							\/			_
$V_{F}$	·o	3403	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V <sub>R</sub>	Exhibit 1		
						$V_R$		Exhibit 10	13-	
Flow Fi	nterino	Merge In	fluence A	rea		Flow Fr	ntering Dive		ence Area	,
1011 21		Actual		Desirable	Violation?	7.00.20	Actual		esirable	Violation
V <sub>R</sub>	12	3403	Exhibit 13-8	4600:All	No	V <sub>12</sub>		Exhibit 13-8		
			nination (i		1		f Service D			<i>t F</i> )
			0.0078 V <sub>12</sub> - 0.0			+	$D_{R} = 4.252 +$		<u> </u>	. , ,
			u.uu i u i 12 - U.U	OOZ/ LA				0.0000 v <sub>12</sub> -	0.003 LD	
	27.6 (pc/mi						oc/mi/ln)			
	C (Exhibit 1	-					Exhibit 13-2)			
Speed	Determ	ination				Speed L	Determinat	ion		
	$_{\rm S} = 0.389  (Exibit 13-11)$						Exhibit 13-12)			
$\Lambda_{\rm S} = 0$							nph (Exhibit 13-12	))		
	59.1 mph (I	Exhibit 13-11)				$S_R = m$	ihii (Exilinii 19-15	-)		
$S_R = 5$						L.'`	•			
$S_R = 5$ $S_0 = 1$	N/A mph (E	Exhibit 13-11) Exhibit 13-11) Exhibit 13-13)				$S_0 = m$	nph (Exhibit 13-12 nph (Exhibit 13-12 nph (Exhibit 13-13	2)		

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Т	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2017 Existing SP Phase 1a F	g+Project PM	Highway/Direction of Trave From/To Jurisdiction	On-Ran	EB np/Cambridge Rd do County
	or rhase la r		) == (N)	□ Dies	aning Data
✓ Oper.(LOS)		L	Des.(N)	□Piai	nning Data
<b>Flow Inputs</b> Volume, V	3172	veh/h	Peak-Hour Factor, PHF	0.96	
AADT	3172	veh/day	%Trucks and Buses, $P_{T}$	1	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0 Rolling mi	
Calculate Flow Adjus	tments				
f <sub>p</sub>	1.00		E <sub>R</sub>	2.0	
E <sub>T</sub>	2.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1)] 0.985	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	$f_{LW}$		mph
Number of Lanes, N	2		$f_{LC}$		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph
LOS and Performanc	e Measures	5	Design (N)		
Operational (LOS) v <sub>p</sub> = (V or DDHV) / (PHF x	N x f <sub>inv</sub>		<u>Design (N)</u> Design LOS		
x f <sub>p</sub> )		pc/h/ln	$v_p = (V \text{ or DDHV}) / (PHF x x f_p)$	N x f <sub>HV</sub>	pc/h/ln
S D = v / S	67.4	mph	s		mph
D = v <sub>p</sub> / S	24.9	pc/mi/ln	$D = v_p / S$		pc/mi/ln
LOS	С		Required Number of Lane	s, N	
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	, 11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1
		erved	HCS 2010 <sup>TM</sup> Version 6.50	Gene	rated: 10/2/2017 3

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General Information Analyst					
			Site Information		
Agency or Company	TKTPM TKTPM		Highway/Direction of Trave	Off-Ramp	B o/Silva Valley
Date Performed Analysis Time Period	10/2/2017 2028 EPAP A		Jurisdiction Analysis Year	Pkwy El Dorado 2028	o County
	P Phase 1a F		A 1)		. 5.
✓ Oper.(LOS)		L L	Pes.(N)	Plann	ing Data
Flow Inputs	4440	1. /1.	D. d. H Et DHE	0.00	
Volume, V AADT	4412	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.96 1	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade -6.00% Length Up/Down %	0 Grade 1.20mi -6.00	
Calculate Flow Adjus	tments				
f <sub>p</sub>	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	)] <i>0.99</i> 5	
Speed Inputs			Calc Speed Adj and F	FFS	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	$f_{LW}$		mph
Number of Lanes, N	2		f <sub>LC</sub>		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS		mph		70.0	Прп
LOS and Performance	e Measures		Design (N)		
Operational (LOS <u>)</u> v <sub>p</sub> = (V or DDHV) / (PHF x l x f <sub>p</sub> ) S	N x f <sub>HV</sub> 2309 55.7	pc/h/ln mph	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x f}_p)$ S	N x f <sub>HV</sub>	pc/h/ln
D = v <sub>p</sub> / S	41.4	pc/mi/ln			mph
LOS	E		D = v <sub>p</sub> / S Required Number of Lanes	s, N	pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design l	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11

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		RA	MPS AND	<b>RAMP JUNG</b>	CTIONS W	ORKSHI	EET			
Genera	al Infor				Site Infor		<del></del>			
Analyst		TKTF	PM	Fre	eeway/Dir of Tr		US 50 WB			
Agency or (	Company	TKTF			nction		Bass Lake Ro	t		
Date Perfor			/2017	Ju	risdiction		El Dorado Co			
Analysis Tir	me Period	2028	BEPAP AM	An	alysis Year		2028	,		
Project Des	scription	BLHSP Phase	: 1a Final Map		-					
Inputs										
Jpstream A	Adj Ramp		Freeway Numb	ber of Lanes, N	2				Downstrea	m Adj
			Ramp Number	of Lanes, N	1				Ramp	•
Yes	☐ On		Acceleration L	ane Length, L <sub>A</sub>	700				□Yes	☐ On
✓ No	Off	•	Deceleration L	ane Length L <sub>D</sub>						
I IIO			Freeway Volur	me, V <sub>F</sub>	3364				✓ No	Off
up =	ft		Ramp Volume		1040				L <sub>down</sub> =	ft
ч				Flow Speed, S <sub>FF</sub>	70.0					
/ <sub>u</sub> =	veh/h		Ramp Free-Flo		35.0				$V_D =$	veh/h
Convoi	rcion t	nc/h Hn		Conditions	33.0					
		<i>γ γ γ γ</i>			0.7	0/5	Τ,	1 ,		
(pc/	/n)	(Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF	х т <sub>НV</sub> х т <sub>р</sub>
Freeway		3364	0.96	Rolling	2	0	0.971	1.00	36	509
Ramp		1040	0.96	Rolling	2	0	0.971	1.00	11	116
UpStream			$\longmapsto$							
DownStrea	am		<u> </u>					D'arran Arr		
Ectima	tion of		Merge Areas			Estimat	ion of v <sub>12</sub>	Diverge Are	eas	
_Suma	tion or					LStillati		=		
		$V_{12} = V_F$	(P <sub>FM</sub> )				$V_1$	$_2 = V_R + (V_F)$	- V <sub>R</sub> )P <sub>FD</sub>	
EQ =		(Equ	ation 13-6 or	13-7)		L <sub>EQ</sub> =		(Equation	13-12 or 13-13	3)
FM =		1.000	using Equati	ion (Exhibit 13-6)		P <sub>FD</sub> =		using Eqเ	uation (Exhibit 13	-7)
/ <sub>12</sub> =		3609	pc/h			V <sub>12</sub> =		pc/h		
7 <sub>3</sub> or V <sub>av34</sub>		0 pc/	h (Equation 1	13-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>		pc/h (Equa	tion 13-14 or 13-17	')
		0 pc/h?		,			$_{24} > 2,700 \text{ pc/}$	h? ∐Yes □		
0 4		V <sub>12</sub> /2 □ Ye						2		
				-16, 13-18, or					iation 13-16, 13	-18, or
Yes,V <sub>12a</sub>		13-19)				If Yes,V <sub>12a</sub> =		13-19)	,	,
Capaci	ty Che	cks				Capacit	y Checks	3		
		Actual	C	apacity	LOS F?		Ac	tual	Capacity	LOS F?
						V <sub>F</sub>		Exhibi	it 13-8	
17	-n	4725	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V <sub>R</sub>	Exhibi	it 13-8	
٧ <sub>٢</sub>	O					V <sub>R</sub>		Exhib		
V <sub>F</sub>										
	4 5					1		1 1		
	ntering		nfluence A		Violation?	1		verge Infl	uence Area	Violation?
Flow E		Actual	Max [	Desirable	Violation?	Flow En	ntering Di Actual	iverge Infl Max	uence Area Desirable	Violation?
Flow E	12	Actual 4725	Max E Exhibit 13-8	Desirable 4600:All	Violation? Yes	Flow En	Actual	iverge Infl Max Exhibit 1	uence Area Desirable 3-8	
Flow Ei	12 of Serv	Actual 4725 ice <b>Deterr</b>	Max E Exhibit 13-8 <b>mination (i</b>	Desirable 4600:All if not F)		Flow En	Actual Service	iverge Infl Max Exhibit 1	Desirable 3-8 ation (if not	
Flow En	12 <b>of Serv</b> = 5.475 +	Actual 4725 <b>ice Deterr</b> 0.00734 v <sub>R</sub> + (	Max E Exhibit 13-8	Desirable 4600:All if not F)		Flow En	Actual  F Service  D <sub>R</sub> = 4.252	iverge Infl Max Exhibit 1	Desirable 3-8 ation (if not	
V <sub>R</sub> . Level o	12 of <b>Serv</b> = 5.475 + 37.4 (pc/m	Actual 4725 <b>ice Deterr</b> 0.00734 v <sub>R</sub> + ( i/ln)	Max E Exhibit 13-8 <b>mination (i</b>	Desirable 4600:All if not F)		Flow En	Actual  F Service  D <sub>R</sub> = 4.252  oc/mi/ln)	Max   Exhibit 1   <b>Determina</b>   + 0.0086 V <sub>12</sub>	Desirable 3-8 ation (if not	
V <sub>R</sub> . Level o  D <sub>R</sub> = 3 OS = E	12 of Servi = 5.475 + 37.4 (pc/m	Actual 4725 <b>ice Deterr</b> 0.00734 v <sub>R</sub> + ( i/ln) 13-2)	Max E Exhibit 13-8 <b>mination (i</b>	Desirable 4600:All if not F)		Flow En	Actual  F Service  D <sub>R</sub> = 4.252  Dc/mi/ln)  Exhibit 13-2	Max   Exhibit 1	Desirable 3-8 ation (if not	
Flow Envelope $V_{R'}$ Level of $D_R = 3$ $O_R = 3$ $O_R = 4$	12 of Servi = 5.475 + 37.4 (pc/m E (Exhibit '	Actual 4725 <b>ice Deterr</b> 0.00734 v <sub>R</sub> + 0 idn) 13-2)	Max E Exhibit 13-8 <b>mination (i</b>	Desirable 4600:All if not F)		Flow En	Actual  F Service  D <sub>R</sub> = 4.252  pc/mi/ln)  Exhibit 13-2  Determina	Max   Exhibit 1	Desirable 3-8 ation (if not	
Flow Enveronment $V_{R'}$ Level of $D_R = 3$ $0S = E$ Speed in	12 of Servi = 5.475 + 37.4 (pc/m	Actual 4725 <b>ice Deterr</b> 0.00734 v <sub>R</sub> + 0 idn) 13-2)	Max E Exhibit 13-8 <b>mination (i</b>	Desirable 4600:All if not F)		V <sub>12</sub>   Level of	Actual  F Service  D <sub>R</sub> = 4.252  oc/mi/ln)  Exhibit 13-12  Oetermina  (xhibit 13-12)	Exhibit 1  Determina + 0.0086 V <sub>12</sub>	Desirable 3-8 ation (if not	
Flow Ei $V_R$ Level o $D_R = 3$ $OS = E$ Speed of $M_S = 0$	12 of Servi = 5.475 + 37.4 (pc/m E (Exhibit 1) Detern 0.712 (Exik	Actual 4725 <b>ice Deterr</b> 0.00734 v <sub>R</sub> + 0 idn) 13-2)	Max E Exhibit 13-8 <b>mination (i</b>	Desirable 4600:All if not F)		V <sub>12</sub>   Level of	Actual  F Service  D <sub>R</sub> = 4.252  pc/mi/ln)  Exhibit 13-2  Determina  xhibit 13-12)  ph (Exhibit 13	Max   Exhibit 1	Desirable 3-8 ation (if not	
Flow Ei  V <sub>R</sub> Level o $D_R = 3$ $OS = E$ Speed i $M_S = 0$ $S_R = 5$	12 of Servi = 5.475 + 37.4 (pc/m E (Exhibit ' Detern 0.712 (Exit 50.1 mph (	Actual 4725 ice Deterr 0.00734 v <sub>R</sub> + 0 id/ln) 13-2) innation bit 13-11)	Max E Exhibit 13-8 <b>mination (i</b>	Desirable 4600:All if not F)		V <sub>12</sub>   Level of	Actual  F Service  D <sub>R</sub> = 4.252  oc/mi/ln)  Exhibit 13-12  Oetermina  (xhibit 13-12)	Max   Exhibit 1	Desirable 3-8 ation (if not	
V <sub>R</sub> :  V <sub>R</sub> :  Level o  D <sub>R</sub> = 3  OS = E  Speed I  S <sub>R</sub> = 5  O = N	12 = 5.475 + 37.4 (pc/m = (Exhibit ' <b>Detern</b> 0.712 (Exik 50.1 mph (	Actual 4725 ice Detern 0.00734 v <sub>R</sub> + ( i/ln) 13-2) nination bit 13-11) Exhibit 13-11)	Max E Exhibit 13-8 <b>mination (i</b>	Desirable 4600:All if not F)		V <sub>12</sub>   Level of     D <sub>R</sub> = (p     LOS = (E     Speed L     D <sub>S</sub> = (E     S <sub>R</sub> = m     S <sub>0</sub> = m	Actual  F Service  D <sub>R</sub> = 4.252  pc/mi/ln)  Exhibit 13-2  Determina  xhibit 13-12)  ph (Exhibit 13	Max   Exhibit 1	Desirable 3-8 ation (if not	

		Site Information  Highway/Direction of Trave From/To Jurisdiction		WB
TKTPM 10/2/2017 2028 EPAP A		From/To		VR
P Phase 1a Fi	Agency or Company TKTPM			np/On-Ramp do County
		N (A1)		
	<u> </u>	Jes.(N)	Plar	nning Data
3364	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain:	0.94 5 0 Level	
	veh/h	Grade % Length	mi	
ments		<b>ор</b> /Венн / о		
1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2 )] 0.976	
		Calc Speed Adj and I	FFS	
2 70.0	ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph
Measures	•	Design (N)		
65.3 28.1 D	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x f}_p)$ $S$ $D = v_p / S$		pc/h/ln mph pc/mi/ln
		Factor Location		
D - Densi FFS - Free BFFS - Bas	ty -flow speed	f <sub>p</sub> - Page 11-18		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1
	ments  1.00  1.5  2  70.0  Measures  I x f <sub>HV</sub> 1834  65.3  28.1  D  S - Speed D - Densi FFS - Free BFFS - Baseour volume	3364 veh/h veh/day  veh/h  ments  1.00 1.5  ft ft 2 ramps/mi mph mph mph  Measures  I x f <sub>HV</sub> 1834 pc/h/ln 65.3 mph 28.1 pc/mi/ln D  S - Speed D - Density FFS - Free-flow speed BFFS - Base free-flow four volume	$\begin{array}{c} \text{veh/day} & \text{%Trucks and Buses, P}_T \\ \text{%RVs, P}_R \\ \text{General Terrain:} \\ \text{Grade} & \text{% Length} \\ \text{Up/Down \%} \\ \\ \hline \\ \textbf{Measures} \\ \hline \\ Measu$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

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		RAMP	S AND RAM	IP JUNCTI	ONS WO	DRKS	HEET			
General Info	mation			Site Infor						
Analyst Agency or Company Date Performed	TKTF TKTF 10/2/	PM 2017	Jı Jı	reeway/Dir of Tr unction urisdiction		El Dora	WB ake Rd ado County	,		
Analysis Time Perio		EPAP AM	A	nalysis Year		2028				
Project Description	BLHSP Phase	1a Final Map								
Inputs		Fraguey Num	har of Lance N	2					1	
Upstream Adj F	_	Ramp Numbe	ber of Lanes, N r of Lanes, N	1					Downstrea Ramp	m Adj
Yes	On	Acceleration L	ane Length, L <sub>A</sub>						□Yes	On
✓No	Off		ane Length L <sub>D</sub>	500					✓No	Off
L <sub>up</sub> = 1	ît .	Freeway Volume		3596					L <sub>down</sub> =	ft
_up		Ramp Volume	**	232					down	
V <sub>u</sub> = v	eh/h		-Flow Speed, S <sub>FF</sub>						V <sub>D</sub> =	veh/h
	// //		ow Speed, S <sub>FR</sub>	35.0						
Conversion t	1	der Base (	Conditions	1	1					
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		$f_{HV}$	f <sub>p</sub>	v = V/PHF	x f <sub>HV</sub> x f <sub>p</sub>
Freeway	3596	0.96	Rolling	2	0	_	.971	1.00	385	
Ramp	232	0.96	Rolling	2	0	0	.971	1.00	24	9
UpStream DownStream		<del>                                     </del>			1	+				
DownStream		Merge Areas						Diverge Areas		
Estimation o					Estima	tion c		goouo		
	V <sub>12</sub> = V <sub>F</sub>	( P <sub>EM</sub> )						V <sub>R</sub> + (V <sub>F</sub> - V <sub>F</sub>		
L <sub>EQ</sub> =		tion 13-6 or	13-7)		L <sub>EQ</sub> =			Equation 13-1		
P <sub>FM</sub> =		Equation (E			P <sub>FD</sub> =		-	000 using Eq	-	
V <sub>12</sub> =	pc/h	(-			V <sub>12</sub> =			358 <b>pc/h</b>	addorr (Exim	,
V <sub>3</sub> or V <sub>av34</sub>	•	Fauation 13	-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>			pc/h (Equatio	on 13-14 or	13-17)
Is $V_3$ or $V_{av34} > 2,70$			,			> 2.7		☐Yes ☑ No		,
Is $V_3$ or $V_{av34} > 1.5$								Yes ☑ No		
			-16, 13-18, or					c/h (Equation	13-16, 13-	18, or 13-
f Yes,V <sub>12a</sub> =	13-19)				If Yes,V <sub>12a</sub>		1	9) ` .		
Capacity Che	1			_	Capaci	ty Ch	ecks			
	Actual	C	apacity	LOS F?	\		Actual	_	pacity	LOS F
					V <sub>F</sub>		3858	Exhibit 13-8	+	No
$V_{FO}$		Exhibit 13-8			$V_{FO} = V$		3609	Exhibit 13-8	3 4800	No
					V <sub>R</sub>		249	Exhibit 13-1		No
Flow Entering	T	1			Flow E			rge Influen		
.,,	Actual	<del>1</del>	Desirable	Violation?	<u> </u>		Actual	Max Desirat	r	Violation <sup>2</sup>
V <sub>R12</sub>	<u> </u>	Exhibit 13-8			V <sub>12</sub>		3858	Exhibit 13-8	4400:All	No
Level of Serv					Level o			terminatio	•	=)
$D_R = 5.475 + 0$		0.0078 V <sub>12</sub> -	0.00627 L <sub>A</sub>		L			.0086 V <sub>12</sub> - 0.	009 L <sub>D</sub>	
O <sub>R</sub> = (pc/mi/lr	-					32.9 <b>(pc</b>				
OS = (Exhibit	· · · · · · · · · · · · · · · · · · ·						bit 13-2)			
Speed Deteri	mination				Speed	Deter	minatio	on		
M <sub>S</sub> = (Exibit 1	3-11)				$D_s = C$	).450 <b>(E</b>	xhibit 13	-12)		
=							(Exhibit	13-12)		
	nibit 13-11)				$S_0 = N$	N/A mph	(Exhibit	13-12)		
•	nibit 13-13)				S = 5	7.4 mph	(Exhibit	13-13)		

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description <i>BLH</i> S	TKTPM TKTPM 10/2/2017 2028 EPAP / SP Phase 1a F		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Cambrid	WB dge Rd/Off-Ramp do County
✓ Oper.(LOS)	or rhase ra r		)oo (NI)	□ Dlor	nning Data
Flow Inputs		L	Pes.(N)	Piai	ining Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D	3596	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain:	0.96 1 0 Rolling	
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	mi	
Calculate Flow Adjus	tments		<u> </u>		
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 )] 0.985	
Speed Inputs			Calc Speed Adj and		
Lane Width Rt-Side Lat. Clearance		ft ft	f <sub>LW</sub>		mph
Number of Lanes, N	2		f <sub>LC</sub>		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph
LOS and Performanc	e Measures	3	Design (N)		
<u>Operational (LOS)</u> v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> )	N x f <sub>HV</sub> 1901	pc/h/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x x f_p)$	N x f <sub>HV</sub>	pc/h/ln
S D = v <sub>p</sub> / S LOS	64.3 29.6 D	mph pc/mi/In	S D = v <sub>p</sub> / S Required Number of Lanes	s, N	mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

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	BASIC FRE	EWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2028 EPAP A	AM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	Silva Va Ramp	B lley Pkwy/Off- do County
	P Phase 1a Fi		7 maryolo 1 dai	2020	
✓ Oper.(LOS)			es.(N)	☐Plan	ning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K	2322	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub>	0.96 1 0	
Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	General Terrain: Grade -6.00% Length Up/Down %	Grade 1.20mi -6.00	
Calculate Flow Adjus	tments				
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2	
	1.0				
Speed Inputs Lane Width		ft	Calc Speed Adj and I		
Rt-Side Lat. Clearance Number of Lanes, N	2	ft	f <sub>LW</sub>		mph mph
Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	70.0	ramps/mi mph mph	TRD Adjustment	70.0	mph mph
LOS and Performance	e Measures		Design (N)		
Operational (LOS) v <sub>p</sub> = (V or DDHV) / (PHF x l x f <sub>p</sub> ) S		pc/h/ln mph pc/mi/ln		N x f <sub>HV</sub>	pc/h/ln mph
D = v <sub>p</sub> / S LOS	17. <del>4</del> В	ρε/πι/π	D = v <sub>p</sub> / S Required Number of Lanes	s, N	pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design l	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11

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		DAMD	C AND DAM	ID ILINOTI	ONC WO	DKC	UEET			
General Inf	ormation	KAWIP	S AND RAM	Site Infor		KNO	песі			
Analyst	TKT	DM	F	reeway/Dir of Tr		US 50 I	FR			
Agency or Compa				unction		Bass La				
Date Performed	•	/2017		urisdiction			ido County			
Analysis Time Pe		B EPAP AM	А	nalysis Year		2028	,			
Project Description	on BLHSP Phase	1a Final Map								
Inputs										
Upstream Ad	dj Ramp	Freeway Nun Ramp Numbe	nber of Lanes, N	2 1					Downstrea	am Adj
□Yes	□On		Lane Length, L <sub>A</sub>	'					□Yes	On
☑No	Off	Deceleration Freeway Volu	Lane Length L <sub>D</sub>	500 2322					✓No	Off
L <sub>up</sub> =	ft		•						-down =	ft
_up		Ramp Volum		375					down	
V <sub>u</sub> =	veh/h		e-Flow Speed, S <sub>FF</sub>					\	√ <sub>D</sub> =	veh/h
		1	low Speed, S <sub>FR</sub>	35.0						
Conversion	1 to pc/h Un	<u>der Base</u>	<u>Conditions</u>	_						
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	_	f <sub>HV</sub>	f <sub>p</sub> v	/ = V/PHF	$x f_{HV} x f_{p}$
Freeway	2322	0.96	Rolling	2	0		971	1.00	24	91
Ramp	375	0.96	Rolling	2	0	0.	971	1.00	4	02
UpStream					<u> </u>	_				
DownStream		Merge Areas			<del> </del>		Div	/erge Areas		
Estimation	of v	Wicigo Aicas			Estimati	ion o	f V	reige Aicus		
		(D.)			20077140				\ <u>D</u>	
<u>l</u>	$V_{12} = V_{F}$				l.			$V_R + (V_F - V_R)$		
L <sub>EQ</sub> =		ation 13-6 or	· ·		L <sub>EQ</sub> =		•	quation 13-12		•
P <sub>FM</sub> =	_	Equation (	Exhibit 13-6)		P <sub>FD</sub> =			00 using Equ	ation (Exhi	bit 13-7)
V <sub>12</sub> =	pc/h				V <sub>12</sub> =		249	1 pc/h		
V <sub>3</sub> or V <sub>av34</sub>	pc/h	(Equation 13	-14 or 13-17)		$V_3$ or $V_{av34}$		0 p	c/h (Equation	า 13-14 oı	13-17)
	2,700 pc/h? 🗌 <b>Y</b> e				Is V <sub>3</sub> or V <sub>av3</sub>	$_{34} > 2.7$	00 pc/h? 🔲	Yes 🗹 No		
Is $V_3$ or $V_{av34} > 1$	I.5 * V <sub>12</sub> /2				Is V <sub>3</sub> or V <sub>av3</sub>	<sub>34</sub> > 1.5		Yes 🗹 No		
If Yes,V <sub>12a</sub> =			-16, 13-18, or		If Yes, V <sub>12a</sub> =			/h (Equation	13-16, 13	-18, or 13-
Capacity C	13-19	)			Capacity		19)			
Capacity C	Actual	1 (	Canacity .	LOS F?	Capacity	y CH	Actual	Can	acity	LOS F?
	Actual		Capacity	LUST!	V <sub>F</sub>		2491	Exhibit 13-8	4800	
.,		E 1 11 11 40 0			<u> </u>	.,		+	1	No
$V_{FO}$		Exhibit 13-8			$V_{FO} = V_{F}$	- v <sub>R</sub>	2089	Exhibit 13-8	4800	No
					V <sub>R</sub>		402	Exhibit 13-10		No
Flow Enter	ing Merge Ir	ı			Flow En	terin	g Diverg	ge Influenc		
	Actual	1 -	Desirable	Violation?		- /	Actual	Max Desirabl		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	2	2491	Exhibit 13-8	4400:All	No
Level of Se	rvice Deteri	mination (	if not F)		Level of	Serv	∕ice Dete	ermination	(if not	<b>F</b> )
D <sub>R</sub> = 5.475 +	- 0.00734 v <sub>R</sub> +	0.0078 V <sub>12</sub>	- 0.00627 L <sub>A</sub>		[	$D_R = 4$	.252 + 0.0	086 V <sub>12</sub> - 0.0	09 L <sub>D</sub>	
D <sub>R</sub> = (pc/m	i/ln)				$D_R = 21$	.2 (pc/	/mi/ln)			
LOS = (Exhib	oit 13-2)				LOS = C	(Exhib	oit 13-2)			
Speed Dete	ermination				Speed D			<u> </u>		
	t 13-11)				<del>                                     </del>		xhibit 13-1			
	Exhibit 13-11)				ů.		(Exhibit 1	-		
	- ·				I ''		(Exhibit 13	-		
	Exhibit 13-11) Exhibit 13-13)				1	-	(Exhibit 1	•		
ļ	Iniversity of Florida.	All Dights Dogg	wed		D = 07		•	•	perated: 10/0	/2017 3:14 F

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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description <i>BLH</i> S	TKTPM TKTPM 10/2/2017 2028 EPAP / SP Phase 1a F		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Rar	EB mp/On-Ramp ado County
✓ Oper.(LOS)	or rhase la r		)oo (NI)	□ Die	nning Data
Flow Inputs		L	Pes.(N)	Ріа	nning Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	1947	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.94 5 0 Level mi	
70.51 XXX 5		V 311/11	Up/Down %		
Calculate Flow Adjus	tments				
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2 1)] 0.976	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	2 70.0	ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performanc	e Measures	<b>5</b>	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1062 70.0 15.2 B	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF \text{ x})$ $x f_p)$ $S$ $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

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ompany ned ne Period	<b>nation</b> TKTI TKTI			Site Infor	mation				
ned					mauon				
ned			Fr	eeway/Dir of Tr		US 50 EB			
ned		PM		nction		Bass Lake R	d		
e Period	10/2/		Ju	risdiction		El Dorado Co			
	2028	EPAP AM	Ar	alysis Year		2028	,		
ription I	BLHSP Phase	1a Final Map		-					
dj Ramp		Freeway Numb	er of Lanes, N	2				Downstre	eam Adj
		Ramp Number	of Lanes, N	1				Ramp	•
∐ On		Acceleration La	ane Length, L <sub>A</sub>	700				□Yes	On
□ Off		Deceleration L	ane Length L <sub>D</sub>						
		Freeway Volun	ne, V <sub>E</sub>	1947				MNO	Off
ft				185				L <sub>down</sub> =	ft
			13						
veh/h		1						$V_D =$	veh/h
ion to	no/h I In			33.0					
	V PC/II UII					1 ,	<del></del>		
1)	(Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PH	rxt <sub>HV</sub> xt <sub>p</sub>
	1947	0.96	Rolling	2	0	0.971	1.00		2089
	185	0.96	Rolling	2	0	0.971	1.00		198
n		<u> </u>							
ion of		Merge Areas			Fatimes	ion of	Diverge Are	as	
ion or					Estimat	ion of v <sub>1.</sub>	2		
	$V_{12} = V_{F}$	(P <sub>FM</sub> )				$V_1$	$_{2} = V_{R} + (V_{F} -$	· V <sub>R</sub> )P <sub>FD</sub>	
	(Equ	ation 13-6 or	13-7)		L <sub>FO</sub> =		(Equation	13-12 or 13-	13)
	1.000	using Equati	on (Exhibit 13-6)				using Equ	ation (Exhibit	13-7)
			,					·	
		•	3_14 or 13_17)				•	ion 13-14 or 13-	.17)
> 2 700			0-14-01-10-11/			> 2.700 nc			17)
			16 13 19 or						13 18 or
			-10, 13-10, 01		If Yes,V <sub>12a</sub> =	:	13-19)	ation 15-10,	10-10, 01
y Ched	cks				Capacit	y Checks	s		
	Actual	Ca	apacity	LOS F?		Ac	tual	Capacity	LOS F?
					$V_{F}$		Exhibit	13-8	
	2287	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V <sub>R</sub>	Exhibit	13-8	
' l	2207						Exhibit	t 13-	
tering				1" 1 " 0	Flow En				_
					\/	Actual		-	Violation?
				INO		<u> </u>			<u> </u>
		•						•	<i>t F)</i>
		0.0078 V <sub>12</sub> - 0.0	0627 L <sub>A</sub>				+ 0.0086 V <sub>12</sub>	- 0.009 L <sub>D</sub>	
8.8 (pc/mi/	•					oc/mi/ln)			
(Evhihit 1						xhibit 13-2			
(Exhibit 1	ination					Determin	ation		
Determ	шаноп				ID /F	xhibit 13-12)			
					$D_s = (E$	.XIIIDIL 13-12)			
<b>Determ</b> 310 (Exib						ph (Exhibit 13	3-12)		
<b>Determ</b> 310 (Exib .3 mph (E	it 13-11) Exhibit 13-11)				S <sub>R</sub> = m	•			
<b>Determ</b> 310 (Exib .3 mph (E A mph (E	it 13-11)				$S_R = m$ $S_0 = m$	ph (Exhibit 13	3-12)		
) m ii	veh/h  ion to  on of  on of  con of  con of  con of  con of  con of  con of	ft  veh/h  ion to pc/h University (Veh/hr) 1947 185  on of V <sub>12</sub> V <sub>12</sub> = V <sub>F</sub> (Equ 1.000 2089 0 pc/h 4 > 2,700 pc/h? □ Ye 4 > 1.5 * V <sub>12</sub> /2 □ Ye pc/h 13-19  v Checks  Actual 2287  Service Deteri	On Acceleration La Deceleration La Freeway Volume, Freeway Free-Ramp Free-Flo  ion to pc/h Under Base C  (Veh/hr) PHF 1947 0.96 185 0.96  Merge Areas  On of V <sub>12</sub> V <sub>12</sub> = V <sub>F</sub> (P <sub>FM</sub> ) (Equation 13-6 or 1.000 using Equation 2089 pc/h 0 pc/h (Equation 13-6 or 1.000 using Equation 2089 pc/h 0 pc/h (Equation 13-13-19)  Checks  Actual Ca Actual Ca Actual Max E 2287 Exhibit 13-8  Service Determination (i	Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> Freeway Volume, V <sub>F</sub> Ramp Volume, V <sub>R</sub> Freeway Free-Flow Speed, S <sub>FF</sub> Ramp Free-Flow Speed, S <sub>FR</sub> Ramp Volume, V <sub>R</sub> Ramp Velous Speed, Sepson Speed	□ On	□ On Acceleration Lane Length, $L_A$ 700  □ Off  □ Off  □ Deceleration Lane Length $L_D$ Freeway Volume, $V_F$ 1947  ft Ramp Volume, $V_R$ 185  Freeway Free-Flow Speed, $S_{FF}$ 70.0  Ramp Free-Flow Speed, $S_{FF}$ 35.0  ion to pc/h Under Base Conditions  □ V (Veh/hr) PHF Terrain %Truck %RV  □ 1947 0.96 Rolling 2 0  □ 185 0.96 Rolling 2 0  ■ Merge Areas  On of $V_{12}$ $V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7)  1.000 using Equation (Exhibit 13-6)  2089 pc/h  0 pc/h (Equation 13-14 or 13-17)  4 > 2,700 pc/h? □ Yes ☑ No  pc/h (Equation 13-16, 13-18, or 13-19)  7 Checks  □ Actual Capacity LOS F?  □ V_F  V_FO = V_F  V_F  V_FO = V_F  V_F  V_FO = V_F  V_R  Service Determination (if not F)  □ Volution?  Level of		□ On	

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description BLHS	TKTPM TKTPM 10/2/2017 2028 EPAP / SP Phase 1a F		Highway/Direction of Trave From/To Jurisdiction Analysis Year	On-Ran	EB np/Cambridge Rd do County
	or rhase ia r		Non (NI)	□ Dler	oning Data
✓ Oper.(LOS)  Flow Inputs		L	Pes.(N)	Piai	nning Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D	2132	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain:	0.96 1 0 Rolling	
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	mi	
Calculate Flow Adjus	tments		·		
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_{R}$ $f_{HV} = 1/[1+P_{T}(E_{T}-1)+P_{R}(E_{R}-1)]$	2.0 )] 0.985	
Speed Inputs			Calc Speed Adj and		
Lane Width Rt-Side Lat. Clearance		ft ft	f <sub>LW</sub>		mph
Number of Lanes, N	2		f <sub>LC</sub>		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph
LOS and Performanc	e Measures	6	Design (N)		
Operational (LOS) v <sub>p</sub> = (V or DDHV) / (PHF x l	N x f <sub>HV</sub> 1127	pc/h/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF x)$	N x f <sub>HV</sub>	n o/b/l/n
x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	70.0 16.1 B	mph pc/mi/ln	$x f_p$ )  S $D = v_p / S$ Required Number of Lanes	s, N	pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Т	
General Information			Site Information		
Analyst	TKTPM		Highway/Direction of Trave	el <i>US 50 V</i>	VB
Agency or Company	TKTPM		From/To		np/Silva Valley
Date Performed	10/2/2017		Jurisdiction	Pkwy El Dora	do County
Analysis Time Period	2028 EPAP	PM	Analysis Year	2028	ac ccam,
Project Description BLHS	SP Phase 1a F	inal Map			
✓ Oper.(LOS)			Des.(N)	☐ Plar	nning Data
Flow Inputs					
Volume, V	2809	veh/h	Peak-Hour Factor, PHF	0.96	
AADT		veh/day	%Trucks and Buses, P <sub>T</sub>	1	
Peak-Hr Prop. of AADT, K			%RVs, P <sub>R</sub>	0	
Peak-Hr Direction Prop, D			General Terrain: Grade -6.00%	Grade	
DDHV = AADT x K x D		veh/h	Length	1.20mi	
			Up/Down %	-6.00	
Calculate Flow Adjus	tments				
fp	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	)1 <i>0.995</i>	
Speed Inputs			Calc Speed Adj and		
Lane Width		ft	Guio Opoca 7 taj ana 1		
Rt-Side Lat. Clearance		ft			b
Number of Lanes, N	2	It	f <sub>LW</sub>		mph
Total Ramp Density, TRD	2	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	f <sub>LC</sub>		mph
, ,	70.0	ramps/mi	TRD Adjustment		mph
FFS (measured) Base free-flow Speed,	70.0	mph	FFS	70.0	mph
BFFS		mph			
LOS and Performanc	e Measures	 S	Design (N)		
			Design (N)		
Operational (LOS)			Design LOS		
$v_p = (V \text{ or DDHV}) / (PHF x I)$	N x f <sub>HV 1470</sub>	pc/h/ln	$v_p = (V \text{ or DDHV}) / (PHF x)$	N x f	
x f <sub>p</sub> )	1470	рс/п/п	F .	' 'HV	pc/h/ln
S	69.2	mph	x f <sub>p</sub> ) S		mnh
D = v <sub>p</sub> / S	21.3	pc/mi/ln			mph
LOS	С		$D = v_p / S$		pc/mi/ln
-			Required Number of Lanes	5, N	
Glossary			Factor Location		
N - Number of lanes	S - Spee	ed	E <sub>R</sub> - Exhibits 11-10, 11-12		f <sub>I W</sub> - Exhibit 11-8
V - Hourly volume	D - Dens	•	E <sub>T</sub> - Exhibits 11-10, 11-11,	11-13	f <sub>LC</sub> - Exhibit 11-9
v <sub>p</sub> - Flow rate		e-flow speed	f <sub>n</sub> - Page 11-18	•	TRD - Page 11-11
LOS - Level of service	BFFS - Ba	ase free-flow	LOS, S, FFS, v <sub>p</sub> - Exhibits	11-2	
speed DDHV - Directional design	hour volume		11-3	· · <del>-</del> ,	
וויסם ואייס - אייסם וויס - אייסם	No. All Dights Poss		100 0040TM - Vi 0.50		ratad: 10/2/2017 3:16 D

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		RA	MPS AND	<b>RAMP JUNG</b>	CTIONS W	ORKSH	EET			
Genera	l Inform				Site Infor					
Analyst		TKTI	PM	Fr	eeway/Dir of Tr	avel	US 50 WB			
Agency or (	Company	TKT	PM	Ju	nction		Bass Lake Rd			
Date Perfor		10/2/	/2017	Ju	risdiction		El Dorado Cour	nty		
Analysis Tir			B EPAP PM	Ar	nalysis Year		2028			
Project Des	cription I	BLHSP Phase	1a Final Map							
Inputs										
Jpstream A	Adj Ramp		1	ber of Lanes, N	2				Downstre	eam Adj
			Ramp Number	r of Lanes, N	1				Ramp	
Yes	☐ On		Acceleration L	ane Length, L <sub>A</sub>	700				□Yes	On
✓ No	Off		Deceleration L	ane Length L <sub>D</sub>						_
			Freeway Volur	me, V <sub>F</sub>	2400				✓ No	Off
- <sub>up</sub> =	ft		Ramp Volume	•	409				$L_{down} =$	ft
				Flow Speed, S <sub>FF</sub>	70.0				L.	
√ <sub>u</sub> =	veh/h		1	ow Speed, S <sub>FR</sub>	35.0				$V_D =$	veh/h
0	!	/			33.0					
Conver	SION to		ger Base (	Conditions	1		1	1		
(pc/	h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	$f_{HV}$	f <sub>p</sub>	v = V/PH	$F x f_{HV} x f_{p}$
Freeway		2400	0.96	Rolling	2	0	0.971	1.00	1	2575
Ramp		409	0.96	Rolling	2	0	0.971	1.00	1	439
UpStream				<u> </u>						
DownStrea	am									
			Merge Areas					Diverge Areas	S	
Estimat	tion of	v <sub>12</sub>				Estimat	ion of v <sub>12</sub>			
		V <sub>12</sub> = V <sub>F</sub>	(P <sub>EM</sub> )				V <sub>40</sub> :	= V <sub>R</sub> + (V <sub>F</sub> - \	V <sub>B</sub> )P <sub>ED</sub>	
-EQ =			ation 13-6 or	13-7)		L <sub>EQ</sub> =	12		3-12 or 13-	13)
_				ion (Exhibit 13-6)				using Equa		
P <sub>FM</sub> =				IOTT (EXHIBIT 13-0)		P <sub>FD</sub> =		pc/h	tion (Exhibit	13 1)
/ <sub>12</sub> =		2575	•	10 11 10 17		V <sub>12</sub> =		•	. 10 14 10	17\
V <sub>3</sub> or V <sub>av34</sub>	0.700	-		13-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>	2.700		n 13-14 or 13-	17)
		pc/h? TYe					<sub>34</sub> > 2,700 pc/h?			
is V <sub>3</sub> or V <sub>av</sub>	<sub>v34</sub> > 1.5 ^	V <sub>12</sub> /2 □ Ye		10 10 10		is v <sub>3</sub> or v <sub>av</sub>	$_{34} > 1.5 * V_{12}/2$			10.40
f Yes,V <sub>12a</sub>	=	pc/n 13-19)		3-16, 13-18, or		If Yes,V <sub>12a</sub> =	=	pc/h (Equat 13-19)	tion 13-16, 1	13-18, or
Capacit	ty Chec		<i>)</i>			Canacit	y Checks	10-19)		
<i>зараоп</i>	19 07700	Actual	C	apacity	LOS F?	Jupatr	Actua	al (	Capacity	LOS F
		Hotaui	<del>†                                     </del>	араску	20011	V <sub>F</sub>	710100	Exhibit 1		2001
						<u> </u>	\/			
V <sub>F</sub>	О	3014	Exhibit 13-8		No	$V_{FO} = V_{F}$	- v <sub>R</sub>	Exhibit 1		
						$V_R$		Exhibit 10	13-	
Flow Fi	nterina	Merge Ir	fluence A	rea		Flow Fr	tering Div		ence Area	<del></del>
1011 21	normy	Actual		Desirable	Violation?	7.00.20	Actual		esirable	Violation
$V_{R1}$	10	3014	Exhibit 13-8	4600:All	No	V <sub>12</sub>		Exhibit 13-8		
Level o	f Sorvi		nination (i				f Service D			+ F1
			0.0078 V <sub>12</sub> - 0.0				D <sub>R</sub> = 4.252 +		<u> </u>	(1)
• • • • • • • • • • • • • • • • • • • •			5.0070 V <sub>12</sub> - 0.0	70027 L <sub>A</sub>				0.0000 v <sub>12</sub> -	0.003 LD	
11	4.4 (pc/mi/						oc/mi/ln)			
	Exhibit 1					<u> </u>	Exhibit 13-2)			
Speed I	Determ	ination				Speed L	Determinat	ion		
$M_S = 0$	.351 (Exib	it 13-11)				$D_s = (E_s)^T$	Exhibit 13-12)			
νις –							ph (Exhibit 13-1	2)		
	0.2 mph (F	XIIIDIL 13-111				FR	r (			
$S_R = 6$	0.2 mph (E J/A mph (F					L"	-			
$S_R = 6$ $S_0 = N$	I/A mph (E	xhibit 13-11) Exhibit 13-13)				$S_0 = m$	ph (Exhibit 13-1 ph (Exhibit 13-1	2)		

General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2028 EPAP I		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Ram	VB np/On-Ramp do County
	SP Phase 1a F		(A.1)		. 5.
✓ Oper.(LOS)		<u> </u>	Pes.(N)	Plan	ining Data
Flow Inputs Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D	2400	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain:	0.94 5 0 Rolling	
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	mi	
Calculate Flow Adjus	tments				
$f_p$ $E_T$	1.00 2.5		$E_R$ $f_{HV} = \frac{1}{[1 + P_T(E_T - 1) + P_R(E_R - 1)]}$	2.0 )] 0.930	
Speed Inputs			Calc Speed Adj and I	FFS	
Lane Width		ft	,		
Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD	2	ft ramps/mi	f <sub>LW</sub>		mph mph
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	TRD Adjustment	70.0	mph mph
LOS and Performanc	e Measures	•	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1372 69.7 19.7 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS  v <sub>p</sub> = (V or DDHV) / (PHF x  x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11

		RAMP	S AND RAI	MP JUNCTI	ONS WO	RKS	HEET			
General Infor	mation	TO UM	O 7 (11 D 117 (1)	Site Infor		,				
Analyst Agency or Company Date Performed Analysis Time Perioc	TKTF TKTF 10/2/ I 2028	PM 2017 EPAP PM	J	Freeway/Dir of Tr Junction Jurisdiction Analysis Year		US 50 Bass L El Dora 2028				
Project Description Inputs	BLHSP Phase	Ta Final Map								
_		Frooway Num	ber of Lanes, N	2						
Upstream Adj R	amp	Ramp Numbe		1					Downstrea Ramp	am Adj
□Yes □	On		ane Length, L <sub>A</sub>	ı					Yes	On
✓ No	Off		ane Length L <sub>D</sub>	500					✓No	Off
L <sub>up</sub> = f	t	Freeway Volu Ramp Volume		2669 269					L <sub>down</sub> =	ft
	Freeway Free-Flow Speed S 70.0								V <sub>D</sub> =	veh/h
			ow Speed, S <sub>FR</sub>	35.0					L D	
Conversion to	o pc/h Und	der Base	Conditions							
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		f <sub>HV</sub>	$f_p$	v = V/PHF	x f <sub>HV</sub> x f <sub>p</sub>
Freeway	2669	0.96	Rolling	2	0	0.	971	1.00	28	364
Ramp	269	0.96	Rolling	2	0	0.	971	1.00	2	89
UpStream DownStream										
DownStream		Merge Areas					<u>_</u>	iverge Areas		
Estimation of		<b>*</b>			Estima	tion c		<b>*</b>		
L <sub>EQ</sub> = P <sub>FM</sub> =		(P <sub>FM</sub> ) tion 13-6 or Equation(E	•		L <sub>EQ</sub> = P <sub>FD</sub> =		(E	V <sub>R</sub> + (V <sub>F</sub> - V Equation 13-1 000 using Eq	12 or 13-13	
V <sub>12</sub> = V <sub>3</sub> or V <sub>av34</sub> Is V <sub>3</sub> or V <sub>av34</sub> > 2,70 Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 *	0 pc/h?	s	-14 or 13-17)		$V_{12} = V_3$ or $V_{av34}$ Is $V_3$ or $V_{av}$		0 00 pc/h? [ * V <sub>12</sub> /2 [	64 pc/h pc/h (Equatio Yes ☑ No Yes ☑ No		
If Yes,V <sub>12a</sub> =	pc/h ( 13-19)		-16, 13-18, or		If Yes,V <sub>12a</sub>	=	p 19	c/h (Equation ১)	13-16, 13	-18, or 13-
Capacity Che					Capacia	ty Ch		<del>')</del>		
	Actual	С	apacity	LOS F?	1		Actual	Ca	apacity	LOS F?
.,					V <sub>F</sub>		2864	Exhibit 13-		No
$V_{FO}$		Exhibit 13-8			$V_{FO} = V_{FO}$		2575	Exhibit 13-		No
	<u> </u>	<u> </u>	1		V <sub>R</sub>		289	Exhibit 13-1		No
Flow Entering	Actual		I <b>rea</b> Desirable	Violation?	FIOW EI		Actual	<b>rge Influen</b> Max Desiral		Violation?
V <sub>R12</sub>	Actual	Exhibit 13-8	Desirable	Violations	V <sub>12</sub>		2864	Exhibit 13-8	4400:All	No
Level of Serv	ice Detern	nination (	if not F)			f Ser	vice De	terminatio	n (if not	<del>.</del> <b>F</b> )
$D_R = 5.475 + 0.$	00734 v <sub>R</sub> +	0.0078 V <sub>12</sub> -	0.00627 L <sub>A</sub>			D <sub>R</sub> = 4	1.252 + 0.	0086 V <sub>12</sub> - 0.	.009 L <sub>D</sub>	
D <sub>R</sub> = (pc/mi/ln	)				D <sub>R</sub> = 2	4.4 (pc	/mi/ln)			
LOS = (Exhibit	13-2)				LOS = C	(Exhi	oit 13-2)			
Speed Detern	nination				Speed I	Deter	minatio	n		
IX	ibit 13-11)				$S_R = 5$	7.3 mph	xhibit 13- (Exhibit	13-12)		
	ibit 13-11) ibit 13-13)				1	-	(Exhibit 1 (Exhibit	•		
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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Т	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description BLHS	TKTPM TKTPM 10/2/2017 2028 EPAP I SP Phase 1a F		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Cambrid	WB dge Rd/Off-Ramp do County
	or riiase ia r		Non (NI)	□ Dlor	oning Data
✓ Oper.(LOS)  Flow Inputs		L	Pes.(N)	Piai	nning Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	2669	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.96 1 0 Rolling mi	
			Up/Down %		
Calculate Flow Adjus	tments				
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 )] 0.985	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	2 70.0	ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performanc	e Measures	<u> </u>	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x l x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1411 69.5 20.3 C	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF \text{ x})$ $x f_p)$ $S$ $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

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	BASIC FRE	EWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed	TKTPM TKTPM 10/2/2017		Highway/Direction of Trave From/To Jurisdiction	Silva Va Ramp	B lley Pkwy/Off- do County
Analysis Time Period Project Description <i>BLHS</i>	2028 EPAP F P Phase 1a Fi		Analysis Year	2028	
✓ Oper.(LOS)	i i ilase ia i i		Pes.(N)	Plan	ning Data
Flow Inputs					9 = 5.15.
Volume, V AADT	4561	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.96 1	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade -6.00% Length Up/Down %	0 Grade 1.20mi -6.00	
Calculate Flow Adjus	tments				
f <sub>p</sub>	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$		
Speed Inputs			Calc Speed Adj and I	-FS	
Lane Width Rt-Side Lat. Clearance	0	ft ft	$f_{LW}$		mph
Number of Lanes, N Total Ramp Density, TRD	2	ramps/mi	f <sub>LC</sub> TRD Adjustment		mph mph
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph
LOS and Performance	e Measures		Design (N)		
Operational (LOS) v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> )	N x f <sub>HV</sub> 2387	pc/h/ln	Design (N) Design LOS v <sub>p</sub> = (V or DDHV) / (PHF x	N x f <sub>HV</sub>	pc/h/ln
S D = v <sub>p</sub> / S LOS	53.7 44.5 E	mph pc/mi/ln	x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes	s, N	mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design l	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11

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		RAMP	S AND RAN	/P JUNCTI	ONS WO	RKS	HEET			
General Infor	mation	TO COM	<u> </u>	Site Infor		,				
Analyst Agency or Company Date Performed Analysis Time Perioc	TKTF TKTF 10/2/: 2028	PM 2017 EPAP PM	J	Freeway/Dir of Tr lunction lurisdiction Analysis Year		US 50 Bass L El Dora 2028				
Project Description Inputs	BLHSP Phase	1a Final Map								
-		Freeway Num	ber of Lanes, N	2					1	
Upstream Adj R	amp	Ramp Numbe		1					Downstrea Ramp	am Adj
□Yes □	On		ane Length, L	'					l `	
ZN-	1 <b>0</b> #		ane Length L <sub>D</sub>	500					☐ Yes	□ On —
✓ No	Off	Freeway Volu	• Б	4561					✓ No	Off
L <sub>up</sub> = f	t	Ramp Volume		901					L <sub>down</sub> =	ft
V =	- l- /l-	Freeway Free	-Flow Speed, S <sub>FF</sub>	70.0					V <sub>D</sub> =	veh/h
$V_{u} = V_{0}$	eh/h	Ramp Free-Fl	ow Speed, S <sub>FR</sub>	35.0					V <sub>D</sub> –	VCII/II
Conversion to	o pc/h Und	der Base (	Conditions							
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv		$f_{HV}$	$f_p$	v = V/PHF	x f <sub>HV</sub> x f <sub>p</sub>
Freeway	4561	0.96	Rolling	2	0	0.	971	1.00	48	394
Ramp	901	0.96	Rolling	2	0	0.	971	1.00	9	67
UpStream										
DownStream		Merge Areas						iverge Areas		
Estimation of		vicige Aleas			Estima	tion o		iverge Areas		
	V <sub>12</sub> = V <sub>F</sub>	(D )						V <sub>R</sub> + (V <sub>F</sub> - V	\D	
l –		tion 13-6 or	12 7)		_			V <sub>R</sub> + (V <sub>F</sub> - V <sub>I</sub> Equation 13-1	–	1
L <sub>EQ</sub> = P _		Equation (F	=		L <sub>EQ</sub> = D _		-	000 using Eq		
P <sub>FM</sub> = V <sub>12</sub> =	pc/h	Equation (L	-AIIIDIL 13-0)		P <sub>FD</sub> = V <sub>12</sub> =			94 pc/h	uation (Exil	IDIL 13-7)
V <sub>3</sub> or V <sub>av34</sub>	•	Fouation 13	-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>			pc/h (Equation	on 13-14 o	r 13-17)
Is $V_3$ or $V_{av34} > 2,70$	-	-	,			.24 > 2,7		Yes ☑ No	311 10 11 0	10 11)
Is $V_3$ or $V_{av34} > 1.5$								Yes ☑ No		
If Yes,V <sub>12a</sub> =	pc/h (	Equation 13	-16, 13-18, or		If Yes,V <sub>12a</sub>		p	c/h (Equation	13-16, 13	-18, or 13-
	13-19)						19	9)		
Capacity Che	Actual		apacity	LOS F?	Capaci	ly CII	Actual	Ca	pacity	LOS F?
	Actual	Ĭ	apacity	2001.	V <sub>F</sub>		4894	Exhibit 13-	<del></del>	Yes
V <sub>FO</sub>		Exhibit 13-8			$V_{FO} = V_{FO}$	_	3927	Exhibit 13-	_	No
FO					V <sub>R</sub>		967	Exhibit 13-1		No
Flow Entering	n Merae In	ifluence A	rea		- '`			ge Influen		
Tion Lineing	Actual		Desirable	Violation?	1011 21	T T	Actual	Max Desiral		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	4	1894	Exhibit 13-8	4400:All	Yes
Level of Serv	ice Detern	nination (	if not F)	•	Level o	f Ser	vice De	terminatio	n (if not	<b>F</b> )
$D_R = 5.475 + 0.$	00734 v <sub>R</sub> + (	0.0078 V <sub>12</sub> -	0.00627 L <sub>A</sub>			D <sub>R</sub> = 4	.252 + 0.	0086 V <sub>12</sub> - 0.	.009 L <sub>D</sub>	
D <sub>R</sub> = (pc/mi/ln	)				D <sub>R</sub> = 4	1.8 <b>(pc</b>	/mi/ln)			
LOS = (Exhibit	13-2)				LOS = F	(Exhib	oit 13-2)			
Speed Detern	nination				Speed I	Deter	minatio	n		
$M_S = $ (Exibit 13	3-11)				$D_s = 0$	.515 <b>(E</b>	xhibit 13-	12)		
	ibit 13-11)					5.6 mph	(Exhibit	13-12)		
	ibit 13-11)					I/A mph	(Exhibit 1	3-12)		
	ibit 13-13)				S = 5	5.6 mph	(Exhibit	13-13)		
Copyright © 2013 Unive	ersity of Florida, A	All Rights Reserv	/ed		HCS2010 <sup>TM</sup>	<sup>1</sup> Versio	n 6.50	Ge	enerated: 10/2	2/2017 3:20 F

	BASIC FRE	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2028 EPAP F		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Ran	EB np/On-Ramp do County
	P Phase 1a Fi		(A.1)		. 5.
✓ Oper.(LOS)			es.(N)	Plar	nning Data
Flow Inputs	0000	1. //.	Deale Herm Frederic DUE	0.04	
Volume, V AADT	3660	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.94 5	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0 Level mi	
Calculate Flow Adjus	tments				
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2 DI 0.976	
Speed Inputs			Calc Speed Adj and		
			Caic Speed Auj and	rrs	
Lane Width		ft			
Rt-Side Lat. Clearance	•	ft	$f_{LW}$		mph
Number of Lanes, N	2		$f_{LC}$		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph
LOS and Performance	e Measures	<u> </u>	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1995 62.7 31.8 D	pc/h/ln mph pc/mi/ln	Design (N) Design LOS  v <sub>p</sub> = (V or DDHV) / (PHF x x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11
DDHV - Directional design I Copyright © 2013 University of Florid		ved	HCS 2010 <sup>TM</sup> Version 6.50	Gener	rated: 10/2/2017 3:20 F

	RA	MPS AND	RAMP JUNG	CTIONS W	/ORKSH	EET				
General Infor		5,1115		Site Infor						
Analyst Agency or Company Date Performed	TKTF TKTF		Ju	eeway/Dir of Tr nction risdiction		US 50 EB Bass Lake El Dorado				
analysis Time Perio		B EPAP PM	An	alysis Year		2028				
Project Description	BLHSP Phase	: 1a Final Map								
nputs		<del></del>								
Jpstream Adj Ramp		Freeway Num Ramp Number	ber of Lanes, N r of Lanes, N	2 1					Downstre Ramp	am Adj
☐ Yes ☐ Or	1	Acceleration L	ane Length, L <sub>A</sub>	700					☐Yes	On
☑ No ☐ Of	f	Deceleration L Freeway Volui	ane Length L <sub>D</sub>	3660					✓No	Off
up = ft		Ramp Volume	, V <sub>R</sub>	149					L <sub>down</sub> =	ft
u = veh/h	1	1	-Flow Speed, S <sub>FF</sub> ow Speed, S <sub>FR</sub>	70.0 35.0					V <sub>D</sub> =	veh/h
Conversion t	o pc/h Un	der Base	Conditions							
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>		f <sub>p</sub>	v = V/PHI	x f <sub>HV</sub> x f <sub>p</sub>
Freeway	3660	0.96	Rolling	2	0	0.971		1.00	,	3927
Ramp	149	0.96	Rolling	2	0	0.971		1.00		160
JpStream		++								
DownStream		Merge Areas					Div	erge Areas		
stimation o	f V <sub>40</sub>	Weige Aleas			Estimat	tion of v	/ <sub>40</sub>	erge Areas		
		(D )						. () / ) / )	\D	
	$V_{12} = V_F$		40.7)			,		+ (V <sub>F</sub> - V <sub>R</sub>		١٥)
EQ =		ation 13-6 or	•		L <sub>EQ</sub> =			quation 13-		•
FM =			ion (Exhibit 13-6)		P <sub>FD</sub> =			ing Equatio 	n (Exhibit 1	3-7)
12 =	3927	•			V <sub>12</sub> =		рс			
<sub>3</sub> or V <sub>av34</sub>			13-14 or 13-17)		$V_3$ or $V_{av34}$		-	h (Equation 1	3-14 or 13-1	17)
s $V_3$ or $V_{av34} > 2,70$								Yes 🗌 No		
s $V_3$ or $V_{av34} > 1.5$					Is V <sub>3</sub> or V <sub>av</sub>	<sub>/34</sub> > 1.5 * V		Yes 🗌 No		
Yes,V <sub>12a</sub> =	pc/h 13-19)		3-16, 13-18, or		If Yes,V <sub>12a</sub> :	=	pc. 13-1	/h (Equatior	า 13-16, 1	3-18, or
Capacity Che					Capacit	v Chec		19)		
apaonty one	Actual	T C	apacity	LOS F?			Actual	Can	acity	LOS F?
	+		-						· · · · ·	
					V <sub>E</sub>			Exhibit 13-8	3	
V	4007	F.,L!L!! 12.0		NI-	V <sub>F</sub>			Exhibit 13-8		
$V_{FO}$	4087	Exhibit 13-8		No	$V_{FO} = V_{F}$			Exhibit 13-8	3	
$V_{FO}$	4087	Exhibit 13-8		No					3	
			rea	No	$V_{FO} = V_{F}$ $V_{R}$	: - V <sub>R</sub>	Diverg	Exhibit 13-8		
Flow Enterin	<b>g Merge In</b> Actual	nfluence A	Desirable	Violation?	V <sub>FO</sub> = V <sub>F</sub> V <sub>R</sub>	: - V <sub>R</sub>	al	Exhibit 13-8 Exhibit 13-10 <b>e Influen</b> Max Desi	ce Area	Violation
Flow Enterin	g Merge In Actual 4087	Max I Exhibit 13-8	Desirable 4600:All		V <sub>FO</sub> = V <sub>F</sub> V <sub>R</sub> Flow E <sub>I</sub> V <sub>12</sub>	ntering Actu	al [	Exhibit 13-8 Exhibit 13-10 E Influen Max Desi Exhibit 13-8	ce Area	Violation <sup>2</sup>
V <sub>R12</sub>	g Merge In Actual 4087	nfluence A Max I Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	Violation?	V <sub>FO</sub> = V <sub>F</sub> V <sub>R</sub> Flow Er V <sub>12</sub> Level o	ntering Actu	al E <b>Dete</b>	Exhibit 13-8 Exhibit 13-10 Ee Influen Max Desi Exhibit 13-8	ce Area	Violation <sup>2</sup>
V <sub>R12</sub>	g Merge In Actual 4087	Max I Exhibit 13-8	Desirable 4600:All <b>if not F</b> )	Violation?	V <sub>FO</sub> = V <sub>F</sub> V <sub>R</sub> Flow Er V <sub>12</sub> Level o	ntering Actu	al E <b>Dete</b>	Exhibit 13-8 Exhibit 13-10 E Influen Max Desi Exhibit 13-8	ce Area	Violation <sup>2</sup>
V <sub>R12</sub> .evel of Serv	g Merge In Actual 4087 rice Detern 0.00734 v <sub>R</sub> + 0	nfluence A Max I Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	Violation?	V <sub>FO</sub> = V <sub>F</sub> V <sub>R</sub> Flow E <sub>I</sub> V <sub>12</sub> Level o	ntering Actu	al E <b>Dete</b>	Exhibit 13-8 Exhibit 13-10 Ee Influen Max Desi Exhibit 13-8	ce Area	Violation <sup>2</sup>
Flow Entering $V_{R12}$ Level of Serv $D_{R} = 5.475 + 32.9 \text{ (pc/m)}$	g Merge In Actual 4087 rice Detern 0.00734 v <sub>R</sub> + (	nfluence A Max I Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	Violation?	$V_{FO} = V_F$ $V_R$ Flow Er $V_{12}$ Level of	ntering Actu	e <b>Dete</b>	Exhibit 13-8 Exhibit 13-10 Ee Influen Max Desi Exhibit 13-8	ce Area	Violation
Flow Entering $V_{R12}$ Level of Serv $D_{R} = 5.475 + 32.9 \text{ (pc/m)}$	### Actual 4087  #### Actual 4087  #### Actual 4087  #### Actual 4087  ##### Actual 4087  ###################################	nfluence A Max I Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	Violation?	$V_{FO} = V_F$ $V_R$ Flow Er $V_{12}$ Level of	retering Acturn	al [6] <b>e Dete</b> 52 + 0.00	Exhibit 13-8 Exhibit 13-10 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8	ce Area	Violation <sup>2</sup>
Flow Entering $V_{R12}$ Level of Serv $D_R = 5.475 + 4$ $C_R = 32.9 \text{ (pc/m OS} = D \text{ (Exhibit)}$ Speed Determines	g Merge In Actual 4087 rice Detern 0.00734 v <sub>R</sub> + 0 ni/ln) 13-2) mination	nfluence A Max I Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	Violation?	$V_{FO} = V_F$ $V_R$ Flow Er $V_{12}$ Level of the control of	f Servic  D <sub>R</sub> = 4.25 pc/mi/ln) Exhibit 13	e Dete 52 + 0.00 -2)	Exhibit 13-8 Exhibit 13-10 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8	ce Area	Violation
Flow Entering $V_{R12}$ Level of Serv $D_R = 5.475 + 32.9 \text{ (pc/m}$ $OS = D \text{ (Exhibit)}$ $Speed Detern$ $S_S = 0.504 \text{ (Exhibit)}$	### Actual 4087  #### Actual 4087  ##### Actual 4087  ##### Actual 4087  ##### Actual 4087  ###################################	nfluence A Max I Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	Violation?	$V_{FO} = V_F$ $V_R$ Flow En $V_{12}$ Level of the control of	Acturate Act	e Dete 52 + 0.00 -2) nation	Exhibit 13-8 Exhibit 13-10 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8	ce Area	Violation
Flow Entering $V_{R12}$ Evel of Serv $D_R = 5.475 + $ $R = 32.9 \text{ (pc/m}$ $OS = D \text{ (Exhibit)}$ Speed Determination of the service of the	Actual   4087	nfluence A Max I Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	Violation?	$V_{FO} = V_F$ $V_R$ Flow En $V_{12}$ Level of the control of	Acturate Act	al [ e Dete 52 + 0.00  -2)  nation 2)  13-12)	Exhibit 13-8 Exhibit 13-10 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8	ce Area	Violation
Flow Entering $V_{R12}$ Level of Serv $D_R = 5.475 + 4$ $D_R = 32.9 \text{ (pc/m}$ $D_R = 5.475 + 4$ $D_R = 32.9 \text{ (pc/m}$ $D_R = 5.475 + 4$ $D_R = 32.9 \text{ (pc/m}$ $D_R = 5.475 + 4$ $D_R = 32.9 \text{ (pc/m}$ $D_R = 5.475 + 4$ $D_R = 5$	### Actual 4087  #### Actual 4087  ##### Actual 4087  ##### Actual 4087  ##### Actual 4087  ###################################	nfluence A Max I Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	Violation?	V <sub>FO</sub> = V <sub>F</sub> V <sub>R</sub> V <sub>R</sub> Flow Er V <sub>12</sub> Level of LOS = (I) Speed I S <sub>R</sub> = m S <sub>0</sub> = m	Acturate Act	al [62 + 0.00]  -2)  nation 2) 13-12)	Exhibit 13-8 Exhibit 13-10 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8 Exhibit 13-8	ce Area	Violation <sup>2</sup>

General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2028 EPAP I		Highway/Direction of Trave From/To Jurisdiction Analysis Year	On-Ram	EB np/Cambridge Rd do County
	SP Phase 1a F		(4.1)		
✓ Oper.(LOS)			es.(N)	∐Plan	ning Data
Flow Inputs	0000	1. //-	D. d. II E. d DIJE	0.00	
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D	3809	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain:	0.96 1 0 Rolling	
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	mi	
Calculate Flow Adjus	tments				
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 )] 0.985	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	$f_{LW}$		mph
Number of Lanes, N	2		f <sub>LC</sub>		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS		mph		70.0	трп
LOS and Performanc	e Measures	}	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 2014 62.3 32.3 D	pc/h/ln mph pc/mi/ln	Design (N) Design LOS  v <sub>p</sub> = (V or DDHV) / (PHF x  x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Т	
General Information			Site Information		
Analyst	TKTPM		Highway/Direction of Trave		VB np/Silva Valley
Agency or Company	TKTPM		From/To	Pkwy	ip/Giiva valicy
Date Performed Analysis Time Period	10/2/2017 2028 EPAP+	-Project AM	Jurisdiction Analysis Year	El Dorad 2028	do County
	SP Phase 1a F	-	•		
✓ Oper.(LOS)			Des.(N)	☐Plar	nning Data
Flow Inputs					
Volume, V	4481	veh/h	Peak-Hour Factor, PHF	0.96	
AADT		veh/day	%Trucks and Buses, $P_T$	1	
Peak-Hr Prop. of AADT, K			%RVs, P <sub>R</sub>	0	
Peak-Hr Direction Prop, D			General Terrain:	Grade	
DDHV = AADT x K x D		veh/h	Grade -6.00% Length	1.20mi	
			Up/Down %	-6.00	
Calculate Flow Adjus	tments				
f <sub>p</sub>	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	)] 0.995	
Speed Inputs			Calc Speed Adj and I		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f		mph
Number of Lanes, N	2		f <sub>LW</sub>		-
Total Ramp Density, TRD	-	ramps/mi	f <sub>LC</sub>		mph
FFS (measured)	70.0	•	TRD Adjustment		mph
Base free-flow Speed,	70.0	mph	FFS	70.0	mph
BFFS		mph			
LOS and Performanc	e Measures	3	Design (N)		
			Design (N)		
Operational (LOS)			Design LOS		
$v_p = (V \text{ or DDHV}) / (PHF x I)$	N x f <sub>HV</sub> 2346	pc/h/ln	$v_p = (V \text{ or DDHV}) / (PHF x)$	N x f <sub>in</sub> ,	
x f <sub>p</sub> )		•	x f <sub>p</sub> )	п۷	pc/h/ln
S	54.8	mph	S		mph
$D = v_p / S$	42.8	pc/mi/ln	$D = v_p / S$		pc/mi/ln
LOS	Е		Required Number of Lanes	e N	рс/пп/п
Glossary			Factor Location	, 14	
	C Cnor	- d	Factor Location		
N - Number of lanes	S - Spee		E <sub>R</sub> - Exhibits 11-10, 11-12		f <sub>LW</sub> - Exhibit 11-8
V - Hourly volume	D - Dens	•	E <sub>T</sub> - Exhibits 11-10, 11-11,	11-13	f <sub>LC</sub> - Exhibit 11-9
v <sub>p</sub> - Flow rate		e-flow speed	f <sub>թ</sub> - Page 11-18		TRD - Page 11-11
LOS - Level of service speed	BFFS - B8	ase free-flow	LOS, S, FFS, v <sub>p</sub> - Exhibits	11-2,	
DDHV - Directional design	hour volume		11-3		
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		MII O AIND		CTIONS W					
General Infort	mation			Site Infor					
nalyst	TKTF			eeway/Dir of Tr		US 50 WB			
gency or Company	TKTF			nction		Bass Lake Rd			
ate Performed	10/2/			risdiction		El Dorado Count	ty		
nalysis Time Period roject Description		B EPAP+Project	AIVI AN	nalysis Year		2028			
nputs	DLITSP PIIASE	ia Filiai iviap							
•		Freeway Num	ber of Lanes, N	2				T	
pstream Adj Ramp		Ramp Number		1				Downstre	eam Adj
☐Yes ☐ On				1				Ramp	
			ane Length, L <sub>A</sub>	700				☐Yes	On
☑ No ☐ Off			_ane Length L <sub>D</sub>					☑No	Off
		Freeway Volu		3364					_
<sub>ip</sub> = ft		Ramp Volume	11	1109				L <sub>down</sub> =	ft
., = veh/h		Freeway Free	-Flow Speed, S <sub>FF</sub>	70.0				V <sub>D</sub> =	veh/h
u = veh/h		Ramp Free-Fl	ow Speed, S <sub>FR</sub>	35.0				l'o	VO11/11
onversion to	pc/h Un	der Base	Conditions						
(pc/h)	V	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	fp	v = V/PH	F x f <sub>HV</sub> x f <sub>r</sub>
, .	(Veh/hr)						<del>                                     </del>		
reeway	3364	0.96	Rolling	2	0	0.971	1.00	_	3609
lamp	1109	0.96	Rolling	2	0	0.971	1.00	+	1190
pStream lownStream		+				+	-	+	
ownstream		Merge Areas					Diverge Areas	 }	
stimation of					Estimat	ion of v <sub>12</sub>	3		
	V <sub>12</sub> = V <sub>F</sub>	(D )					· V <sub>R</sub> + (V <sub>F</sub> - V	/ \P	
_			- 12 7)			v <sub>12</sub> –	(Equation 1		12)
EQ =		ation 13-6 or	· ·		L <sub>EQ</sub> =				
FM =			ion (Exhibit 13-6)		P <sub>FD</sub> =		using Equat	ion (Exhibit	13-7)
12 =	3609	•			V <sub>12</sub> =		pc/h		
<sub>3</sub> or V <sub>av34</sub>	-		13-14 or 13-17)		$V_3$ or $V_{av34}$		pc/h (Equation		17)
s $V_3$ or $V_{av34} > 2,700$						$_{34} > 2,700 \text{ pc/h}?$			
s $V_3$ or $V_{av34} > 1.5$ *					Is V <sub>3</sub> or V <sub>av3</sub>	$_{34} > 1.5 * V_{12}/2$			
Yes,V <sub>12a</sub> =	pc/h 13-19)		3-16, 13-18, or				pc/h (Eguat	ion 13-16, 1	13-18, or
apacity Che	10-10	1			If Yes, V <sub>12a</sub> =	•		•	
	cks	)					13-19)		
			apacity	LOS F?		y Checks	13-19)		
	<b>cks</b> Actual		Capacity	LOS F?	Capacit		13-19) C	Capacity	LOS F
	Actual	C	apacity		Capacity V <sub>F</sub>	y Checks Actual	13-19) I C Exhibit 1	Capacity 3-8	
V <sub>FO</sub>			apacity	LOS F?	V <sub>F</sub> V <sub>FO</sub> = V <sub>F</sub>	y Checks Actual	13-19)  Exhibit 1  Exhibit 1	Capacity 3-8 3-8	
	Actual	C	apacity		Capacity V <sub>F</sub>	y Checks Actual	13-19) I C Exhibit 1	Capacity 3-8 3-8	
V <sub>FO</sub>	Actual 4799	Exhibit 13-8			Capacity $V_{F}$ $V_{FO} = V_{F}$ $V_{R}$	y Checks Actual	Exhibit 1  Exhibit 1  Exhibit 1  Exhibit 1	Capacity 3-8 3-8 3-8	LOS F
V <sub>FO</sub> low Entering	Actual 4799	Exhibit 13-8			V <sub>F</sub> V <sub>FO</sub> = V <sub>F</sub> V <sub>R</sub>	y Checks Actual	Exhibit 1  Exhibit 1  Exhibit 1  Exhibit 1	Capacity 3-8 3-8 3-8 ance Area	LOS F
V <sub>FO</sub> low Entering	Actual 4799 <b>g Merge In</b>	Exhibit 13-8	Irea	No	V <sub>F</sub> V <sub>FO</sub> = V <sub>F</sub> V <sub>R</sub>	Actual  - V <sub>R</sub> attering Dive	Exhibit 1 Exhibit 1 10 Exprise 1	Capacity 3-8 3-8 3-8 3- ence Area	LOSF
V <sub>FO</sub> low Entering  V <sub>R12</sub>	4799  Merge In  Actual  4799	Exhibit 13-8  Exhibit 13-8  Max Exhibit 13-8	<b>Irea</b> Desirable 4600:All	No Violation?	$ \begin{array}{c} V_F \\ V_{FO} = V_F \\ V_R \end{array} $ Flow En	Actual  - V <sub>R</sub> attering Dive	Exhibit 1  Exhibit 1  Exhibit 1  Exhibit 1  Orge Influe  Max De  Exhibit 13-8	Sapacity 3-8 3-8 3- Sence Area esirable	LOS F
V <sub>FO</sub> low Entering V <sub>R12</sub> evel of Servi	Actual  4799  Merge In  Actual  4799  ice Determ	Exhibit 13-8  Exhibit 13-8  Max Exhibit 13-8	Area Desirable 4600:All if not F)	No Violation?	V <sub>F</sub> V <sub>FO</sub> = V <sub>F</sub> V <sub>R</sub> Flow En	Actual  - V <sub>R</sub> atering Dive	Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 13-8	Sapacity 3-8 3-8 3-8 3-8 ence Area esirable sion (if no	LOS F
V <sub>FO</sub> low Entering  V <sub>R12</sub> evel of Servi	Actual  4799  7 Merge In  Actual  4799  ice Determ  0.00734 v R + C	Exhibit 13-8  The state of the	Area Desirable 4600:All if not F)	No Violation?	V <sub>FO</sub> = V <sub>F</sub> V <sub>R</sub> Flow En	Actual  Actual  Actual  Actual  Actual  Actual  Actual	Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 13-8	Sapacity 3-8 3-8 3-8 3-8 ence Area esirable sion (if no	LOS F
$V_{FO}$ Volume Entering $V_{R12}$ evel of Servior $D_R = 5.475 + C_R = 38.0 \text{ (pc/missing)}$	Actual  4799  The Merge In Actual  4799  The Actual  4799  The Actual  4799  The Actual  4799  The Actual  4799	Exhibit 13-8  The state of the	Area Desirable 4600:All if not F)	No Violation?	$\begin{array}{c} V_{F} \\ V_{FO} = V_{F} \\ V_{R} \\ \hline \end{array}$ Flow En	Actual  - V <sub>R</sub> Actual  Actual  Actual  Actual  F Service Do D <sub>R</sub> = 4.252 + 6  Actual  Actual	Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 1 Exhibit 13-8	Sapacity 3-8 3-8 3-8 3-8 ence Area esirable sion (if no	LOS F
$V_{FO}$ Very series of Servior Density Series (Servior Servior Serv	Actual  4799  7 Merge In  Actual  4799  6 Ce Detern  0.00734 v R + 0  6 In  13-2)	Exhibit 13-8  Influence A  Max Exhibit 13-8  Exhibit 13-8	Area Desirable 4600:All if not F)	No Violation?	$\begin{array}{c} V_{F} \\ V_{FO} = V_{F} \\ V_{R} \\ \hline \end{array}$ Flow En	Actual  - V <sub>R</sub> Actual  Actual  F Service Do D <sub>R</sub> = 4.252 + 6 Doc/mi/ln) Exhibit 13-2)	Exhibit 1 Exhibit 13-8	Sapacity 3-8 3-8 3-8 3-8 ence Area esirable sion (if no	LOS F
$V_{FO}$ Flow Entering $V_{R12}$ evel of Servi $D_R = 5.475 + C$ $C_R = 38.0 \text{ (pc/mi)}$ $C_R = 5.475 + C$ $C_R = 38.0 \text{ (pc/mi)}$ $C_R = 6.475 + C$ $C_R$	Actual  4799  The Merge In Actual  4799  The Actual  4799	Exhibit 13-8  Influence A  Max Exhibit 13-8  Exhibit 13-8	Area Desirable 4600:All if not F)	No Violation?	$\begin{array}{c} V_{F} \\ V_{FO} = V_{F} \\ V_{R} \\ \hline \end{array}$ Flow En	Actual	Exhibit 1 Exhibit 13-8	Sapacity 3-8 3-8 3-8 3-8 ence Area esirable sion (if no	LOS F
V <sub>FO</sub> V <sub>R12</sub> evel of Servi  D <sub>R</sub> = 5.475 + ( R = 38.0 (pc/mi  OS = E (Exhibit 1)  Epeed Determ  S = 0.745 (Exib	Actual  4799  7 Merge In  Actual  4799  ice Detern  0.00734 v <sub>R</sub> + 0  i/ln)  13-2)  nination	Exhibit 13-8  Influence A  Max Exhibit 13-8  Exhibit 13-8	Area Desirable 4600:All if not F)	No Violation?	$\begin{array}{c} V_{F} \\ V_{FO} = V_{F} \\ V_{R} \\ \hline \end{array}$ Flow En $\begin{array}{c} V_{12} \\ Level \ otherwise \\ LOS = (E \\ Speed \ L \\ D_{S} = (E \\ \end{array}$	Actual  - V <sub>R</sub> Actual  - V <sub>R</sub> Actual  Actual  F Service Do D <sub>R</sub> = 4.252 + 6 Dc/mi/ln)  Exhibit 13-2)  Determination	Exhibit 1.  Ocree Influe  Exhibit 13-8  Exermination 1.00086 V <sub>12</sub> -	Sapacity 3-8 3-8 3-8 3-8 ence Area esirable sion (if no	LOS F
V <sub>FO</sub> V <sub>R12</sub> evel of Servi  D <sub>R</sub> = 5.475 + 1  R = 38.0 (pc/mi  DS = E (Exhibit 1  peed Detern  S = 0.745 (Exit  R = 49.1 mph (	Actual  4799  7 Merge In  Actual  4799  ice Detern  0.00734 v R + 0  i/ln)  13-2)  nination  bit 13-11)  Exhibit 13-11)	Exhibit 13-8  Influence A  Max Exhibit 13-8  Exhibit 13-8	Area Desirable 4600:All if not F)	No Violation?	$\begin{array}{c} V_{F} \\ V_{FO} = V_{F} \\ V_{R} \\ \hline \end{array}$	Actual  - V <sub>R</sub> Intering Dive Actual  F Service De D <sub>R</sub> = 4.252 + 6 De/mi/In) Exhibit 13-12) Determination The property of the content of the	Exhibit 1  Exhibit 1  Exhibit 1  Exhibit 1  Ourge Influe  Max De  Exhibit 13-8  Exhibit 14-8  Exhibit 15-8  Exhibi	Sapacity 3-8 3-8 3-8 3-8 ence Area esirable sion (if no	LOS F
V <sub>FO</sub> V <sub>R12</sub> evel of Servi  D <sub>R</sub> = 5.475 + 1  R = 38.0 (pc/mi  DS = E (Exhibit 1)  Epeed Determ  S = 0.745 (Exib  R = 49.1 mph (Exit 1)  Exit 10	Actual  4799  7 Merge In  Actual  4799  ice Detern  0.00734 v <sub>R</sub> + 0  i/ln)  13-2)  nination	Exhibit 13-8  Influence A  Max Exhibit 13-8  Exhibit 13-8	Area Desirable 4600:All if not F)	No Violation?	$\begin{array}{c} V_F \\ V_{FO} = V_F \\ V_R \\ \hline \end{array}$ $\begin{array}{c} V_{12} \\ \hline \\ Level \ of \\ \\ LOS = (E \\ S_P = m) \\ S_0 = m \end{array}$	Actual  - V <sub>R</sub> Actual  - V <sub>R</sub> Actual  Actual  F Service Do D <sub>R</sub> = 4.252 + 6 Dc/mi/ln)  Exhibit 13-2)  Determination	Exhibit 1  Exhibit 1  Exhibit 1  Exhibit 1  Exhibit 1  Exhibit 1  Exhibit 130	Sapacity 3-8 3-8 3-8 3-8 ence Area esirable sion (if no	LOS F

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description <i>BLH</i> S	TKTPM TKTPM 10/2/2017 2028 EPAP+ SP Phase 1a F		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Ran	NB np/On-Ramp do County
	er riiase ia r		Acc (NI)	□ Dlor	aning Data
✓ Oper.(LOS)  Flow Inputs			es.(N)	Piar	nning Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	3364	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.94 5 0 Level mi	
			Up/Down %		
Calculate Flow Adjus  fp ET	1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2 1)] 0.976	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed,	2 70.0	ft ft ramps/mi mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph
BFFS LOS and Performanc	o Moasuros	mph	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x Nx f <sub>p</sub> )  S D = v <sub>p</sub> / S LOS		pc/h/ln mph pc/mi/ln	Design (N)  Design LOS $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x } f_p)$ S $D = v_p / S$ Required Number of Lane		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	, 11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11
DDHV - Directional design I Copyright © 2013 University of Florid		rved	HCS 2010 <sup>TM</sup> Version 6.50	Gener	rated: 10/2/2017 3:24 F

		RAMP:	S AND RAN	<u>IP JUNCTI</u>	<u>ONS WO</u>	<u>RKS</u> I	<u> IEET</u>			
General Info	rmation			Site Infor	mation					
Analyst	TKTF	PM	F	reeway/Dir of Tr	avel	US 50 V	VB			
gency or Company	y TKTF	PM	Jı	unction		Bass La	ke Rd			
ate Performed	10/2/	2017	Ju	urisdiction		El Dora	do County	1		
analysis Time Perio	d 2028	EPAP+Project	AM A	nalysis Year		2028				
Project Description	BLHSP Phase	1a Final Map								
nputs										
Upstream Adj F	Pamn	Freeway Num	per of Lanes, N	2					Downstrea	ım Adi
Opsilealii Auj i	Vallip	Ramp Number	of Lanes, N	1					Ramp	iiii Auj
☐Yes	On		ane Length, L <sub>₄</sub>	·					_	
			- ^	F00					∐Yes	On
✓ No	Off	Deceleration L	- 0	500					✓ No	Off
	_	Freeway Volur		3610						
L <sub>up</sub> =	ft	Ramp Volume	, V <sub>R</sub>	246					L <sub>down</sub> =	ft
.,		Freeway Free-	Flow Speed, S <sub>FF</sub>	70.0					V <sub>D</sub> =	veh/h
$V_{u} = V_{u}$	/eh/h	Ramp Free-Flo	ow Speed, S <sub>ED</sub>	35.0					v <sub>D</sub> –	veii/ii
Conversion	to nc/h Un	-	· 11X							
			Jonanions	1	T T	Т		_		
(pc/h)	(Veh/hr)	PHF	Terrain	%Truck	%Rv	1	HV	f <sub>p</sub>	v = V/PHF	$x f_{HV} x f_{p}$
Freeway	3610	0.96	Rolling	2	0	0.9	71	1.00	38	73
Ramp	246	0.96	Rolling	2	0	0.9		1.00	26	
JpStream	2.0	0.70	. tog	_	Ů	+ ***	<u>,</u>			
DownStream										
	•	Merge Areas				-	ı	Diverge Areas		
stimation o	f V <sub>12</sub>				Estimati	ion o	f V <sub>12</sub>			
	<del></del>	(D )						- \/ . (\/ \/	\D	
	$V_{12} = V_{F}$							= V <sub>R</sub> + (V <sub>F</sub> - V <sub>F</sub>		
EQ =		ation 13-6 or	· ·		L <sub>EQ</sub> =		(	Equation 13-1	2 or 13-13	)
r <sub>FM</sub> =	using	Equation (E	xhibit 13-6)		$P_{FD} =$		1.	000 using Equ	uation (Exhi	bit 13-7)
12 =	pc/h				V <sub>12</sub> =		3	373 <b>pc/h</b>		
' <sub>3</sub> or V <sub>av34</sub>	pc/h (	Equation 13-	·14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>		0	pc/h (Equation	n 13-14 or	13-17)
s $V_3$ or $V_{av34} > 2.70$			,			> 2.70		Yes ☑ No		,
s $V_3$ or $V_{av34} > 1.5$								Yes ☑ No		
			-16, 13-18, or					res ເ⊻ ino oc/h (Equation	13 16 13	19 or 13
Yes,V <sub>12a</sub> =	13-19)		10, 13-10, 01		If Yes, V <sub>12a</sub> =	:		9)	13-10, 13-	10, 01 13
Capacity Che					Capacity	v Che		- /		
a personal	Actual	I C.	apacity	LOS F?		1	Actual	Ca	pacity	LOS F
	7 totaa.	i i	аравку		V <sub>F</sub>		3873	Exhibit 13-8	· 1	No
						.,				_
$V_{FO}$		Exhibit 13-8			$V_{FO} = V_{F}$	- v <sub>R</sub>	3609	Exhibit 13-8	3 4800	No
					$V_R$		264	Exhibit 13-1	0 2000	No
low Enterin	g Merge In	fluence A	rea		Flow En	terin	g Dive	rge Influen	ce Area	
	Actual	·	Desirable	Violation?			ctual	Max Desirab		Violation
	1	Exhibit 13-8			V <sub>12</sub>		373	Exhibit 13-8	4400:All	No
V <sub>D12</sub>	ico Dotorr		f not F		+			terminatio		
V <sub>R12</sub>		ını auvii (I								,
Level of Serv		0.0070.17			1	υ <sub>R</sub> = 4		.0086 V <sub>12</sub> - 0.	ooa r <sup>D</sup>	
<b>D<sub>R</sub> = 5.475 + 0</b>	.00734 v <sub>R</sub> +	0.0078 V <sub>12</sub> -	0.00027 L <sub>A</sub>							
D <sub>R</sub> = $5.475 + 0$ $D_R = (pc/mi/lr$	.00734 v <sub>R</sub> + า)	0.0078 V <sub>12</sub> -	0.00027 L <sub>A</sub>			3.1 <b>(pc/</b>	mı/ln)			
D <sub>R</sub> = $5.475 + 0$ $D_R = (pc/mi/lr$	.00734 v <sub>R</sub> + า)	0.0078 V <sub>12</sub> -	0.00027 L <sub>A</sub>			**	mı/ln) it 13-2)			
Level of Serv $D_R = 5.475 + 0$ $D_R = (pc/mi/lr$ $D_R = (Exhibit)$	.00734 v <sub>R</sub> + n) 13-2)	0.0078 V <sub>12</sub> -	0.00027 L <sub>A</sub>		LOS = D	(Exhib	it 13-2)	on .		
Level of Serv $D_R = 5.475 + 0$ $D_R = (pc/mi/lr)$ $D_R = (Exhibit)$ Speed Determines	.00734 v <sub>R</sub> + n) 13-2) <b>mination</b>	0.0078 V <sub>12</sub> -	0.00027 L <sub>A</sub>		LOS = D <b>Speed D</b>	(Exhib	it 13-2) <b>ninati</b> o			
Level of Serv $D_R = 5.475 + 0$ $D_R = (pc/mi/lr$ OS = (Exhibit) Speed Determined by $D_S = (Exhibit)$	.00734 v <sub>R</sub> + n) 13-2) <b>mination</b> 13-11)	0.0078 V <sub>12</sub> -	0.00027 L <sub>A</sub>		LOS = D <b>Speed D</b> D <sub>S</sub> = 0.4	(Exhib <b>Deteri</b> 452 (Ex	it 13-2) <b>ninatio</b> thibit 13	-12)		
Level of Serv $D_R = 5.475 + 0$ $D_R = (pc/mi/lr)$ $D_R = (Exhibit)$ $D_R = (Exhibit)$ $D_R = (Exhibit)$ $D_R = (Exhibit)$ $D_R = (Exhibit)$	1.00734 v <sub>R</sub> + 1) 13-2) <b>mination</b> 3-11) hibit 13-11)	0.0078 V <sub>12</sub> -	0.00027 L <sub>A</sub>		$\begin{array}{ccc} LOS = & D \\ \textbf{Speed D} \\ D_{S} = & 0.4 \\ S_{R} = & 57 \end{array}$	(Exhib <b>Deteri</b> 452 (Ex	it 13-2) <b>ninatio</b> chibit 13 (Exhibit	-12) 13-12)		
Level of Server $D_R = 5.475 + 0$ $D_R = (pc/mi/lr)$ $D_R = (pc/mi/lr$	.00734 v <sub>R</sub> + n) 13-2) <b>mination</b> 13-11)	0.0078 V <sub>12</sub> -	0.00027 L <sub>A</sub>		$\begin{array}{ccc} LOS = & D \\ \textbf{Speed D} \\ D_{S} = & 0.4 \\ S_{R} = & 57 \end{array}$	(Exhib <b>Deteri</b> 452 (Ex	it 13-2) <b>ninatio</b> thibit 13	-12) 13-12)		

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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Τ	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2028 EPAP+ SP Phase 1a F		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Cambrid	VB Ige Rd/Off-Ramp do County
✓ Oper.(LOS)			es.(N)	Plar	nning Data
Flow Inputs					
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	3610	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0.96 1 0 Rolling mi	
Calculate Flow Adjus	tments		<b>Ор/Венн 70</b>		
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 1)] 0.985	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N	2	ft ft	f <sub>LW</sub>		mph mph
Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	70.0	ramps/mi mph mph	TRD Adjustment	70.0	mph mph
LOS and Performanc	e Measures	<b>3</b>	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x i x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1908 64.2 29.7 D	pc/h/ln mph pc/mi/ln	Design (N) Design LOS v <sub>p</sub> = (V or DDHV) / (PHF x x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	11-13	f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1
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	BASIC FR	EWAY SE	GMENTS WORKSHEE	Т	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2028 EPAP+	Project AM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	Silva Va Ramp	EB alley Pkwy/Off- do County
	P Phase 1a F				
✓ Oper.(LOS)			Des.(N)	∐ Plar	nning Data
Flow Inputs	00.10	1.0	B 1 11 E / BUE		
Volume, V AADT	2348	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.96 1	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade -6.00% Length Up/Down %	0 Grade 1.20mi -6.00	
Calculate Flow Adjus	tments				
f <sub>p</sub>	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1 + P_T(E_T - 1) + P_R(E_R - 1)]$	)] 0.995	
Speed Inputs			Calc Speed Adj and I	FFS	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	$f_{LW}$		mph
Number of Lanes, N	2		$f_{LC}$		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured) Base free-flow Speed,	70.0	mph mph	FFS	70.0	mph
BFFS LOS and Performanc	o Mooduros	-	Decign (N)		
Operational (LOS)  V <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> )		pc/h/ln	Design (N)  Design (N)  Design LOS  v <sub>p</sub> = (V or DDHV) / (PHF x	N x f <sub>HV</sub>	pc/h/ln
S D = v <sub>p</sub> / S LOS	70.0 17.6 B	mph pc/mi/ln	x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes	s, N	mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11

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		RAMP	S AND RAM	<u>IP JUNCTI</u>	<u>ONS W</u> O	<u>RKS</u> I	<u>IEET</u>			
General Info	rmation			Site Infor	mation					
Analyst	TKTF	PM	F	reeway/Dir of Tr	avel	US 50 E	B			
gency or Compan	y TKTF	PM	J	unction		Bass La	ke Rd			
Date Performed	10/2/	2017	J	urisdiction		El Dora	do County	1		
nalysis Time Perio		EPAP+Project	AM A	nalysis Year		2028				
Project Description	BLHSP Phase	1a Final Map								
nputs										
Upstream Adj	Ramn	Freeway Num	per of Lanes, N	2					Downstrea	am Adi
Opstream Auj	Ramp	Ramp Number	of Lanes, N	1					Ramp	anirraj
☐ Yes [	On		ane Length, L <sub>₄</sub>	•					_	
			- A	F00					∐Yes	☐ On
✓ No	Off	Deceleration L	- 5	500					✓ No	Off
	-	Freeway Volur		2348					ı	er.
L <sub>up</sub> =	ft	Ramp Volume	, V <sub>R</sub>	401					L <sub>down</sub> =	ft
		Freeway Free-	Flow Speed, S <sub>FF</sub>	70.0					V <sub>D</sub> =	veh/h
$V_{u} = V_{u}$	veh/h	Ramp Free-Flo	ow Speed, S <sub>ED</sub>	35.0					v <sub>D</sub> –	VC11/11
Conversion	to nc/h l ln	-	· 11X						<u> </u>	
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		Jonanions	T	Ι	Т		_		
(pc/h)	(Veh/hr)	PHF	Terrain	%Truck	%Rv		HV	f <sub>p</sub>	v = V/PHF	x t <sub>HV</sub> x f <sub>p</sub>
reeway	2348	0.96	Rolling	2	0	0.9	71	1.00	25	519
Ramp	401	0.96	Rolling	2	0	0.9		1.00		30
JpStream	+	1		<del>                                     </del>						
DownStream	1			1						
		Merge Areas					[	Diverge Areas		
Estimation o	of V <sub>12</sub>				Estimat	ion o	F V <sub>12</sub>			
		(D )			<del>                                     </del>			= V <sub>R</sub> + (V <sub>F</sub> - V <sub>F</sub>	\D	
	$V_{12} = V_F$				l.					
EQ =		ation 13-6 or	•		L <sub>EQ</sub> =		-	Equation 13-1		-
P <sub>FM</sub> =	using	Equation (E	xhibit 13-6)		P <sub>FD</sub> =		1.	000 using Equ	uation (Exh	ibit 13-7)
/ <sub>12</sub> =	pc/h				V <sub>12</sub> =		2!	519 <b>pc/h</b>		
$V_3$ or $V_{av34}$	pc/h (	Equation 13-	14 or 13-17)		$V_3$ or $V_{av34}$		0	pc/h (Equation	n 13-14 o	r 13-17)
Is $V_3$ or $V_{av34} > 2.7$	'00 pc/h?	s∏No				, > 2,70		☐Yes ☑ No		
Is V <sub>3</sub> or V <sub>av34</sub> > 1.5								 ☐Yes ☑ No		
			16, 13-18, or		0 0.	0.		oc/h (Equation	13-16, 13	-18. or 13
Yes,V <sub>12a</sub> =	13-19)		10, 10 10, 01		If Yes,V <sub>12a</sub> =	=		9)		.0, 00
Capacity Ch	ecks				Capacit	y Che	cks			
•	Actual	C	apacity	LOS F?			Actual	Ca	pacity	LOS F
					V <sub>F</sub>		2519	Exhibit 13-8	1	No
V		Exhibit 13-8			V <sub>FO</sub> = V <sub>F</sub>	- V	2089	Exhibit 13-8		-
$V_{FO}$		LAHIDIL 13-0						_	+	No
					V <sub>R</sub>		430	Exhibit 13-1		No
Flow Enterin	ng Merge In	ifluence A	rea		Flow En	nterin	g Dive	rge Influen	ce Area	
	Actual	1	Desirable	Violation?		Α	ctual	Max Desirab	ole	Violation
$V_{R12}$		Exhibit 13-8			V <sub>12</sub>	2	519	Exhibit 13-8	4400:All	No
Level of Ser	vice Deterr	nination (i	f not F)	-	+	f Serv	ice De	terminatio	n (if not	F)
								.0086 V <sub>12</sub> - 0.		,
$D_D = 5.475 + 0$	7.7	12	A					12 0.	υ U	
	•				.,	1.4 (pc/	,			
<sub>R</sub> = (pc/mi/l	40.0					(Exhib				
$O_R = (pc/mi/l)$ OS = (Exhibit)	-				ICnood I	Deteri	ninatio	on		
$O_R = (pc/mi/l)$ OS = (Exhibit)	-				Speeu L	- 0 (0				
O <sub>R</sub> = (pc/mi/li OS = (Exhibit Speed Deter	mination				<del>                                     </del>		hibit 13	-12)		
$O_R = (pc/mi/l)$ OS = (Exhibit) OS = (Exhibit) OS = (Exhibit)	<b>mination</b> 13-11)				$D_s = 0.$	.467 <b>(E</b> >		•		
OS = (Exhibit) OS = (Exhibit) OS = (Exhibit) OS = (Exhibit) OS = (Exhibit) OS = (Exhibit) OS = (Exhibit)	13-11) thibit 13-11)				$D_{S} = 0.$ $S_{R} = 56$	.467 <b>(E)</b> 6.9 mph	(Exhibit	13-12)		
$O_R = (pc/mi/loo)$ $OS = (Exhibit)$ $O$	<b>mination</b> 13-11)				$D_{s} = 0.$ $S_{R} = 56$ $S_{0} = N_{s}$	.467 <b>(E)</b> 6.9 mph /A mph (		13-12) 13-12)		

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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	Т	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description <i>BLH</i> S	TKTPM TKTPM 10/2/2017 2028 EPAP+ SP Phase 1a F		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Ran	EB np/On-Ramp do County
✓ Oper.(LOS)			es.(N)	Plar	nning Data
Flow Inputs			( )		
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	1947	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0.94 5 0 Level mi	
Calculate Flow Adjus	tments				
f <sub>p</sub> E <sub>T</sub>	1.00 1.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	1.2 1)] 0.976	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD	2	ft ft ramps/mi	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment		mph mph mph
FFS (measured) Base free-flow Speed, BFFS	70.0	mph mph	FFS	70.0	mph
LOS and Performanc	e Measures	3	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x t x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1062 70.0 15.2 B	pc/h/ln mph pc/mi/ln	Design (N) Design LOS  v <sub>p</sub> = (V or DDHV) / (PHF x  x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1
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	RA	MPS AND	KAMP JUNG	CHONS W	OKNOH	EEI			
General Info	ormation			Site Infor	mation				
Analyst	TKT	PM	Fr	eeway/Dir of Tr	avel	US 50 EB			
Agency or Compa	nny TKT	PM	Ju	nction		Bass Lake Rd			
Date Performed		2/2017		risdiction		El Dorado Cour	nty		
Analysis Time Per		8 EPAP+Project	t AM Ar	nalysis Year		2028			
	n BLHSP Phase	e 1a Final Map							
Inputs		<del></del>							
Jpstream Adj Rar	np	1 1	ber of Lanes, N	2				Downstre	am Adj
		Ramp Numbe	r of Lanes, N	1				Ramp	
☐ Yes ☐ (	On	Acceleration L	ane Length, L <sub>A</sub>	700				□Yes	On
☑ No □	Off	Deceleration L	_ane Length L <sub>D</sub>					✓No	Off
		Freeway Volu	me, V <sub>F</sub>	1947				INO INO	
- <sub>up</sub> = ft		Ramp Volume	, V <sub>P</sub>	227				L <sub>down</sub> =	ft
			-Flow Speed, S <sub>FF</sub>	70.0					
$V_{\rm u} = {\rm veh}$	n/h		ow Speed, S <sub>FR</sub>	35.0				$V_D =$	veh/h
Conversion	to pc/h Un			30.0					
	i to pc/ii oii	1		l	1	Τ.	Τ.		- , -
(pc/h)	(Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PH	$F \times f_{HV} \times f_{p}$
Freeway	1947	0.96	Rolling	2	0	0.971	1.00		2089
Ramp	227	0.96	Rolling	2	0	0.971	1.00		244
UpStream									
DownStream									
<b>-</b>		Merge Areas			Fatima a	(! - · · · · · · · · ·	Diverge Areas	S	
Estimation	or v <sub>12</sub>				⊏stimat	tion of v <sub>12</sub>			
	$V_{12} = V_{F}$	<sub>:</sub> (P <sub>FM</sub> )				V <sub>12</sub> :	= V <sub>R</sub> + (V <sub>F</sub> - \	/ <sub>R</sub> )P <sub>FD</sub>	
- <sub>EQ</sub> =	(Equ	uation 13-6 or	r 13-7)		L <sub>EQ</sub> =		(Equation 1	3-12 or 13-1	13)
P <sub>FM</sub> =	1.000	using Equat	ion (Exhibit 13-6)		P <sub>FD</sub> =		using Equa	tion (Exhibit 1	3-7)
I <sub>12</sub> =	2089	pc/h			V <sub>12</sub> =		pc/h		
V <sub>3</sub> or V <sub>av34</sub>		•	13-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>		pc/h (Equation	n 13-14 or 13-	17)
	,700 pc/h? <b>☐ Y</b> e		,			, <sub>34</sub> > 2,700 pc/h?			,
	.5 * V <sub>12</sub> /2 □ Ye					<sub>/34</sub> > 1.5 * V <sub>12</sub> /2			
			3-16, 13-18, or				pc/h (Equat		3-18. or
f Yes,V <sub>12a</sub> =	13-19				If Yes,V <sub>12a</sub> =	=	13-19)	,	- 12, -1
Capacity Cl	hecks				Capacit	ty Checks			
	Actual	С	apacity	LOS F?		Actua	al (	Capacity	LOS F
					$V_{F}$		Exhibit 1	3-8	
		Exhibit 13-8		No	$V_{FO} = V_{F}$	- V <sub>R</sub>	Exhibit 1	3-8	
$V_{ro}$	2333							13_	
$V_{FO}$	2333				\ \/		Exhibit 1	1 <del>9-</del>	
					V <sub>R</sub>		10		
	ing Merge lı	nfluence A				ntering Div	erge Influe	ence Area	
Flow Enteri	ing Merge II	nfluence A	Desirable	Violation?	Flow Er	ntering Div	erge Influe	ence Area esirable	Violation
Flow Enteri	ing Merge II Actual 2333	nfluence A Max Exhibit 13-8	Desirable 4600:All	Violation?	Flow Er	Actual	erge Influe Max D Exhibit 13-8	ence Area esirable	Violation
Flow Enteri V <sub>R12</sub> Level of Se	ing Merge In Actual 2333 rvice Deteri	nfluence A Max Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	<b>—</b>	Flow Er	Actual  f Service D	erge Influe Max D Exhibit 13-8	ence Area esirable B	Violation
Flow Enteri V <sub>R12</sub> Level of Se	ing Merge II Actual 2333	nfluence A Max Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	<b>—</b>	Flow Er	Actual	erge Influe Max D Exhibit 13-8	ence Area esirable B	Violation
V <sub>R12</sub> Level of Se	Actual 2333  rvice Deteri 5 + 0.00734 v <sub>R</sub> +	nfluence A Max Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	<b>—</b>	V <sub>12</sub> Level of	Actual  f Service D	erge Influe Max D Exhibit 13-8	ence Area esirable B	Violation
Flow Enterior $V_{R12}$ Level of Set $D_{R} = 5.475$ $D_{R} = 19.2 (pc)$	Actual 2333  rvice Deteri 5 + 0.00734 v <sub>R</sub> +	nfluence A Max Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	<b>—</b>	Flow Er	Actual  f Service D  D  R = 4.252 +	erge Influe Max D Exhibit 13-8	ence Area esirable B	Violatior
Flow Enterior $V_{R12}$ Level of Set $D_R = 5.475$ $D_R = 19.2 (pc)$ $OS = B (Exhilator)$	Actual 2333  rvice Deterion 5 + 0.00734 v R + c/mi/ln) bit 13-2)	nfluence A Max Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	<b>—</b>	Flow Er  V <sub>12</sub> Level of  D <sub>R</sub> = (FLOS = (ELOS	Actual  f Service D  D  R  = 4.252 + oc/mi/ln)  Exhibit 13-2)	erge Influe Max D Exhibit 13-8 Determinat 0.0086 V <sub>12</sub> -	ence Area esirable B	Violation
Flow Enterior $V_{R12}$ Level of Set $D_R = 5.475$ $D_R = 19.2 (pc$ $D_R = 19.$	Actual 2333  rvice Deterion 5 + 0.00734 v R + c/mi/ln) bit 13-2)  ermination	nfluence A Max Exhibit 13-8 mination (	Desirable 4600:All <b>if not F</b> )	<b>—</b>	Flow Er  V <sub>12</sub> Level of  D <sub>R</sub> = (Flow Er  LOS = (Flow Er  Speed L	Actual  f Service D  D  R  = 4.252 +  pc/mi/ln)  Exhibit 13-2)  Determinat	erge Influe Max D Exhibit 13-8 Determinat 0.0086 V <sub>12</sub> -	ence Area esirable B	Violation
Flow Enterior $V_{R12}$ Level of Selection $D_R = 5.475$ $D_R = 19.2 \text{ (pc. OS} = 8 \text{ (Exhilication Speed Deteits)}$ $M_S = 0.312 \text{ (Bissing Speed Deteits)}$	Actual 2333  rvice Deterion 5 + 0.00734 v R + c/mi/ln) bit 13-2) ermination Exibit 13-11)	mfluence A  Max Exhibit 13-8  mination (10,0078 V <sub>12</sub> - 0.00	Desirable 4600:All <b>if not F</b> )	<b>—</b>	V <sub>12</sub>   Level or	Actual  f Service D  R = 4.252 +  oc/mi/ln)  Exhibit 13-2)  Determinate  Exhibit 13-12)	erge Influe  Max D  Exhibit 13-8  Determinat:  0.0086 V <sub>12</sub> -	ence Area esirable B	Violation
Flow Enterior $V_{R12}$ Level of Separate Department of Separate D	Actual 2333  rvice Deterion 5 + 0.00734 v R + c/mi/ln) bit 13-2) ermination Exibit 13-11) oh (Exhibit 13-11)	mfluence A  Max Exhibit 13-8  mination (10,0078 V <sub>12</sub> - 0.00	Desirable 4600:All <b>if not F</b> )	<b>—</b>	V <sub>12</sub>   Level or     D <sub>R</sub> = (For instance   For i	Actual  F Service D  R = 4.252 +  poc/mi/ln)  Exhibit 13-2)  Determinat  Exhibit 13-12)  ph (Exhibit 13-1	erge Influe Max D Exhibit 13-8 Determinat 0.0086 V <sub>12</sub> -	ence Area esirable B	Violation
Flow Enterior $V_{R12}$ Level of Set $D_R = 5.475$ $D_R = 19.2 \text{ (pc)}$ $D_R = 8 \text{ (Exhilition of Speed Deteinor)}$ $D_R = 0.312 \text{ (if)}$ $D_R = 0.312 $	Actual 2333  rvice Deterion 5 + 0.00734 v R + c/mi/ln) bit 13-2) ermination Exibit 13-11)	mfluence A  Max Exhibit 13-8  mination (1  0.0078 V <sub>12</sub> - 0.0	Desirable 4600:All <b>if not F</b> )	<b>—</b>	$\begin{array}{c} \textbf{Flow Er} \\ \textbf{V}_{12} \\ \textbf{Level of} \\ \textbf{D}_{R} = (\mathfrak{p}_{R}) \\ \textbf{LOS} = (\mathbf{E}) \\ \textbf{Speed I} \\ \textbf{D}_{S} = (\mathbf{E}) \\ \textbf{S}_{R} = \mathbf{m} \\ \textbf{S}_{0} = \mathbf{m} \end{array}$	Actual  f Service D  R = 4.252 +  oc/mi/ln)  Exhibit 13-2)  Determinate  Exhibit 13-12)	erge Influe Max D Exhibit 13-8 Determinat: 0.0086 V <sub>12</sub> -	ence Area esirable B	Violation

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description BLHS	TKTPM TKTPM 10/2/2017 2028 EPAP+ SP Phase 1a F	-	Highway/Direction of Trave From/To Jurisdiction Analysis Year	On-Ran	EB np/Cambridge Rd do County
✓ Oper.(LOS)	or rhase rar		Des.(N)	□ Dlar	nning Data
Flow Inputs			765.(11)	<u> </u>	Illing Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	2174	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.96 1 0 Rolling mi	
			Up/Down %		
Calculate Flow Adjus					
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 )] 0.985	
Speed Inputs			Calc Speed Adj and I	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	2 70.0	ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performanc	e Measures	<b>3</b>	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x I x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1149 70.0 16.4 B	pc/h/ln mph pc/mi/ln	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF \text{ x})$ $x f_p)$ $S$ $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

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	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst	TKTPM		Highway/Direction of Trave		
Agency or Company	TKTPM		From/To	On-Ran Pkwy	np/Silva Valley
Date Performed Analysis Time Period	10/2/2017 2028 EPAP+		Jurisdiction Analysis Year		do County
Project Description BLHS	SP Phase 1a F	inal Map			
✓ Oper.(LOS)			Des.(N)	Plar	nning Data
Flow Inputs					
Volume, V AADT	2851	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.96 1	
Peak-Hr Prop. of AADT, K			%RVs, P <sub>R</sub>	0	
Peak-Hr Direction Prop, D			General Terrain:	Grade	
DDHV = AADT x K x D		veh/h	Grade -6.00% Length	1.20mi	
			Up/Down %	-6.00	
Calculate Flow Adjus	tments				
f <sub>p</sub>	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	)] 0.995	
Speed Inputs			Calc Speed Adj and I	FFS	
Lane Width		ft	,		
Rt-Side Lat. Clearance		ft	$f_{LW}$		mph
Number of Lanes, N	2		f <sub>LC</sub>		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	•
Base free-flow Speed,		mph	FFS	70.0	mph
BFFS		•			
LOS and Performanc	e Measures	<u> </u>	Design (N)		
Operational (LOS)			Design (N)		
v <sub>p</sub> = (V or DDHV) / (PHF x l	Nyf		Design LOS		
v f )	1492	pc/h/ln	$v_p = (V \text{ or DDHV}) / (PHF x)$	$N \times f_{HV}$	pc/h/ln
x f <sub>p</sub> ) S	69.0	mph	x f <sub>p</sub> )		родил
D = v <sub>p</sub> / S	21.6	pc/mi/ln	S		mph
LOS	2 1.0 C	рс/пп/п	$D = v_p / S$		pc/mi/ln
LO3	C		Required Number of Lanes	s, N	
Glossary			Factor Location		
N - Number of lanes	S - Spee	ed	E <sub>R</sub> - Exhibits 11-10, 11-12		f <sub>I W</sub> - Exhibit 11-8
V - Hourly volume	D - Dens	sity	$E_{\rm T}$ - Exhibits 11-10, 11-12, $E_{\rm T}$ - Exhibits 11-10, 11-11,	11-13	$f_{LC}$ - Exhibit 11-9
v <sub>p</sub> - Flow rate	FFS - Free	e-flow speed	$f_{\rm n}$ - Page 11-18	11-10	TRD - Page 11-1
LOS - Level of service	BFFS - Ba	ase free-flow	r	11_9	IND - Fage 11-1
speed	hour velues		LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3	ı ı-∠,	
DDHV - Directional design	riour volume				

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	RA	MPS AND	RAMP JUNG	CTIONS V	VORKSHI	EET			
General Infor	mation			Site Infor	mation				
Analyst	TKT	PM	Fr	eeway/Dir of Ti	ravel	US 50 WB			
Agency or Company	TKT	PM	Ju	nction		Bass Lake Rd			
Date Performed		2/2017		risdiction		El Dorado Count	y		
Analysis Time Period		8 EPAP+Project	PM Ar	nalysis Year		2028			
Project Description	BLHSP Phase	e 1a Final Map							
Inputs		L						1	
Upstream Adj Ramp			ber of Lanes, N	2				Downstre	am Adj
	_	Ramp Number		1				Ramp	
Yes Or	1	Acceleration L	ane Length, L <sub>A</sub>	700				□Yes	On
☑ No ☐ Of	f	Deceleration L	ane Length L <sub>D</sub>					☑ No	Off
		Freeway Volui	ne, V <sub>F</sub>	2400					
L <sub>up</sub> = ft		Ramp Volume	, V <sub>R</sub>	451				L <sub>down</sub> =	ft
		Freeway Free	Flow Speed, S <sub>FF</sub>	70.0				V <sub>D</sub> =	veh/h
$V_u = veh/h$	1	Ramp Free-Flo	ow Speed, S <sub>FR</sub>	35.0				V <sub>D</sub> -	VCII/II
Conversion t	o pc/h Un	der Base (	Conditions						
	V	PHF		%Truck	%Rv	f	f	v – V/DHI	x f <sub>HV</sub> x f <sub>p</sub>
(pc/h)	(Veh/hr)		Terrain	70 ITUCK	70KV	f <sub>HV</sub>	f <sub>p</sub>	V - V/F111	^ 'HV ^ 'p
Freeway	2400	0.96	Rolling	2	0	0.971	1.00	<b>†</b>	2575
Ramp	451	0.96	Rolling	2	0	0.971	1.00		484
UpStream DownStream									
Downsteam		Merge Areas			+		I Diverge Areas		
Estimation of	f V <sub>40</sub>	morgo ra ous			Estimat	ion of v <sub>12</sub>	Divorgo 7 il odo		
		(D )			+	<u></u>	V <sub>R</sub> + (V <sub>F</sub> - V <sub>F</sub>	\D	
	$V_{12} = V_F$		40.7\		l.	v <sub>12</sub> –			(0)
L <sub>EQ</sub> =		uation 13-6 or	· ·		L <sub>EQ</sub> =		(Equation 13-		=
P <sub>FM</sub> =			ion (Exhibit 13-6)		P <sub>FD</sub> =		using Equation	on (Exnibit i	3-7)
V <sub>12</sub> =	2575	•			V <sub>12</sub> =		pc/h		
V <sub>3</sub> or V <sub>av34</sub>			13-14 or 13-17)		$V_3$ or $V_{av34}$		pc/h (Equation 1	13-14 or 13-1	17)
Is $V_3$ or $V_{av34} > 2,70$						<sub>34</sub> > 2,700 pc/h?			
Is $V_3$ or $V_{av34} > 1.5$					Is V <sub>3</sub> or V <sub>av3</sub>	$_{34} > 1.5 * V_{12}/2$			
If Yes,V <sub>12a</sub> =	pc/h 13-19		-16, 13-18, or		If Yes,V <sub>12a</sub> =	. 1	pc/h (Equatio 3-19)	n 13-16, 1	3-18, or
Capacity Che		<u>')                                    </u>			Capacit	y Checks	0-10)		
Cupucky Circ	Actual	I C	apacity	LOS F?	Jupann	Actual	Ca	pacity	LOS F?
			11119		V <sub>F</sub>		Exhibit 13-		
	2050	F.,,b,;b,;t, 10, 0		N.	$V_{FO} = V_{F}$	- V <sub>2</sub>	Exhibit 13-	_	
V <sub>FO</sub>	3059	Exhibit 13-8		No		· K	Exhibit 13		
					$V_R$		10		
Flow Entering	g Merge li	nfluence A	rea		Flow En	tering Dive	rge Influer	ice Area	1
	Actual	Max I	Desirable	Violation?		Actual	Max Des	irable	Violation?
V <sub>R12</sub>	3059	Exhibit 13-8	4600:All	No	V <sub>12</sub>		Exhibit 13-8		
Level of Serv	rice Deteri	mination (i	f not F)		Level of	Service De	eterminatio	n (if not	: <b>F</b> )
D <sub>R</sub> = 5.475 +	0.00734 v <sub>R</sub> +	0.0078 V <sub>12</sub> - 0.0	00627 L <sub>A</sub>			D <sub>R</sub> = 4.252 + (	0.0086 V <sub>12</sub> - 0	.009 L <sub>D</sub>	
$D_{R} = 24.7 \text{ (pc/m)}$	ni/ln)				$D_R = (p)$	c/mi/ln)			
LOS = C (Exhibit	13-2)					xhibit 13-2)			
Speed Deterr					`	Determinati	on		
					+	xhibit 13-12)	<u> </u>		
$M_S = 0.355 \text{ (Exi}$					, and the second	ph (Exhibit 13-12)	)		
	(Exhibit 13-11)				L'`	ph (Exhibit 13-12 ph (Exhibit 13-12			
	Exhibit 13-11)								
	(Exhibit 13-13)		. 1			ph (Exhibit 13-13		0	0/0/00/17
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General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2028 EPAP+		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Ram	VB p/On-Ramp do County
•	SP Phase 1a F		A (A I)		u to u Data
✓ Oper.(LOS)  Flow Inputs			Pes.(N)	Pian	ning Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	2400	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0.94 5 0 Rolling mi	
Calculate Flow Adjus	tments		Op/Down %		
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = \frac{1}{[1+P_T(E_T - 1) + P_R(E_R - 1)]}$	2.0 )] 0.930	
Speed Inputs			Calc Speed Adj and I	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS  LOS and Performanc  Operational (LOS)  Vp = (V or DDHV) / (PHF x I		ft ft ramps/mi mph mph pc/h/ln	$f_{LW}$ $f_{LC}$ TRD Adjustment FFS  Design (N)  Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF \text{ x})$	70.0 N x f	mph mph mph mph
x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	69.7 19.7 C	mph pc/mi/ln	x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

		RAMP	S AND RAM	IP JUNCTI	ONS WO	ORKS	HEET			
General Info	rmation			Site Infor						
Analyst	TKTI	PM	Fı	reeway/Dir of Tr		US 50	WB			
agency or Compan				unction		Bass L				
Date Performed	-	/2017		urisdiction			ido County			
nalysis Time Perio		EPAP+Project		nalysis Year		2028	ido oodiii.			
roject Description				. <b>,</b>						
nputs										
Upstream Adj	Ramp		ber of Lanes, N	2					Downstrea	m Adj
□Yes	□On	Ramp Numbe		1	1 Ramp				Ramp	
	_	1	ane Length, L <sub>A</sub> ane Length L <sub>D</sub>	500					□Yes	On
✓ No	∐ Off	Freeway Volu	- 5	2717					<b>☑</b> No	Off
L <sub>up</sub> =	ft	Ramp Volume		317					L <sub>down</sub> =	ft
•			-Flow Speed, S <sub>FF</sub>	70.0						
$V_{u} =$	veh/h	1	ow Speed, $S_{FR}$	35.0					V <sub>D</sub> =	veh/h
Conversion	to no/h lin		111	33.0						
	V ACTIONS						_	_		
(pc/h)	(Veh/hr)	PHF	Terrain	%Truck	%Rv		f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF	x f <sub>HV</sub> x f <sub>p</sub>
reeway	2717	0.96	Rolling	2	0	0.	971	1.00	29	15
Ramp	317	0.96	Rolling	2	0	0.	971	1.00	34	10
JpStream						4				
OownStream		M A			-			N A		
stimation o		Merge Areas			Estima	tion o		Diverge Areas		
-Sumation C					LStilla					
	$V_{12} = V_{F}$	(P <sub>FM</sub> )					V <sub>12</sub> =	: V <sub>R</sub> + (V <sub>F</sub> - V <sub>F</sub>	<sub>R</sub> )P <sub>FD</sub>	
EQ =	(Equa	ation 13-6 or	13-7)		L <sub>EQ</sub> =		(	Equation 13-1	2 or 13-13	)
FM =	using	Equation (E	Exhibit 13-6)		P <sub>FD</sub> =		1.	000 using Equ	uation (Exhil	oit 13-7)
' <sub>12</sub> =	pc/h				V <sub>12</sub> =			915 <b>pc/h</b>		
' <sub>3</sub> or V <sub>av34</sub>	pc/h (	Fouation 13	-14 or 13-17)		V <sub>3</sub> or V <sub>av34</sub>			pc/h (Equation	on 13-14 or	13-17)
s V <sub>3</sub> or V <sub>av34</sub> > 2,7			,			. > 27		Yes ☑ No		,
					0 0					
s $V_3$ or $V_{av34} > 1.5$			-16, 13-18, or					☐ Yes  ☑ No oc/h (Equation	13 16 13	19 or 13
$Yes, V_{12a} =$	13-19		-10, 13-16, 01		If Yes,V <sub>12a</sub>	=		o/ii (⊑qualioii 9)	13-10, 13-	10, 01 13
Capacity Ch	ecks				Capaci	ty Ch	ecks	•		
	Actual	C	apacity	LOS F?			Actual	Ca	pacity	LOS F
					V <sub>F</sub>		2915	Exhibit 13-8	4800	No
$V_{FO}$		Exhibit 13-8			V <sub>FO</sub> = V	<sub>F</sub> - V <sub>R</sub>	2575	Exhibit 13-8	3 4800	No
					V <sub>R</sub>		340	Exhibit 13-1	0 2000	No
low Enterin	na Merae Ir	fluence A	rea				a Dive	rge Influen	ce Area	-
	Actual	1	Desirable	Violation?		-	Actual	Max Desirat		Violation
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	1	915	Exhibit 13-8	4400:All	No
1 ( 0	vice Deterr		if not F		<del></del>	f Ser	ice De	terminatio	n (if not l	F)
evel of Ser								.0086 V <sub>12</sub> - 0.		/
	0.00701	0.0070 112	0.00027 L <sub>A</sub>		D <sub>R</sub> = 2	24.8 (pc		.0000 112 0.	ооо <u>-</u> Б	
D <sub>R</sub> = 5.475 + 0	ln)									
$D_{R} = 5.475 + (pc/mi/l)$	•				10S = 0	` (Evhil				
$D_R = 5.475 + 0$ $R_R = (pc/mi/l)$ OS = (Exhibit)	t 13-2)					(Exhil		<u> </u>		
$D_R = 5.475 + 0$ $D_R = (pc/mi/l)$ $D_R = (Exhibit)$ <b>Speed Deter</b>	t 13-2)				Speed	Deter	minatio			
$D_R = 5.475 + 0$ $R_R = (pc/mi/los) = (Exhibit)$ $C_S = (Exhibit)$ $C_S = (Exhibit)$	t 13-2) rmination 13-11)				<b>Speed</b> D <sub>s</sub> = 0	<b>Deter</b> 0.459 (E	mination xhibit 13-	-12)		
$D_{R} = 5.475 + 0$ $D_{R} = (pc/mi/los)$	rmination 13-11) (hibit 13-11)				<b>Speed</b> D <sub>s</sub> = 0 S <sub>R</sub> = 5	<b>Deter</b> 0.459 (E 07.2 mph	mination xhibit 13- (Exhibit	-12) 13-12)		
$D_{R} = 5.475 + 0$ $D_{R} = (pc/mi/los)$	t 13-2) rmination 13-11)				$\begin{array}{ccc} \textbf{Speed} & \textbf{S} \\ \textbf{D}_{\text{S}} = & \textbf{0} \\ \textbf{S}_{\text{R}} = & \textbf{5} \\ \textbf{S}_{\text{0}} = & \textbf{N} \end{array}$	<b>Deter</b> 0.459 (E 67.2 mph N/A mph	mination xhibit 13-	-12) 13-12) 13-12)		

	BASIC FR	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period Project Description BLHS	TKTPM TKTPM 10/2/2017 2028 EPAP+ SP Phase 1a F	-	Highway/Direction of Trave From/To Jurisdiction Analysis Year	Cambrid	WB dge Rd/Off-Ramp do County
✓ Oper.(LOS)	or rhase ra r		Des.(N)	□ Dlar	nning Data
Flow Inputs			765.(IV)		Illing Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	2717	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.96 1 0 Rolling mi	
Calculate Flow Adjus	tments		Up/Down %		
f <sub>p</sub> E <sub>T</sub>	1.00 2.5		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 )] 0.985	
Speed Inputs			Calc Speed Adj and I	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	2 70.0	ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS	70.0	mph mph mph mph
LOS and Performanc	e Measures	3	Design (N)		
Operational (LOS)  v <sub>p</sub> = (V or DDHV) / (PHF x l x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	N x f <sub>HV</sub> 1436 69.4 20.7 C	pc/h/ln mph pc/mi/ln	Design (N) Design LOS $v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x} f_p)$ S $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

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	BASIC FRI	EEWAY SE	GMENTS WORKSHEE	T	
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2028 EPAP+	Project PM	Highway/Direction of Trave From/To Jurisdiction Analysis Year	Silva Va Ramp	EB Alley Pkwy/Off- do County
	P Phase 1a F		Alialysis Teal	2020	
✓ Oper.(LOS)			Des.(N)	☐ Plar	nning Data
Flow Inputs					
Volume, V AADT	4638	veh/h veh/day	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub>	0.96 1	
Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub> General Terrain: Grade -6.00% Length Up/Down %	0 Grade 1.20mi -6.00	
Calculate Flow Adjus	tments				
f <sub>p</sub> ⊏	1.00 1.5		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$		
Speed Inputs		r.	Calc Speed Adj and I	-F3	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N	2	ft ft	$f_{LW}$ $f_{LC}$		mph mph
Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS	70.0	ramps/mi mph mph	TRD Adjustment FFS	70.0	mph mph
LOS and Performance	e Measures	<u> </u>	Design (N)		
Operational (LOS) v <sub>p</sub> = (V or DDHV) / (PHF x l) x f <sub>p</sub> ) S	52.5	pc/h/ln mph	$\frac{\text{Design (N)}}{\text{Design LOS}}$ $v_p = (V \text{ or DDHV}) / (PHF \text{ x})$ $x f_p)$ S	N x f <sub>HV</sub>	pc/h/ln mph
D = v <sub>p</sub> / S LOS	46.2 F	pc/mi/ln	$D = v_p / S$ Required Number of Lanes	s, N	pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design l	BFFS - Ba		$E_R$ - Exhibits 11-10, 11-12 $E_T$ - Exhibits 11-10, 11-11, $f_p$ - Page 11-18 LOS, S, FFS, $v_p$ - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-11

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		RAMP:	S AND RAM	<u>IP JUNCTI</u>	<u>ONS WO</u>	<u>RKS</u> I	<u>HEET</u>			
General Info	rmation			Site Infor	mation					
Analyst	TKTI	PM	F	reeway/Dir of Ti	avel	US 50 E	B			
gency or Company	•			unction		Bass La	ke Rd			
ate Performed		/2017	J	urisdiction		El Dora	do County	1		
nalysis Time Perio		B EPAP+Project	PM A	nalysis Year		2028				
roject Description	BLHSP Phase	1a Final Map								
nputs		_								
Upstream Adj I	Ramp	Freeway Num	ber of Lanes, N	2					Downstrea	ım Adi
		Ramp Number	of Lanes, N	1	Ramp					
□Yes	On	Acceleration L	ane Length, L₄						□Vaa	On
		1	ane Length L <sub>n</sub>	500					∐Yes	□ On
✓ No	Off		- 5						✓ No	Off
1 -	£.	Freeway Volur	•	4638					l. =	ft
L <sub>up</sub> =	ft	Ramp Volume		978					L <sub>down</sub> =	10
V <sub>11</sub> = \(\frac{1}{2}\)	/eh/h	Freeway Free-	Flow Speed, S <sub>FF</sub>	70.0					V <sub>D</sub> =	veh/h
v <sub>u</sub> –	/en/m	Ramp Free-Flo	ow Speed, S <sub>FR</sub>	35.0					ם -	
Conversion	to pc/h Un	der Base (	Conditions							
	V	PHF		0/ Truck	0/ Dv	Τ.	:	f	v – V/DUE	vf vf
(pc/h)	(Veh/hr)	PHF	Terrain	%Truck	%Rv	'	HV	f <sub>p</sub>	v = V/PHF	X IHV X Ip
reeway	4638	0.96	Rolling	2	0	0.9	)71	1.00	49	76
Ramp	978	0.96	Rolling	2	0	0.9	)71	1.00	10	49
JpStream										
DownStream										
		Merge Areas				_		Diverge Areas		
Estimation o	of v <sub>12</sub>				Estimat	ion o	f v <sub>12</sub>			
	V <sub>12</sub> = V <sub>F</sub>	(P <sub>EM</sub> )					V <sub>12</sub> =	V <sub>R</sub> + (V <sub>F</sub> - V <sub>F</sub>	)P <sub>ED</sub>	
- = =		ation 13-6 or	13-7)		l =			Equation 13-1		)
EQ =		Equation (E	•		L <sub>EQ</sub> =			-		•
<sub>FM</sub> =	_	Equation (E	.XIIIDIL 13-0)		P <sub>FD</sub> =			000 using Equ	iation (Exili	DIL 13-7)
12 =	pc/h				V <sub>12</sub> =			976 <b>pc/h</b>		
or V <sub>av34</sub>			-14 or 13-17)		$V_3$ or $V_{av34}$			pc/h (Equation	n 13-14 or	13-17)
s $V_3$ or $V_{av34} > 2.7$	00 pc/h? <b>☐ Ye</b>	s 🗌 No			Is V <sub>3</sub> or V <sub>av</sub>	<sub>34</sub> > 2,70	00 pc/h? [	☐ Yes 🗹 No		
s $V_3$ or $V_{av34} > 1.5$	* V <sub>12</sub> /2	s 🗌 No			Is V <sub>3</sub> or V <sub>av</sub>	<sub>34</sub> > 1.5		☐ Yes 🗹 No		
Yes,V <sub>12a</sub> =			-16, 13-18, or		If Yes,V <sub>12a</sub> =	:		c/h (Equation	13-16, 13-	·18, or 13
	13-19)	)						9)		
Capacity Ch	î			,	Capacit	y Che				
	Actual	C	apacity	LOS F?			Actual		pacity	LOS F
					$V_{F}$		4976	Exhibit 13-8	4800	Yes
$V_{FO}$		Exhibit 13-8			$V_{FO} = V_{F}$	- V <sub>R</sub>	3927	Exhibit 13-8	4800	No
					V <sub>R</sub>		1049	Exhibit 13-1	0 2000	No
low Enterin	Morgo Ir	afluoneo A	roa		<del>-</del>	torin		rge Influen		
TOW LINEIII	Actual	ν	Desirable	Violation?	I IOW LI		ctual	Max Desirat		Violation
V	notual	Exhibit 13-8	JOJII UNIC	v iolation:	V <sub>12</sub>	_	976	Exhibit 13-8	4400:All	Yes
$V_{R12}$			S ( <b></b> )		+					<u> </u>
								terminatio		<u>r)                                    </u>
	0.00734 v <sub>R</sub> +	0.0078 V <sub>12</sub> -	0.00627 L <sub>A</sub>			D <sub>R</sub> = 4	.252 + 0	.0086 V <sub>12</sub> - 0.	009 L <sub>D</sub>	
					$D_R = 42$	2.5 <b>(pc/</b>	mi/ln)			
$D_R = 5.475 + 0$	n)				LOS = F	(Exhib	it 13-2)			
$D_{R} = 5.475 + 0$	•						,			
$D_R = 5.475 + 0$ $D_R = (pc/mi/li)$ $D_R = (Exhibit)$	13-2)						ninatio	on		
$D_R = 5.475 + 0$ $D_R = (pc/mi/li)$ $D_R = (Exhibit)$ <b>Speed Deter</b>	13-2) mination				Speed L	Deteri				
$D_R = 5.475 + 0$ $D_R = (pc/mi/li)$ $D_R = (Exhibit)$ $D_R = (Exhibit)$ $D_R = (Exhibit)$	13-2) <b>mination</b> 13-11)				<b>Speed L</b> D <sub>s</sub> = 0.	<b>Deteri</b> 522 (E)	hibit 13	-12)		
$D_{\rm R}$ = 5.475 + 0 $D_{\rm R}$ = (pc/mi/li $D_{\rm R}$ = (Exhibit $D_{\rm R}$ = (Exibit 1 $D_{\rm R}$ = (Exibit 1 $D_{\rm R}$ = mph (Exi	13-2) mination 13-11) hibit 13-11)				<b>Speed L</b> D <sub>s</sub> = 0. S <sub>R</sub> = 55	<b>Deteri</b> 522 (Ex 5.4 mph	rhibit 13 (Exhibit	-12) 13-12)		
$OS = (Exhibit)$ $Speed Deter$ $M_S = (Exibit)$ $S_R = mph (Ex)$ $S_0 = mph (Ex)$	13-2) <b>mination</b> 13-11)				<b>Speed L</b> D <sub>s</sub> = 0. S <sub>R</sub> = 55	<b>Deteri</b> 522 (Ex 5.4 mph	hibit 13	-12) 13-12)		

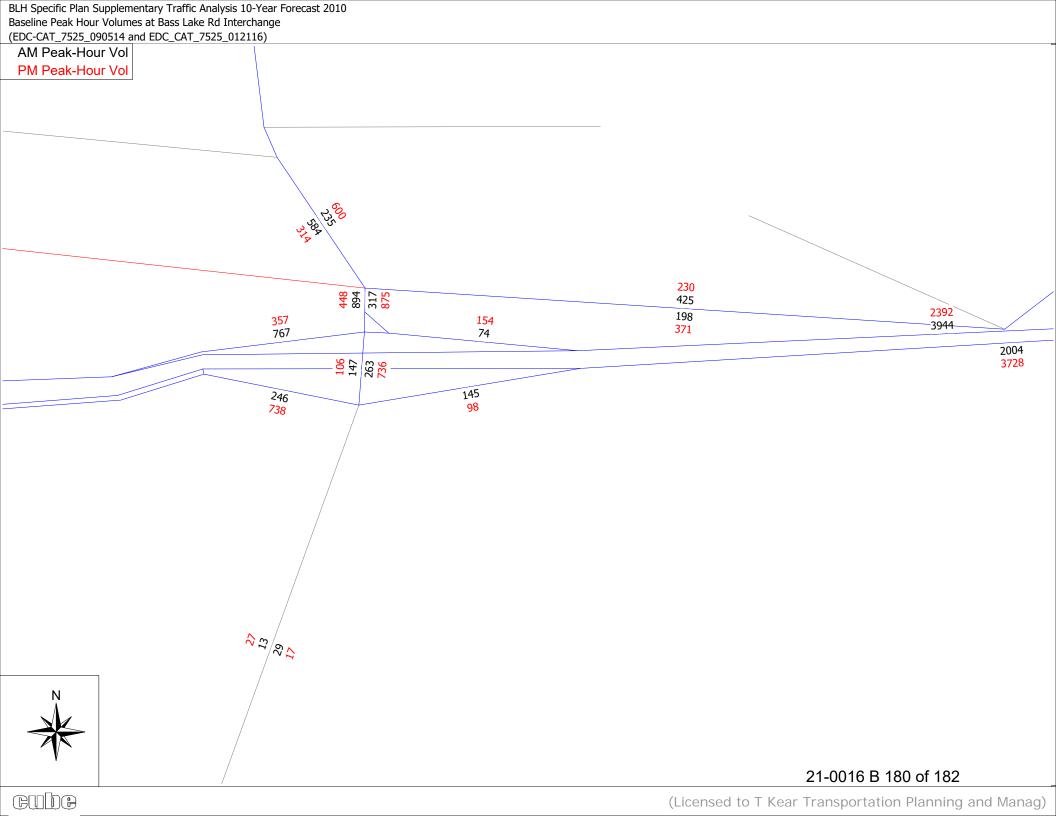
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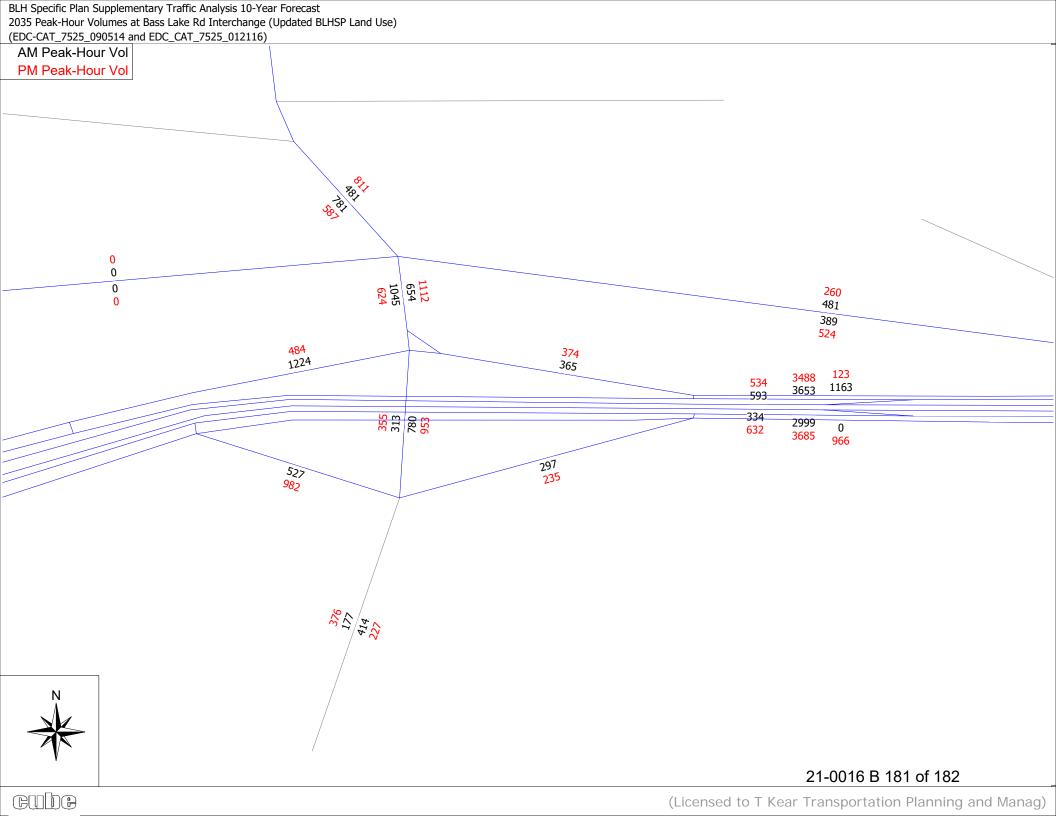
General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2028 EPAP+		Highway/Direction of Trave From/To Jurisdiction Analysis Year	Off-Ran	EB np/On-Ramp do County
	SP Phase 1a F		(A.1)		. 5.
✓ Oper.(LOS)			es.(N)	∐Plar	nning Data
Flow Inputs	0000	1. //.	D. d. II E. d DIJE	0.04	
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	3660	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length	0.94 5 0 Level mi	
DDIIV - AADI X K X D		VC11/11	Up/Down %	1111	
Calculate Flow Adjus	tments		· · · · · · · · · · · · · · · · · · ·		
$f_p$	1.00		E <sub>R</sub>	1.2	
E <sub>T</sub>	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	)] <i>0.97</i> 6	
Speed Inputs			Calc Speed Adj and	FFS	
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f <sub>LW</sub>		mph
Number of Lanes, N	2		f <sub>LC</sub>		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	70.0	mph	FFS	70.0	mph
Base free-flow Speed, BFFS		mph			•
LOS and Performance	e Measures	<b>.</b>	Design (N)		
Operational (LOS) v <sub>p</sub> = (V or DDHV) / (PHF x i	N x f <sub>HV</sub> 1995	pc/h/ln	Design (N) Design LOS v <sub>p</sub> = (V or DDHV) / (PHF x	N x f <sub>HV</sub>	
x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	62.7 31.8 D	mph pc/mi/ln	x f <sub>p</sub> ) S D = v <sub>p</sub> / S Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

		RAI	MPS AND	RAMP JUN	<u>CTIONS</u> W	ORKSH	<u>EET</u>			
General	Inform				Site Infor					
Analyst		TKTF	PM	Fr	eeway/Dir of Tr	avel	US 50 EB			
Agency or Co	ompany	TKTF	PΜ	Ju	ınction		Bass Lake Rd			
Date Perform		10/2/	2017	Ju	ırisdiction		El Dorado Cour	nty		
Analysis Tim			EPAP+Project	PM Ar	nalysis Year		2028			
	ription [	BLHSP Phase	1a Final Map							
Inputs			L						1	
Jpstream Ad				2				Downstre	am Adj	
			Ramp Number		1				Ramp	
☐Yes	☐ On		Acceleration L	ane Length, L <sub>A</sub>	700				□Yes	On
✓ No	Off		Deceleration L	ane Length L <sub>D</sub>					☑ No	Off
			Freeway Volu	me, V <sub>F</sub>	3660				INO	
-up =	ft		Ramp Volume	, V <sub>R</sub>	176				L <sub>down</sub> =	ft
				Flow Speed, S <sub>FF</sub>	70.0				.,	
√ <sub>u</sub> =	veh/h			ow Speed, S <sub>FR</sub>	35.0				$V_D =$	veh/h
Convers	ion to	nc/h Hn		Conditions	30.0					
		<del>) βε/π οπο</del> ∀	1			***	Τ.	Τ.		F
(pc/h)	)	(Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PH	$F \times f_{HV} \times f_{p}$
Freeway		3660	0.96	Rolling	2	0	0.971	1.00		3927
Ramp		176	0.96	Rolling	2	0	0.971	1.00		189
UpStream										
DownStream	n									
<b>-</b>			Merge Areas			F = 15 = 1	(! <b>(</b>	Diverge Area	S	
Estimati	on or	v <sub>12</sub>				Estimat	ion of v <sub>12</sub>			
		$V_{12} = V_{F}$	(P <sub>FM</sub> )				V <sub>12</sub>	= V <sub>R</sub> + (V <sub>F</sub> - '	$V_R)P_{FD}$	
-EQ =		(Equ	ation 13-6 or	13-7)		L <sub>EQ</sub> =		(Equation 1	13-12 or 13-	13)
P <sub>FM</sub> =		1.000	using Equat	ion (Exhibit 13-6)		P <sub>FD</sub> =		using Equa	ition (Exhibit 1	3-7)
V <sub>12</sub> =		3927	pc/h			V <sub>12</sub> =		pc/h		
V <sub>3</sub> or V <sub>av34</sub>			•	13-14 or 13-17)	)	V <sub>3</sub> or V <sub>av34</sub>		•	n 13-14 or 13-	17)
	> 2.700	pc/h? Ye		,	,		34 > 2,700 pc/h?			,
		V <sub>12</sub> /2 □ Ye					$v_{34} > 1.5 * V_{12}/2$			
				3-16, 13-18, or					tion 13-16, 1	13-18. or
f Yes,V <sub>12a</sub> =		13-19)		,,		If Yes,V <sub>12a</sub> =	=	13-19)		
Capacity	y Ched	cks				Capacit	y Checks			
		Actual	C	apacity	LOS F?		Actu		Capacity	LOS F
						$V_{F}$		Exhibit 1	13-8	
$V_{FO}$	,	4116	Exhibit 13-8		No	$V_{FO} = V_{F}$	- V <sub>R</sub>	Exhibit 1	13-8	
10	´					V <sub>R</sub>		Exhibit	13-	
			<u> </u>					10		
-low En	tering		fluence A		N' della de la C	Flow Er	ntering Div			
		Actual	<del>1                                    </del>	Desirable 4400 All	Violation?	\/	Actual		esirable	Violation
			Exhibit 13-8	4600:All	No	V <sub>12</sub>		Exhibit 13-		
V <sub>R12</sub>	2	4116		Level of Service Determination (if not F)					ion (if no	t F)
V <sub>R12</sub> Level of	Servi	ce Deterr								
V <sub>R12</sub> Level of	Servi	ce Deterr	<b>nination (</b> 0.0078 V <sub>12</sub> - 0.0				D <sub>R</sub> = 4.252 +		0.009 L <sub>D</sub>	
V <sub>R12</sub> Level of	Servi	<b>ce Deterr</b> 0.00734 v <sub>R</sub> + 0							· 0.009 L <sub>D</sub>	
$V_{R12}$ Level of $D_R = D_R = 33$	<b>Servi</b> 5.475 + 0	<b>ce Deterr</b> 0.00734 v <sub>R</sub> + (				D <sub>R</sub> = (p	D <sub>R</sub> = 4.252 +		- 0.009 L <sub>D</sub>	
$V_{R12}$ Level of $D_R = D_R = 33$ $LOS = D_R = 0$	5.475 + 0 5.475 + 0 .1 (pc/mi/ (Exhibit 1	<b>ce Deterr</b> 0.00734 v <sub>R</sub> + ( 'In) 3-2)				D <sub>R</sub> = (p LOS = (E	D <sub>R</sub> = 4.252 + oc/mi/ln)	0.0086 V <sub>12</sub> -	· 0.009 L <sub>D</sub>	
$V_{R12}$ Level of $D_R = 0$ $C_R = 0$ $C_R = 0$ Speed D	5.475 + 0 5.475 + 0 .1 (pc/mi/ (Exhibit 1	ce Detern 0.00734 v <sub>R</sub> + 0 (In) 3-2) ination				D <sub>R</sub> = (p LOS = (E <b>Speed L</b>	D <sub>R</sub> = 4.252 + oc/mi/ln) Exhibit 13-2)	0.0086 V <sub>12</sub> -	0.009 L <sub>D</sub>	
$V_{R12}$ Level of $D_R = 0$ $C_R = 0$	5.475 + 0 5.475 + 0 6.1 (pc/mi/ (Exhibit 1 <b>Determ</b> 511 (Exibi	0.00734 v <sub>R</sub> + 0 (ln) (3-2) (ination				$D_R = (p)$ $LOS = (E)$ $Speed L$ $D_S = (E)$	D <sub>R</sub> = 4.252 + pc/mi/ln) Exhibit 13-2) <b>Determina</b> t Exhibit 13-12)	0.0086 V <sub>12</sub> -	· 0.009 L <sub>D</sub>	
$V_{R12}$ Level of $D_{R} = 0$ $D_{R} = 0$ $D_{R} = 0$ Speed D $D_{R} = 0$ $D_{R} = 0$ $D_{R} = 0$	5.475 + 0 5.475 + 0 6.1 (pc/mi/ (Exhibit 1 <b>Determ</b> 511 (Exibi	0.00734 v <sub>R</sub> + 0 (In) 3-2) (ination it 13-11) (Exhibit 13-11)				$D_R = (p)$ $LOS = (E)$ $Speed L$ $D_S = (E)$ $S_R = m$	D <sub>R</sub> = 4.252 + pc/mi/ln) Exhibit 13-2) <b>Determinat</b> Exhibit 13-12) uph (Exhibit 13-1	0.0086 V <sub>12</sub> - tion	· 0.009 L <sub>D</sub>	
$V_{R12}$ Level of $D_{R} = 0$ $C_{R} = 0$ Speed D $C_{R} = 0$ $C$	5.475 + C 5.475 + C 1.1 (pc/mi/ (Exhibit 1) Determoder 11 (Exibit 1.7 mph (EX) A mph (EX)	0.00734 v <sub>R</sub> + 0 (ln) (3-2) (ination				$\begin{array}{lll} D_R = & (\mu \\ LOS = & (E \\ \hline \textbf{Speed L} \\ D_S = & (E \\ S_R = & m \\ S_0 = & m \end{array}$	D <sub>R</sub> = 4.252 + pc/mi/ln) Exhibit 13-2) <b>Determina</b> t Exhibit 13-12)	0.0086 V <sub>12</sub> -  tion  2) 2)	- 0.009 L <sub>D</sub>	

General Information			Site Information		
Analyst Agency or Company Date Performed Analysis Time Period	TKTPM TKTPM 10/2/2017 2028 EPAP+		Highway/Direction of Trave From/To Jurisdiction Analysis Year	On-Ram	EB np/Cambridge Rd do County
	SP Phase 1a F		A = - (N1)	□ Dia:	unio u Data
✓ Oper.(LOS)  Flow Inputs		U	Pes.(N)	Pian	nning Data
Volume, V AADT Peak-Hr Prop. of AADT, K Peak-Hr Direction Prop, D DDHV = AADT x K x D	3836	veh/h veh/day veh/h	Peak-Hour Factor, PHF %Trucks and Buses, P <sub>T</sub> %RVs, P <sub>R</sub> General Terrain: Grade % Length Up/Down %	0.96 1 0 Rolling mi	
Calculate Flow Adjus	tments		Op/Down 76		
f <sub>p</sub> E <sub>T</sub>	1.00		$E_R$ $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	2.0 )] 0.985	
Speed Inputs			Calc Speed Adj and I	FFS	
Lane Width Rt-Side Lat. Clearance Number of Lanes, N Total Ramp Density, TRD FFS (measured) Base free-flow Speed, BFFS LOS and Performance Operational (LOS)		ft ft ramps/mi mph mph	f <sub>LW</sub> f <sub>LC</sub> TRD Adjustment FFS  Design (N)  Design (N) Design LOS	70.0	mph mph mph mph
v <sub>p</sub> = (V or DDHV) / (PHF x t x f <sub>p</sub> ) S D = v <sub>p</sub> / S LOS	62.0 32.7 D	pc/h/ln mph pc/mi/ln	$v_p = (V \text{ or DDHV}) / (PHF \text{ x} \text{ x } f_p)$ S $D = v_p / S$ Required Number of Lanes		pc/h/ln mph pc/mi/ln
Glossary			Factor Location		
N - Number of lanes V - Hourly volume v <sub>p</sub> - Flow rate LOS - Level of service speed DDHV - Directional design	BFFS - Ba		E <sub>R</sub> - Exhibits 11-10, 11-12 E <sub>T</sub> - Exhibits 11-10, 11-11, f <sub>p</sub> - Page 11-18 LOS, S, FFS, v <sub>p</sub> - Exhibits 11-3		f <sub>LW</sub> - Exhibit 11-8 f <sub>LC</sub> - Exhibit 11-9 TRD - Page 11-1

## Appendix E: Travel Demand Model Application and Loaded Network Plots





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