P17010

Bass Lake Hills Specific Plan Phase 1a
Final Map Supplemental Traffic Analysis

El Dorado County, California

Prepared for:
BL Road, LLC

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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 level-of-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[1]. 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.

[1] 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)[2]

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)

[2] SACOG (2012) 2035 *Metropolitan Transportation Plan*, Appendix A project list, P15.

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)[3]

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[4] 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[5] analyzed traffic operations for 2017 without Project and 2017 with Project conditions. This supplemental analysis considered level-of-service 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

[3] SACOG (2012) *2035 Metropolitan Transportation Plan*, Appendix A project list, P14.
[4] TKTPM (2015) Ten-Year 2025 Bass Lake Road Interchange Interim Improvements Traffic Operations Analysis, T. Kear Transportation Planning and Management, Inc., January 2015.
[5] TKTPM (2017) BLHSP Phase 1a Final Map Supplemental Traffic Analysis, T. Kear Transportation Planning and Management, Inc., March 16, 2017.

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 24th, 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, 95th 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[6].

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

Intersection	2017 AM, No Project		2017 PM, No Project	
	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	A	21.6	C

*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 50 WB Ramps	WB Left-Thru-Right	12	820
	NB Left-Thru	15	17
#5 US 50 EB Ramps	EB Left-Thru-Right	90	401
	SB Left-Thru	21	13

[6] The Peak-Hour Signal Warrant (Warrant 3) was evaluated within the TIA for 2014, 2019, and 2035 conditions with and without the project.

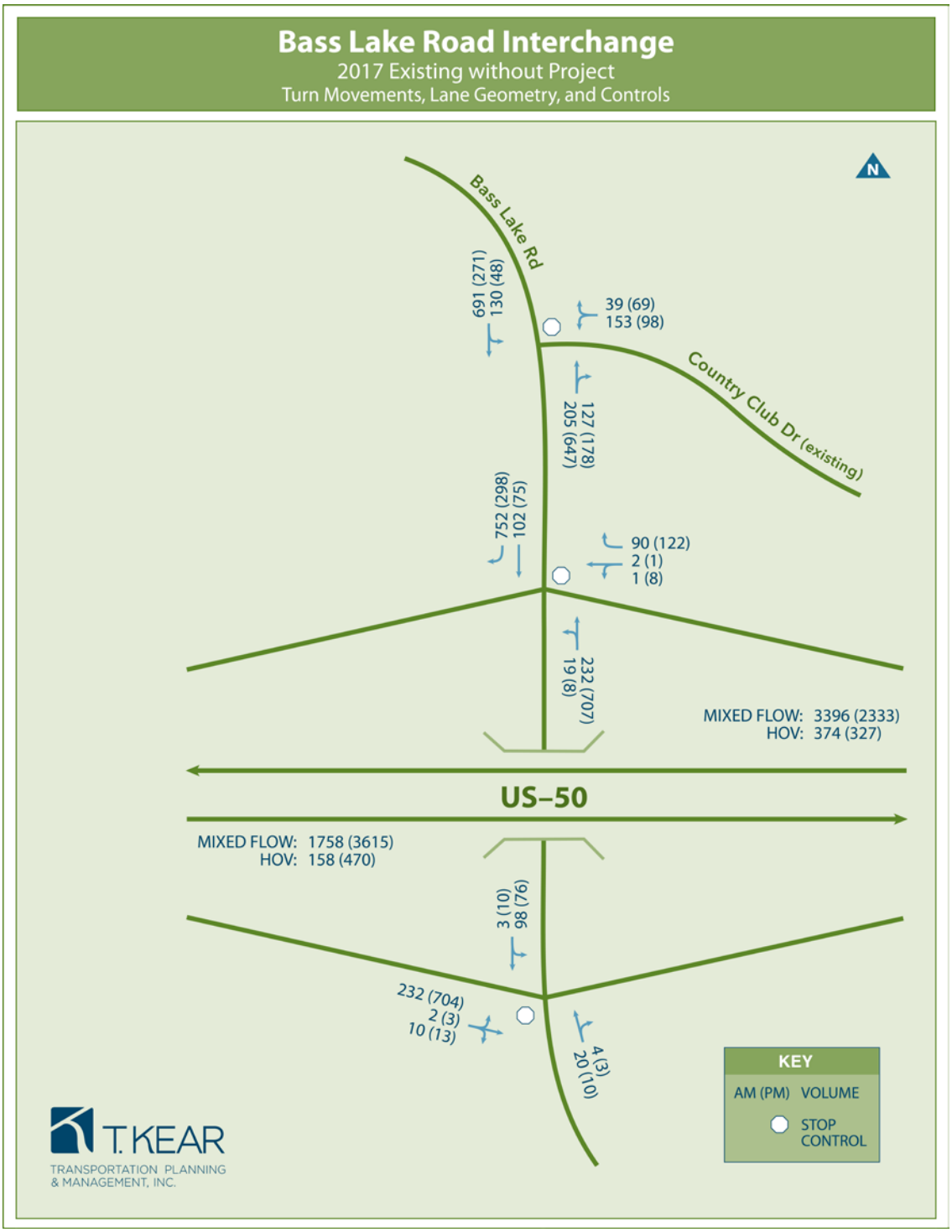

Figure 1. 2017 Volumes, Lanes, and Controls without Bass Lake Hills Development

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[7]. 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[8] .

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.

[7] 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.
[8] There are approximately eight homes accessed from Old Bass Lake Road.

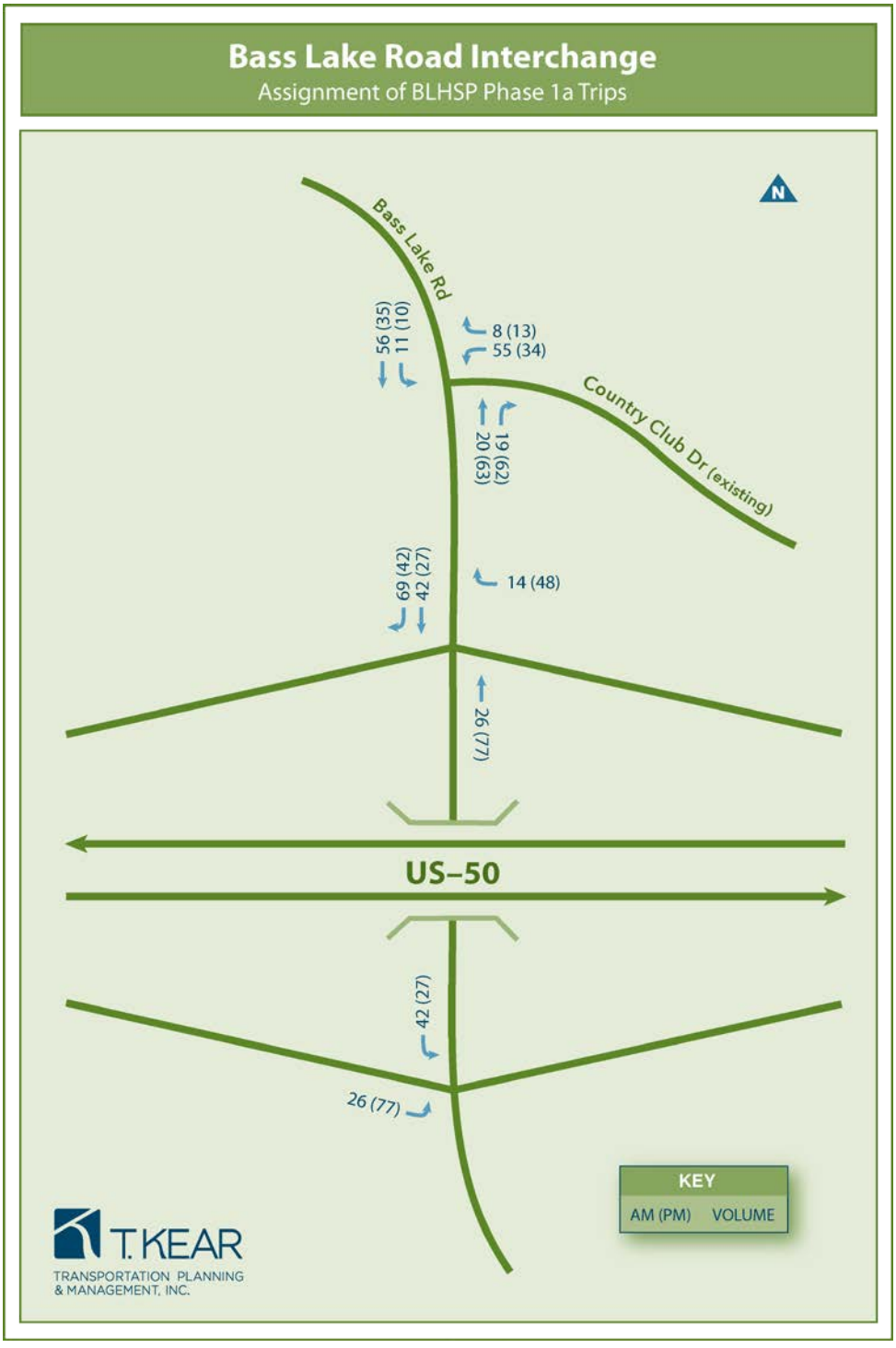

Figure 2. BLHSP Phase 1a Project Trips

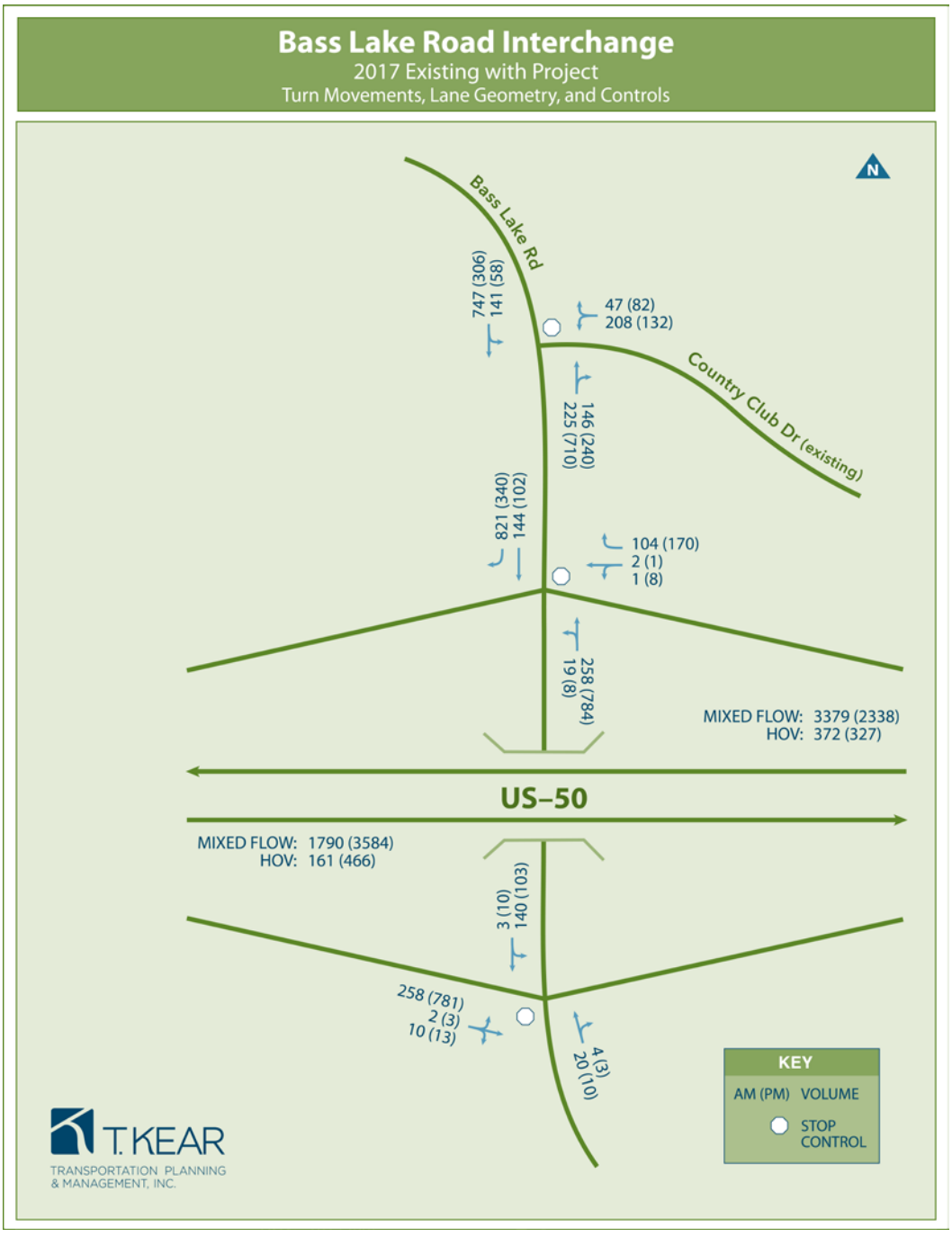

Figure 3. 2017 Volumes, Lanes, and Controls with Bass Lake Hills Phase 1a Development – Existing Roadway and Intersections Geometry, Existing Control

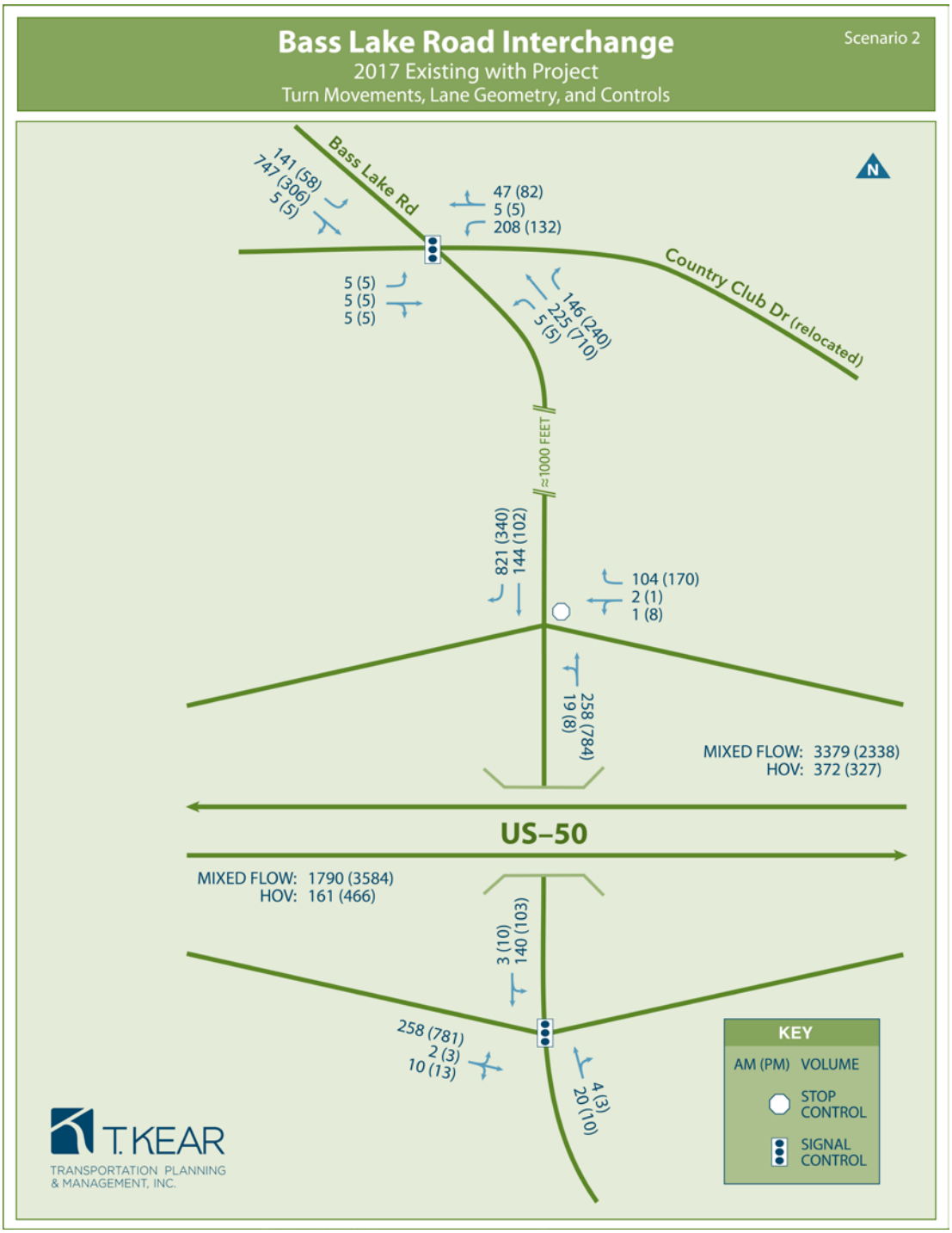

Figure 4. 2017 Volumes, Lanes, and Controls with Bass Lake Hills Phase 1a Development – Existing Roadway and Intersections Geometry, Signals at Intersection 3 and 5

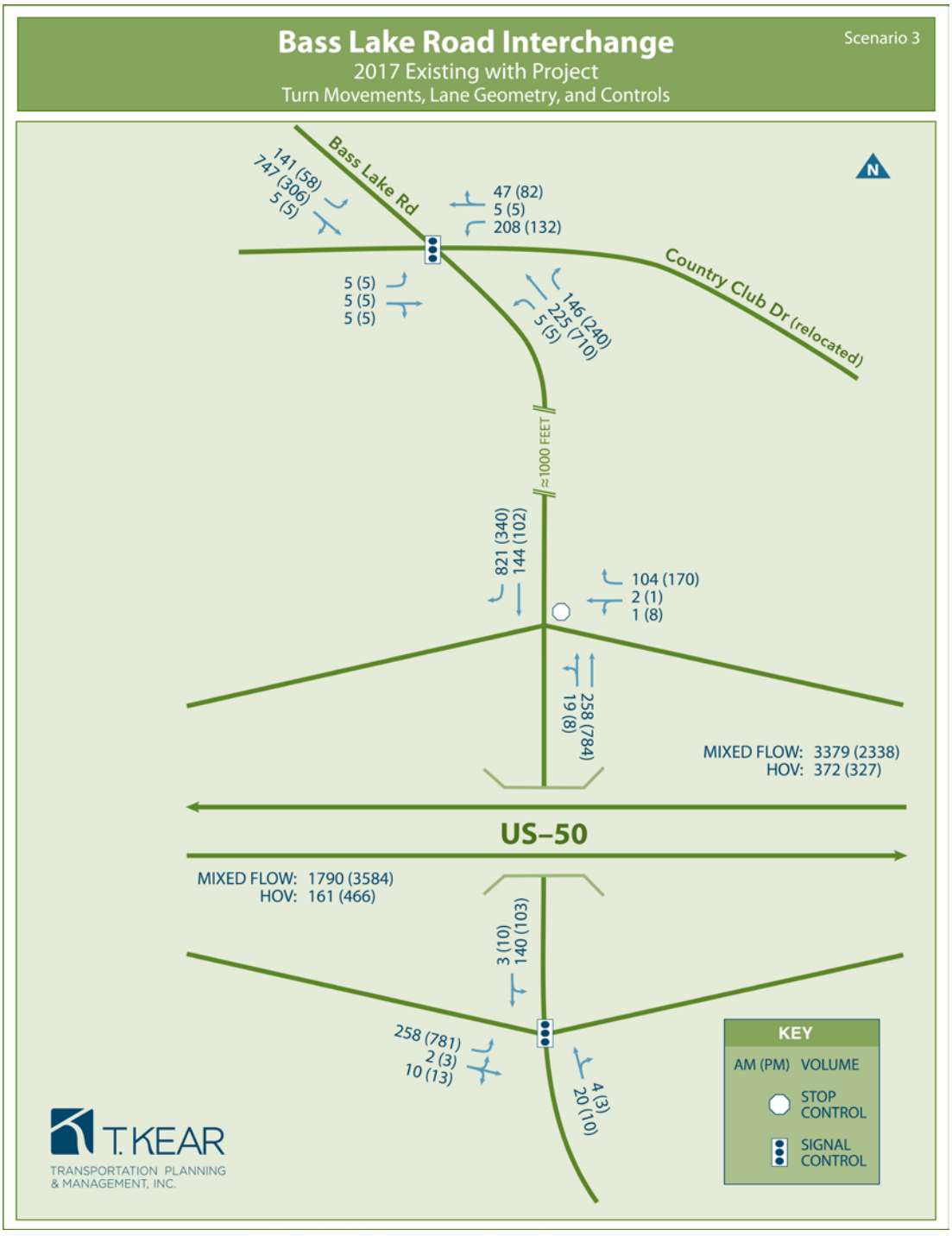

Figure 5. 2017 Volumes, Lanes, and Controls with Bass Lake Hills Phase 1a Development – 2 Northbound Lanes Under US 50 and Signals at Intersection 3 & 5

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

Intersection	2017 AM		2017 PM	
	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*	0.2(5.4)	A(A)	33.2(376.0)	D(F)
5. Bass Lake Rd. & US 50 EB Ramps	4.0	A	21.6	C
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)	F(F)
5. Bass Lake Rd. & US 50 EB Ramps	4.6	A	58.0	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*	0.1(3.5)	A(A)	0.1(17.9)	A(C)
5. Bass Lake Rd. & US 50 EB Ramps	9.2	A	8.3	A
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 ramp 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)	A(B)
5. Bass Lake Rd. & US 50 EB Ramps	8.2	A	5.6	A

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 geometry, and existing intersection controls.			
#4 US 50 WB Ramps Scenario 1	WB Left-Thru-Right	12	820
	NB Left-Thru	15	17
#5 US 50 EB Ramps Scenario 1	EB Left-Thru-Right	90	401
	SB Left-Thru	21	13
Scenario 1 Existing roadway geometry, existing intersection geometry, and existing intersection controls.			
#4 US 50 WB Ramps Scenario 1	WB Left-Thru-Right	16	1517
	NB Left-Thru	17	10
#5 US 50 EB Ramps Scenario 1	EB Left-Thru-Right	95	897
	SB Left-Thru	19	11
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 US 50 WB Ramps – Scenario 2	WB Left-Thru-Right	15	29
	NB Left-Thru	21	7
#5 US 50 EB Ramps – Scenario 2	EB Left-Thru-Right	153	315
	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 – Scenario 3	WB Left-Thru-Right	19	28
	NB Left-Thru	24	30
#5 US 50 EB Ramps – Scenario 3	EB Left	129	205
	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[9] 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.

[9] Ridgeview, Promontory, Carson Creek, Valley View, El Dorado Hills (Serrano)
[10] 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).

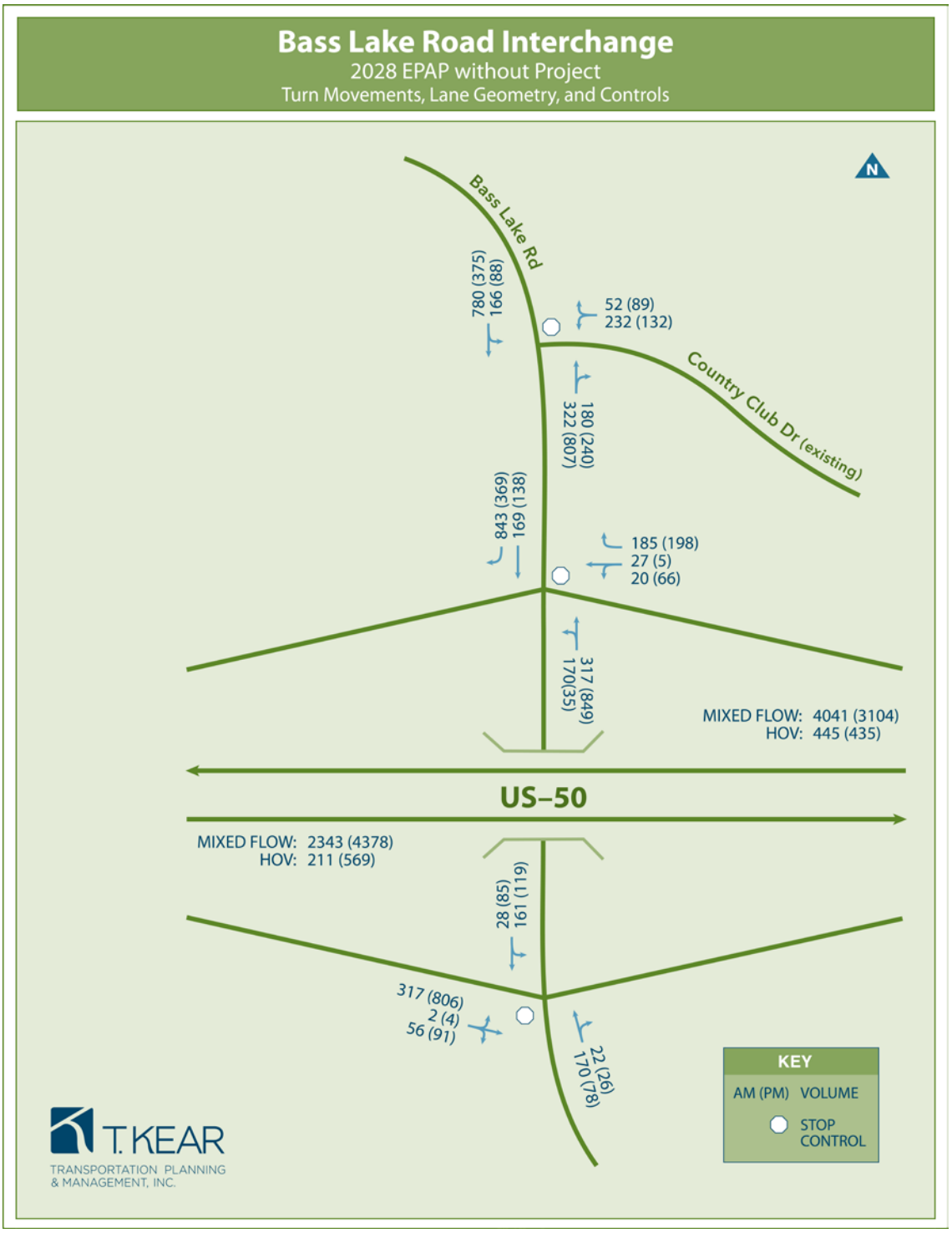

Figure 6. 2028 Volumes, Lane, and Controls without Bass Lake Hills Development

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 [11]. 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 Project		2028 PM, No Project	
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	B	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 US 50 WB Ramps	WB Left-Thru-Right	133	1447
	NB Left-Thru	72	44
#5 US 50 EB Ramps	EB Left-Thru-Right	224	1088
	SB Left-Thru	55	35

[11] 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**.

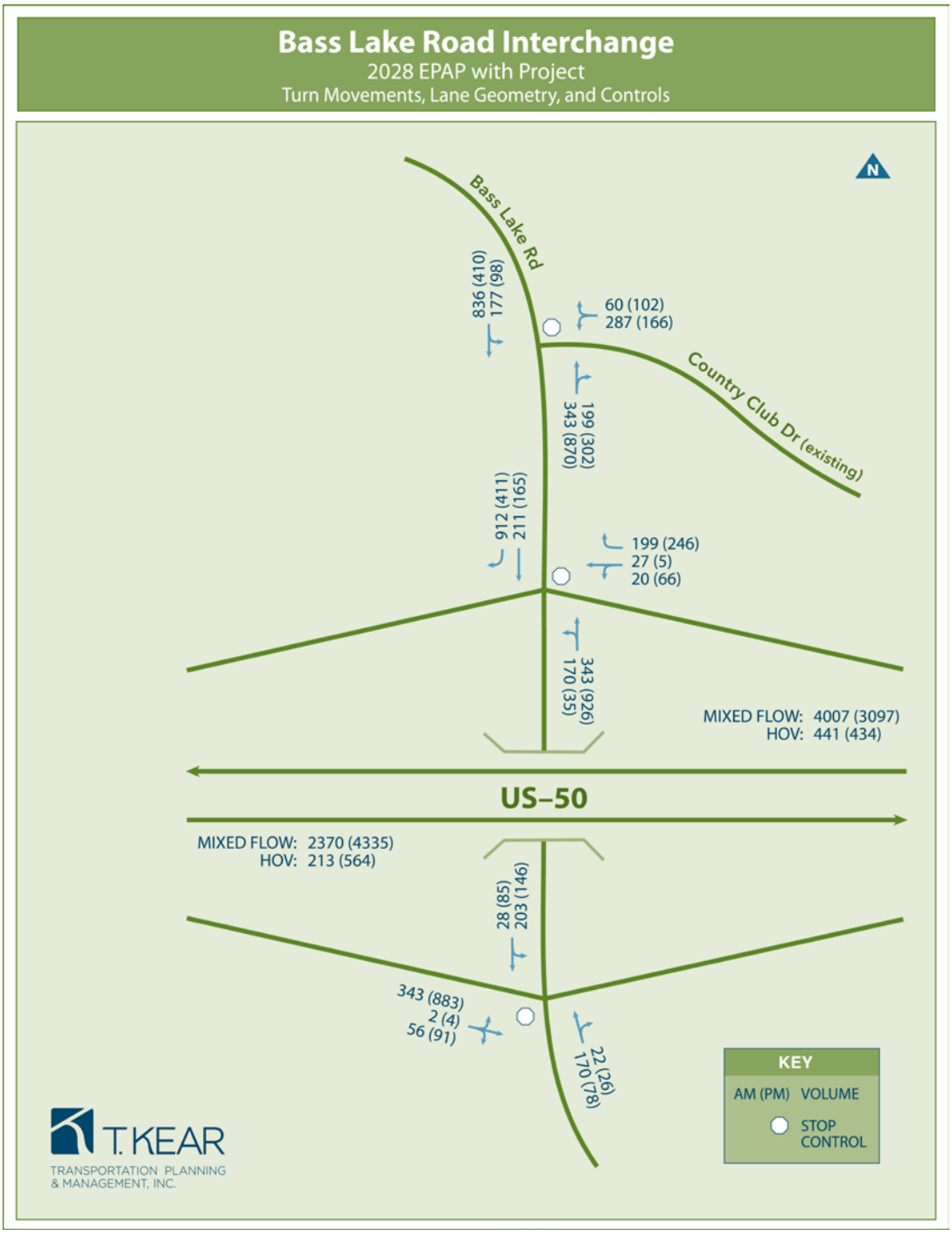

Figure 7. 2028 Volumes, Lane, and Controls with Bass Lake Hills Development – Existing Roadway and Intersections Geometry, Existing Control

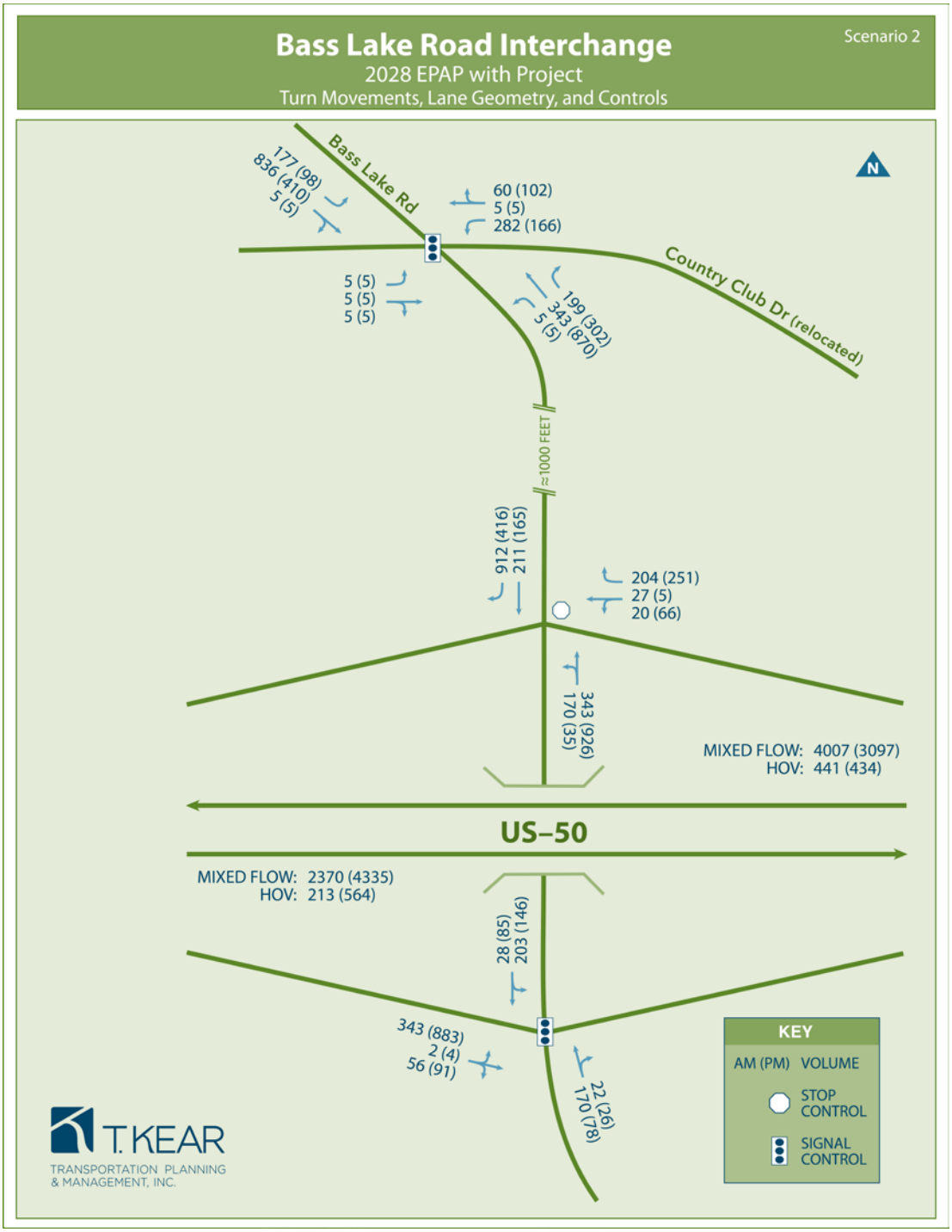

Figure 8. 2028 Volumes, Lane, and Controls with Bass Lake Hills Development – Existing Roadway and Intersections Geometry, Signals at Intersection 3 and 5

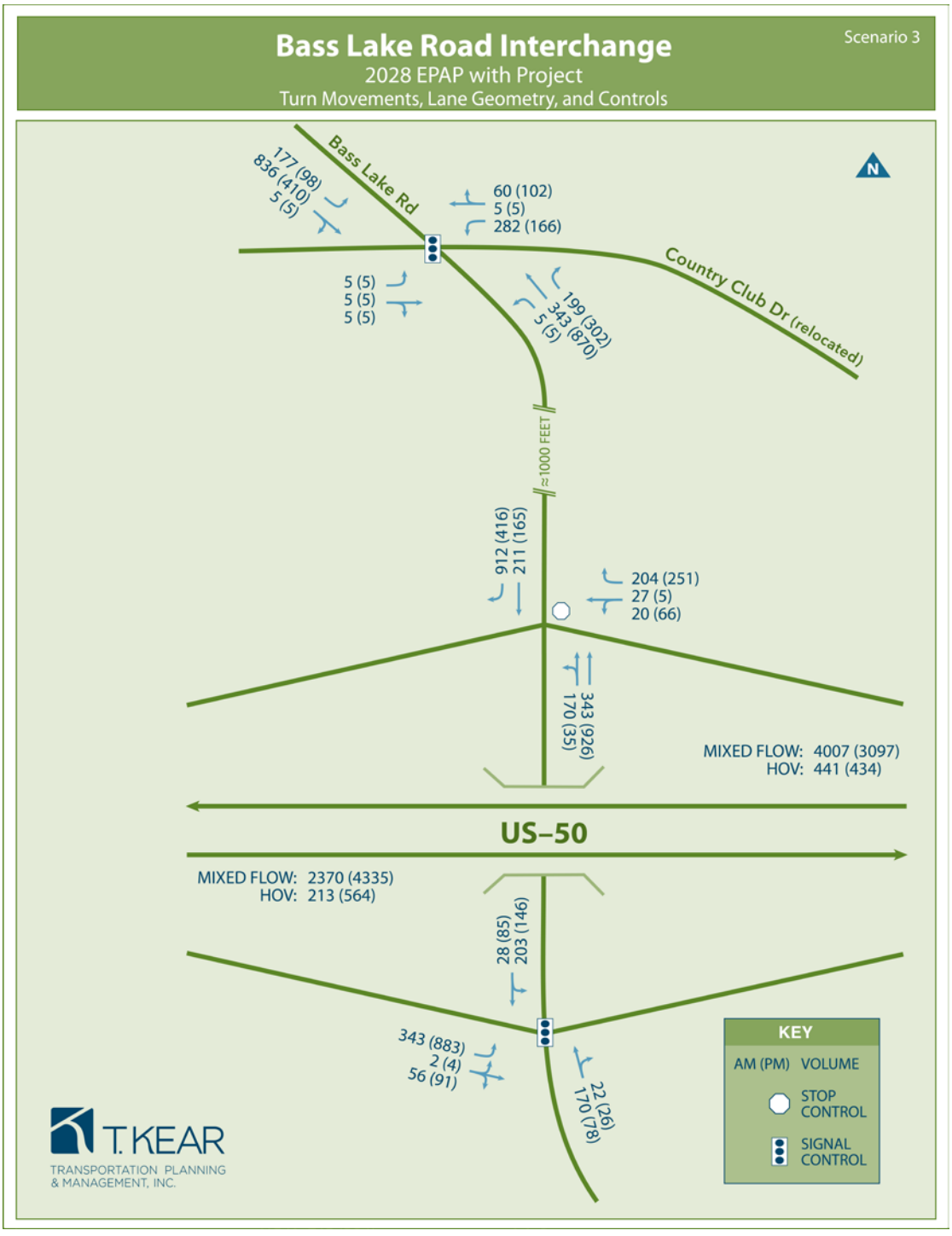

Figure 9. 2028 Volumes, Lanes, and Controls with Bass Lake Hills Development – 2 Northbound Lanes Under US 50 and Signals at Intersection 3 and 5

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 95th 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.

[12] 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

Intersection	2028 AM		2028 PM	
	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	B	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)
5. Bass Lake Rd. & US 50 EB Ramps	17.5	B	21.7	C
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 ramp intersection with a double eastbound left turn (requiring a 240' eastbound left turn pocket)				
4. Bass Lake Rd. & US 50 WB Ramps*	3.7(10.3)	A(B)	1.3(23.1)	A(C)
5. Bass Lake Rd. & US 50 EB Ramps	12.7	B	11.8	B

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 Scenario 1	WB Left-Thru-Right	133	1447
	NB Left-Thru	72	44
#5 US 50 EB Ramps Scenario 1	EB Left-Thru-Right	224	1088
	SB Left-Thru	55	35
Scenario 1 Existing roadway geometry, existing intersection geometry, and existing intersection controls.			
#4 US 50 WB Ramps Scenario 1	WB Left-Thru-Right	235	1397
	NB Left-Thru	80	34
#5 US 50 EB Ramps Scenario 1	EB Left-Thru-Right	375	949
	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 50 eastbound ramp intersection with existing geometry			
#4 US 50 WB Ramps – Scenario 2	WB Left-Thru-Right	56	190
	NB Left-Thru	90	151
#5 US 50 EB Ramps – Scenario 2	EB Left-Thru-Right	257	599
	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 westbound offramp, 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 – Scenario 3	WB Left-Thru-Right	60	146
	NB Left-Thru	113	125
#5 US 50 EB Ramps – Scenario 3	EB Left	182	258
	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 level-of-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 2017			Existing 2017 + BLHSP 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	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	C	23.4	68.2	C
Bass Lake Rd Off-Ramp	Diverge	27.6	57.8	C	27.8	57.7	C
Cambridge Rd to Bass Lake Rd	Basic	23.4	68.2	C	23.6	68.1	C
Westbound US 50 Level-of-Service (PM)							
Bass Lake Rd to Silva Valley Pkwy	Basic	16.3	70.0	B	16.6	70.0	B
Bass Lake Rd On-Ramp	Merge	19.2	61.3	B	19.5	61.2	B
Bass Lake Rd Off-Ramp to On-Ramp	Basic	14.6	70.0	B	14.6	70.0	B
Bass Lake Rd Off-Ramp	Diverge	18.3	57.7	B	18.7	57.5	B
Cambridge Rd to Bass Lake Rd	Basic	15.1	70.0	B	15.5	70.0	B

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	B	13.2	70.0	B
Bass Lake Rd Off-Ramp	Diverge	15.8	57.4	B	16.0	57.3	B
Bass Lake Rd Off-Ramp to On-Ramp	Basic	11.7	70.0	B	11.7	70.0	B
Bass Lake Rd On-Ramp	Merge	14.4	61.8	B	14.8	61.7	B
Bass Lake Rd to Cambridge Rd	Basic	12.1	70.0	B	12.4	70.0	B
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	E
Bass Lake Rd Off-Ramp to On-Ramp	Basic	24.8	67.4	C	24.8	67.4	C
Bass Lake Rd On-Ramp	Merge	27.4	59.2	C	27.6	59.1	C
Bass Lake Rd to Cambridge Rd	Basic	24.6	67.5	C	24.9	67.4	C

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 level-of-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-of-service 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			Ten-Year 2028 + BLHSP 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	E	42.8	54.8	E
Bass Lake Rd On-Ramp	Merge	37.5	50.0	E	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	C	21.6	69.0	C
Bass Lake Rd On-Ramp	Merge	24.4	60.2	C	24.7	60.1	C
Bass Lake Rd Off-Ramp to On-Ramp	Basic	19.7	69.7	C	19.7	69.7	C
Bass Lake Rd Off-Ramp	Diverge	24.4	57.3	C	24.8	57.2	C
Cambridge Rd to Bass Lake Rd	Basic	20.3	69.5	C	20.7	69.4	C

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

		Ten-Year 2028			Ten-Year 2028 + 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	17.4	70.0	B	17.6	70.0	B
Bass Lake Rd Off-Ramp	Diverge	21.2	57.0	C	21.4	56.9	C
Bass Lake Rd Off-Ramp to On-Ramp	Basic	15.2	70.0	B	15.2	70.0	B
Bass Lake Rd On-Ramp	Merge	18.8	61.3	B	19.2	61.3	B
Bass Lake Rd to Cambridge Rd	Basic	16.1	70.0	B	16.4	70.0	B
Eastbound US 50 Level-of-Service (PM)							
Silva Valley Pkwy to Bass Lake Rd	Basic	44.5	53.7	E	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 F.
- 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, 95th 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 95th 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

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Bass Lake Rd -- Country Club Dr

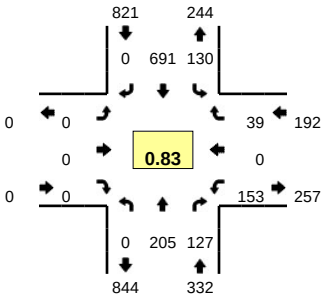
CITY/STATE: El Dorado Hills, CA

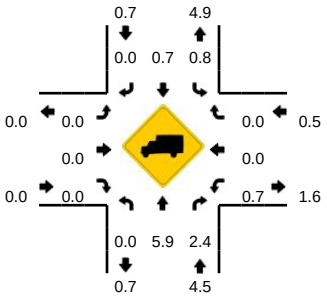
QC JOB #: 14101501

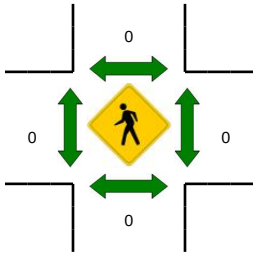
DATE: Tue, Jan 24 2017

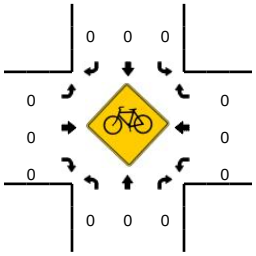
Peak-Hour: 7:00 AM -- 8:00 AM

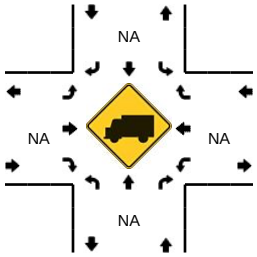
Peak 15-Min: 7:40 AM -- 7:55 AM

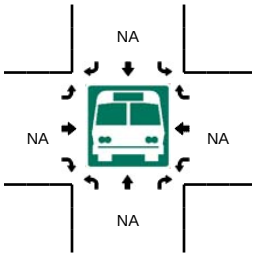












5-Min Count Period Beginning At	Bass Lake Rd (Northbound)				Bass Lake Rd (Southbound)				Country Club Dr (Eastbound)				Country Club Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	1	0	0	1	27	0	0	0	0	0	0	6	0	0	0	35	
6:05 AM	0	2	0	0	0	22	0	0	0	0	0	0	6	0	0	0	30	
6:10 AM	0	2	1	0	0	25	0	0	0	0	0	0	5	0	0	0	33	
6:15 AM	0	1	0	0	0	40	0	0	0	0	0	0	10	0	0	0	51	
6:20 AM	0	1	0	0	0	35	0	0	0	0	0	0	8	0	0	0	44	
6:25 AM	0	1	0	0	2	52	0	0	0	0	0	0	5	0	0	0	60	
6:30 AM	0	5	3	0	1	53	0	0	0	0	0	0	10	0	0	0	72	
6:35 AM	0	6	2	0	1	58	0	0	0	0	0	0	21	0	1	0	89	
6:40 AM	0	9	3	0	1	74	0	0	0	0	0	0	4	0	0	0	91	
6:45 AM	0	12	4	0	0	48	0	0	0	0	0	0	10	0	0	0	74	
6:50 AM	0	6	5	0	2	57	0	0	0	0	0	0	9	0	0	0	79	
6:55 AM	0	20	5	0	2	56	0	0	0	0	0	0	14	0	2	0	99	757
7:00 AM	0	13	2	0	3	51	0	0	0	0	0	0	3	0	0	0	72	794
7:05 AM	0	17	5	0	4	51	0	0	0	0	0	0	16	0	2	0	95	859
7:10 AM	0	19	4	0	2	56	0	0	0	0	0	0	14	0	3	0	98	924
7:15 AM	0	24	3	0	5	63	0	0	0	0	0	0	9	0	1	0	105	978
7:20 AM	0	11	7	0	8	49	0	0	0	0	0	0	11	0	3	0	89	1023
7:25 AM	0	16	4	0	5	51	0	0	0	0	0	0	15	0	0	0	91	1054
7:30 AM	0	16	13	0	17	55	0	0	0	0	0	0	15	0	2	0	118	1100
7:35 AM	0	19	16	0	21	64	0	0	0	0	0	0	7	0	5	0	132	1143
7:40 AM	0	15	32	0	14	63	0	0	0	0	0	0	12	0	3	0	139	1191
7:45 AM	0	13	11	0	14	60	0	0	0	0	0	0	20	0	8	0	126	1243
7:50 AM	0	15	18	0	24	69	0	0	0	0	0	0	13	0	2	0	141	1305
7:55 AM	0	27	12	0	13	59	0	0	0	0	0	0	18	0	10	0	139	1345

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	172	244	0	208	768	0	0	0	0	0	0	180	0	52	0	1624
Heavy Trucks	0	8	4		0	0	0		0	0	0		0	0	0		12
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 1/30/2017 2:56 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Bass Lake Rd -- Country Club Dr

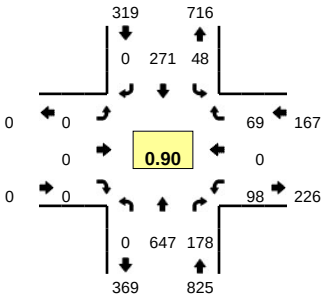
CITY/STATE: El Dorado Hills, CA

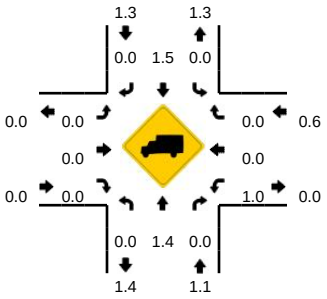
QC JOB #: 14101502

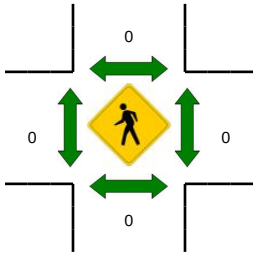
DATE: Tue, Jan 24 2017

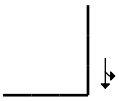
Peak-Hour: 4:55 PM -- 5:55 PM

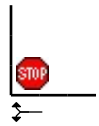
Peak 15-Min: 5:35 PM -- 5:50 PM

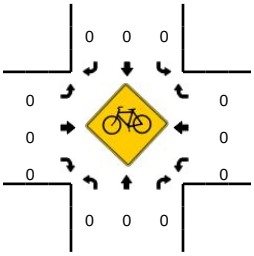


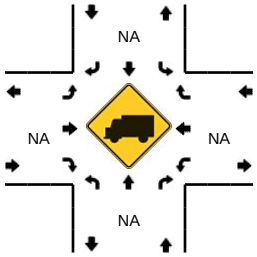


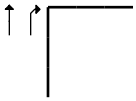


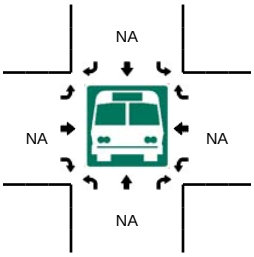












5-Min Count Period Beginning At	Bass Lake Rd (Northbound)				Bass Lake Rd (Southbound)				Country Club Dr (Eastbound)				Country Club Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:30 PM	0	47	11	0	4	26	0	0	0	0	0	0	6	0	4	0	98	
4:35 PM	0	45	14	0	3	25	0	0	0	0	0	0	4	0	2	0	93	
4:40 PM	0	46	10	0	3	22	0	0	0	0	0	0	8	0	5	0	94	
4:45 PM	0	41	12	0	3	25	0	0	0	0	0	0	6	0	4	0	91	
4:50 PM	0	56	8	0	6	27	0	0	0	0	0	0	4	0	1	0	102	
4:55 PM	0	54	17	0	7	17	0	0	0	0	0	0	5	0	5	0	105	
5:00 PM	0	51	18	0	3	22	0	0	0	0	0	0	8	0	7	0	109	
5:05 PM	0	47	18	0	2	25	0	0	0	0	0	0	6	0	0	0	98	
5:10 PM	0	58	7	0	2	23	0	0	0	0	0	0	2	0	3	0	95	
5:15 PM	0	55	9	0	3	24	0	0	0	0	0	0	7	0	9	0	107	
5:20 PM	0	54	17	0	5	23	0	0	0	0	0	0	8	0	1	0	108	
5:25 PM	0	53	11	0	7	16	0	0	0	0	0	0	10	0	3	0	100	1200
5:30 PM	0	54	14	0	3	23	0	0	0	0	0	0	6	0	2	0	102	1204
5:35 PM	0	58	21	0	3	27	0	0	0	0	0	0	11	0	11	0	131	1242
5:40 PM	0	54	9	0	3	22	0	0	0	0	0	0	16	0	12	0	116	1264
5:45 PM	0	57	15	0	4	25	0	0	0	0	0	0	11	0	6	0	118	1291
5:50 PM	0	52	22	0	6	24	0	0	0	0	0	0	8	0	10	0	122	1311
5:55 PM	0	52	12	0	1	13	0	0	0	0	0	0	11	0	0	0	89	1295
6:00 PM	0	44	17	0	1	18	0	0	0	0	0	0	8	0	4	0	92	1278
6:05 PM	0	53	9	0	2	20	0	0	0	0	0	0	2	0	3	0	89	1269
6:10 PM	0	36	19	0	1	19	0	0	0	0	0	0	5	0	2	0	82	1256
6:15 PM	0	47	12	0	2	20	0	0	0	0	0	0	1	0	2	0	84	1233
6:20 PM	0	58	15	0	8	22	0	0	0	0	0	0	9	0	13	0	125	1250
6:25 PM	0	44	6	0	3	10	0	0	0	0	0	0	9	0	6	0	78	1228

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	676	180	0	40	296	0	0	0	0	0	0	152	0	116	0	1460
Heavy Trucks	0	12	0		0	4	0		0	0	0		0	0	0		16
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 1/30/2017 2:56 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

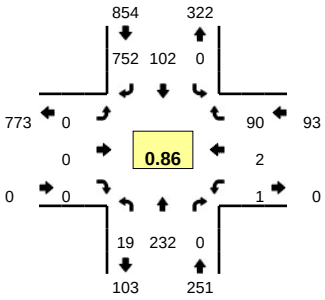
LOCATION: Bass Lake Rd -- US 50 WB Ramps

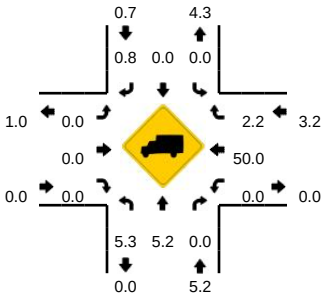
QC JOB #: 14101503

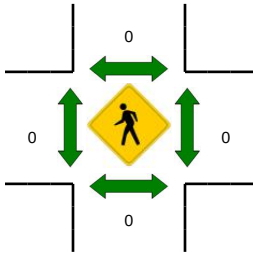
CITY/STATE: El Dorado Hills, CA

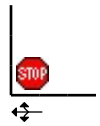
DATE: Tue, Jan 24 2017

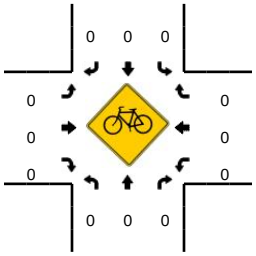
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:35 AM -- 7:50 AM

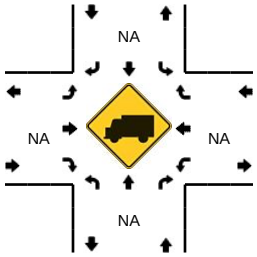


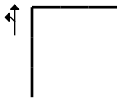


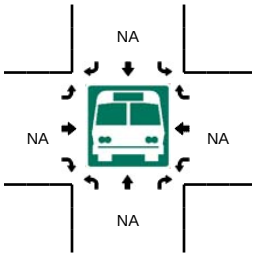












5-Min Count Period Beginning At	Bass Lake Rd (Northbound)				Bass Lake Rd (Southbound)				US 50 WB Ramps (Eastbound)				US 50 WB Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	1	0	0	0	0	1	29	0	0	0	0	0	0	0	0	0	31	
6:05 AM	0	0	0	0	0	1	31	0	0	0	0	0	0	0	2	0	34	
6:10 AM	0	3	0	0	0	2	29	0	0	0	0	0	0	0	0	0	34	
6:15 AM	1	1	0	0	0	3	46	0	0	0	0	0	0	0	0	0	51	
6:20 AM	0	1	0	0	0	5	36	0	0	0	0	0	0	1	0	0	43	
6:25 AM	1	4	0	0	0	7	54	0	0	0	0	0	0	0	1	0	67	
6:30 AM	2	8	0	0	0	13	51	0	0	0	0	0	0	1	0	0	75	
6:35 AM	0	7	0	0	0	15	68	0	0	0	0	0	0	0	2	0	92	
6:40 AM	3	6	0	0	0	16	56	0	0	0	0	0	0	0	5	0	86	
6:45 AM	3	11	0	0	0	12	52	0	0	0	0	0	0	0	3	0	81	
6:50 AM	0	10	0	0	0	11	50	0	0	0	0	0	0	0	1	0	72	
6:55 AM	1	21	0	0	0	6	67	0	0	0	0	0	0	0	5	0	100	766
7:00 AM	0	12	0	0	0	4	52	0	0	0	0	0	0	0	3	0	71	806
7:05 AM	1	17	0	0	0	7	53	0	0	0	0	0	0	0	7	0	85	857
7:10 AM	0	10	0	0	0	10	67	0	0	0	0	0	0	1	9	0	97	920
7:15 AM	1	23	0	0	0	8	66	0	0	0	0	0	0	0	7	0	105	974
7:20 AM	0	13	0	0	0	6	49	0	0	0	0	0	0	0	4	0	72	1003
7:25 AM	2	16	0	0	0	9	60	0	0	0	0	0	0	0	5	0	92	1028
7:30 AM	2	16	0	0	0	10	60	0	0	0	0	0	0	0	6	0	94	1047
7:35 AM	5	32	0	0	0	14	59	0	0	0	0	0	0	0	11	0	121	1076
7:40 AM	0	30	0	0	0	11	67	0	0	0	0	0	0	1	8	0	117	1107
7:45 AM	4	21	0	0	0	10	70	0	0	0	0	0	0	0	7	0	112	1138
7:50 AM	1	25	0	0	0	4	78	0	0	0	0	0	0	0	11	0	119	1185
7:55 AM	3	17	0	0	0	9	71	0	0	0	0	0	1	0	12	0	113	1198

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	36	332	0	0	0	140	784	0	0	0	0	0	0	4	104	0	1400
Heavy Trucks	4	12	0		0	0	0		0	0	0		0	0	4		20
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 1/30/2017 2:56 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

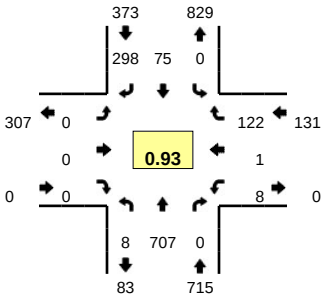
Method for determining peak hour: Total Entering Volume

LOCATION: Bass Lake Rd -- US 50 WB Ramps

QC JOB #: 14101504

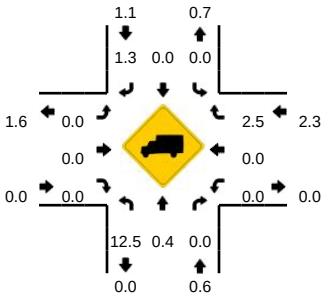
CITY/STATE: El Dorado Hills, CA

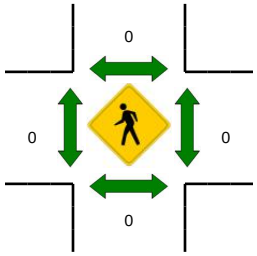
DATE: Tue, Jan 24 2017

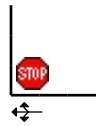


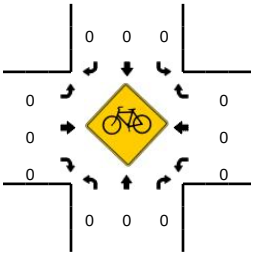
Peak-Hour: 4:55 PM -- 5:55 PM

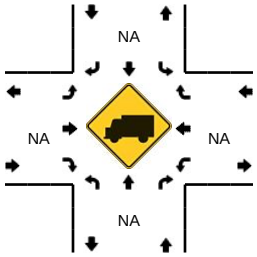
Peak 15-Min: 5:35 PM -- 5:50 PM

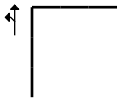


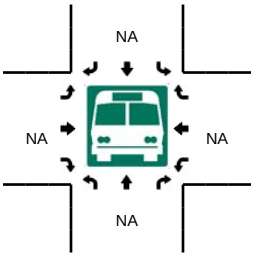












5-Min Count Period Beginning At	Bass Lake Rd (Northbound)				Bass Lake Rd (Southbound)				US 50 WB Ramps (Eastbound)				US 50 WB Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:30 PM	0	50	0	0	0	5	29	0	0	0	0	0	0	0	7	0	91	
4:35 PM	3	48	0	0	0	5	26	0	0	0	0	0	0	0	13	0	95	
4:40 PM	1	47	0	0	0	7	24	0	0	0	0	0	1	0	5	0	85	
4:45 PM	1	48	0	0	0	6	24	0	0	0	0	0	0	0	9	0	88	
4:50 PM	1	55	0	0	0	4	24	0	0	0	0	0	0	1	8	0	93	
4:55 PM	0	70	0	0	0	3	21	0	0	0	0	0	0	1	10	0	105	
5:00 PM	0	57	0	0	0	5	28	0	0	0	0	0	1	0	7	0	98	
5:05 PM	1	51	0	0	0	4	26	0	0	0	0	0	2	0	12	0	96	
5:10 PM	1	56	0	0	0	6	19	0	0	0	0	0	0	0	11	0	93	
5:15 PM	1	52	0	0	0	12	22	0	0	0	0	0	0	0	14	0	101	
5:20 PM	0	54	0	0	0	9	23	0	0	0	0	0	0	0	11	0	97	
5:25 PM	0	57	0	0	0	1	21	0	0	0	0	0	1	0	10	0	90	1132
5:30 PM	1	60	0	0	0	10	21	0	0	0	0	0	1	0	12	0	105	1146
5:35 PM	2	66	0	0	0	6	34	0	0	0	0	0	1	0	7	0	116	1167
5:40 PM	1	58	0	0	0	7	29	0	0	0	0	0	1	0	7	0	103	1185
5:45 PM	0	64	0	0	0	4	30	0	0	0	0	0	0	0	12	0	110	1207
5:50 PM	1	62	0	0	0	8	24	0	0	0	0	0	1	0	9	0	105	1219
5:55 PM	0	62	0	0	0	6	16	0	0	0	0	0	1	2	5	0	92	1206
6:00 PM	0	51	0	0	0	7	24	0	0	0	0	0	0	0	7	0	89	1197
6:05 PM	0	59	0	0	0	3	17	0	0	0	0	0	0	0	7	0	86	1187
6:10 PM	0	43	0	0	0	7	16	0	0	0	0	0	1	0	7	0	74	1168
6:15 PM	1	52	0	0	0	7	17	0	0	0	0	0	1	0	8	0	86	1153
6:20 PM	1	56	0	0	0	4	26	0	0	0	0	0	0	0	12	0	99	1155
6:25 PM	1	45	0	0	0	3	16	0	0	0	0	0	1	0	7	0	73	1138

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	752	0	0	0	68	372	0	0	0	0	0	8	0	104	0	1316
Heavy Trucks	4	4	0		0	0	4		0	0	0		0	0	0		12
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 1/30/2017 2:56 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

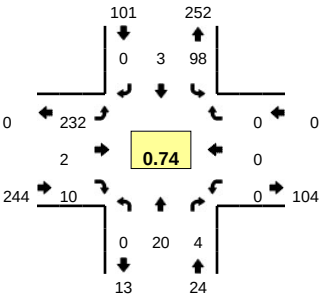
LOCATION: Bass Lake Rd -- US 50 EB Ramps

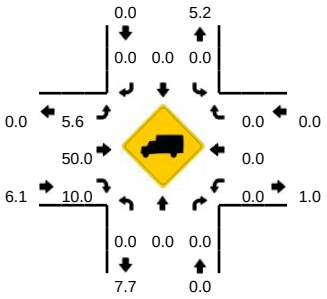
QC JOB #: 14101505

CITY/STATE: El Dorado Hills, CA

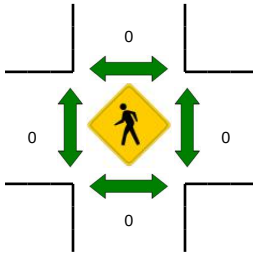
DATE: Tue, Jan 24 2017

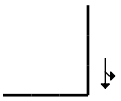
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:35 AM -- 7:50 AM

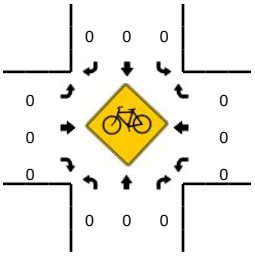


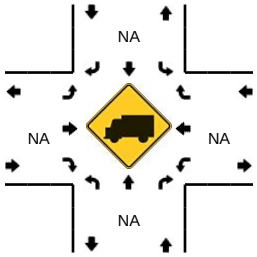


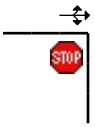
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

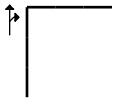


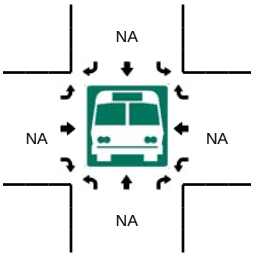












5-Min Count Period Beginning At	Bass Lake Rd (Northbound)				Bass Lake Rd (Southbound)				US 50 EB Ramps (Eastbound)				US 50 EB Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	3	
6:05 AM	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	2	
6:10 AM	0	0	0	0	1	0	0	0	3	0	1	0	0	0	0	0	5	
6:15 AM	0	1	0	0	4	0	0	0	1	0	0	0	0	0	0	0	6	
6:20 AM	0	0	1	0	4	0	0	0	1	0	0	0	0	0	0	0	6	
6:25 AM	0	1	0	0	4	1	0	0	3	0	2	0	0	0	0	0	11	
6:30 AM	0	2	0	0	15	0	0	0	8	0	0	0	0	0	0	0	25	
6:35 AM	0	0	0	0	12	0	0	0	7	0	0	0	0	0	0	0	19	
6:40 AM	0	1	0	0	19	0	0	0	6	1	0	0	0	0	0	0	27	
6:45 AM	0	5	0	0	11	0	0	0	12	0	0	0	0	0	0	0	28	
6:50 AM	0	0	0	0	11	0	0	0	10	0	0	0	0	0	0	0	21	
6:55 AM	0	0	0	0	6	1	0	0	20	0	1	0	0	0	0	0	28	181
7:00 AM	0	0	0	0	4	0	0	0	11	0	2	0	0	0	0	0	17	195
7:05 AM	0	0	0	0	6	0	0	0	18	1	0	0	0	0	0	0	25	218
7:10 AM	0	0	0	0	10	0	0	0	12	0	1	0	0	0	0	0	23	236
7:15 AM	0	2	1	0	10	0	0	0	20	1	0	0	0	0	0	0	34	264
7:20 AM	0	2	0	0	5	0	0	0	12	0	0	0	0	0	0	0	19	277
7:25 AM	0	2	0	0	8	0	0	0	15	0	1	0	0	0	0	0	26	292
7:30 AM	0	2	0	0	10	0	0	0	17	0	1	0	0	0	0	0	30	297
7:35 AM	0	4	0	0	13	0	0	0	30	0	0	0	0	0	0	0	47	325
7:40 AM	0	2	0	0	13	0	0	0	31	0	0	0	0	0	0	0	46	344
7:45 AM	0	1	1	0	5	1	0	0	22	0	1	0	0	0	0	0	31	347
7:50 AM	0	2	0	0	6	0	0	0	24	0	1	0	0	0	0	0	33	359
7:55 AM	0	3	2	0	8	2	0	0	20	0	3	0	0	0	0	0	38	369

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	28	4	0	124	4	0	0	332	0	4	0	0	0	0	0	496
Heavy Trucks	0	0	0		0	0	0		16	0	0		0	0	0		16
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 1/30/2017 2:56 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

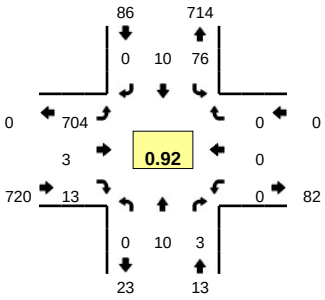
LOCATION: Bass Lake Rd -- US 50 EB Ramps

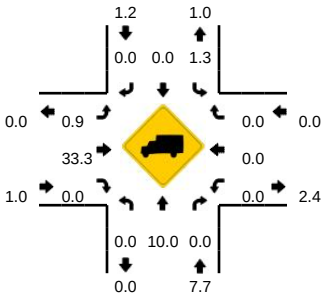
QC JOB #: 14101506

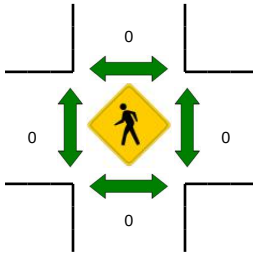
CITY/STATE: El Dorado Hills, CA

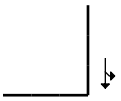
DATE: Tue, Jan 24 2017

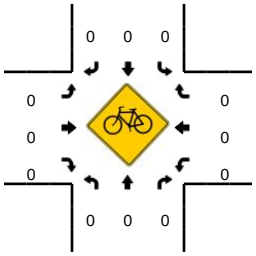
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:30 PM -- 5:45 PM

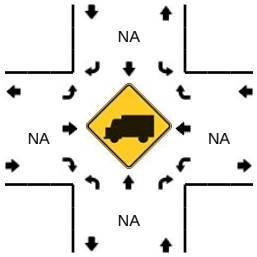


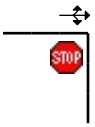


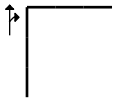


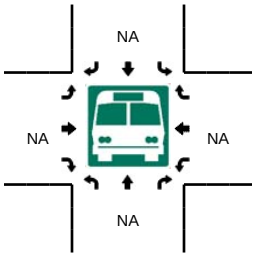












5-Min Count Period Beginning At	Bass Lake Rd (Northbound)				Bass Lake Rd (Southbound)				US 50 EB Ramps (Eastbound)				US 50 EB Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:30 PM	0	1	0	0	5	0	0	0	49	0	1	0	0	0	0	0	56	
4:35 PM	0	3	0	0	4	0	0	0	48	0	3	0	0	0	0	0	58	
4:40 PM	0	0	3	0	6	0	0	0	48	0	0	0	0	0	0	0	57	
4:45 PM	0	1	0	0	9	0	0	0	48	0	1	0	0	0	0	0	59	
4:50 PM	0	2	0	0	4	0	0	0	55	0	1	0	0	0	0	0	62	
4:55 PM	0	0	0	0	3	0	0	0	66	0	1	0	0	0	0	0	70	
5:00 PM	0	0	0	0	2	1	0	0	60	0	1	0	0	0	0	0	64	
5:05 PM	0	1	0	0	5	3	0	0	52	2	1	0	0	0	0	0	64	
5:10 PM	0	1	0	0	5	0	0	0	53	0	1	0	0	0	0	0	60	
5:15 PM	0	1	0	0	10	1	0	0	56	0	0	0	0	0	0	0	68	
5:20 PM	0	2	1	0	8	1	0	0	56	0	2	0	0	0	0	0	70	
5:25 PM	0	0	1	0	3	0	0	0	52	1	0	0	0	0	0	0	57	745
5:30 PM	0	1	0	0	11	1	0	0	60	0	1	0	0	0	0	0	74	763
5:35 PM	0	2	0	0	4	0	0	0	67	0	3	0	0	0	0	0	76	781
5:40 PM	0	1	0	0	7	2	0	0	62	0	0	0	0	0	0	0	72	796
5:45 PM	0	0	0	0	6	0	0	0	60	0	1	0	0	0	0	0	67	804
5:50 PM	0	1	0	0	6	1	0	0	65	0	2	0	0	0	0	0	75	817
5:55 PM	0	0	1	0	9	0	0	0	61	0	1	0	0	0	0	0	72	819
6:00 PM	0	0	0	0	6	0	0	0	51	0	3	0	0	0	0	0	60	815
6:05 PM	0	0	0	0	4	0	0	0	57	0	2	0	0	0	0	0	63	814
6:10 PM	0	0	0	0	4	1	0	0	46	0	5	0	0	0	0	0	56	810
6:15 PM	0	1	0	0	9	1	0	0	52	0	1	0	0	0	0	0	64	806
6:20 PM	0	2	0	0	4	0	0	0	57	0	1	0	0	0	0	0	64	800
6:25 PM	0	2	0	0	2	1	0	0	44	0	0	0	0	0	0	0	49	792

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	16	0	0	88	12	0	0	756	0	16	0	0	0	0	0	888
Heavy Trucks	0	4	0		0	0	0		4	0	0		0	0	0		8
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 1/30/2017 2:56 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

Location: SR 50 (Lincoln Hwy) - EB/WB - East of Marble Valley Rd
Site Code: 14280501
Date: 4/25/2017

	Westbound		
Time	Mixed Flow 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		
Time	Mixed Flow 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 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

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

Location: SR 50 (Lincoln Hwy) - EB/WB - East of Marble Valley Rd
Site Code: 14280502
Date: 4/25/2017

	Westbound		
Time	Mixed Flow 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		
Time	Mixed Flow 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

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)		0.1	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

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	0.1	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	0.8	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

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	0.1	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	0.8	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

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

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	0.1	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

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	0.8
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

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		

4: Bass Lake Road & westbound ramp Performance by movement

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

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

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)	0.1	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)			

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

Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	NB
Directions Served	LTR	LT	T
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)			

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		

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	0.3	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

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

Intersection: 4: Bass Lake Road & westbound ramp

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

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

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	0.8	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

Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	SB	SB
Directions Served	LTR	LT	T	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

Intersection: 5: Bass Lake Road & eastbound ramp

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)			

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

Intersection: 4: Bass Lake Road & westbound ramp

Movement	WB	NB	NB	SB	SB	B1
Directions Served	LTR	LT	T	T	R	T
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	

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

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		

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	0.8	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

Intersection: 4: Bass Lake Road & westbound ramp

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

Intersection: 4: Bass Lake Road & westbound ramp

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

Intersection: 5: Bass Lake Road & eastbound ramp

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)			

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

Intersection: 4: Bass Lake Road & westbound ramp

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)			

5: Bass Lake Road & eastbound ramp Performance by approach

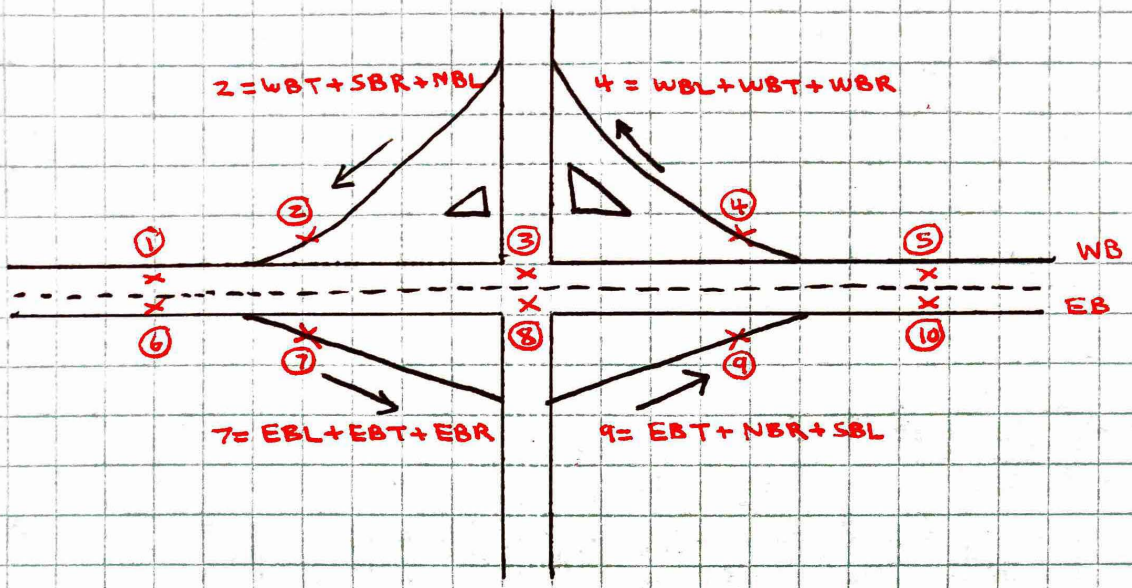
Approach	EB	NB	SB	All
Denied Delay (hr)	0.6	0.0	0.0	0.6
Denied Del/Veh (s)	2.3	0.2	0.0	1.7
Total Delay (hr)	3.5	0.7	2.0	6.2
Total Del/Veh (s)	12.5	24.6	29.1	16.5
Stop Del/Veh (s)	7.4	21.3	25.6	11.8
Denied Entry Before	1	0	0	1

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		

Appendix C: Mainline Volume Calculations

US 50 Merge/Diverge Analysis



Turning movement volumes were used to estimate ramp volumes.

Scenarios

2017 Existing
2017 Existing + Project
2028 EPAP
2028 EPAP + Project

Segments

US 50 WB (AM/PM)

① Bass Lake Rd to Silva Valley Pkwy
② Bass Lake Rd on-ramp
③ Bass Lake Rd off-ramp to on-ramp
④ Bass Lake Rd off-ramp
⑤ Cambridge Rd to Bass Lake Rd

US 50 EB (AM/PM)

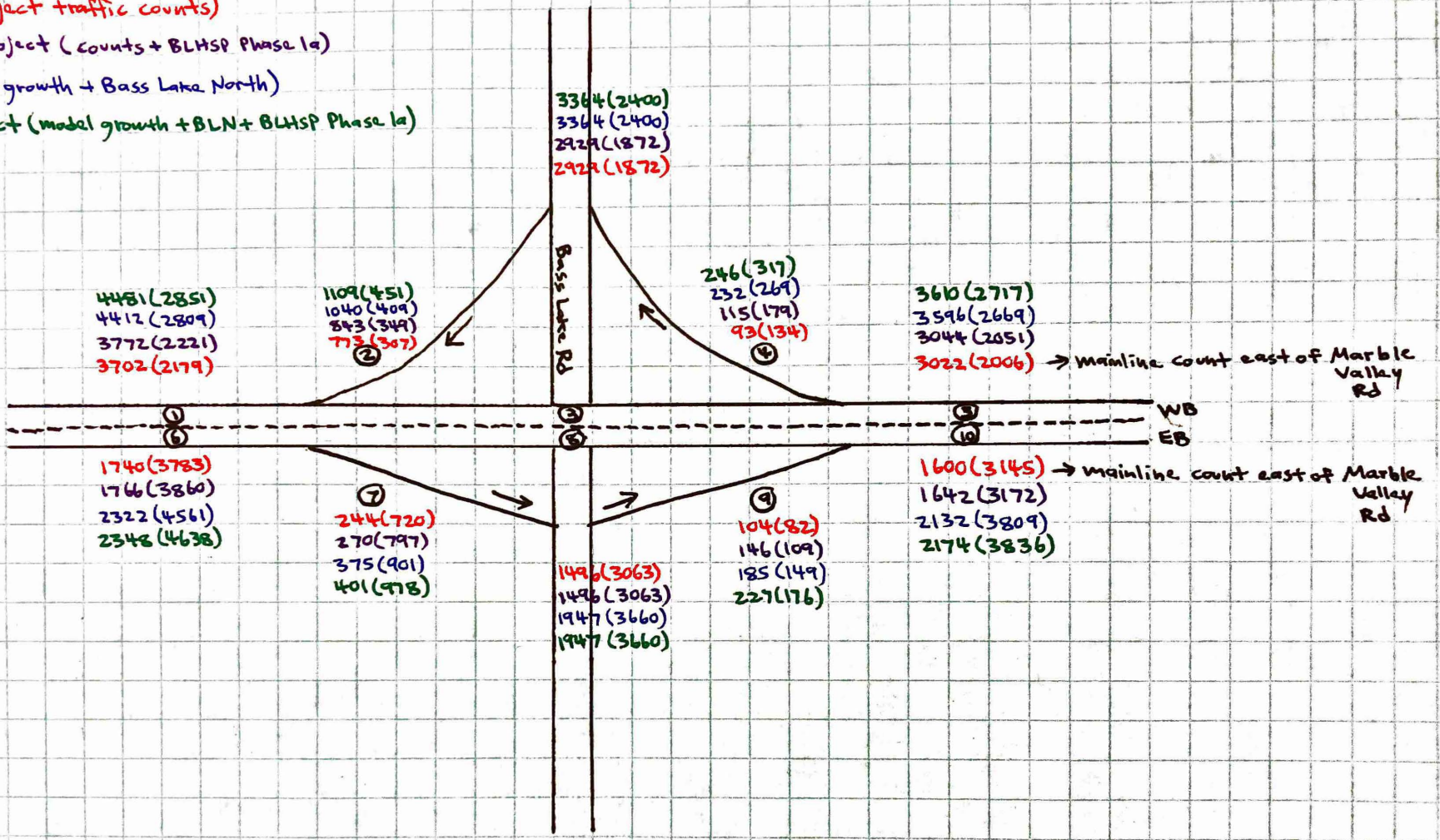
⑥ Bass Lake Rd to Silva Valley Pkwy
⑦ Bass Lake Rd off-ramp
⑧ Bass Lake Rd off-ramp to on-ramp
⑨ Bass Lake Rd on-ramp
⑩ Bass Lake Rd to Cambridge Rd

2017 Existing (Project traffic counts)

2017 Existing + Project (counts + BLHSP Phase 1a)

2028 EPAP (model growth + Bass Lake North)

2028 EPAP + Project (model growth + BLN + BLHSP Phase 1a)



US 50 Merge/Diverge Analysis

Appendix D: HCS Results

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing AM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/Silva Valley Pkwy*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3702*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1938*	pc/h/ln
S	*63.7*	mph
D = v_p / S	*30.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing AM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2929	
	Ramp Volume, V_R: 773	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2929	0.96	Rolling	2	0	0.971	1.00	3143
Ramp	773	0.96	Rolling	2	0	0.971	1.00	829
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3143 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3972	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3972	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 31.7 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.479 (Exibit 13-11)

S_R = 56.6 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 56.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing AM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2929*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1597*	pc/h/ln
S	*68.2*	mph
D = v_p / S	*23.4*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing AM	Analysis Year	2017
Project Description	BLHSP Phase 1a Final Map		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 3022	
	Ramp Volume, V_R: 93	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3022	0.96	Rolling	2	0	0.971	1.00	3242
Ramp	93	0.96	Rolling	2	0	0.971	1.00	100
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3242 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3242	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3142	Exhibit 13-8	4800	No
V_R	100	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3242	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 27.6 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.437 (Exhibit 13-12)

S_R = 57.8 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.8 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing AM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Cambridge Rd/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3022*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1598*	pc/h/ln
S	*68.2*	mph
D = v_p / S	*23.4*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Silva Valley Pkwy/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning 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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*911*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*13.0*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing AM	Analysis Year	2017
Project Description	BLHSP Phase 1a Final Map		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 1740	
	Ramp Volume, V_R: 244	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	1740	0.96	Rolling	2	0	0.971	1.00	1867
Ramp	244	0.96	Rolling	2	0	0.971	1.00	262
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1867 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1867	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1605	Exhibit 13-8	4800	No
V_R	262	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1867	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = 15.8 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.452 (Exhibit 13-12)

S_R = 57.4 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.4 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1496*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*816*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*11.7*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing AM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1496	
	Ramp Volume, V_R: 104	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1496	0.96	Rolling	2	0	0.971	1.00	1605
Ramp	104	0.96	Rolling	2	0	0.971	1.00	112
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1605 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1717	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1717	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 14.4 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.294 (Exibit 13-11)

S_R = 61.8 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*On-Ramp/Cambridge Rd*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1600*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*846*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*12.1*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*On-Ramp/Silva Valley Pkwy*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2179*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1141*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.3*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing PM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1872	
	Ramp Volume, V_R: 307	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1872	0.96	Rolling	2	0	0.971	1.00	2009
Ramp	307	0.96	Rolling	2	0	0.971	1.00	329
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2009 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2338	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2338	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 19.2 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.312 (Exibit 13-11)

S_R = 61.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1872*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1021*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing PM	Analysis Year	2017
Project Description	BLHSP Phase 1a Final Map		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 2006	
	Ramp Volume, V_R: 134	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2006	0.96	Rolling	2	0	0.971	1.00	2152
Ramp	134	0.96	Rolling	2	0	0.971	1.00	144
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2152 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2152	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2008	Exhibit 13-8	4800	No
V_R	144	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2152	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = 18.3 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.441 (Exhibit 13-12)

S_R = 57.7 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.7 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Cambridge Rd/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2006*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1060*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*15.1*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing PM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Silva Valley Pkwy/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3783*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1980*	pc/h/ln
S	*62.9*	mph
D = v_p / S	*31.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing PM	Analysis Year	2017
Project Description	BLHSP Phase 1a Final Map		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 3783	
	Ramp Volume, V_R: 720	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3783	0.96	Rolling	2	0	0.971	1.00	4059
Ramp	720	0.96	Rolling	2	0	0.971	1.00	773
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4059 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4059	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3286	Exhibit 13-8	4800	No
V_R	773	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4059	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 34.7 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.498 (Exhibit 13-12)

S_R = 56.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 56.1 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing PM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3063*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1670*	pc/h/ln
S	*67.4*	mph
D = v_p / S	*24.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing PM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 3063	
	Ramp Volume, V_R: 82	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3063	0.96	Rolling	2	0	0.971	1.00	3286
Ramp	82	0.96	Rolling	2	0	0.971	1.00	88
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3286 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3374	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3374	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 27.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.386 (Exibit 13-11)

S_R = 59.2 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 59.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing PM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*On-Ramp/Cambridge Rd*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3145*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1663*	pc/h/ln
S	*67.5*	mph
D = v_p / S	*24.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project AM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/Silva Valley Pkwy*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3772*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1974*	pc/h/ln
S	*63.1*	mph
D = v_p / S	*31.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing+Project AM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2929	
	Ramp Volume, V_R: 843	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2929	0.96	Rolling	2	0	0.971	1.00	3143
Ramp	843	0.96	Rolling	2	0	0.971	1.00	904
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3143 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4047	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4047	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 32.2 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.495 (Exibit 13-11)

S_R = 56.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 56.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project AM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2929*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1597*	pc/h/ln
S	*68.2*	mph
D = v_p / S	*23.4*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing+Project AM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 3044	
	Ramp Volume, V_R: 115	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3044	0.96	Rolling	2	0	0.971	1.00	3266
Ramp	115	0.96	Rolling	2	0	0.971	1.00	123
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3266 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3266	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3143	Exhibit 13-8	4800	No
V_R	123	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3266	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 27.8 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.439 (Exhibit 13-12)

S_R = 57.7 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.7 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project AM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Cambridge Rd/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3044*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1609*	pc/h/ln
S	*68.1*	mph
D = v_p / S	*23.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Silva Valley Pkwy/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1766*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*924*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*13.2*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing+Project AM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 1766	
	Ramp Volume, V_R: 270	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1766	0.96	Rolling	2	0	0.971	1.00	1895
Ramp	270	0.96	Rolling	2	0	0.971	1.00	290
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1895 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1895	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1605	Exhibit 13-8	4800	No
V_R	290	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1895	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.0 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.454 (Exhibit 13-12)

S_R = 57.3 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.3 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1496*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*816*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*11.7*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing+Project AM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1496	
	Ramp Volume, V_R: 146	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
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								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1605 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1762	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1762	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 14.8 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.295 (Exibit 13-11)

S_R = 61.7 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*On-Ramp/Cambridge Rd*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1642*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*868*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*12.4*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*On-Ramp/Silva Valley Pkwy*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2221*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1163*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing+Project PM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1872	
	Ramp Volume, V_R: 349	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1872	0.96	Rolling	2	0	0.971	1.00	2009
Ramp	349	0.96	Rolling	2	0	0.971	1.00	374
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2009 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2383	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2383	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 19.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.314 (Exibit 13-11)

S_R = 61.2 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1872*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1021*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing+Project PM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 2051	
	Ramp Volume, V_R: 179	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2051	0.96	Rolling	2	0	0.971	1.00	2201
Ramp	179	0.96	Rolling	2	0	0.971	1.00	192
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2201 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2201	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2009	Exhibit 13-8	4800	No
V_R	192	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2201	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 18.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.445 (Exhibit 13-12)

S_R = 57.5 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.5 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Cambridge Rd/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2051*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1084*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*15.5*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project PM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Silva Valley Pkwy/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3860*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2020*	pc/h/ln
S	*62.2*	mph
D = v_p / S	*32.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing+Project PM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 3860	
	Ramp Volume, V_R: 797	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3860	0.96	Rolling	2	0	0.971	1.00	4141
Ramp	797	0.96	Rolling	2	0	0.971	1.00	855
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4141 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4141	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3286	Exhibit 13-8	4800	No
V_R	855	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4141	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 35.4 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.505 (Exhibit 13-12)

S_R = 55.9 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 55.9 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project PM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3063*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1670*	pc/h/ln
S	*67.4*	mph
D = v_p / S	*24.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2017 Existing+Project PM	Analysis Year	2017

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 3063	
	Ramp Volume, V_R: 109	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3063	0.96	Rolling	2	0	0.971	1.00	3286
Ramp	109	0.96	Rolling	2	0	0.971	1.00	117
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3286 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3403	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3403	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 27.6 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.389 (Exibit 13-11)

S_R = 59.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 59.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2017 Existing+Project PM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*On-Ramp/Cambridge Rd*
Jurisdiction	*El Dorado County*
Analysis Year	*2017*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3172*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1677*	pc/h/ln
S	*67.4*	mph
D = v_p / S	*24.9*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*TKTPM*	Highway/Direction of Travel	*US 50 WB*
Agency or Company	*TKTPM*	From/To	*Off-Ramp/Silva Valley Pkwy*
Date Performed	*10/2/2017*	Jurisdiction	*El Dorado County*
Analysis Time Period	*2028 EPAP AM*	Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4412*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2309*	pc/h/ln
S	*55.7*	mph
D = v_p / S	*41.4*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP AM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 3364	
	Ramp Volume, V_R: 1040	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3364	0.96	Rolling	2	0	0.971	1.00	3609
Ramp	1040	0.96	Rolling	2	0	0.971	1.00	1116
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3609 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4725	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4725	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 37.4 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.712 (Exibit 13-11)

S_R = 50.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 50.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP AM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3364*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1834*	pc/h/ln
S	*65.3*	mph
D = v_p / S	*28.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed
DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12
E_T - Exhibits 11-10, 11-11, 11-13
f_p - Page 11-18
LOS, S, FFS, v_p - Exhibits 11-2, 11-3
f_{LW} - Exhibit 11-8
f_{LC} - Exhibit 11-9
TRD - Page 11-11

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP AM	Analysis Year	2028
Project Description	BLHSP Phase 1a Final Map		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 3596	
	Ramp Volume, V_R: 232	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3596	0.96	Rolling	2	0	0.971	1.00	3858
Ramp	232	0.96	Rolling	2	0	0.971	1.00	249
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3858 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3858	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3609	Exhibit 13-8	4800	No
V_R	249	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3858	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 32.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.450 (Exhibit 13-12)

S_R = 57.4 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.4 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP AM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Cambridge Rd/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3596*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1901*	pc/h/ln
S	*64.3*	mph
D = v_p / S	*29.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Silva Valley Pkwy/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2322*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1215*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*17.4*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP AM	Analysis Year	2028
Project Description	BLHSP Phase 1a Final Map		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 2322	
	Ramp Volume, V_R: 375	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2322	0.96	Rolling	2	0	0.971	1.00	2491
Ramp	375	0.96	Rolling	2	0	0.971	1.00	402
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2491 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2491	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2089	Exhibit 13-8	4800	No
V_R	402	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2491	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 21.2 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.464 (Exhibit 13-12)

S_R = 57.0 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.0 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1947*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1062*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*15.2*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP AM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1947	
	Ramp Volume, V_R: 185	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1947	0.96	Rolling	2	0	0.971	1.00	2089
Ramp	185	0.96	Rolling	2	0	0.971	1.00	198
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2089 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2287	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2287	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 18.8 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.310 (Exibit 13-11)

S_R = 61.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*On-Ramp/Cambridge Rd*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2132*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1127*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.1*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*On-Ramp/Silva Valley Pkwy*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2809*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1470*	pc/h/ln
S	*69.2*	mph
D = v_p / S	*21.3*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP PM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2400	
	Ramp Volume, V_R: 409	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2400	0.96	Rolling	2	0	0.971	1.00	2575
Ramp	409	0.96	Rolling	2	0	0.971	1.00	439
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2575 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3014	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3014	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 24.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.351 (Exibit 13-11)

S_R = 60.2 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 60.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2400*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.930*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1372*	pc/h/ln
S	*69.7*	mph
D = v_p / S	*19.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP PM	Analysis Year	2028
Project Description	BLHSP Phase 1a Final Map		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 2669	
	Ramp Volume, V_R: 269	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2669	0.96	Rolling	2	0	0.971	1.00	2864
Ramp	269	0.96	Rolling	2	0	0.971	1.00	289
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2864 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2864	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2575	Exhibit 13-8	4800	No
V_R	289	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2864	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = 24.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.454 (Exhibit 13-12)

S_R = 57.3 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.3 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Cambridge Rd/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2669*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1411*	pc/h/ln
S	*69.5*	mph
D = v_p / S	*20.3*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*TKTPM*	Highway/Direction of Travel	*US 50 EB*
Agency or Company	*TKTPM*	From/To	*Silva Valley Pkwy/Off-Ramp*
Date Performed	*10/2/2017*	Jurisdiction	*El Dorado County*
Analysis Time Period	*2028 EPAP PM*	Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4561*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2387*	pc/h/ln
S	*53.7*	mph
D = v_p / S	*44.5*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP PM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 4561	
	Ramp Volume, V_R: 901	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4561	0.96	Rolling	2	0	0.971	1.00	4894
Ramp	901	0.96	Rolling	2	0	0.971	1.00	967
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4894 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4894	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	3927	Exhibit 13-8	4800	No
V_R	967	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4894	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 41.8 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.515 (Exhibit 13-12)

S_R = 55.6 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 55.6 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP PM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3660*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1995*	pc/h/ln
S	*62.7*	mph
D = v_p / S	*31.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP PM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 3660	
	Ramp Volume, V_R: 149	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3660	0.96	Rolling	2	0	0.971	1.00	3927
Ramp	149	0.96	Rolling	2	0	0.971	1.00	160
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3927 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4087	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4087	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 32.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.504 (Exibit 13-11)

S_R = 55.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 55.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP PM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*On-Ramp/Cambridge Rd*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3809*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2014*	pc/h/ln
S	*62.3*	mph
D = v_p / S	*32.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP+Project AM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/Silva Valley Pkwy*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning 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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2346*	pc/h/ln
S	*54.8*	mph
D = v_p / S	*42.8*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP+Project AM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 3364	
	Ramp Volume, V_R: 1109	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3364	0.96	Rolling	2	0	0.971	1.00	3609
Ramp	1109	0.96	Rolling	2	0	0.971	1.00	1190
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3609 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4799	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4799	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 38.0 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.745 (Exibit 13-11)

S_R = 49.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 49.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP+Project AM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3364*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1834*	pc/h/ln
S	*65.3*	mph
D = v_p / S	*28.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP+Project AM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 3610	
	Ramp Volume, V_R: 246	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3610	0.96	Rolling	2	0	0.971	1.00	3873
Ramp	246	0.96	Rolling	2	0	0.971	1.00	264
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3873 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3873	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3609	Exhibit 13-8	4800	No
V_R	264	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3873	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 33.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.452 (Exhibit 13-12)

S_R = 57.4 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.4 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*TKTPM*	Highway/Direction of Travel	*US 50 WB*
Agency or Company	*TKTPM*	From/To	*Cambridge Rd/Off-Ramp*
Date Performed	*10/2/2017*	Jurisdiction	*El Dorado County*
Analysis Time Period	*2028 EPAP+Project AM*	Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3610*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*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)	*70.0*	mph	FFS	*70.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1908*	pc/h/ln	Design LOS	
S	*64.2*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
D = v_p / S	*29.7*	pc/mi/ln	S	mph
LOS	*D*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP+Project AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Silva Valley Pkwy/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2348*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1229*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*17.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP+Project AM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 2348	
	Ramp Volume, V_R: 401	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2348	0.96	Rolling	2	0	0.971	1.00	2519
Ramp	401	0.96	Rolling	2	0	0.971	1.00	430
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2519 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2519	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2089	Exhibit 13-8	4800	No
V_R	430	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2519	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 21.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.467 (Exhibit 13-12)

S_R = 56.9 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 56.9 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP+Project AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1947*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1062*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*15.2*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP+Project AM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1947	
	Ramp Volume, V_R: 227	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x 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								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2089 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2333	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2333	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 19.2 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.312 (Exibit 13-11)

S_R = 61.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP+Project AM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*On-Ramp/Cambridge Rd*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2174*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1149*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.4*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP+Project PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*On-Ramp/Silva Valley Pkwy*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2851*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1492*	pc/h/ln
S	*69.0*	mph
D = v_p / S	*21.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP+Project PM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2400	
	Ramp Volume, V_R: 451	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2400	0.96	Rolling	2	0	0.971	1.00	2575
Ramp	451	0.96	Rolling	2	0	0.971	1.00	484
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2575 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3059	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3059	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 24.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.355 (Exibit 13-11)

S_R = 60.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 60.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP+Project PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2400*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.930*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1372*	pc/h/ln
S	*69.7*	mph
D = v_p / S	*19.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 WB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP+Project PM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 2717	
	Ramp Volume, V_R: 317	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2717	0.96	Rolling	2	0	0.971	1.00	2915
Ramp	317	0.96	Rolling	2	0	0.971	1.00	340
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2915 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2915	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2575	Exhibit 13-8	4800	No
V_R	340	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2915	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.8 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.459 (Exhibit 13-12)

S_R = 57.2 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 57.2 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP+Project PM*

Site Information

Highway/Direction of Travel	*US 50 WB*
From/To	*Cambridge Rd/Off-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2717*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1436*	pc/h/ln
S	*69.4*	mph
D = v_p / S	*20.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*TKTPM*	Highway/Direction of Travel	*US 50 EB*
Agency or Company	*TKTPM*	From/To	*Silva Valley Pkwy/Off-Ramp*
Date Performed	*10/2/2017*	Jurisdiction	*El Dorado County*
Analysis Time Period	*2028 EPAP+Project PM*	Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4638*	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_R	*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 Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.995*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2428*	pc/h/ln
S	*52.5*	mph
D = v_p / S	*46.2*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP+Project PM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 4638	
	Ramp Volume, V_R: 978	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4638	0.96	Rolling	2	0	0.971	1.00	4976
Ramp	978	0.96	Rolling	2	0	0.971	1.00	1049
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4976 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4976	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	3927	Exhibit 13-8	4800	No
V_R	1049	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4976	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 42.5 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.522 (Exhibit 13-12)

S_R = 55.4 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 55.4 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP+Project PM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*Off-Ramp/On-Ramp*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3660*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*5*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.976*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1995*	pc/h/ln
S	*62.7*	mph
D = v_p / S	*31.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TKTPM	Freeway/Dir of Travel	US 50 EB
Agency or Company	TKTPM	Junction	Bass Lake Rd
Date Performed	10/2/2017	Jurisdiction	El Dorado County
Analysis Time Period	2028 EPAP+Project PM	Analysis Year	2028

Project Description BLHSP Phase 1a Final Map

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 700	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 3660	
	Ramp Volume, V_R: 176	
	Freeway Free-Flow Speed, S_{FF}: 70.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x 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								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3927 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4116	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4116	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 33.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.511 (Exibit 13-11)

S_R = 55.7 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 55.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*TKTPM*
Agency or Company	*TKTPM*
Date Performed	*10/2/2017*
Analysis Time Period	*2028 EPAP+Project PM*

Site Information

Highway/Direction of Travel	*US 50 EB*
From/To	*On-Ramp/Cambridge Rd*
Jurisdiction	*El Dorado County*
Analysis Year	*2028*

Project Description *BLHSP Phase 1a Final Map*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3836*	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_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.985*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*70.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*70.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2028*	pc/h/ln
S	*62.0*	mph
D = v_p / S	*32.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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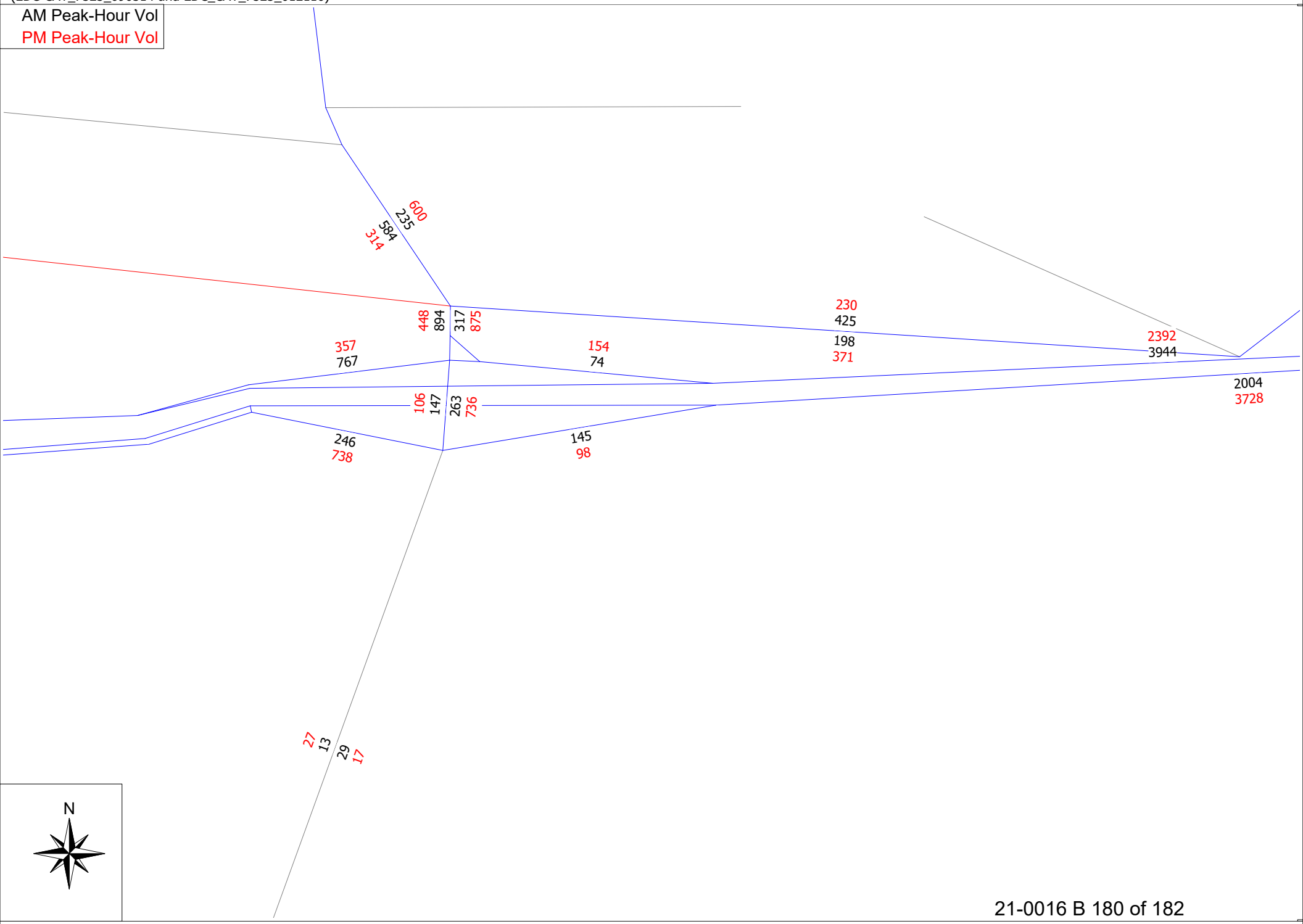
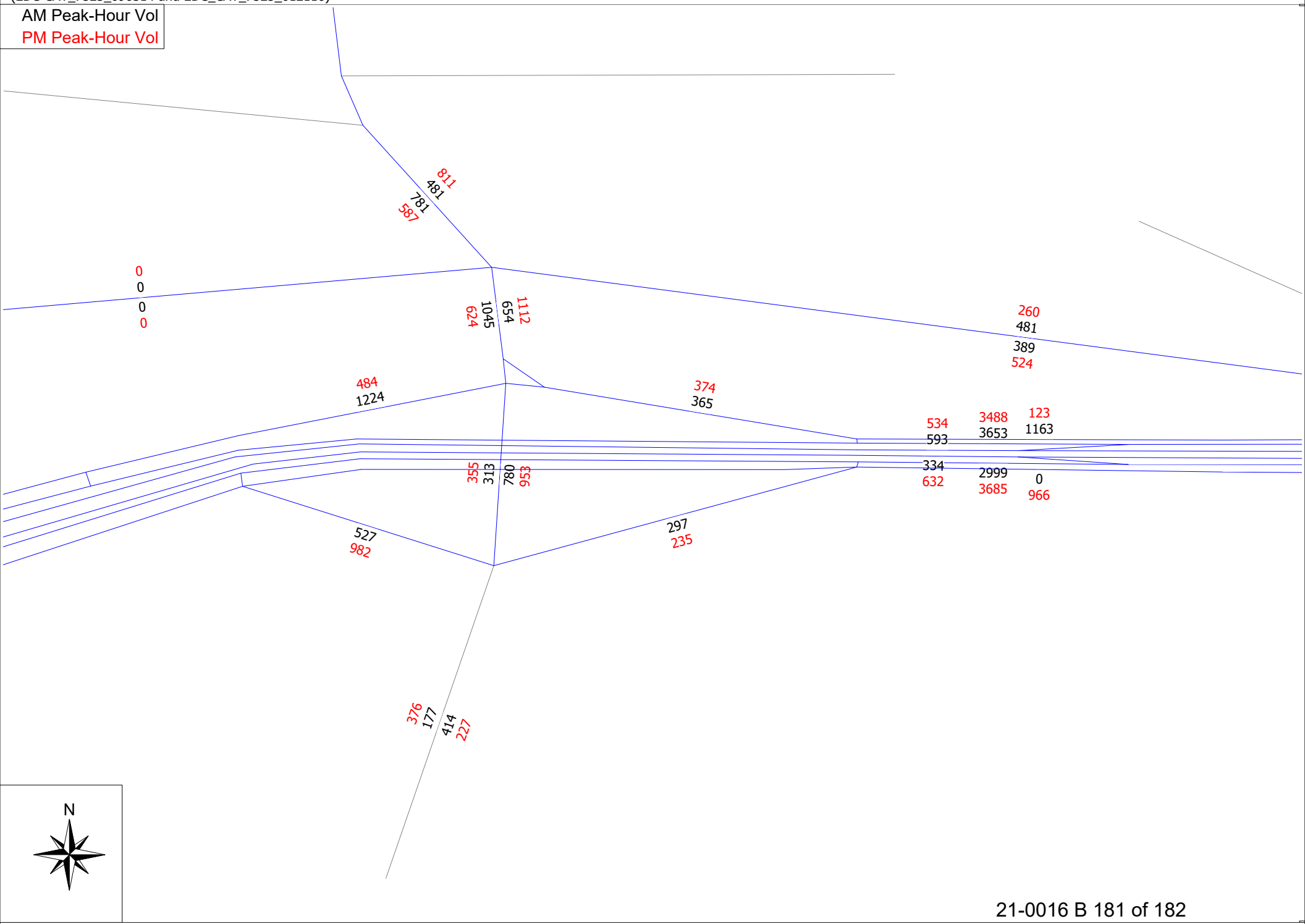
Appendix E: Travel Demand Model Application and Loaded Network Plots

BLH Specific Plan Supplementary Traffic Analysis 10-Year Forecast 2010
Baseline Peak Hour Volumes at Bass Lake Rd Interchange
(EDC-CAT_7525_090514 and EDC_CAT_7525_012116)



BLH Specific Plan Supplementary Traffic Analysis 10-Year Forecast
2035 Peak-Hour Volumes at Bass Lake Rd Interchange (Updated BLHSP Land Use)
(EDC-CAT_7525_090514 and EDC_CAT_7525_012116)



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