TRAFFIC STUDY

YERMO TRAVEL STOP

SAN BERNARDINO COUNTY, CALIFORNIA

This traffic study has been prepared under the supervision of
Les Card, P.E.

Signed Les Card

LSA

August 19, 2014

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SAN BERNARDINO COUNTY, CALIFORNIA

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INTRODUCTION

This traffic study has been prepared to assess the potential circulation impacts associated with the proposed Yermo Travel Stop, located in the unincorporated Yermo area of San Bernardino County. The project is located at the southeast corner of Calico Road/Calico Boulevard near the Interstate 15 (I-15) ramps at Calico Road. Figure 1 illustrates the regional and project location. The proposed travel stop's intended clientele are those traveling in passenger vehicles on I-15. The project will include a gas station with 26 fueling positions and a 25,060-square foot building housing a convenience store and fast casual-type restaurant.

The traffic analysis examines the following scenarios:

- Existing traffic conditions;
- Existing with project traffic conditions;
- Opening year without project traffic conditions;
- Opening year with project traffic conditions;
- Year 2035 without project conditions; and
- Year 2035 with project traffic conditions.

The analysis provides an assessment of traffic impacts and determination of traffic mitigation as required for California Environmental Quality Act (CEQA) compliance. This report satisfies the requirements for the disclosure of potential impacts and mitigation measures per CEQA and generally follows the guidelines for a traffic impact analysis established by the County of San Bernardino (County) Draft Interim Traffic Impact Study Guidelines (February 2013) and the San Bernardino County Congestion Management Program (CMP) (adopted November 3, 1993, and last revised in 2009). The scope of work was agreed to by the County prior to preparation of the analysis.

For each scenario, traffic operations at study intersections are evaluated for the weekday a.m. and p.m. peak hours. The a.m. peak hour is defined as the one hour of highest traffic volumes occurring between 7:00 and 9:00 a.m. The p.m. peak hour is defined as the one hour of highest traffic volumes occurring between 4:00 and 6:00 p.m. In addition, traffic operations at freeway segments are evaluated for the Friday and Sunday peak hours, since traffic volumes will be the highest on Interstate 15 during those periods.

PROJECT DESCRIPTION

As stated above, the proposed project includes include a gas station with 26 fueling positions and a 25,060-square foot building housing a convenience store and fast casual-type restaurant. The project is located at the southeast corner of Calico Road/Calico Boulevard near the I-15 ramps at Calico Road. Access to the project will be provided by one right-in/right-out driveway on Calico Road, one full-access driveway on Calico Road, and one full-access driveway on Calico Boulevard. Truck access is provided by the full-access driveway on Calico Road (southbound left-turn/northbound right-turn) and the right-in/right-out driveway on Calico Road (westbound right-turn). The opening year of the project is expected to be 2015. Figure 2 shows the site plan.

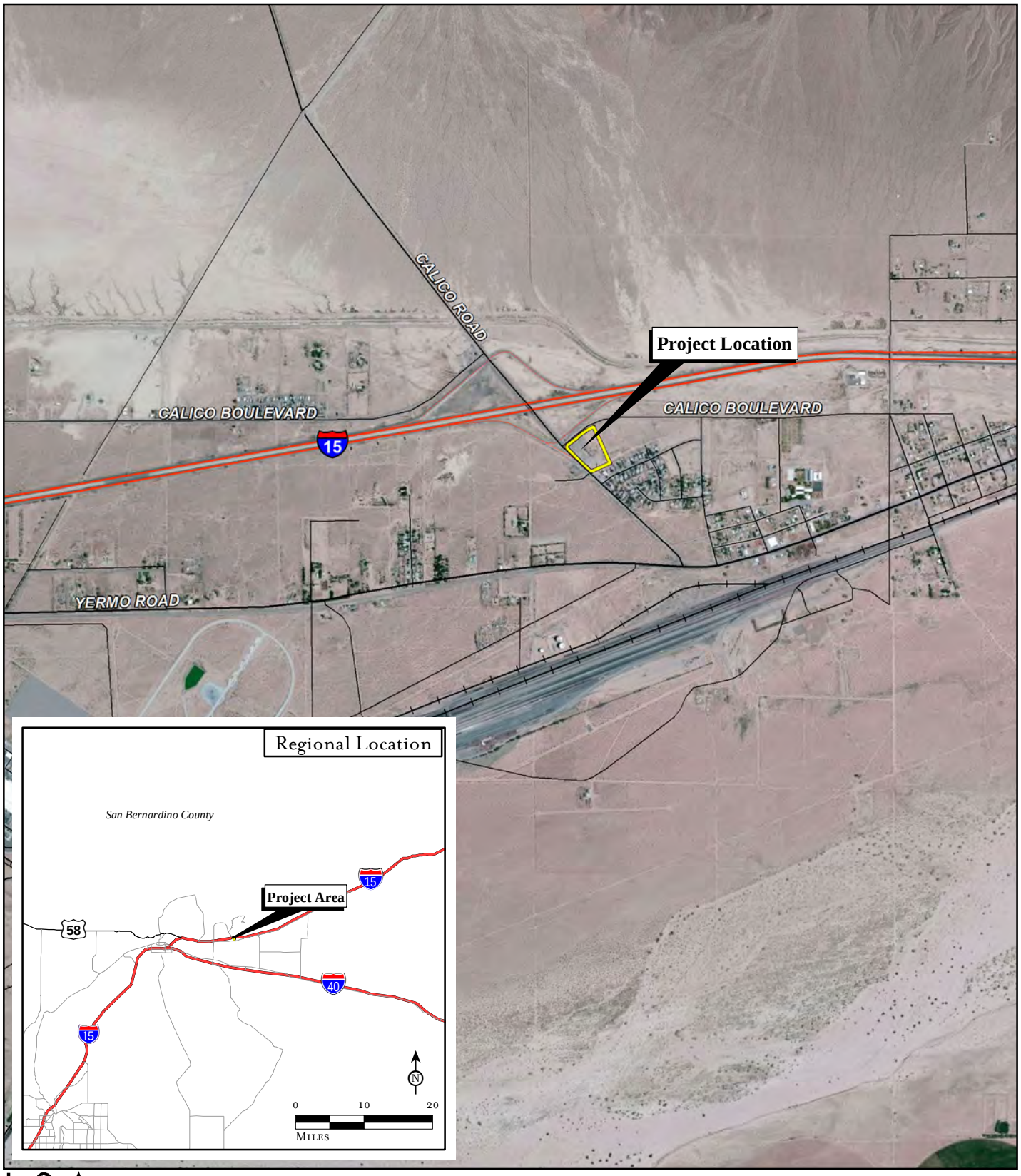

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FIGURE 1

N

0 1,000 2,000

Feet

Yermo Travel Stop
Traffic Impact Analysis

SOURCE: Bing Imagery, 2010; Thomas Bros., 2009

Regional and Project Location

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FIGURE 2

N

0 70 140

FEET

SOURCE: Paul Berger, November 5, 2013.

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Yermo Travel Stop
Traffic Impact Analysis

Site Plan

It should be noted that Caltrans and the County of San Bernardino had safety concerns regarding the northern driveway on Calico Road (Calico Road/Driveway 1) being too close to the I-15 Northbound Off-Ramp. Therefore, a median on Calico Road has been added to the site plan to restrict access from the Northbound Off-Ramp to the northern driveway. Furthermore, a southbound left-turn pocket has been added to the southern driveway (Calico Road/Driveway 2).

ANALYSIS METHODOLOGY

The scope of the study was determined based on consultation with County staff. This traffic impact analysis has been prepared to provide an analysis of traffic operations at intersections and freeway segments where project-related traffic has the potential to cause circulation impacts on the local roadway network.

Study Area Determination

The study area was determined through analysis of the project trip generation and distribution of project trips to the existing and future roadway network and based on consultation with County staff.

The following intersections are included in the analysis:

1. Calico Road/Interstate 15 Southbound Ramps;
2. Calico Road/Interstate 15 Northbound Ramps;
3. Calico Road/Calico Boulevard;
4. Calico Road/Interstate 15 Northbound Off-Ramp;
5. Calico Road/Driveway 1;
6. Calico Road/Driveway 2; and
7. Driveway 3/Calico Boulevard.

Figure 3 illustrates the locations of study area intersections.

The following freeway segments/merge-diverge ramps are included in the analysis:

- Northbound:
    1. South of Calico Road Off-Ramp;
    2. Calico Road Off-Ramp;
    3. Calico Road Off-Ramp to Calico Road On-Ramp;
    4. Calico Road On-Ramp; and
    5. North of Calico Road On-Ramp.
- Southbound:
    6. North of Calico Road Off-Ramp;

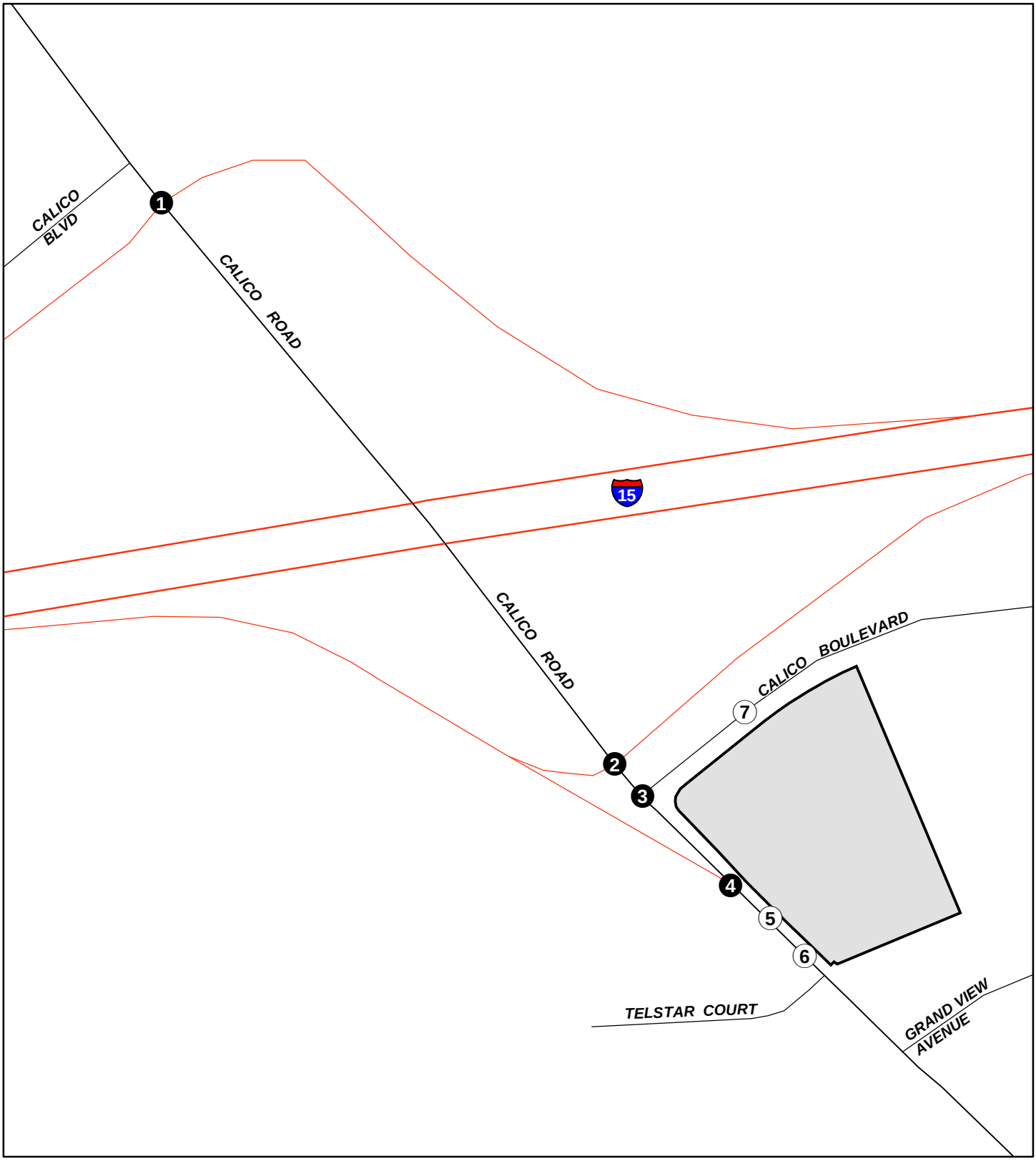

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FIGURE 3

N

0 150 300

FEET

Project Location

Study Area Intersections

Intersection

Driveway

SOURCE: Paul Berger, November 5, 2013.

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Yermo Travel Stop
Traffic Impact Analysis

Study Area Intersections

7. Calico Road Off-Ramp;
8. Calico Road Off-Ramp to Calico Road On-Ramp;
9. Calico Road On-Ramp; and
10. South of Calico Road On-Ramp.

Existing Traffic Volumes

Existing traffic volumes are based on peak hour intersection turn movement counts collected by National Data and Surveying Services in April 2014. Count sheets are contained in Appendix A.

Daily counts were collected on Calico Road on Thursday, Friday, Saturday, and Sunday to determine the day on which traffic would be the highest at study intersections. Based on these counts, it was determined that Thursday had the highest volume of traffic; therefore, counts were collected on Thursday. Count sheets are contained in Appendix A.

Vehicle classification counts were collected at Calico Road/I-15 Southbound Ramps, Calico Road/I-15 Northbound Ramps, Calico Road/Calico Boulevard, and Calico Road/Interstate 15 Northbound Off-Ramp. For these intersections, passenger car equivalent (PCE) volumes were computed using a PCE factor of 1.5 for 2-axle trucks, 2.0 for 3-axle trucks, and 3.0 for trucks with 4 or more axles. Traffic volumes at study intersections that are located adjacent to each other were balanced to maintain consistency of flow. Detailed volume development worksheets are included in Appendix B.

Existing freeway volumes are based on Friday and Sunday northbound/southbound freeway mainline volume data provided by Caltrans in April 2014. The total peak hour volumes on study area segments have been divided into passenger vehicles and truck volumes based on truck percentages published by Caltrans in 2012. Consistent with Highway Capacity Manual methodologies, PCE volumes were computed using a PCE factor of 1.5 for all trucks, since the impact of trucks on freeway operations is less than on intersection operations. Total PCE volumes on the freeway segments are the summation of the passenger vehicle volumes and truck PCE volumes. Detailed volume development worksheets are included in Appendix B.

Existing With Project Traffic Volumes. Existing with project traffic conditions were developed by adding the project trips to the existing traffic volumes.

Opening Year Without Project Traffic Volumes. Opening year without project traffic volumes were developed by applying an annual growth rate of 1.49 percent per year for one year (2014 to 2015) to the existing traffic volumes at each intersection. The annual growth rate is based on traffic projections from 2008 to 2035 provided in the SBTAM traffic model in the unincorporated Yermo area. Based on discussion with County staff, there is one cumulative project in the area (Minneola Travel Center). However, since this project does not add any traffic volumes to the study area, it was not included in the analysis.

Opening year without project traffic volumes at the freeway segments were developed by applying an annual growth rate of 1.75 percent per year for one year (2014 to 2015) to the existing traffic

volumes. The annual growth rate is based on traffic projections on I-15 from 2008 to 2035 provided in the SBTAM traffic model in the unincorporated Yermo area.

Year 2035 Without Project Traffic Volumes. Year 2035 without project traffic volumes were developed by applying an annual growth rate of 1.49 percent per year for 21 years (2014 to 2035), or 31 percent, to the existing traffic volumes at each intersection. The annual growth rate is based on traffic projections from 2008 to 2035 provided in the SBTAM traffic model in the unincorporated Yermo area.

Year 2035 without project traffic volumes at the freeway segments were developed by applying an annual growth rate of 1.75 percent per year for 21 years (2014 to 2035), or 37 percent, to the existing traffic volumes. The annual growth rate is based on traffic projections on I-15 from 2008 to 2035 provided in the SBTAM traffic model in the unincorporated Yermo area.

Year 2035 With Project Traffic Volumes. Year 2035 with project traffic volumes were developed by adding the project trips to the year 2035 without project traffic volumes.

Level of Service Definitions and Procedures

Roadway operations and the relationship between capacity and traffic volumes are generally expressed in terms of levels of service (which are defined using the letter grades A through F). These levels recognize that, while an absolute limit exists as to the amount of traffic traveling through a given intersection (the absolute capacity), the conditions that motorists experience rapidly deteriorate as traffic approaches the absolute capacity. Under such conditions, congestion is experienced. There is general instability in the traffic flow, which means that relatively small incidents (e.g., momentary engine stall) can cause considerable fluctuations in speeds and delays. This near-capacity situation is labeled Level of Service (LOS) E. Beyond LOS E, capacity has been exceeded, and arriving traffic will exceed the ability of the intersection to accommodate it. Upstream queues will then form and continue to expand in length until the demand volume again declines.

A complete description of the meaning of level of service can be found in the Transportation Research Board Special Report 209, *Highway Capacity Manual*. The Manual establishes levels of service A through F. Table A provides brief descriptions of the six levels of service, as abstracted from the Manual.

Table A: Level of Service Definitions

LOS	Description
A	No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Typically, the approach appears quite open, turns are made easily and nearly all drivers find freedom of operation.
B	This service level represents stable operation, where an occasional approach phase is fully utilized and a substantial number are approaching full use. Many drivers begin to feel restricted within platoons of vehicles.
C	This level still represents stable operating conditions. Occasionally drivers may have to wait through more than one red signal indication, and backups may develop behind turning vehicles. Most drivers feel somewhat restricted, but not objectionably so.

Table A: Level of Service Definitions

LOS	Description
D	This level encompasses a zone of increasing restriction approaching instability at the intersection. Delays to approaching vehicles may be substantial during short peaks within the peak period; however, enough cycles with lower demand occur to permit periodic clearance of developing queues, thus preventing excessive backups.
E	Capacity occurs at the upper end of this service level. It represents the most vehicles that any particular intersection approach can accommodate. Full utilization of every signal cycle is seldom attained no matter how great the demand.
F	This level describes forced flow operations at low speeds, where volumes exceed capacity. These conditions usually result from queues of vehicles backing up from a restriction downstream. Speeds are reduced substantially and stoppages may occur for short or long periods of time due to the congestion. In the extreme case, both speed and volume can drop to zero.

Table B shows the relationship between delay and level of service for unsignalized and signalized intersections.

Table B: Level of Service for Unsignalized and Signalized Intersections

Level of Service	Unsignalized Intersection Average Delay per Vehicle (sec.)	Signalized Intersection Average Delay per Vehicle (sec.)
A	$\leq$ 10	$\leq$ 10
B	> 10 and $\leq$ 15	> 10 and $\leq$ 20
C	> 15 and $\leq$ 25	> 20 and $\leq$ 35
D	> 25 and $\leq$ 35	> 35 and $\leq$ 55
E	> 35 and $\leq$ 50	> 55 and $\leq$ 80
F	> 50	> 80

For all study area intersections, the 2010 *Highway Capacity Manual* (HCM 2010) analysis methodologies were used to determine intersection levels of service. Levels of service at all intersections were calculated using the Synchro 8 software, which uses the HCM 2010 methodologies.

Level of Service Standards

All ramp terminus intersections are under the jurisdiction of Caltrans. The remaining study intersections are under the jurisdiction of the County of San Bernardino. The County of San Bernardino uses LOS C as the minimum level of service standard for intersection operations; therefore, study intersections operating at LOS D, E or F are required to be mitigated to LOS C or better. Caltrans considers acceptable level of service to be between C and D for all intersections under its jurisdiction; therefore, all intersections under Caltrans jurisdiction must operate with a weighted average delay of 45 seconds or less.

For freeway segments and merge/diverge areas, Caltrans Route Concept District 8 Report uses LOS C as the minimum acceptable level of service in the Yermo area; therefore, for freeway facilities LOS C has been applied.

Project Trip Generation

Vehicle trip generation for the proposed project was developed using rates for Land Use "Gas Station with Convenience Store" and "Fast-food Without Drive Through" from the Institute of Transportation Engineers *Trip Generation, 9th Edition*.

Most of the trips generated by the project would not be new trips, but instead would be trips already traveling on I-15 who are diverted from the freeway to patronize the project. These trips are referred to as diverted linked trips. It is also likely that the project would generate some pass-by trips. Pass-by trips would be those trips already traveling on Calico Road who stop at the project. Due to the location of the project, pass-by trips are likely to be limited to residents of Yermo who stop for gas or food on their way to and from the freeway. The total pass-by and diverted-linked trip percentages were used from the ITE *Trip Generation Handbook*, 2nd Edition. However, the number of designated pass-by and diverted-linked trips was modified based on the unique nature of the project. The total pass-by and diverted linked trips shown in the *Trip Generation Handbook* is 83 percent during the a.m. peak hour and 87 percent during the p.m. peak hour. It is estimated that 80 percent of the total trip generation would be diverted linked trips. The remainder (3% during the a.m. peak hour and 7% during the p.m. peak hour) would be pass-by trips. The remaining trips would be primary new trips made up of employees of the project, patrons from Yermo, and employees of the nearby Marine Corps Logistics Base. The net new primary trip generation is shown in Table C. As shown in Table C, the total net new primary trip generation is expected to be 70 trips in the a.m. peak hour, 80 trips in the p.m. peak hour, and 1,139 daily trips. It should be noted for the Friday and Sunday peak hour freeway analysis, the p.m. peak hour trips were used since those trips represent the worst-case volumes.

Project Trip Distribution

The distribution of project trips was developed in consultation with County staff and reflects the fact that most of the project trips would originate from existing traffic on I-15. Figures 4 and 5 illustrate the project distribution and primary net new trip assignment at the study intersections. Figures 6 and 7 illustrate the pass-by and diverted linked trip assignments at the study intersections. Figure 8 illustrates the total net trip assignment at the study intersections.

EXISTING CONDITIONS

This section discusses existing traffic conditions with and without the proposed project. Existing traffic volumes were developed using the approach discussed in the Analysis Methodology section.

Existing Traffic Conditions

Figure 9 illustrates existing intersection geometrics and traffic controls. Existing a.m. and p.m. peak hour traffic volumes at study area intersections are illustrated in Figure 10. A level of service analysis was conducted to evaluate existing a.m. and p.m. peak hour traffic operations at study area intersections. Table D summarizes the results of this analysis and shows that all study area intersections are currently operating at satisfactory levels of service. Detailed level of service worksheets are included in Appendix C.

Table C - Project Trip Generation

Land Use[1]	Units		A.M. Peak Hour In	A.M. Peak Hour Out	A.M. Peak Hour Total	P.M. Peak Hour In	P.M. Peak Hour Out	P.M. Peak Hour Total	Daily
Gas Station with Convenience Store[1]	26	Fueling							
Trips/Unit		Positions	5.08	5.08	10.16	6.76	6.76	13.51	162.78
Total Trip Generation			132	132	264	176	176	352	4,232
Internal Trips[2]			(25)	(38)	(63)	(13)	(13)	(26)	(1038)
Pass-By Trips[3]			(3)	(3)	(6)	(11)	(11)	(23)	(29)
Diverted Linked Trips[3]	80%		(78)	(78)	(156)	(121)	(121)	(243)	(2,532)
Net Primary Trip Generation			26	13	39	30	30	61	633
Restaurant	5.000	TSF							
Trips/Unit			26.32	17.55	43.87	13.34	12.81	26.15	716.00
Trip Generation			132	88	220	67	64	131	3,580
Internal Trips[2]			(38)	(25)	(63)	(13)	(13)	(26)	(1,038)
Pass-By Trips[3]			(2)	(2)	(4)	(4)	(4)	(8)	(12)
Diverted Linked Trips[3]	80%		(61)	(61)	(122)	(39)	(39)	(78)	(2,024)
Net Primary Trip Generation			31	0	31	11	8	19	506
Total Net New Primary Trip Generation			**57**	**13**	**70**	**42**	**39**	**80**	**1,139**
Trip Rates[4]									
Gas Station with Convenience Store (LU 945)		Fuel Pos	5.08	5.08	10.16	6.76	6.76	13.51	162.78
Fast Food W/out Drive Thru (LU 933)		TSF	26.32	17.55	43.87	13.34	12.81	26.15	716.00

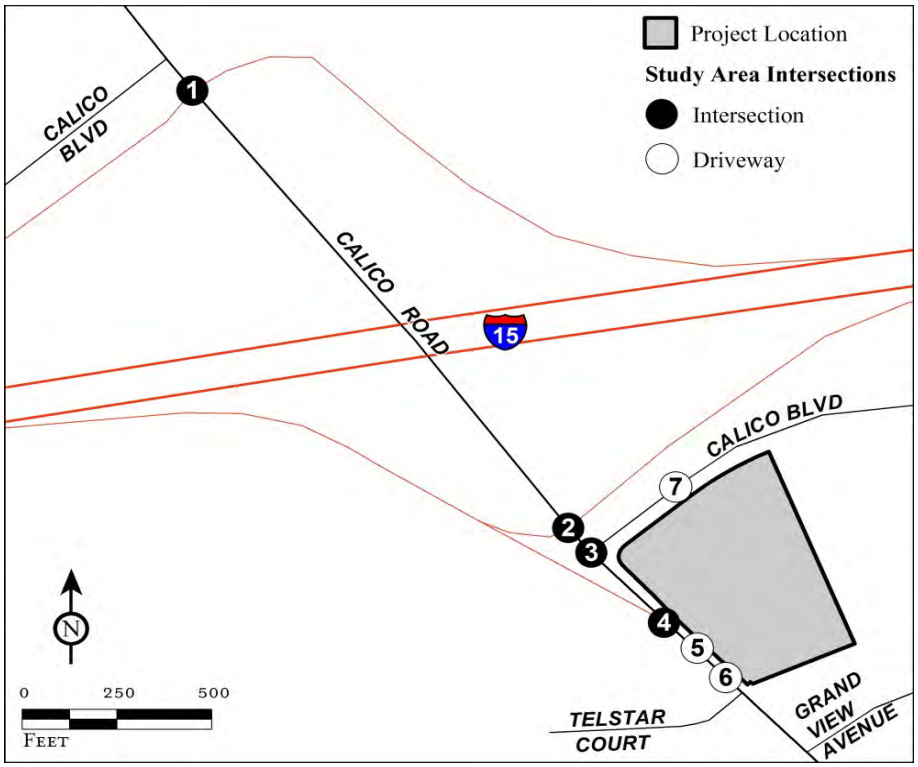
TSF = Thousand Square Feet

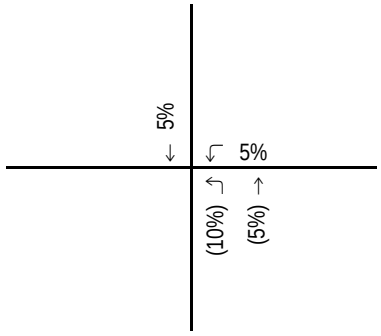
[1] Total building area is 25,060 SF made up of restaurant, convenience store, restrooms and storage.

[2] Internal trips are those motorists who patronize the gas station and restaurant, or convenience store and restaurant uses. Internal trips were calculated using the methodology in the ITE *Trip Generation Handbook*, 2nd Edition.

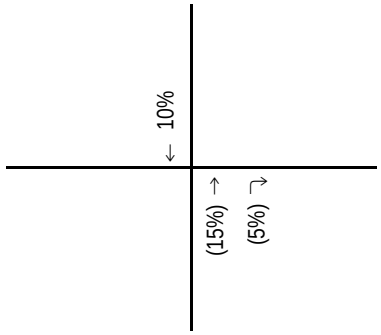
[3] Pass-by plus Diverted Linked rates for Gas Station with Convenience Store from the ITE *Trip Generation Handbook, 2nd Edition,* are 83% during the a.m. peak hour and 87% during the p.m. peak hour. Because the use is a freeway serving use, it is estimated that 80% will be diverted linked trips (from I-15) and the remainder will be pass-by trips from Yermo. The Remaining trips will be new trips made up of employees and patrons from Yermo.

[4] Trip rates from the Institute of Transportation Engineers, *Trip Generation* , 9th Edition.

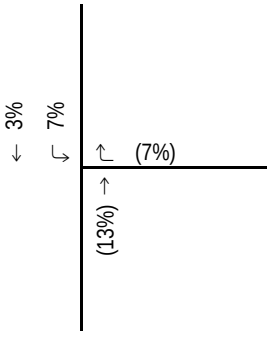




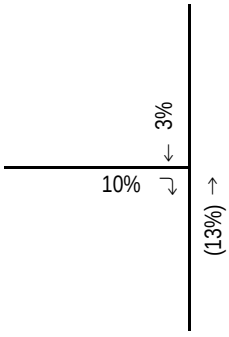
1 Calico Road/Interstate 15 Southbound Ramps



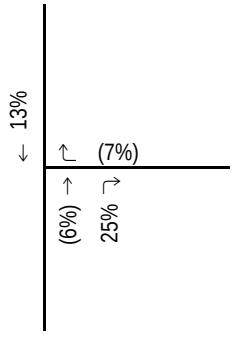
2 Calico Road/Interstate 15 Northbound Ramps



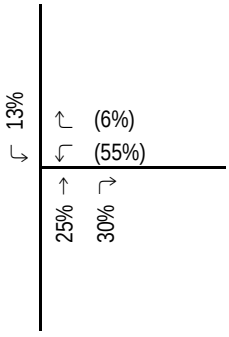
3 Calico Road/Calico Boulevard



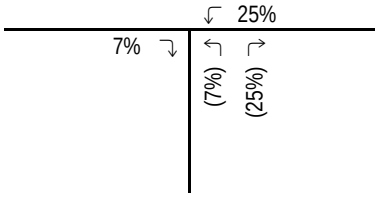
4 Calico Road/Interstate 15 Northbound Off-Ramp



5 Calico Road/Driveway 1



6 Calico Road/Driveway 2



7 Driveway 3/Calico Boulevard

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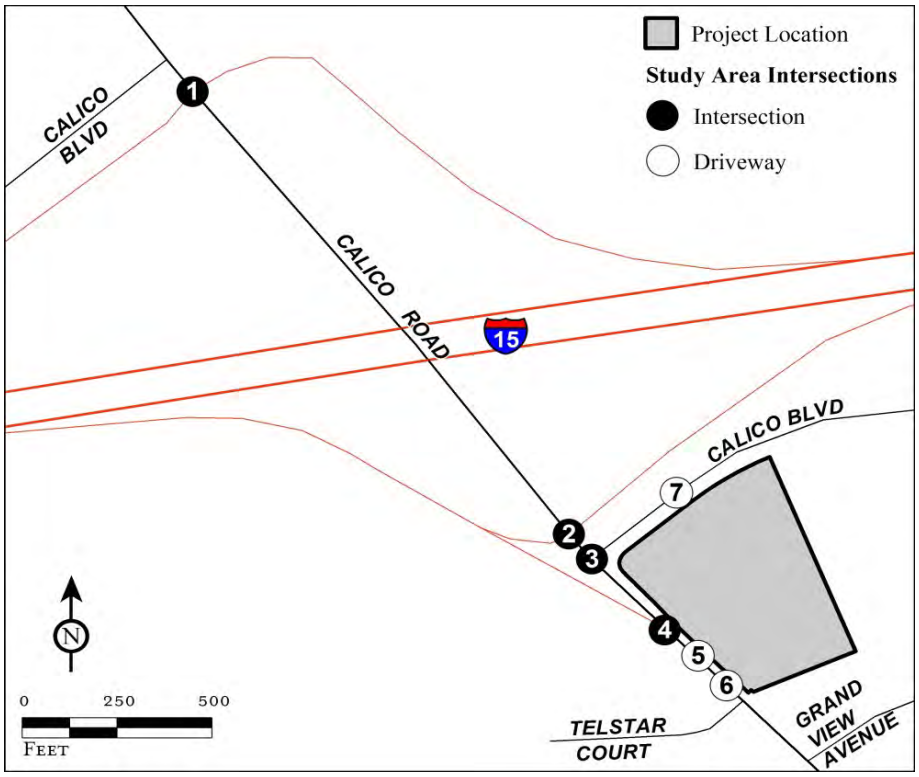
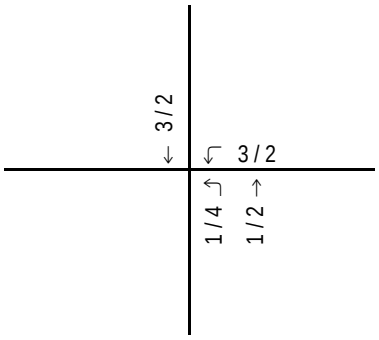
FIGURE 4

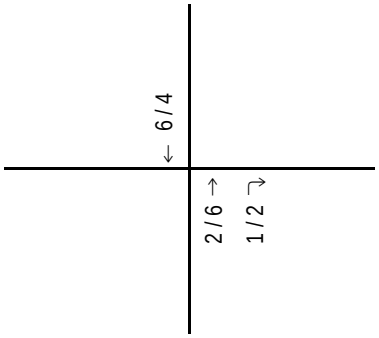
XX% (YY%) Inbound (Outbound) Distribution

Yermo Travel Stop
Traffic Study
Project Trip Distribution

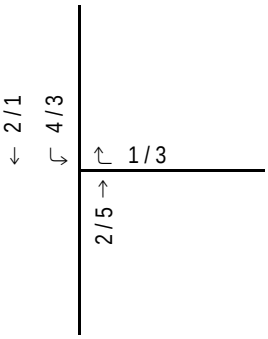




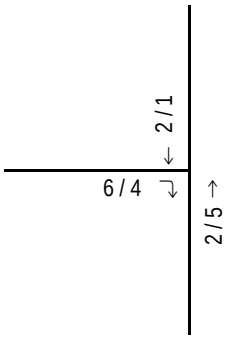
1 Calico Road/Interstate 15 Southbound Ramps



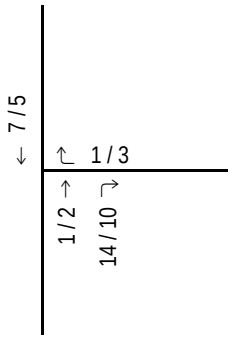
2 Calico Road/Interstate 15 Northbound Ramps



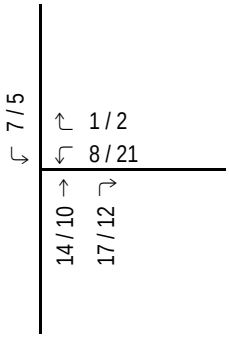
3 Calico Road/Calico Boulevard



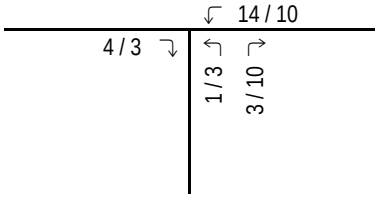
4 Calico Road/Interstate 15 Northbound Off-Ramp



5 Calico Road/Driveway 1



6 Calico Road/Driveway 2



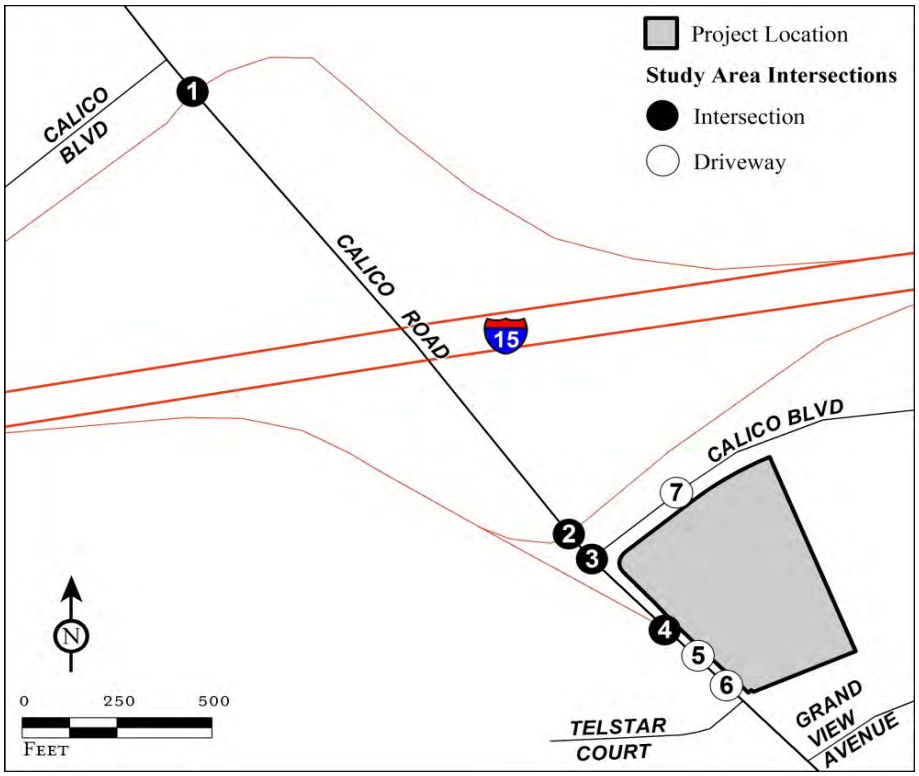
7 Driveway 3/Calico Boulevard

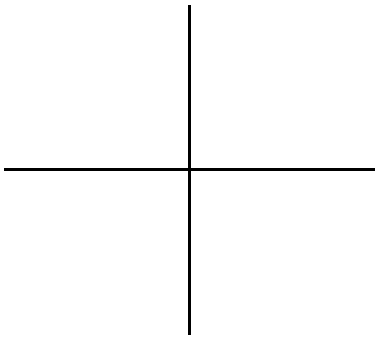
LSA

FIGURE 5

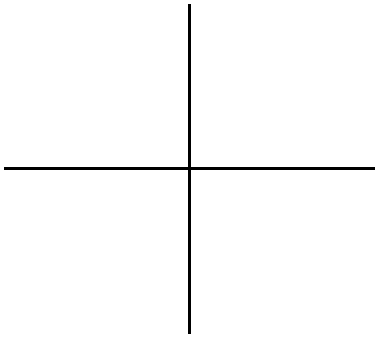
XXX / YYY AM / PM Peak Hour Trips

Yermo Travel Stop
Traffic Study
Primary Net New Project Trip Assignment

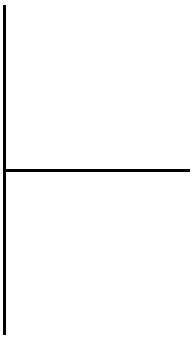




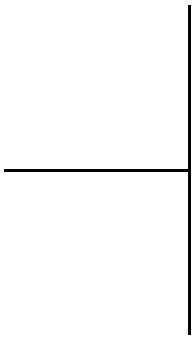
1 Calico Road/Interstate 15 Southbound Ramps



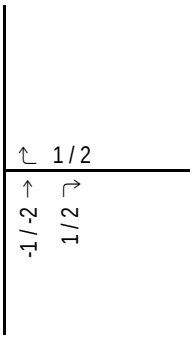
2 Calico Road/Interstate 15 Northbound Ramps



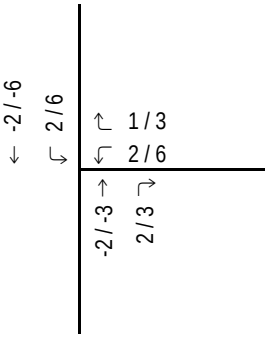
3 Calico Road/Calico Boulevard



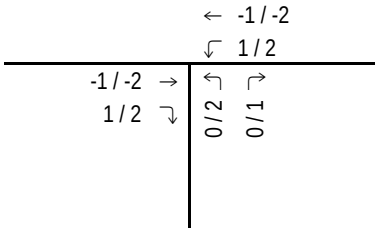
4 Calico Road/Interstate 15 Northbound Off-Ramp



5 Calico Road/Driveway 1



6 Calico Road/Driveway 2



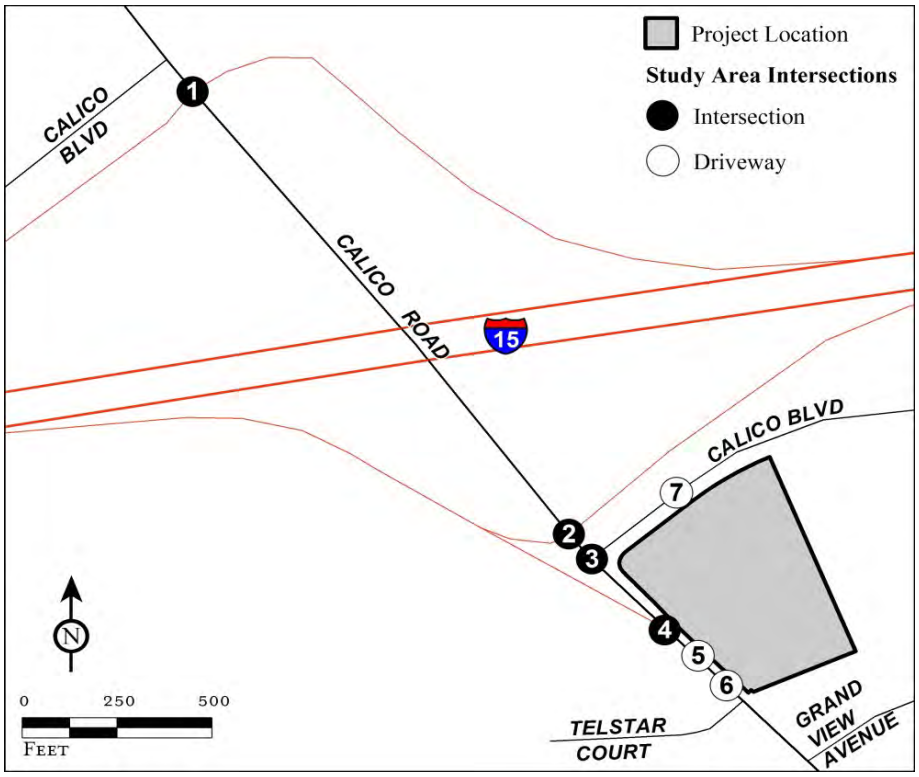
7 Driveway 3/Calico Boulevard

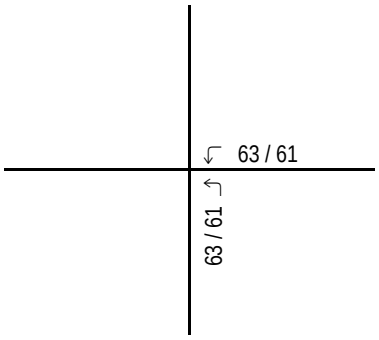
LSA

FIGURE 6

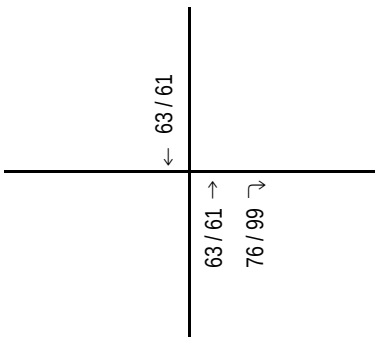
XXX / YYY AM / PM Peak Hour Trips

Yermo Travel Stop
Traffic Study
Pass-By Project Trip Assignment

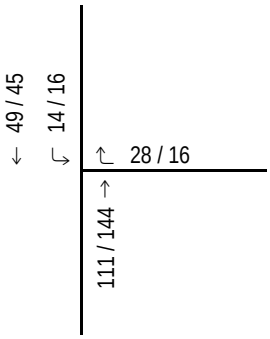




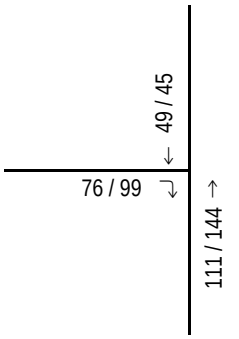
1 Calico Road/Interstate 15 Southbound Ramps



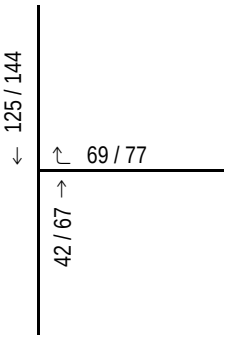
2 Calico Road/Interstate 15 Northbound Ramps



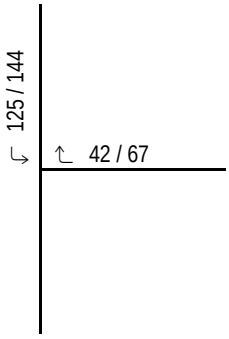
3 Calico Road/Calico Boulevard



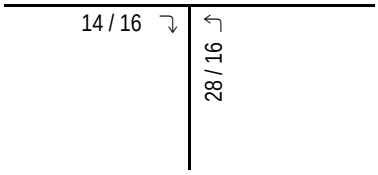
4 Calico Road/Interstate 15 Northbound Off-Ramp



5 Calico Road/Driveway 1



6 Calico Road/Driveway 2



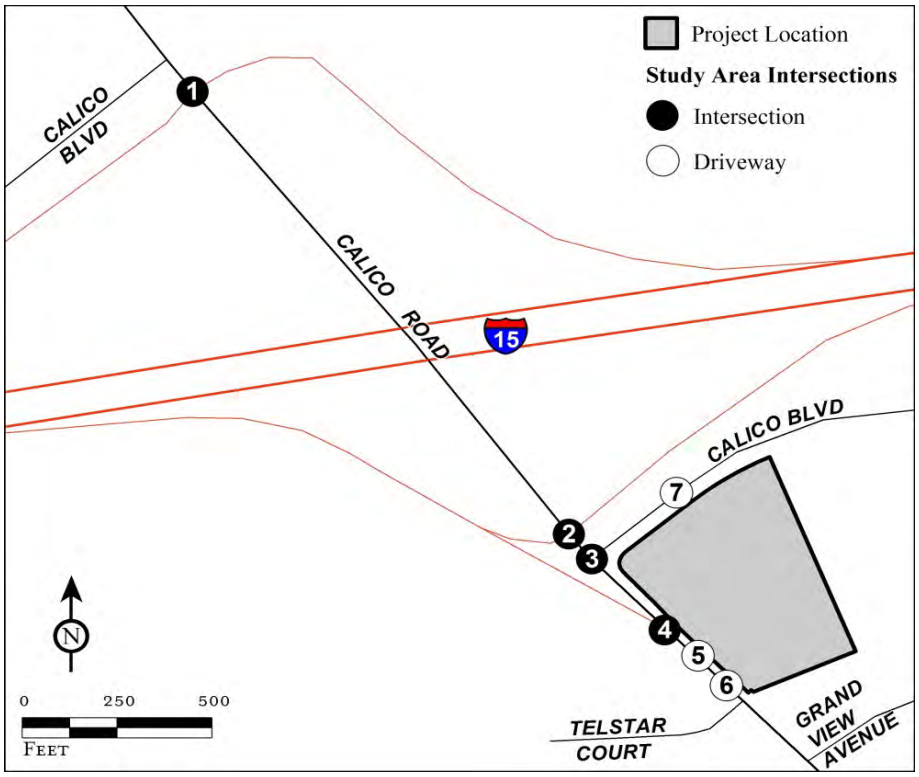
7 Driveway 3/Calico Boulevard

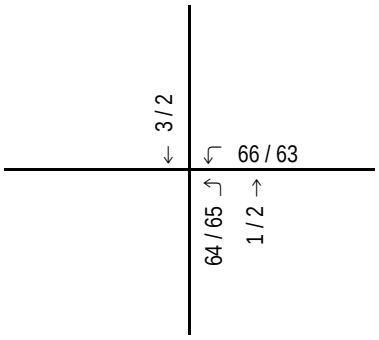
LSA

FIGURE 7

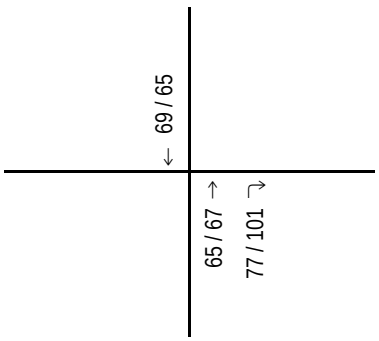
XXX / YYY AM / PM Peak Hour Trips

Yermo Travel Stop
Traffic Study
Diverted Linked Project Trip Assignment

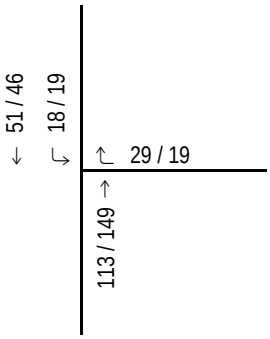




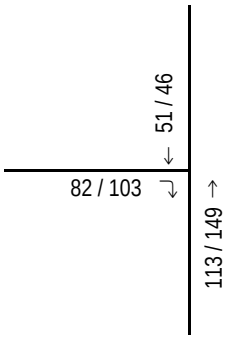
1 Calico Road/Interstate 15 Southbound Ramps



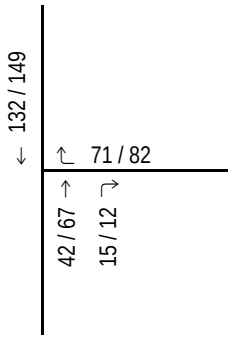
2 Calico Road/Interstate 15 Northbound Ramps



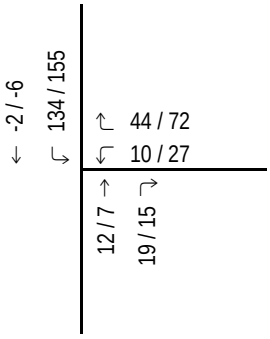
3 Calico Road/Calico Boulevard



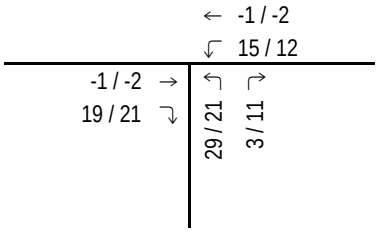
4 Calico Road/Interstate 15 Northbound Off-Ramp



5 Calico Road/Driveway 1



6 Calico Road/Driveway 2



7 Driveway 3/Calico Boulevard

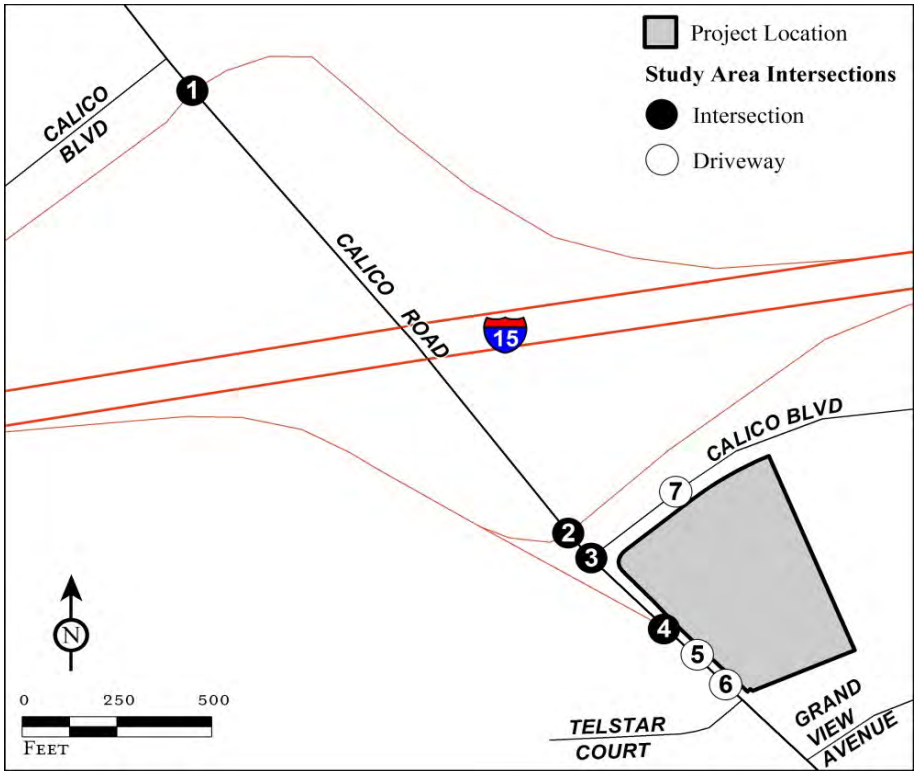
LSA

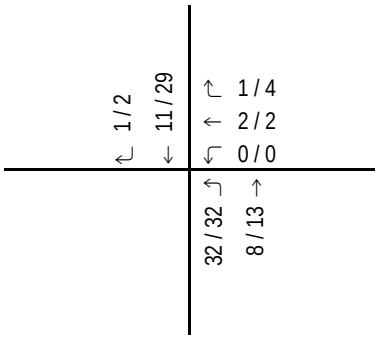
FIGURE 8

XXX / YYY AM / PM Peak Hour Trips

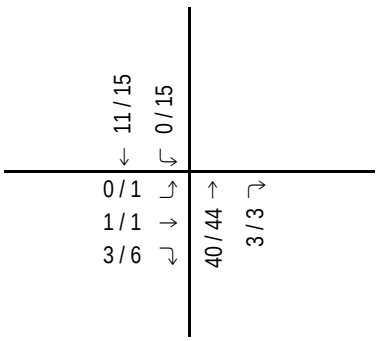
Yermo Travel Stop
Traffic Study
Total Net Project Trip Assignment

R:\PBE1301\August 2014\z12_ Trip Assign_Total 8/19/2014

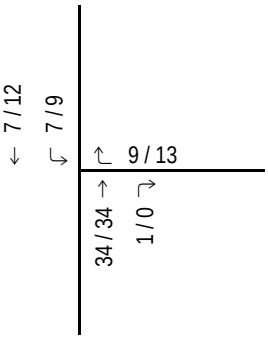




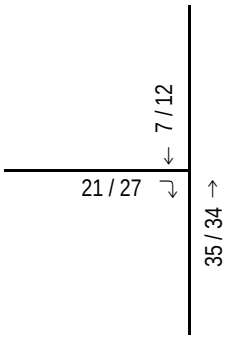
1 Calico Road/Interstate 15 Southbound Ramps



2 Calico Road/Interstate 15 Northbound Ramps



3 Calico Road/Calico Boulevard



4 Calico Road/Interstate 15 Northbound Off-Ramp

Future Intersection

5 Calico Road/Driveway 1

Future Intersection

6 Calico Road/Driveway 2

Future Intersection

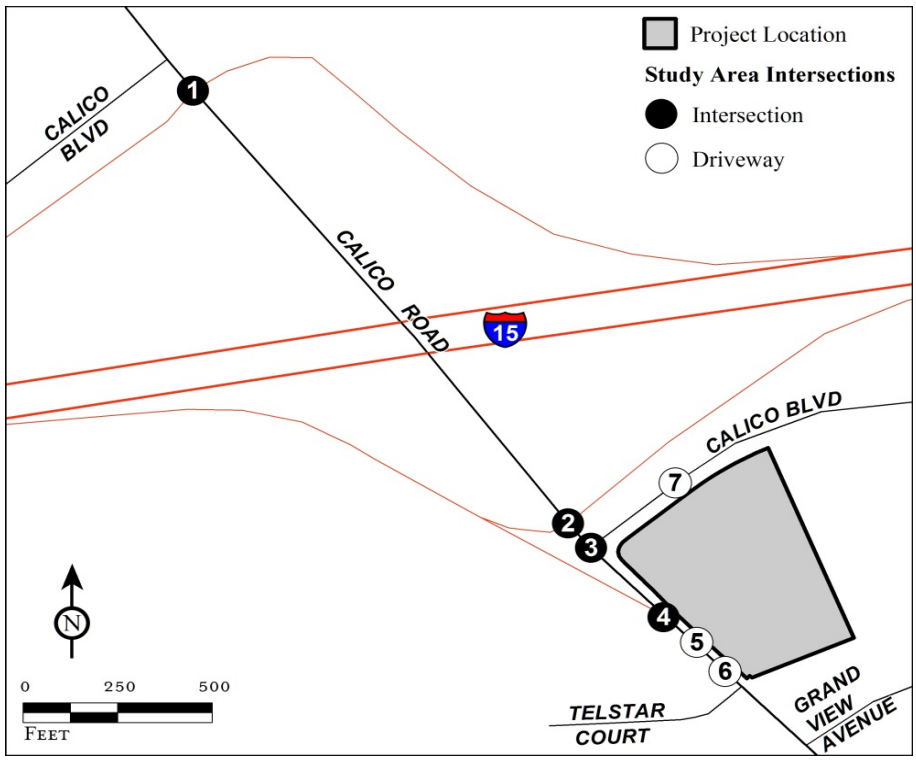
7 Driveway 3/Calico Boulevard

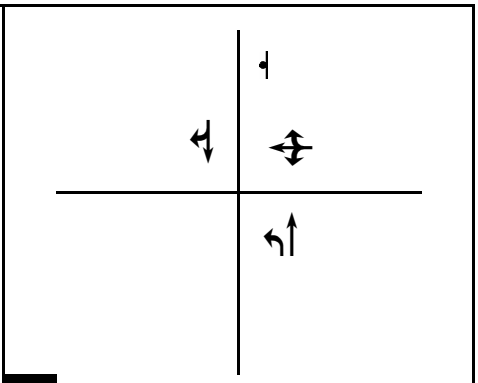
LSA

FIGURE 9

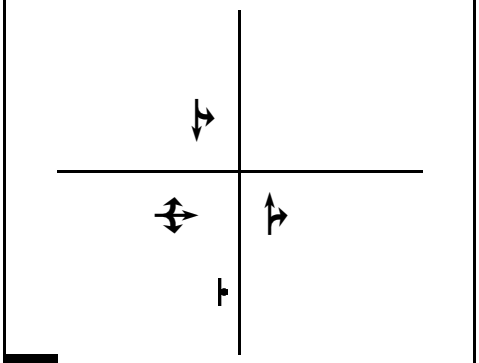
XX / YY AM / PM Peak Hour Traffic Volumes

Yermo Travel Stop
Traffic Study
Existing Peak Hour Traffic Volumes

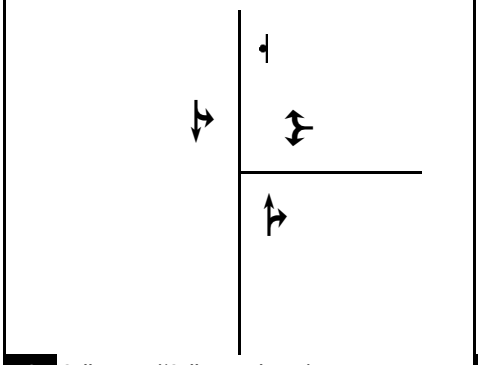




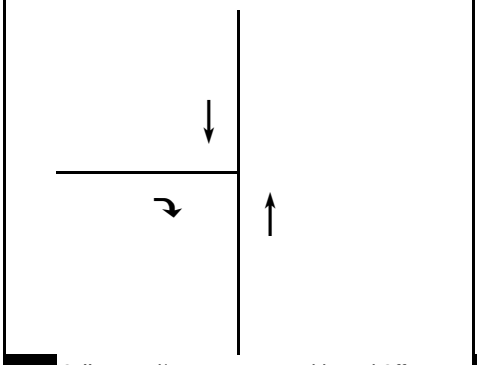
1 Calico Road/Interstate 15 Southbound Ramps



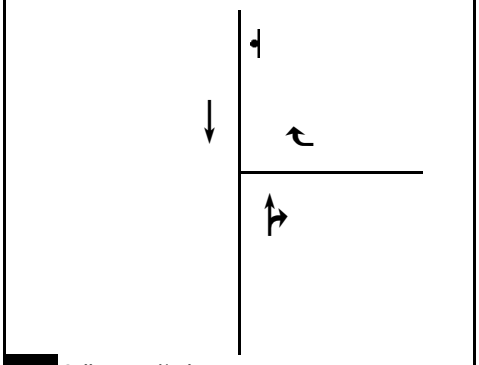
2 Calico Road/Interstate 15 Northbound Ramps



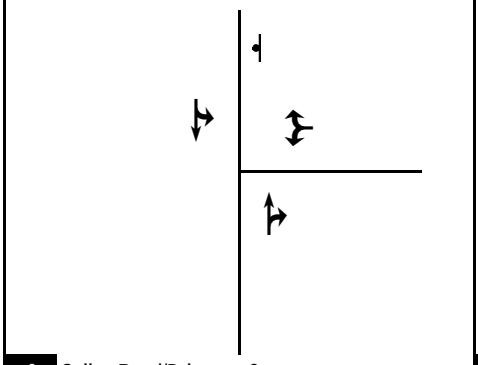
3 Calico Road/Calico Boulevard



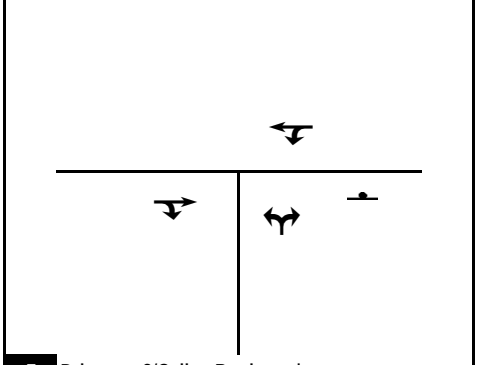
4 Calico Road/Interstate 15 Northbound Off-Ramp



5 Calico Road/Driveway 1



6 Calico Road/Driveway 2



7 Driveway 3/Calico Boulevard

LSA

FIGURE 10

Legend

Signal

Stop Sign

d Defacto Right-Turn

Yermo Travel Stop

Traffic Study

Existing With Project Intersection Geometrics and Stop Control

R:\PBE1301\August 2014\z12 -geo_Exist (8/21/2014)

Table D - Existing Intersection Levels of Service

Intersection	Jurisdiction	Control	Without Project				With Project			
			A.M Peak Hour		P.M Peak Hour		A.M Peak Hour		P.M Peak Hour	
			Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS
1 . Calico Road/Interstate 15 Southbound Ramps	Caltrans	TWSC	8.4	A	8.4	A	11.2	B	11.3	B
2 . Calico Road/Interstate 15 Northbound Ramps	Caltrans	TWSC	8.4	A	8.5	A	8.7	A	9.0	A
3 . Calico Road/Calico Boulevard	County	TWSC	8.5	A	8.6	A	9.3	A	9.9	A
4 . Calico Road/Interstate 15 Northbound Off-Ramp	Caltrans	TWSC	8.4	A	8.5	A	9.2	A	9.5	A
5 . Calico Road/Driveway 1	County	TWSC	*Future Intersection*		*Future Intersection*		9.0	A	9.2	A
6 . Calico Road/Driveway 2	County	TWSC	*Future Intersection*		*Future Intersection*		9.4	A	10.1	B
7 . Driveway 3/Calico Boulevard	County	TWSC	*Future Intersection*		*Future Intersection*		8.9	A	8.8	A

Notes:

TWSC = Two-Way Stop Control

LOS = Level of Service

A freeway mainline and merge/diverge analysis for Friday and Sunday peak hours was conducted for existing conditions. Table E summarizes the existing Friday and Sunday peak hour volumes and Table F summarizes the levels of service. As shown in Table F, all freeway segments and merge/ diverge areas are currently operating as satisfactory levels of service with the exception of the following:

- I-15 Northbound:
  - Calico Road Off-Ramp merge/diverge (Friday peak hour); and
  - Calico Road On-Ramp merge/diverge (Friday peak hour).
- I-15 Southbound:
  - Calico Road Off-Ramp merge/diverge (Sunday peak hour); and
  - Calico Road On-Ramp merge/diverge (Sunday peak hour).

Existing With Project Traffic Conditions

The existing with project condition considers the addition of traffic generated by the proposed project to the existing conditions. Figure 11 illustrates existing with project a.m. and p.m. peak hour traffic volumes at study area intersections. A level of service analysis was conducted to evaluate existing with project a.m. and p.m. peak hour traffic operations at study area intersections. As shown in previously referenced Table D, all study area intersections are projected to operate at satisfactory levels of service. Detailed level of service worksheets are included in Appendix C.

A freeway mainline and merge/diverge analysis for Friday and Sunday peak hours was conducted for existing with project conditions. Table E summarizes the existing with project Friday and Sunday peak hour volumes and Table F summarizes the levels of service. As shown in Table F, all freeway segments and merge/diverge areas are projected to operate at satisfactory levels of service with the exception of the following:

- I-15 Northbound:
  - Calico Road Off-Ramp merge/diverge (Friday peak hour); and
  - Calico Road On-Ramp merge/diverge (Friday peak hour).
- I-15 Southbound:
  - Calico Road Off-Ramp merge/diverge (Sunday peak hour); and
  - Calico Road On-Ramp merge/diverge (Sunday peak hour).

It should be noted that these freeway merge/diverge areas also operate at unsatisfactory levels of service without the project.

Table E - Existing Freeway Segment and Ramp Volumes

	Northbound											
	Friday Peak Hour						Sunday Peak Hour					
	Without Project			Project Trips		With Project	Without Project			Project Trips		With Project
Freeway Segment	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Total PCE	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Total PCE
Interstate 15												
1 South of Calico Road Off-Ramp	2,397	888	3,285	4	0	3,289	1,383	512	1,895	4	0	1,899
2 Calico Road Off-Ramp	31	3	34	4	99	137	37	2	39	4	59	102
3 Calico Road Off-Ramp to Calico Road On-Ramp	2,366	885	3,251	0	-99	3,152	1,346	510	1,856	0	-59	1,797
4 Calico Road On-Ramp	2	3	5	2	99	106	18	2	20	2	59	81
5 North of Calico Road On-Ramp	2,368	888	3,256	2	0	3,258	1,364	512	1,876	2	0	1,878

	Southbound											
	Friday Peak Hour						Sunday Peak Hour					
	Without Project			Project Trips		With Project	Without Project			Project Trips		With Project
Freeway Segment	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Autos	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Autos
Interstate 15												
6 North of Calico Road Off-Ramp	1,424	545	1,969	2	0	1,971	2,226	835	3,061	2	0	3,063
7 Calico Road Off-Ramp	1	3	4	2	61	67	7	0	7	2	101	110
8 Calico Road Off-Ramp to Calico Road On-Ramp	1,423	542	1,965	0	-61	1,904	2,219	835	3,054	0	-101	2,953
9 Calico Road On-Ramp	45	3	48	4	61	113	39	2	41	4	101	146
10 South of Calico Road On-Ramp	1,468	545	2,013	4	0	2,017	2,258	837	3,095	4	0	3,099

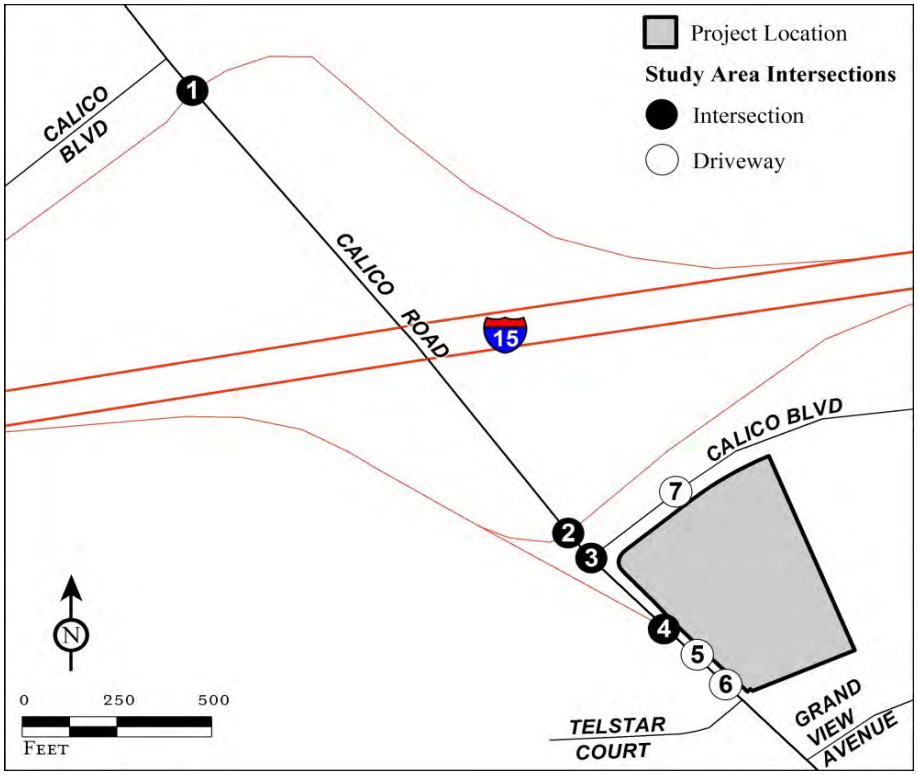
Table F - Existing Freeway Segment and Ramp Levels of Service

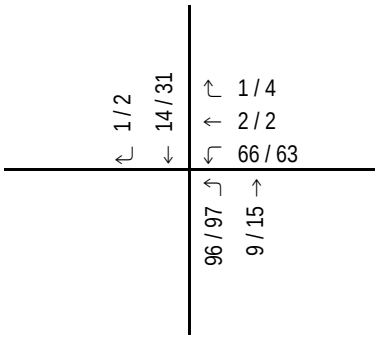
Segment/Ramp	Type	Without Project						With Project					
		Friday Peak Hour			Sunday Peak Hour			Friday Peak Hour			Sunday Peak Hour		
		Speed (m/hr)	Density (pc/m/ln)	LOS	Speed (m/hr)	Density (pc/m/ln)	LOS	Speed (m/hr)	Density (pc/m/ln)	LOS	Speed (m/hr)	Density (pc/m/ln)	LOS
Interstate 15 Northbound													
1 . South of Calico Road Off-Ramp	Basic	66..8	25.9	C	70.0	14.2	B	66.7	25.9	C	70.0	14.3	B
2 . Calico Road Off-Ramp	1 Lane Off	57.9	32.3	D *	57.9	19.7	B	57.7	31.4	D *	57.7	19.2	B
3 . Calico Road Off-Ramp to Calico Road On-Ramp	Basic	67.0	25.5	C	70.0	14.0	B	67.6	24.6	C	70.0	13.5	B
4 . Calico Road On-Ramp	1 Lane On	58.0	31.3	D *	61.0	19.9	B	58.0	31.2	D *	61.0	19.9	B
5 . North of Calico Road On-Ramp	Basic	66.9	25.6	C	70.0	14.1	B	66.9	25.6	C	70.0	14.1	B
Interstate 15 Southbound													
6 . North of Calico Road Off-Ramp	Basic	70.0	14.8	B	68.0	23.7	C	70.0	14.8	B	68.0	23.7	C
7 . Calico Road Off-Ramp	1 Lane Off	58.0	20.7	C	58.0	30.6	D *	57.8	20.1	B	57.7	29.6	D *
8 . Calico Road Off-Ramp to Calico Road On-Ramp	Basic	70.0	14.8	B	68.1	23.6	C	70.0	14.3	B	68.5	22.7	C
9 . Calico Road On-Ramp	1 Lane On	60.0	20.7	C	59.0	29.6	D *	60.0	20.7	C	59.0	29.6	D *
10 . South of Calico Road On-Ramp	Basic	70.0	15.1	B	67.9	24.0	C	70.0	15.2	B	67.8	24.0	C

* = Exceed's Level of Service

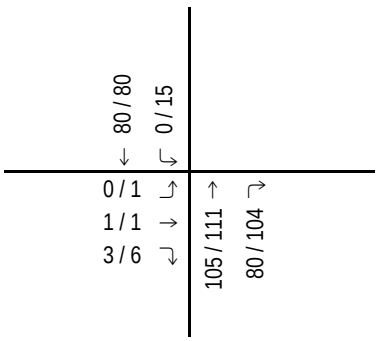
m/hr = miles per hour

pc/m/ln = passenger cars per mile per lane

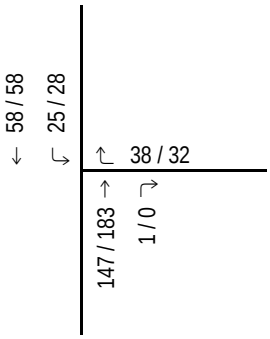




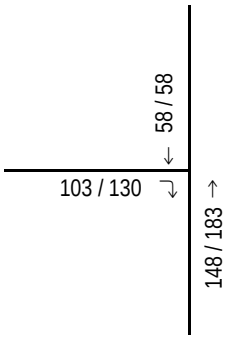
1 Calico Rd/I-15 SB Ramps



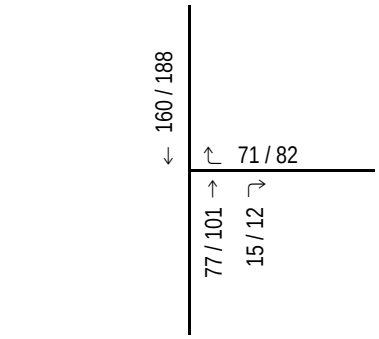
2 Calico Rd/I-15 NB Ramps



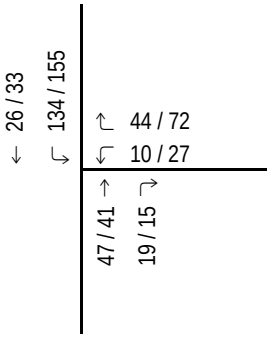
3 Calico Rd/Calico Blvd



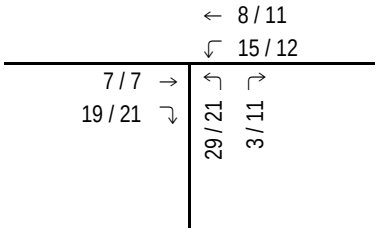
4 Calico Rd/I-15 NB Off-Ramp



5 Calico Rd/Driveway 1



6 Calico Rd/Driveway 2



7 Driveway 3/Calico Blvd

LSA

FIGURE 11

XX / YY AM / PM Peak Hour Traffic Volumes

Yermo Travel Stop
Traffic Study
Existing With Project Peak Hour Traffic Volumes

OPENING YEAR CONDITIONS

This section discusses opening year traffic conditions with and without the proposed project. Opening year traffic volumes were developed using the approach discussed in the Analysis Methodology section.

Opening Year Without Project Traffic Conditions

Figure 12 illustrates opening year without project a.m. and p.m. peak hour traffic volumes at study area intersections. A level of service analysis was conducted to evaluate opening year without project a.m. and p.m. peak hour traffic operations at study area intersections. Table G summarizes the results of this analysis and shows that all study area intersections are projected to operate at satisfactory levels of service. Detailed level of service worksheets are included in Appendix C.

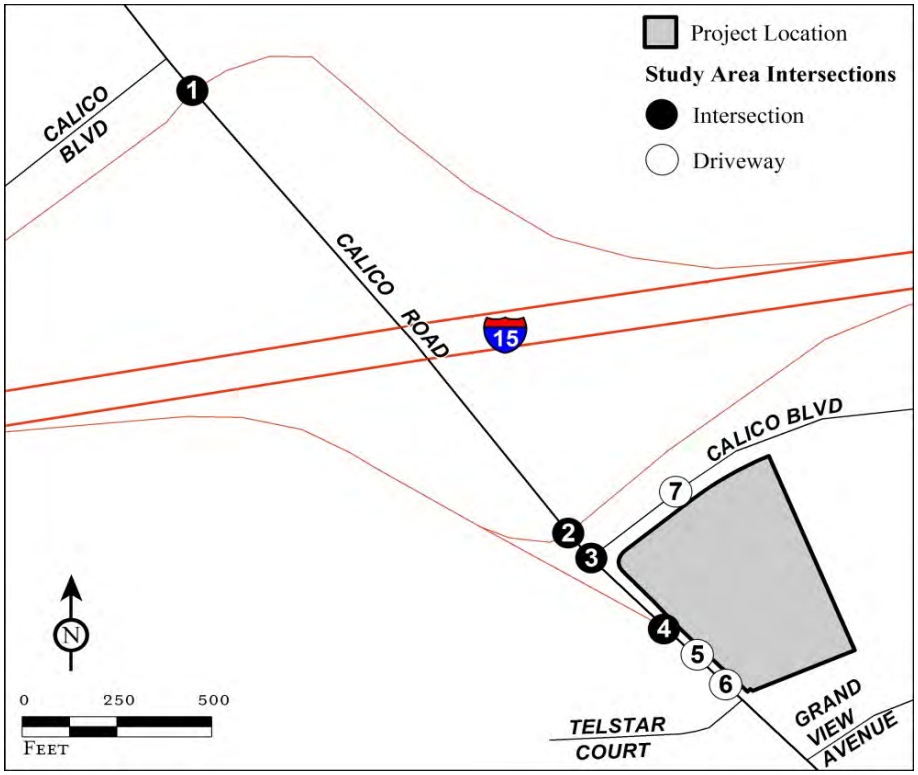
A freeway mainline and merge/diverge analysis for Friday and Sunday peak hours was conducted for opening year without project conditions. Table H summarizes the opening year without project Friday and Sunday peak hour volumes and Table I summarizes the levels of service. As shown in Table I, all freeway segments and merge/diverge areas are projected to operate at satisfactory levels of service with the exception of the following:

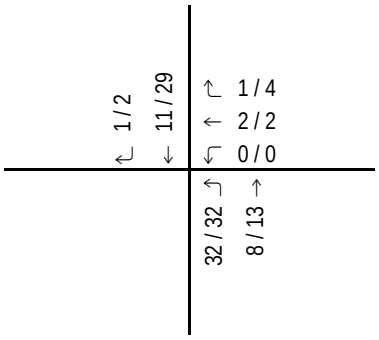
- I-15 Northbound:
  - South of Calico Off-Ramp (Friday peak hour);
  - Calico Road Off-Ramp merge/diverge (Friday peak hour);
  - Calico Road Off-Ramp to Calico Road On-Ramp (Friday peak hour);
  - Calico Road On-Ramp merge/diverge (Friday peak hour); and
  - North of Calico Road On-Ramp (Friday peak hour).
- I-15 Southbound:
  - Calico Road Off-Ramp merge/diverge (Sunday peak hour); and
  - Calico Road On-Ramp merge/diverge (Sunday peak hour).

Opening Year With Project Conditions

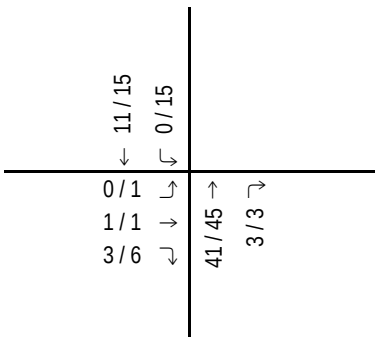
The opening year with project condition considers the addition of traffic generated by the proposed project to the opening year without project conditions. Figure 13 illustrates opening year with project a.m. and p.m. peak hour traffic volumes at study area intersections. A level of service analysis was conducted to evaluate opening year with project a.m. and p.m. peak hour traffic operations at study area intersections. As shown in Table G, all study area intersections are projected to operate at satisfactory levels of service. Detailed level of service worksheets are included in Appendix C.

A freeway mainline and merge/diverge analysis for Friday and Sunday peak hours was conducted for opening year with project conditions. Table H summarizes the opening year with project Friday and Sunday peak hour volumes and Table I summarizes the levels of service. As shown in Table I, all

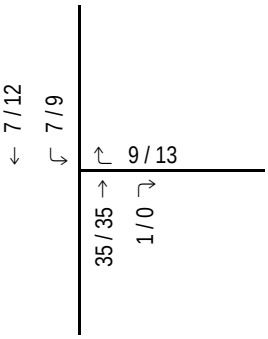




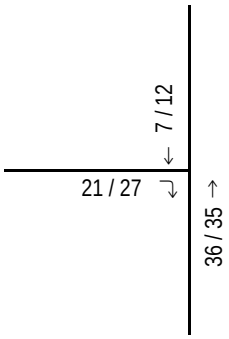
1 Calico Rd/I-15 SB Ramps



2 Calico Rd/I-15 NB Ramps



3 Calico Rd/Calico Blvd



4 Calico Rd/I-15 NB Off-Ramp

Future Intersection

5 Calico Rd/Driveway 1

Future Intersection

6 Calico Rd/Driveway 2

Future Intersection

7 Driveway 3/Calico Blvd

LSA

FIGURE 12

XX / YY AM / PM Peak Hour Traffic Volumes

Yermo Travel Stop
Traffic Study

Opening Year Without Project Peak Hour Traffic Volumes

Table G - Opening Year Intersection Levels of Service

Intersection	Jurisdiction	Control	Without Project				With Project			
			A.M Peak Hour		P.M Peak Hour		A.M Peak Hour		P.M Peak Hour	
			Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS
1 . Calico Road/Interstate 15 Southbound Ramps	Caltrans	TWSC	8.4	A	8.4	A	11.2	B	11.3	B
2 . Calico Road/Interstate 15 Northbound Ramps	Caltrans	TWSC	8.4	A	8.5	A	8.7	A	9.0	A
3 . Calico Road/Calico Boulevard	County	TWSC	8.5	A	8.6	A	9.3	A	10.0	A
4 . Calico Road/Interstate 15 Northbound Off-Ramp	Caltrans	TWSC	8.4	A	8.5	A	9.2	A	9.5	A
5 . Calico Road/Driveway 1	County	TWSC	*Future Intersection*		*Future Intersection*		9.0	A	9.2	A
6 . Calico Road/Driveway 2	County	TWSC	*Future Intersection*		*Future Intersection*		9.4	A	10.1	B
7 . Driveway 3/Calico Boulevard	County	TWSC	*Future Intersection*		*Future Intersection*		8.9	A	8.8	A

Notes:

TWSC = Two-Way Stop Control

LOS = Level of Service

Table H - Opening Year Freeway Segment and Ramp Volumes

	Northbound											
	Friday Peak Hour						Sunday Peak Hour					
	Without Project			Project Trips		With Project	Without Project			Project Trips		With Project
Freeway Segment	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Total PCE	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Total PCE
Interstate 15												
1 South of Calico Road Off-Ramp	2,439	904	3,343	4	0	3,347	1,407	521	1,928	4	0	1,932
2 Calico Road Off-Ramp	32	3	35	4	99	138	38	2	40	4	59	103
3 Calico Road Off-Ramp to Calico Road On-Ramp	2,408	901	3,309	0	-99	3,210	1,370	519	1,889	0	-59	1,830
4 Calico Road On-Ramp	2	3	5	2	99	106	18	2	20	2	59	81
5 North of Calico Road On-Ramp	2,410	904	3,314	2	0	3,316	1,388	521	1,909	2	0	1,911

	Southbound											
	Friday Peak Hour						Sunday Peak Hour					
	Without Project			Project Trips		With Project	Without Project			Project Trips		With Project
Freeway Segment	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Autos	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Autos
Interstate 15												
6 North of Calico Road Off-Ramp	1,449	555	2,004	2	0	2,006	2,265	850	3,115	2	0	3,117
7 Calico Road Off-Ramp	1	3	4	2	61	67	7	0	7	2	101	110
8 Calico Road Off-Ramp to Calico Road On-Ramp	1,448	552	2,000	0	-61	1,939	2,258	850	3,108	0	-101	3,007
9 Calico Road On-Ramp	46	3	49	4	61	114	40	2	42	4	101	147
10 South of Calico Road On-Ramp	1,494	555	2,049	4	0	2,053	2,298	852	3,150	4	0	3,154

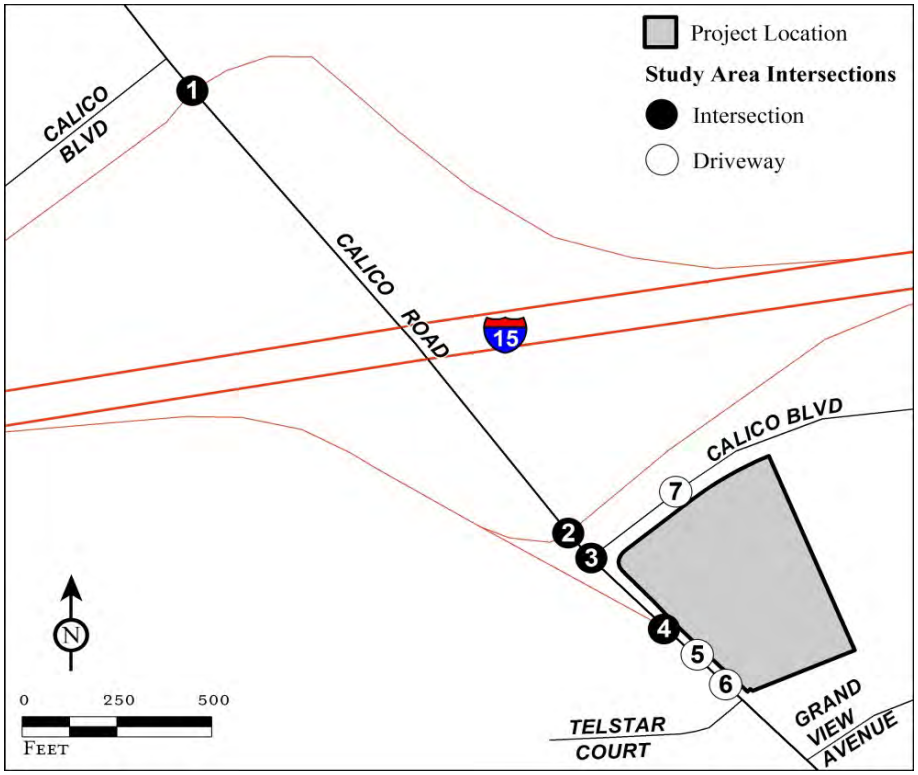
Table I - Opening Year Freeway Segment and Ramp Levels of Service

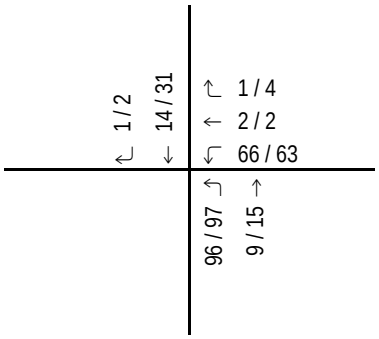
Segment/Ramp	Type	Without Project						With Project					
		Friday Peak Hour			Sunday Peak Hour			Friday Peak Hour			Sunday Peak Hour		
		Speed (m/hr)	Density (pc/m/ln)	LOS	Speed (m/hr)	Density (pc/m/ln)	LOS	Speed (m/hr)	Density (pc/m/ln)	LOS	Speed (m/hr)	Density (pc/m/ln)	LOS
Interstate 15 Northbound													
1 . South of Calico Road Off-Ramp	Basic	66.4	26.5	D *	70.0	14.5	B	66.3	26.6	D *	70.0	14.5	B
2 . Calico Road Off-Ramp	1 Lane Off	57.9	32.9	D *	57.9	20.0	B	57.7	32.0	D *	57.7	19.5	B
3 . Calico Road Off-Ramp to Calico Road On-Ramp	Basic	66.6	26.2	D *	70.0	14.2	B	67.2	25.1	C	70.0	13.8	B
4 . Calico Road On-Ramp	1 Lane On	58.0	31.7	D *	60.0	20.2	C	58.0	31.7	D *	60.0	20.2	C
5 . North of Calico Road On-Ramp	Basic	66.6	26.2	D *	70.0	14.4	B	66.6	26.2	D *	70.0	14.4	B
Interstate 15 Southbound													
6 . North of Calico Road Off-Ramp	Basic	70.0	15.1	B	67.8	24.2	C	70.0	15.1	B	67.7	24.2	C
7 . Calico Road Off-Ramp	1 Lane Off	58.0	21.0	C	58.0	31.0	D *	57.8	20.5	C	57.7	30.1	D *
8 . Calico Road Off-Ramp to Calico Road On-Ramp	Basic	70.0	15.0	B	67.8	24.1	C	70.0	14.6	B	68.3	23.2	C
9 . Calico Road On-Ramp	1 Lane On	60.0	21.0	C	58.0	30.1	D *	60.0	21.0	C	58.0	30.0	D *
10 . South of Calico Road On-Ramp	Basic	70.0	15.4	B	67.6	24.5	C	70.0	15.4	B	67.5	24.6	C

* = Exceed's Level of Service

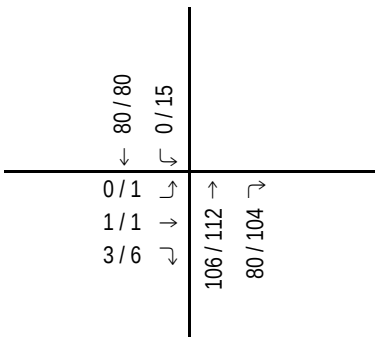
m/hr = miles per hour

pc/m/ln = passenger cars per mile per lane

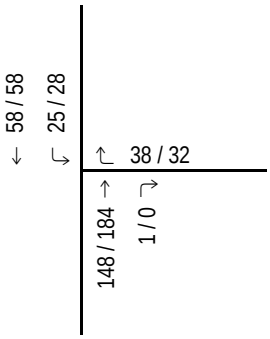




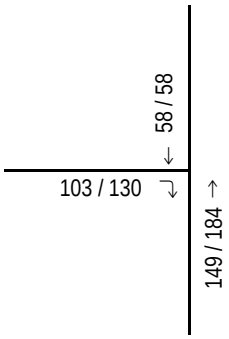
1 Calico Rd/I-15 SB Ramps



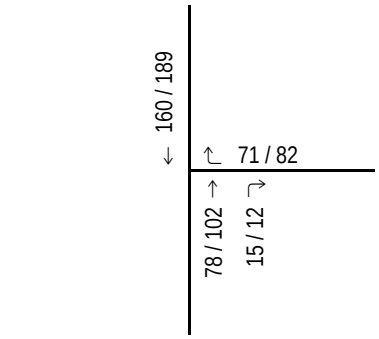
2 Calico Rd/I-15 NB Ramps



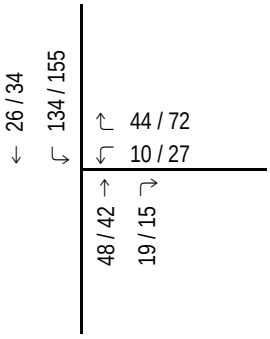
3 Calico Rd/Calico Blvd



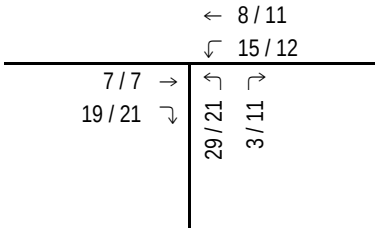
4 Calico Rd/I-15 NB Off-Ramp



5 Calico Rd/Driveway 1



6 Calico Rd/Driveway 2



7 Driveway 3/Calico Blvd

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FIGURE 13

XX / YY AM / PM Peak Hour Traffic Volumes

Yermo Travel Stop
Traffic Study

Opening Year With Project Peak Hour Traffic Volumes

freeway segments and merge/diverge areas are projected to operate at satisfactory levels of service with the exception of the following:

- I-15 Northbound:
  - South of Calico Off-Ramp (Friday peak hour);
  - Calico Road Off-Ramp merge/diverge (Friday peak hour);
  - Calico Road On-Ramp merge/diverge (Friday peak hour); and
  - North of Calico Road On-Ramp (Friday peak hour).
- I-15 Southbound:
  - Calico Road Off-Ramp merge/diverge (Sunday peak hour); and
  - Calico Road On-Ramp merge/diverge (Sunday peak hour).

It should be noted that these freeway merge/diverge areas also operate at unsatisfactory levels of service without the project.

YEAR 2035 CONDITIONS

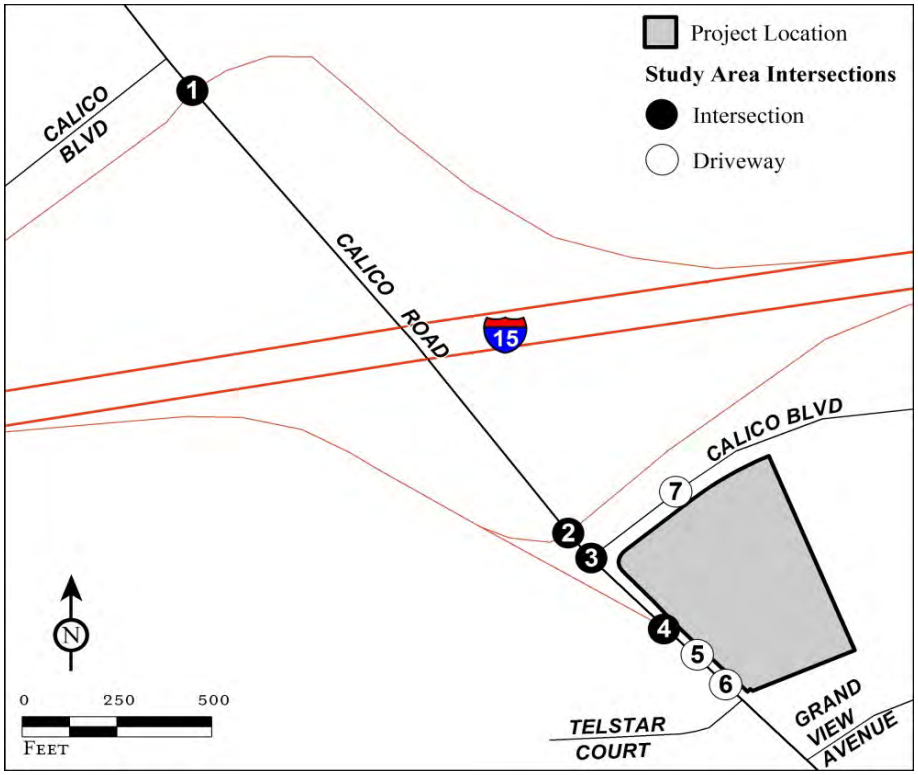
This section discusses year 2035 traffic conditions with and without the proposed project. Year 2035 traffic volumes were developed using the approach discussed in the Analysis Methodology section.

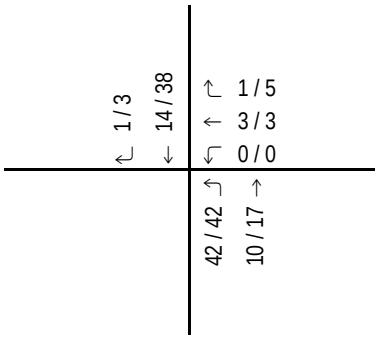
Year 2035 Without Project Traffic Conditions

Figure 14 illustrates year 2035 without project a.m. and p.m. peak hour traffic volumes at study area intersections. A level of service analysis was conducted to evaluate year 2035 without project a.m. and p.m. peak hour traffic operations at study area intersections. Table J summarizes the results of this analysis and shows that all study area intersections are projected to operate at satisfactory levels of service. Detailed level of service worksheets are included in Appendix C.

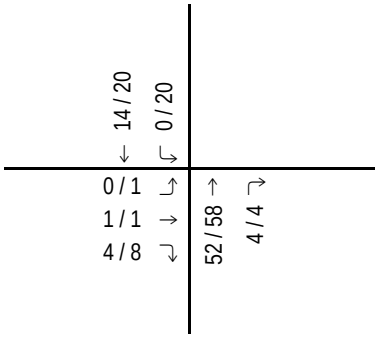
A freeway mainline and merge/diverge analysis for Friday and Sunday peak hours was conducted for year 2035 without project conditions. Table K summarizes the year 2035 without project Friday and Sunday peak hour volumes and Table L summarizes the levels of service. As shown in Table L, all freeway segments and merge/diverge areas are projected to operate at satisfactory levels of service with the exception of the following:

- I-15 Northbound:
  - South of Calico Off-Ramp (Friday peak hour);
  - Calico Road Off-Ramp merge/diverge (Friday peak hour);
  - Calico Road Off-Ramp to Calico Road On-Ramp (Friday peak hour);
  - Calico Road On-Ramp merge/diverge (Friday peak hour); and
  - North of Calico Road On-Ramp (Friday peak hour).

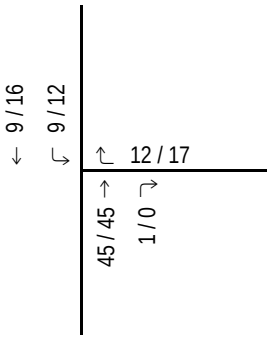




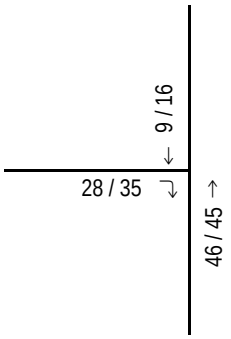
1 Calico Rd/I-15 SB Ramps



2 Calico Rd/I-15 NB Ramps



3 Calico Rd/Calico Blvd



4 Calico Rd/I-15 NB Off-Ramp

Future Intersection

5 Calico Rd/Driveway 1

Future Intersection

6 Calico Rd/Driveway 2

Future Intersection

7 Driveway 3/Calico Blvd

LSA

FIGURE 14

XX / YY AM / PM Peak Hour Traffic Volumes

Yermo Travel Stop
Traffic Study

Year 2035 Without Project Peak Hour Traffic Volumes

Table J - Year 2035 Intersection Levels of Service

Intersection	Jurisdiction	Control	Without Project				With Project			
			A.M Peak Hour		P.M Peak Hour		A.M Peak Hour		P.M Peak Hour	
			Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS
1 . Calico Road/Interstate 15 Southbound Ramps	Caltrans	TWSC	8.4	A	8.4	A	11.6	B	11.7	B
2 . Calico Road/Interstate 15 Northbound Ramps	Caltrans	TWSC	8.4	A	8.5	A	8.8	A	9.0	A
3 . Calico Road/Calico Boulevard	County	TWSC	8.5	A	8.6	A	9.4	A	10.1	B
4 . Calico Road/Interstate 15 Northbound Off-Ramp	Caltrans	TWSC	8.4	A	8.5	A	9.2	A	9.7	A
5 . Calico Road/Driveway 1	County	TWSC	*Future Intersection*		*Future Intersection*		9.1	A	9.3	A
6 . Calico Road/Driveway 2	County	TWSC	*Future Intersection*		*Future Intersection*		9.5	A	10.3	B
7 . Driveway 3/Calico Boulevard	County	TWSC	*Future Intersection*		*Future Intersection*		8.9	A	8.8	A

Notes:

TWSC = Two-Way Stop Control

LOS = Level of Service

Table K - Year 2035 Freeway Segment and Ramp Volumes

	Northbound											
	Friday Peak Hour						Sunday Peak Hour					
	Without Project			Project Trips		With Project	Without Project			Project Trips		With Project
Freeway Segment	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Total PCE	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Total PCE
Interstate 15												
1 South of Calico Road Off-Ramp	3,280	1,215	4,495	4	0	4,499	1,893	701	2,594	4	0	2,598
2 Calico Road Off-Ramp	42	4	46	4	99	149	51	3	54	4	59	117
3 Calico Road Off-Ramp to Calico Road On-Ramp	3,238	1,211	4,449	0	-99	4,350	1,842	698	2,540	0	-59	2,481
4 Calico Road On-Ramp	3	4	7	2	99	108	25	3	28	2	59	89
5 North of Calico Road On-Ramp	3,241	1,215	4,456	2	0	4,458	1,867	701	2,568	2	0	2,570

	Southbound											
	Friday Peak Hour						Sunday Peak Hour					
	Without Project			Project Trips		With Project	Without Project			Project Trips		With Project
Freeway Segment	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Autos	Autos	Truck PCE	Total PCE	Primary Trips	Diverted Link Trips	Autos
Interstate 15												
6 North of Calico Road Off-Ramp	1,949	746	2,695	2	0	2,697	3,046	1,143	4,189	2	0	4,191
7 Calico Road Off-Ramp	1	4	5	2	61	68	10	0	10	2	101	113
8 Calico Road Off-Ramp to Calico Road On-Ramp	1,947	742	2,689	0	-61	2,628	3,037	1,143	4,180	0	-101	4,079
9 Calico Road On-Ramp	62	4	66	4	61	131	53	3	56	4	101	161
10 South of Calico Road On-Ramp	2,009	746	2,755	4	0	2,759	3,090	1,145	4,235	4	0	4,239

Table L - Year 2035 Freeway Segment and Ramp Levels of Service

Segment/Ramp	Type	Without Project						With Project					
		Friday Peak Hour			Sunday Peak Hour			Friday Peak Hour			Sunday Peak Hour		
		Speed (m/hr)	Density (pc/m/ln)	LOS	Speed (m/hr)	Density (pc/m/ln)	LOS	Speed (m/hr)	Density (pc/m/ln)	LOS	Speed (m/hr)	Density (pc/m/ln)	LOS
Interstate 15 Northbound													
1 . South of Calico Road Off-Ramp	Basic	54.2	43.6	E *	69.7	19.6	C	54.2	43.7	E *	69.7	19.6	C
2 . Calico Road Off-Ramp	1 Lane Off	57.9	43.2	E *	57.9	25.9	C	57.6	42.3	E *	57.7	25.4	C
3 . Calico Road Off-Ramp to Calico Road On-Ramp	Basic	54.9	42.7	E *	69.8	19.2	C	56.2	40.7	E *	69.9	18.7	C
4 . Calico Road On-Ramp	1 Lane On	49.0	41.1	E *	60.0	25.6	C	49.0	41.1	E *	60.0	25.6	C
5 . North of Calico Road On-Ramp	Basic	54.8	42.8	E *	69.7	19.4	C	54.8	42.8	E *	69.7	19.4	C
Interstate 15 Southbound													
6 . North of Calico Road Off-Ramp	Basic	69.4	20.4	C	58.3	37.8	E *	69.4	20.4	C	58.3	37.9	E *
7 . Calico Road Off-Ramp	1 Lane Off	58.0	27.2	C	58.0	40.7	E *	57.8	26.7	C	57.7	39.8	E *
8 . Calico Road Off-Ramp to Calico Road On-Ramp	Basic	69.5	20.4	C	58.4	37.7	E *	69.6	19.9	C	59.6	36.0	E *
9 . Calico Road On-Ramp	1 Lane On	59.0	26.8	C	52.0	39.0	E *	59.0	26.8	C	52.0	39.0	E *
10 . South of Calico Road On-Ramp	Basic	69.3	20.9	C	57.7	38.6	E *	69.3	21.0	C	57.7	38.7	E *

* = Exceed's Level of Service

m/hr = miles per hour

pc/m/ln = passenger cars per mile per lane

- I-15 Southbound:
  - North of Calico Road Off-Ramp (Sunday peak hour);
  - Calico Road Off-Ramp merge/diverge (Sunday peak hour);
  - Calico Road Off-Ramp to Calico Road On-Ramp (Sunday peak hour);
  - Calico Road On-Ramp merge/diverge (Sunday peak hour); and
  - South of Calico Road On-Ramp (Sunday peak hour).

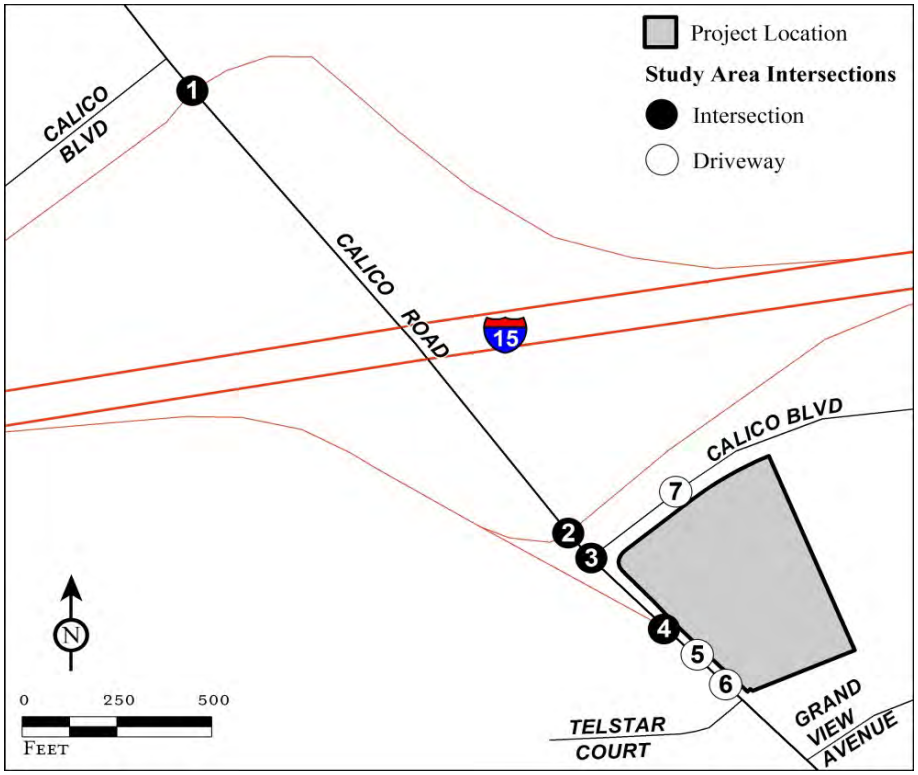
Year 2035 With Project Conditions

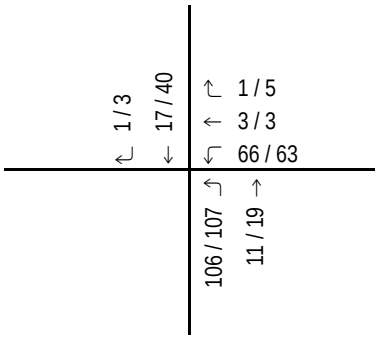
The year 2035 with project condition considers the addition of traffic generated by the proposed project to the year 2035 without project conditions. Figure 15 illustrates year 2035 with project a.m. and p.m. peak hour traffic volumes at study area intersections. A level of service analysis was conducted to evaluate year 2035 with project a.m. and p.m. peak hour traffic operations at study area intersections. As shown in previously referenced Table H, all study area intersections are projected to operate at satisfactory levels of service. Detailed level of service worksheets are included in Appendix C.

A freeway mainline and merge/diverge analysis for Friday and Sunday peak hours was conducted for year 2035 with project conditions. Previously referenced Table K summarizes the year 2035 with project Friday and Sunday peak hour volumes and previously referenced Table L summarizes the levels of service. As shown in Table L, all freeway segments and merge/diverge areas are projected to operate at satisfactory levels of service with the exception of the following:

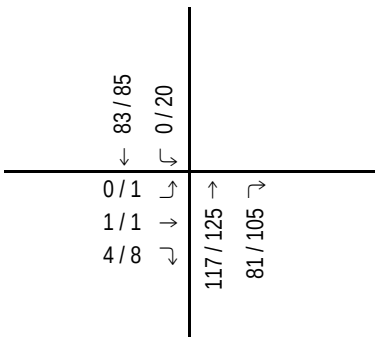
- I-15 Northbound:
  - South of Calico Off-Ramp (Friday peak hour);
  - Calico Road Off-Ramp merge/diverge (Friday peak hour);
  - Calico Road Off-Ramp to Calico Road On-Ramp (Friday peak hour);
  - Calico Road On-Ramp merge/diverge (Friday peak hour); and
  - North of Calico Road On-Ramp (Friday peak hour).
- I-15 Southbound:
  - North of Calico Road Off-Ramp (Sunday peak hour);
  - Calico Road Off-Ramp merge/diverge (Sunday peak hour);
  - Calico Road Off-Ramp to Calico Road On-Ramp (Sunday peak hour);
  - Calico Road On-Ramp merge/diverge (Sunday peak hour); and
  - South of Calico Road On-Ramp (Sunday peak hour).

It should be noted that these freeway merge/diverge areas also operate at unsatisfactory levels of service without the project.

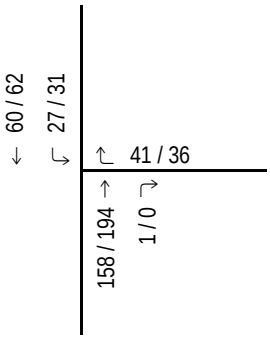




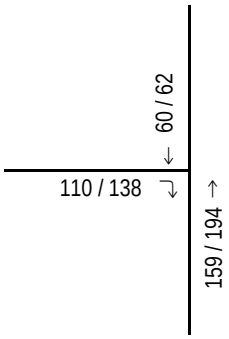
1 Calico Rd/I-15 SB Ramps



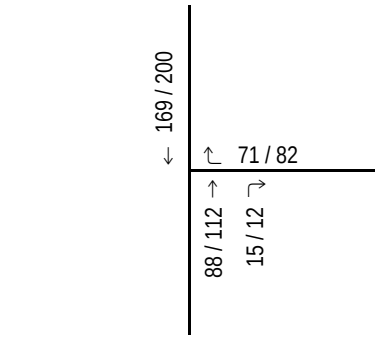
2 Calico Rd/I-15 NB Ramps



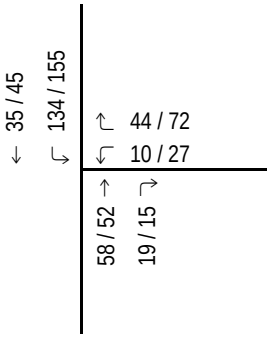
3 Calico Rd/Calico Blvd



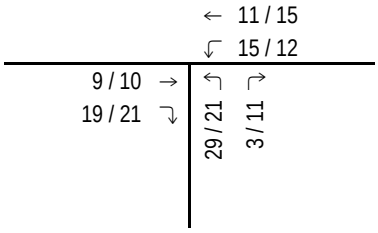
4 Calico Rd/I-15 NB Off-Ramp



5 Calico Rd/Driveway 1



6 Calico Rd/Driveway 2



7 Driveway 3/Calico Blvd

LSA

FIGURE 15

XX / YY AM / PM Peak Hour Traffic Volumes

Yermo Travel Stop
Traffic Study

Year 2035 With Project Peak Hour Traffic Volumes

CIRCULATION IMPROVEMENTS

Intersections

Under existing, opening year, and year 2035 conditions, all study intersections operate or are projected to operate at satisfactory levels of service without and with the proposed project.

Freeways

Under existing, opening year, and year 2035 conditions, several freeway facilities operate at unsatisfactory levels of service without and with the project. Therefore, the project would add to the existing deficiencies on I-15. These freeway segments are already operating at unsatisfactory levels of service in the no project condition; thus, the increase in delay would be considered a cumulative impact and not a direct result of the project. There are currently no improvements planned at these facilities. Additionally, no Caltrans funding programs are available for the project applicant to contribute fair-share funding toward freeway improvements although the County may collect a fair share contribution if needed.

SITE ACCESS ANALYSIS

Intersection stopping site distance was analyzed to determine the safety of driveway ingress and egress movements at the proposed driveways at Calico Road/Driveway 1, Calico Road/Driveway 2, and Driveway 3/Calico Boulevard. Based on the Caltrans Highway Design Manual Table 201.1, the minimum stopping distance is the distance required by the driver to bring the vehicle to a stop after an object on the road becomes visible. Calico Road has a design speed of 50 miles per hour with a minimum stopping distance of 430 feet and Calico Boulevard has a design speed of 25 miles per hour with a minimum stopping distance of 150 feet. All project driveways are at 90-degree angles to their adjacent streets with level ground (no rolling hills or signs). Based on the location of the driveways, there is sufficient stopping distance at all driveways.

The County Draft Interim Traffic Impact Study Guidelines (February 2013) require a right-turn deceleration lane if the project right-turn peak hour volume is 50 or more vehicles. The peak hour right-turn volume is 15 vehicles at Calico Road/Driveway 1 (northbound right), 19 vehicles at Calico Road/Driveway 2 (northbound right), and 21 vehicles at Driveway 3/Calico Boulevard. Therefore, a dedicated right-turn lane is not required at any of the project driveways.

QUEUING ANALYSIS

A queuing analysis on Calico Road was conducted at Calico Road/I-15 Northbound Ramps (eastbound left-turn/through/right-turn), Calico Road/I-15 Northbound Off-Ramp (eastbound right-turn), and Calico Road/Driveway 2 (southbound left-turn) to determine the sufficiency of the storage lengths at each location. Table M summarizes the queuing analysis and shows the maximum vehicle queue length at any location is one vehicle; therefore, there is adequate storage length available for each location.

Table M - Intersection Queue Summary (95th Percentile)

Intersection	Movement	Existing		Existing With Project		Opening Year Without Project		Opening Year With Project		Year 2035 Without Project		Year 2035 With Project	
		95th Percentile Queue (Vehicles/lane)		95th Percentile Queue (Vehicles/lane)		95th Percentile Queue (Vehicles/lane)		95th Percentile Queue (Vehicles/lane)		95th Percentile Queue (Vehicles/lane)		95th Percentile Queue (Vehicles/lane)	
		A.M. Peak Hour	P.M. Peak Hour	A.M. Peak Hour	P.M. Peak Hour	A.M. Peak Hour	P.M. Peak Hour	A.M. Peak Hour	P.M. Peak Hour	A.M. Peak Hour	P.M. Peak Hour	A.M. Peak Hour	P.M. Peak Hour
2 . Calico Road/Interstate 15 Northbound Ramps	EBLTR	0	0	0	0	0	0	0	0	0	0	0	0
4 . Calico Road/Interstate 15 Northbound Off-Ramp	EBR	0.1	0.1	0.4	0.7	0.1	0.1	0.4	0.7	0.1	0.1	0.5	0.8
6 . Calico Road/Driveway 2	SBL	-	-	0.3	0.4	-	-	0.3	0.4	-	-	0.3	0.4

Notes:
All queues reported are 95th percentile queues.
The 95th-percentile queue is defined to be the queue length that has only a 5-percent probability of being exceeded during the analysis time period.

SUMMARY

The proposed Yermo Travel Stop to be located at the southeast corner of Calico Road/Calico Boulevard in the unincorporated Yermo area of San Bernardino County, California is projected to generate 70 a.m. peak hour, 80 p.m. peak hour, and 1,139 daily net new primary trips. Opening year of the project is 2015. Under existing, opening year, and year 2035 conditions, all study intersections operate at or are projected to operate at satisfactory levels of service without and with the proposed project. Under existing, opening year, and year 2035 conditions, several freeway facilities operate at unsatisfactory levels of service without and with the project. Therefore, the project would add to the existing deficiencies on I-15. These freeway segments are already operating at unsatisfactory levels of service in the no project condition; thus, the increase in delay would be considered a cumulative impact and not a direct result of the project. There are currently no improvements planned at these facilities. Additionally, no Caltrans funding programs are available for the project applicant to contribute fair-share funding toward freeway improvements although the County may collect a fair share contribution if needed.

APPENDIX A:

TRAFFIC COUNT SHEETS

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Calico Rd and Interstate 15 SB Ramps , Yermo

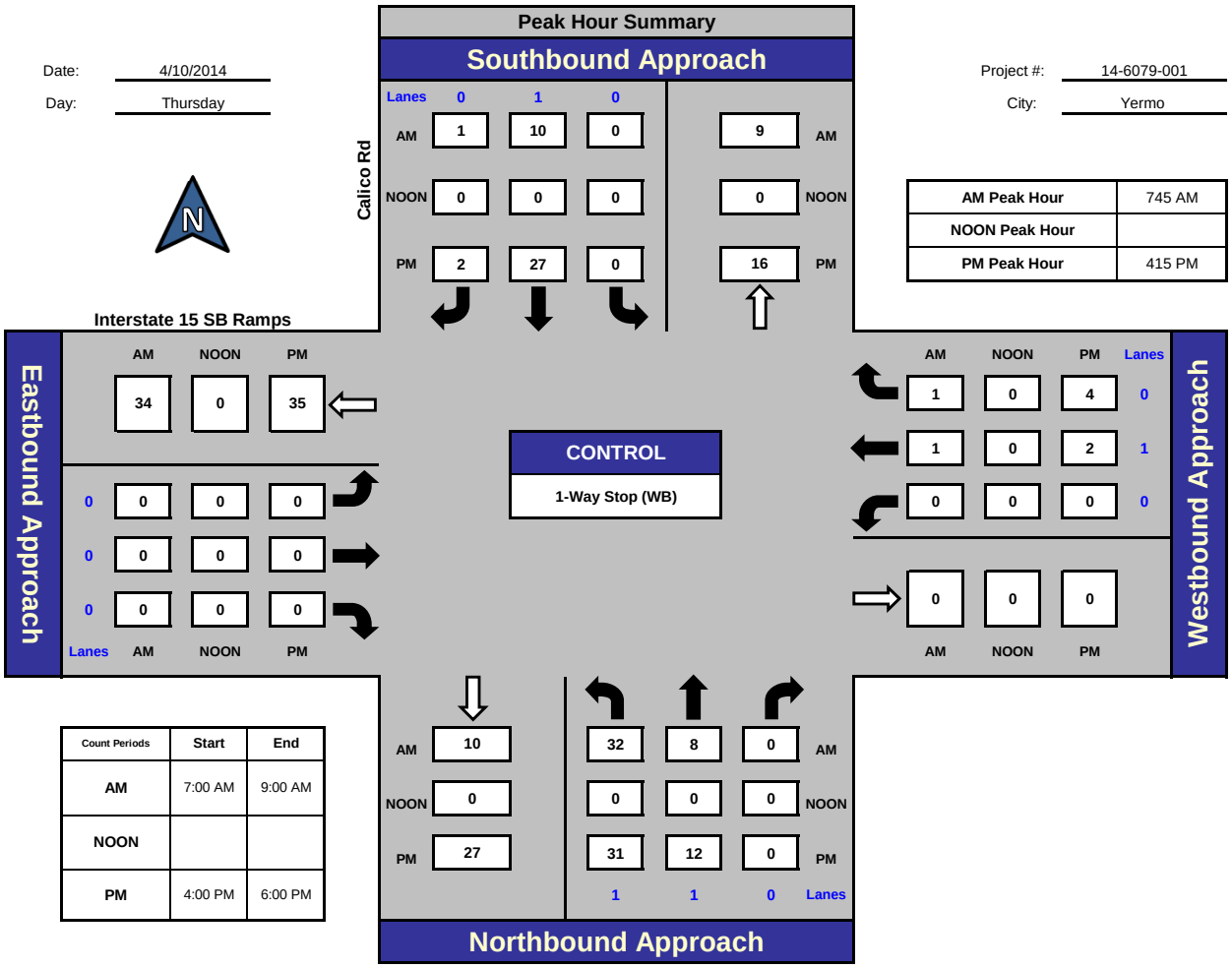
Date: 4/10/2014

Day: Thursday

Project #: 14-6079-001

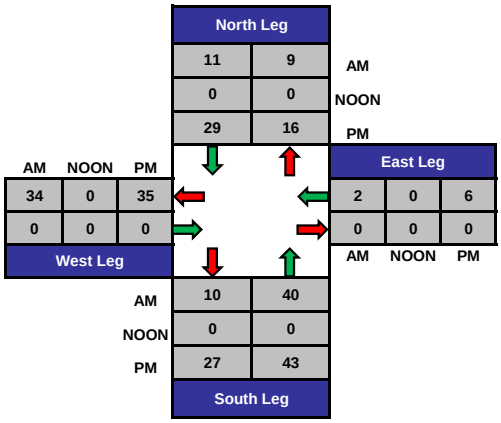
City: Yermo

AM Peak Hour	745 AM
NOON Peak Hour	
PM Peak Hour	415 PM

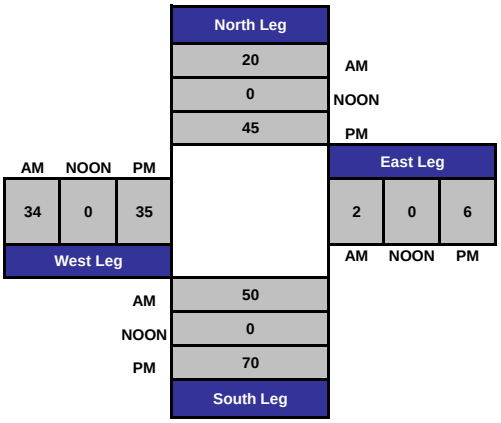


Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

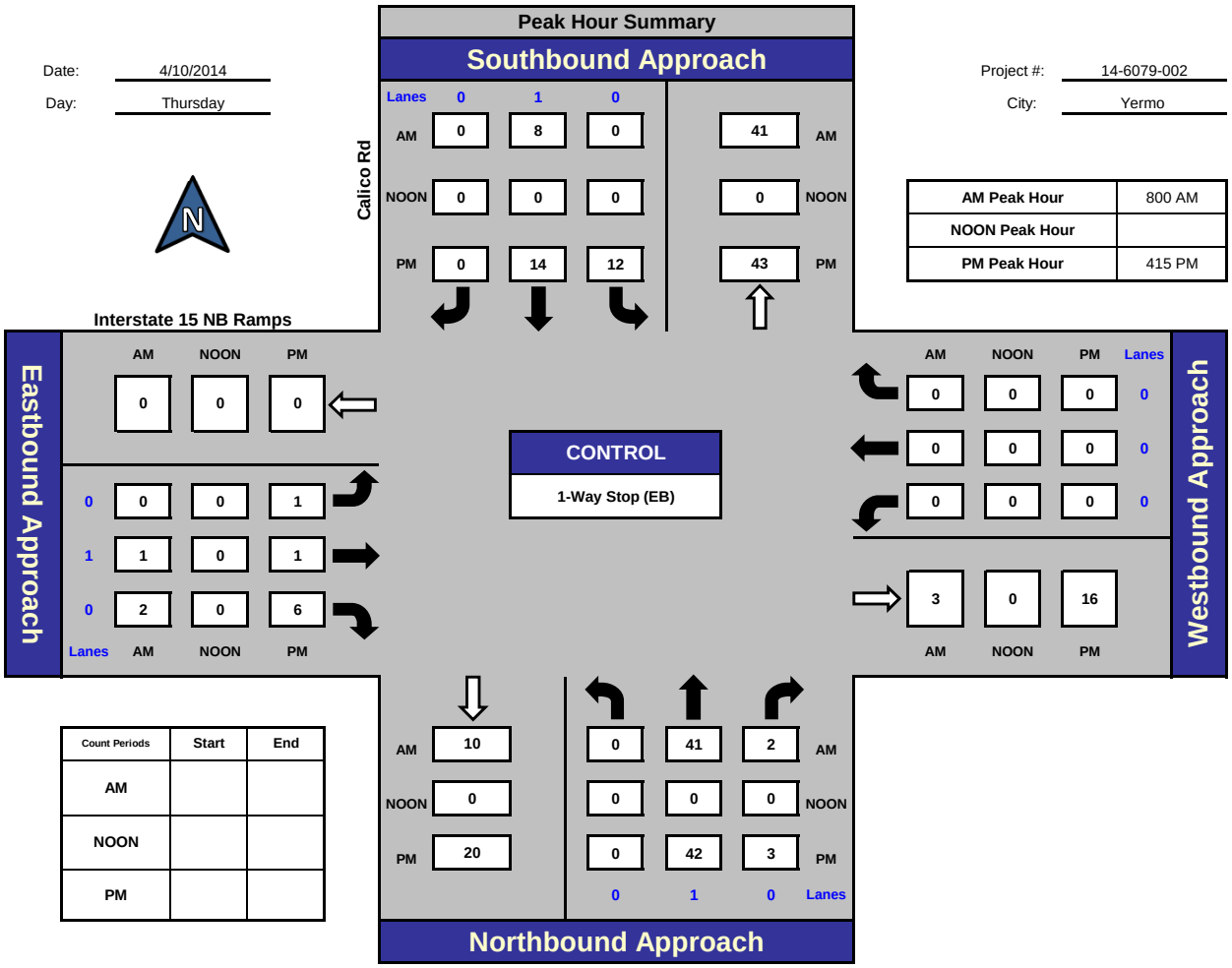
Calico Rd and Interstate 15 NB Ramps , Yermo

Date: 4/10/2014

Day: Thursday

Project #: 14-6079-002

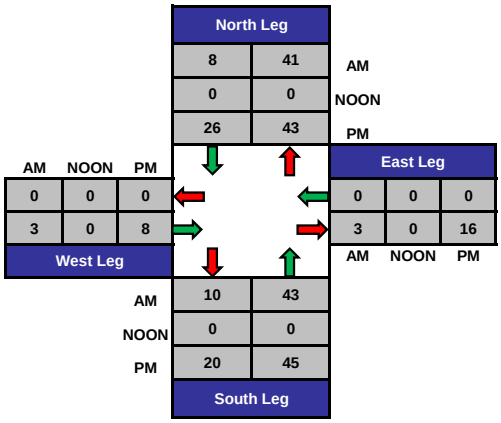
City: Yermo



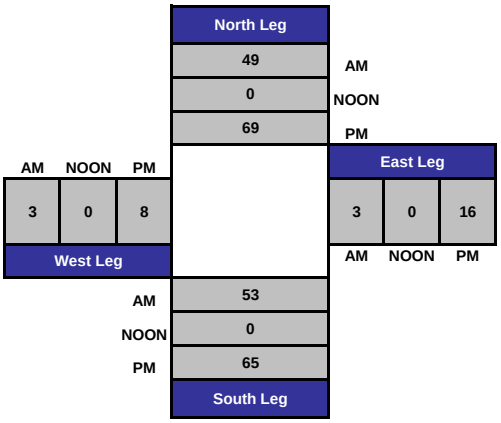
Count Periods	Start	End
AM		
NOON		
PM		

AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	415 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Calico Rd and Calico Blvd , Yermo

Date: 4/10/2014

Day: Thursday

Project #: 14-6079-003

City: Yermo

AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	415 PM

Peak Hour Summary

Southbound Approach

Lanes	0	1	0		
AM	0	5	4	43	AM
NOON	0	0	0	0	NOON
PM	0	11	9	45	PM

Calico Rd

Calico Blvd

Eastbound Approach

	AM	NOON	PM
	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
Lanes	AM	NOON	PM

Westbound Approach

	AM	NOON	PM	Lanes
	9	0	12	0
	0	0	0	1
	0	0	0	0
	5	0	9	
	AM	NOON	PM	

CONTROL

1-Way Stop (WB)

Count Periods	Start	End
AM		
NOON		
PM		

Northbound Approach

AM	5	0	34	1	AM
NOON	0	0	0	0	NOON
PM	11	0	33	0	PM
		0	1	0	Lanes

Total Ins & Outs

North Leg			
9	43	AM	
0	0	NOON	
20	45	PM	
AM NOON PM		East Leg	
0 0 0		9 0 12	
0 0 0		5 0 9	
West Leg		AM NOON PM	
AM	5	35	
NOON	0	0	
PM	11	33	
South Leg			

Total Volume Per Leg

North Leg			
52		AM	
0		NOON	
65		PM	
AM NOON PM		East Leg	
0 0 0		14 0 21	
West Leg		AM NOON PM	
AM	40		
NOON	0		
PM	44		
South Leg			

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Calico Rd and Interstate 15 NB Off-Ramp , Yermo

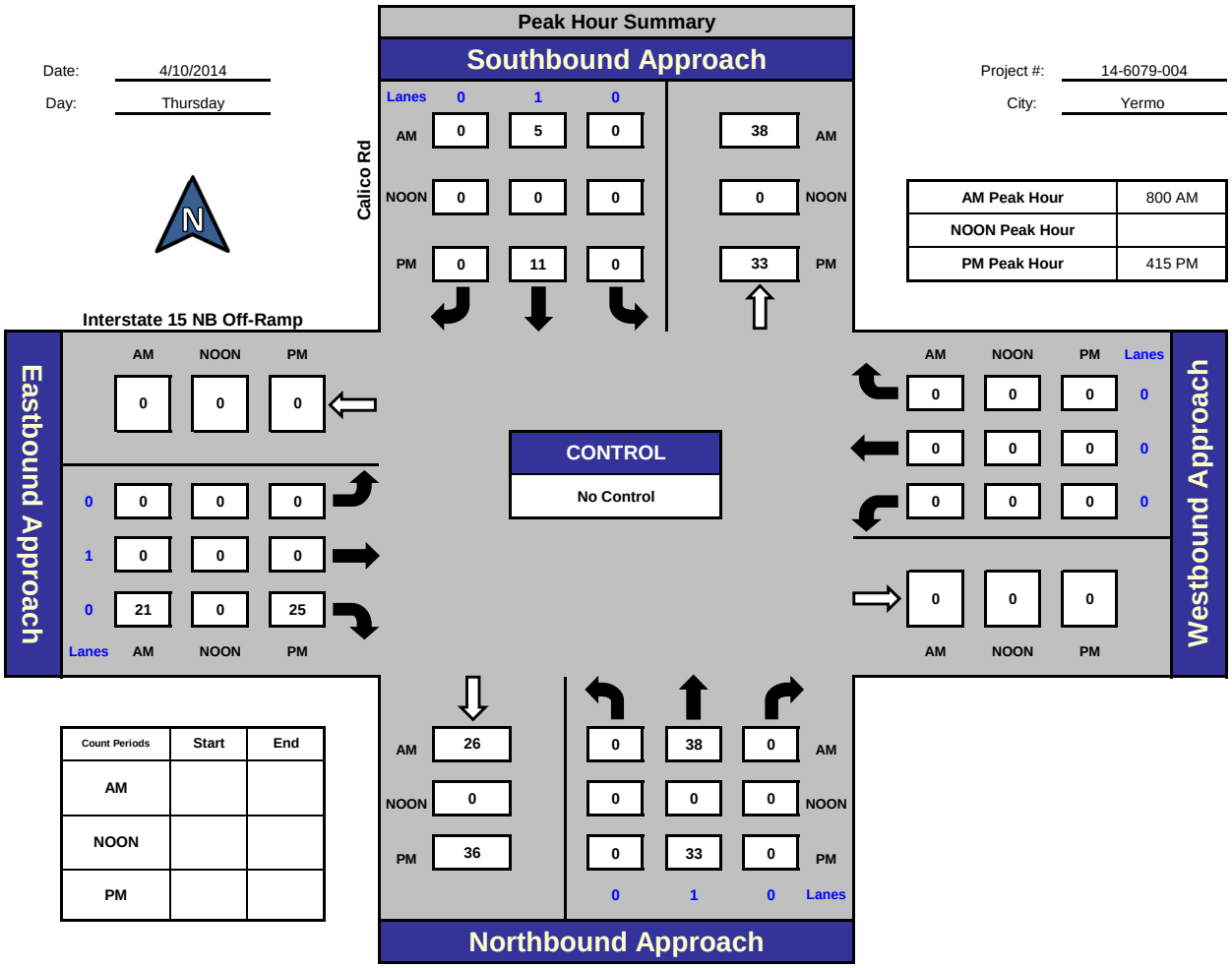
Date: 4/10/2014

Day: Thursday

Project #: 14-6079-004

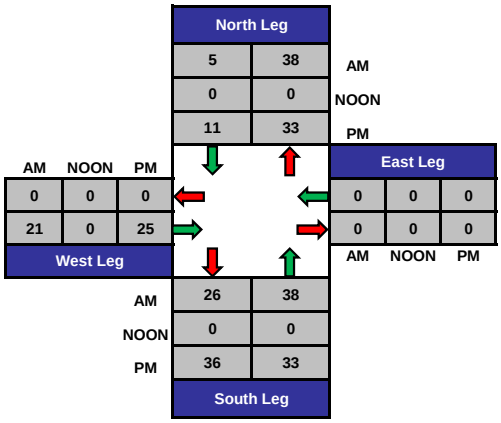
City: Yermo

AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	415 PM

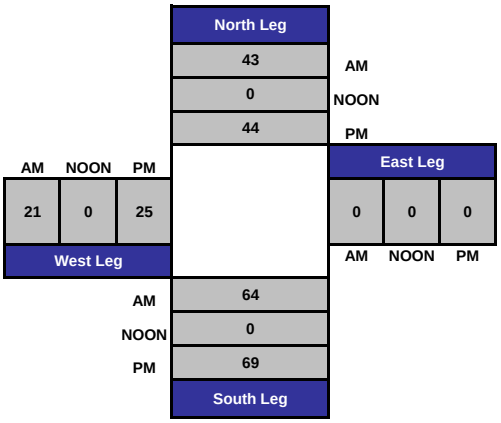


Count Periods	Start	End
AM		
NOON		
PM		

Total Ins & Outs



Total Volume Per Leg



Prepared by NDS/ATD

VOLUME

Calico Rd N/o Telstar Court

Day: Thursday
Date: 4/10/2014

City: Yermo
Project #: CA14_6080_001

DAILY TOTALS	NB	SB	EB	WB	Total
	417	406	0	0	823

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	0		2						2		12:00	4		7						11	
00:15	0		0						0		12:15	6		7						13	
00:30	0		0						0		12:30	8		5						13	
00:45	1	1	0	2					1	3	12:45	3	21	1	20					4	41
01:00	0		0						0		13:00	5		7						12	
01:15	1		0						1		13:15	7		10						17	
01:30	0		0						0		13:30	7		12						19	
01:45	0	1	0						0	1	13:45	9	28	5	34					14	62
02:00	1		0						1		14:00	9		9						18	
02:15	0		0						0		14:15	10		9						19	
02:30	0		0						0		14:30	12		11						23	
02:45	0	1	0						0	1	14:45	4	35	5	34					9	69
03:00	1		0						1		15:00	10		21						31	
03:15	0		1						1		15:15	29		6						35	
03:30	0		0						0		15:30	7		5						12	
03:45	0	1	0	1					0	2	15:45	3	49	5	37					8	86
04:00	0		0						0		16:00	8		10						18	
04:15	0		0						0		16:15	8		10						18	
04:30	2		1						3		16:30	6		11						17	
04:45	2	4	0	1					2	5	16:45	6	28	4	35					10	63
05:00	0		1						1		17:00	14		9						23	
05:15	2		0						2		17:15	3		15						18	
05:30	2		0						2		17:30	6		11						17	
05:45	6	10	0	1					6	11	17:45	3	26	6	41					9	67
06:00	3		0						3		18:00	6		4						10	
06:15	6		3						9		18:15	5		9						14	
06:30	3		1						4		18:30	3		5						8	
06:45	5	17	1	5					6	22	18:45	4	18	9	27					13	45
07:00	2		3						5		19:00	4		4						8	
07:15	5		1						6		19:15	2		3						5	
07:30	5		8						13		19:30	3		3						6	
07:45	1	13	10	22					11	35	19:45	2	11	8	18					10	29
08:00	10		9						19		20:00	4		4						8	
08:15	14		7						21		20:15	6		6						12	
08:30	9		2						11		20:30	3		5						8	
08:45	5	38	8	26					13	64	20:45	8	21	5	20					13	41
09:00	8		2						10		21:00	2		2						4	
09:15	8		3						11		21:15	1		2						3	
09:30	6		5						11		21:30	2		2						4	
09:45	4	26	6	16					10	42	21:45	0	5	2	8					2	13
10:00	7		5						12		22:00	1		6						7	
10:15	7		5						12		22:15	3		0						3	
10:30	6		7						13		22:30	1		2						3	
10:45	11	31	9	26					20	57	22:45	1	6	3	11					4	17
11:00	7		7						14		23:00	2		3						5	
11:15	7		3						10		23:15	1		1						2	
11:30	6		4						10		23:30	0		0						0	
11:45	3	23	1	15					4	38	23:45	0	3	2	6					2	9
TOTALS		166		115						**281**	**TOTALS**		251		291						**542**
SPLIT %		59.1%		40.9%						**34.1%**	**SPLIT %**		46.3%		53.7%						**65.9%**

DAILY TOTALS	NB	SB	EB	WB	Total
	417	406	0	0	823

AM Peak Hour	08:00	07:30			**07:30**	**PM Peak Hour**	14:30	14:15			**14:30**
AM Pk Volume	38	34			**64**	**PM Pk Volume**	55	46			**98**
Pk Hr Factor	0.679	0.850			**0.762**	**Pk Hr Factor**	0.474	0.548			**0.700**
7 - 9 Volume	51	48	0	0	**99**	**4 - 6 Volume**	54	76	0	0	**130**
7 - 9 Peak Hour	08:00	07:30			**07:30**	**4 - 6 Peak Hour**	16:15	17:00			**16:15**
7 - 9 Pk Volume	38	34	0	0	**64**	**4 - 6 Pk Volume**	34	41	0	0	**68**
Pk Hr Factor	0.679	0.850	0.000	0.000	**0.762**	**Pk Hr Factor**	0.607	0.683	0.000	0.000	**0.739**

Prepared by NDS/ATD

VOLUME

Calico Rd N/o Telstar Court

Day: Friday
Date: 4/11/2014

City: Yermo
Project #: CA14_6080_001

DAILY TOTALS	NB	SB	EB	WB	Total
	361	363	0	0	724

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	1		0						1		12:00	6		7						13	
00:15	0		0						0		12:15	3		5						8	
00:30	2		1						3		12:30	3		9						12	
00:45	1	4	1	2					2	6	12:45	7	19	8	29					15	48
01:00	0		1						1		13:00	6		3						9	
01:15	0		0						0		13:15	9		5						14	
01:30	1		1						2		13:30	6		5						11	
01:45	1	2	0	2					1	4	13:45	7	28	9	22					16	50
02:00	0		0						0		14:00	12		5						17	
02:15	0		0						0		14:15	6		8						14	
02:30	0		0						0		14:30	9		8						17	
02:45	1	1	0						1	1	14:45	2	29	5	26					7	55
03:00	0		1						1		15:00	8		9						17	
03:15	1		1						2		15:15	8		11						19	
03:30	1		0						1		15:30	6		6						12	
03:45	0	2	0	2					0	4	15:45	6	28	4	30					10	58
04:00	0		1						1		16:00	11		6						17	
04:15	0		0						0		16:15	4		6						10	
04:30	0		3						3		16:30	6		8						14	
04:45	0		1	5					1	5	16:45	4	25	4	24					8	49
05:00	0		1						1		17:00	12		12						24	
05:15	0		4						4		17:15	9		6						15	
05:30	0		1						1		17:30	5		6						11	
05:45	0		2	8					2	8	17:45	5	31	5	29					10	60
06:00	0		4						4		18:00	9		8						17	
06:15	0		1						1		18:15	2		4						6	
06:30	3		4						7		18:30	7		2						9	
06:45	1	4	4	13					5	17	18:45	4	22	3	17					7	39
07:00	3		2						5		19:00	5		2						7	
07:15	6		2						8		19:15	2		4						6	
07:30	3		3						6		19:30	2		7						9	
07:45	13	25	4	11					17	36	19:45	1	10	4	17					5	27
08:00	14		2						16		20:00	5		2						7	
08:15	9		11						20		20:15	3		2						5	
08:30	3		11						14		20:30	6		2						8	
08:45	4	30	7	31					11	61	20:45	2	16	0	6					2	22
09:00	4		1						5		21:00	4		3						7	
09:15	1		9						10		21:15	5		0						5	
09:30	3		5						8		21:30	5		2						7	
09:45	3	11	4	19					7	30	21:45	3	17	1	6					4	23
10:00	3		3						6		22:00	3		2						5	
10:15	3		4						7		22:15	1		4						5	
10:30	8		9						17		22:30	0		1						1	
10:45	5	19	10	26					15	45	22:45	5	9	3	10					8	19
11:00	5		8						13		23:00	0		0						0	
11:15	6		6						12		23:15	2		1						3	
11:30	10		5						15		23:30	3		0						3	
11:45	2	23	8	27					10	50	23:45	1	6	0	1					1	7
TOTALS		121		146						267	TOTALS		240		217						457
SPLIT %		45.3%		54.7%						36.9%	SPLIT %		52.5%		47.5%						63.1%

DAILY TOTALS	NB	SB	EB	WB	Total
	361	363	0	0	724

AM Peak Hour	07:30	10:30			07:45	PM Peak Hour	13:15	14:30			13:45
AM Pk Volume	39	33			67	PM Pk Volume	34	33			64
Pk Hr Factor	0.696	0.825			0.838	Pk Hr Factor	0.708	0.750			0.941
7 - 9 Volume	55	42	0	0	97	4 - 6 Volume	56	53	0	0	109
7 - 9 Peak Hour	07:30	08:00			07:45	4 - 6 Peak Hour	16:30	16:15			16:30
7 - 9 Pk Volume	39	31	0	0	67	4 - 6 Pk Volume	31	30	0	0	61
Pk Hr Factor	0.696	0.705	0.000	0.000	0.838	Pk Hr Factor	0.646	0.625	0.000	0.000	0.635

Prepared by NDS/ATD

VOLUME

Calico Rd N/o Telstar Court

Day: Saturday
Date: 4/12/2014

City: Yermo
Project #: CA14_6080_001

DAILY TOTALS	NB	SB	EB	WB	Total
	312	333	0	0	645

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	3		1						4		12:00	2		10						12	
00:15	0		1						1		12:15	4		5						9	
00:30	0		0						0		12:30	10		8						18	
00:45	3	6	0	2					3	8	12:45	6	22	7	30					13	52
01:00	0		0						0		13:00	6		8						14	
01:15	0		0						0		13:15	10		12						22	
01:30	0		0						0		13:30	5		6						11	
01:45	0		1	1					1	1	13:45	5	26	6	32					11	58
02:00	0		0						0		14:00	4		3						7	
02:15	0		1						1		14:15	5		4						9	
02:30	2		1						3		14:30	5		4						9	
02:45	1	3	0	2					1	5	14:45	11	25	7	18					18	43
03:00	0		0						0		15:00	1		6						7	
03:15	0		1						1		15:15	17		12						29	
03:30	1		1						2		15:30	5		7						12	
03:45	0	1	0	2					0	3	15:45	4	27	3	28					7	55
04:00	0		1						1		16:00	9		3						12	
04:15	0		0						0		16:15	4		2						6	
04:30	0		1						1		16:30	7		2						9	
04:45	1	1	1	3					2	4	16:45	1	21	4	11					5	32
05:00	2		1						3		17:00	2		4						6	
05:15	0		0						0		17:15	5		5						10	
05:30	0		1						1		17:30	6		9						15	
05:45	0	2	1	3					1	5	17:45	10	23	2	20					12	43
06:00	0		0						0		18:00	4		0						4	
06:15	0		5						5		18:15	3		10						13	
06:30	1		2						3		18:30	7		4						11	
06:45	3	4	3	10					6	14	18:45	5	19	4	18					9	37
07:00	1		3						4		19:00	4		2						6	
07:15	1		3						4		19:15	2		4						6	
07:30	2		0						2		19:30	3		2						5	
07:45	2	6	5	11					7	17	19:45	3	12	4	12					7	24
08:00	4		2						6		20:00	3		2						5	
08:15	5		10						15		20:15	2		2						4	
08:30	2		6						8		20:30	6		1						7	
08:45	3	14	6	24					9	38	20:45	2	13	2	7					4	20
09:00	4		7						11		21:00	4		3						7	
09:15	3		7						10		21:15	3		1						4	
09:30	4		6						10		21:30	2		0						2	
09:45	3	14	10	30					13	44	21:45	1	10	2	6					3	16
10:00	3		7						10		22:00	6		1						7	
10:15	5		7						12		22:15	4		1						5	
10:30	5		9						14		22:30	1		0						1	
10:45	5	18	4	27					9	45	22:45	3	14	1	3					4	17
11:00	9		6						15		23:00	0		0						0	
11:15	8		8						16		23:15	2		4						6	
11:30	4		9						13		23:30	1		0						1	
11:45	6	27	6	29					12	56	23:45	1	4	0	4					1	8
TOTALS		96		144						240	TOTALS		216		189						405
SPLIT %		40.0%		60.0%						37.2%	SPLIT %		53.3%		46.7%						62.8%

DAILY TOTALS	NB	SB	EB	WB	Total
	312	333	0	0	645

AM Peak Hour	10:30	09:45			11:00	PM Peak Hour	15:15	12:30			12:30
AM Pk Volume	27	33			56	PM Pk Volume	35	35			67
Pk Hr Factor	0.750	0.825			0.875	Pk Hr Factor	0.515	0.729			0.761
7 - 9 Volume	20	35	0	0	55	4 - 6 Volume	44	31	0	0	75
7 - 9 Peak Hour	08:00	08:00			08:00	4 - 6 Peak Hour	17:00	16:45			17:00
7 - 9 Pk Volume	14	24	0	0	38	4 - 6 Pk Volume	23	22	0	0	43
Pk Hr Factor	0.700	0.600	0.000	0.000	0.633	Pk Hr Factor	0.575	0.611	0.000	0.000	0.717

Prepared by NDS/ATD

VOLUME

Calico Rd N/o Telstar Court

Day: Sunday
Date: 4/13/2014

City: Yermo
Project #: CA14_6080_001

DAILY TOTALS	NB	SB	EB	WB	Total
	244	300	0	0	544

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	1		0						1		12:00	5		6						11	
00:15	1		0						1		12:15	2		2						4	
00:30	0		0						0		12:30	0		7						7	
00:45	1	3	1	1					2	4	12:45	1	8	8	23					9	31
01:00	0		0						0		13:00	3		7						10	
01:15	0		3						3		13:15	4		4						8	
01:30	0		0						0		13:30	7		2						9	
01:45	2	2	0	3					2	5	13:45	7	21	9	22					16	43
02:00	1		0						1		14:00	5		6						11	
02:15	0		0						0		14:15	3		5						8	
02:30	0		0						0		14:30	7		2						9	
02:45	1	2	0						1	2	14:45	2	17	2	15					4	32
03:00	0		0						0		15:00	3		6						9	
03:15	0		0						0		15:15	5		6						11	
03:30	0		0						0		15:30	5		4						9	
03:45	2	2	1	1					3	3	15:45	3	16	3	19					6	35
04:00	2		0						2		16:00	3		3						6	
04:15	0		0						0		16:15	3		3						6	
04:30	0		0						0		16:30	6		4						10	
04:45	0	2	0						0	2	16:45	3	15	2	12					5	27
05:00	0		0						0		17:00	2		4						6	
05:15	1		1						2		17:15	6		4						10	
05:30	1		1						2		17:30	8		12						20	
05:45	0	2	1	3					1	5	17:45	8	24	3	23					11	47
06:00	0		2						2		18:00	6		9						15	
06:15	0		1						1		18:15	2		8						10	
06:30	1		2						3		18:30	8		5						13	
06:45	1	2	3	8					4	10	18:45	4	20	7	29					11	49
07:00	1		0						1		19:00	6		3						9	
07:15	0		1						1		19:15	2		4						6	
07:30	3		1						4		19:30	2		3						5	
07:45	1	5	4	6					5	11	19:45	6	16	4	14					10	30
08:00	1		1						2		20:00	5		1						6	
08:15	3		3						6		20:15	2		2						4	
08:30	3		4						7		20:30	5		1						6	
08:45	2	9	6	14					8	23	20:45	3	15	2	6					5	21
09:00	3		2						5		21:00	0		6						6	
09:15	2		9						11		21:15	1		5						6	
09:30	3		4						7		21:30	5		3						8	
09:45	3	11	5	20					8	31	21:45	2	8	1	15					3	23
10:00	1		10						11		22:00	3		1						4	
10:15	6		5						11		22:15	3		8						11	
10:30	0		6						6		22:30	3		2						5	
10:45	8	15	4	25					12	40	22:45	0	9	2	13					2	22
11:00	5		3						8		23:00	1		1						2	
11:15	2		6						8		23:15	2		1						3	
11:30	4		5						9		23:30	1		3						4	
11:45	5	16	9	23					14	39	23:45	0	4	0	5					0	9
TOTALS		71		104						175	TOTALS		173		196						369
SPLIT %		40.6%		59.4%						32.2%	SPLIT %		46.9%		53.1%						67.8%

DAILY TOTALS	NB	SB	EB	WB	Total
	244	300	0	0	544

AM Peak Hour	10:15	09:15			11:15	PM Peak Hour	17:15	17:30			17:15
AM Pk Volume	19	28			42	PM Pk Volume	28	32			56
Pk Hr Factor	0.594	0.700			0.750	Pk Hr Factor	0.875	0.667			0.700
7 - 9 Volume	14	20	0	0	34	4 - 6 Volume	39	35	0	0	74
7 - 9 Peak Hour	08:00	08:00			08:00	4 - 6 Peak Hour	17:00	17:00			17:00
7 - 9 Pk Volume	9	14	0	0	23	4 - 6 Pk Volume	24	23	0	0	47
Pk Hr Factor	0.750	0.583	0.000	0.000	0.719	Pk Hr Factor	0.750	0.479	0.000	0.000	0.588

APPENDIX B:

VOLUME DEVELOPMENT WORKSHEETS

Yermo Travel Stop
Table B-1 Existing Peak Hour Volumes
(Intersections With Classification Counts)

	AM Peak Hour						PM Peak Hour					
	Passenger Vehicles	Trucks 2 Axle	Trucks 3 Axle	Trucks 4 Axle	Trucks PCE	Total PCE Volume	Passenger Vehicles	Trucks 2 Axle	Trucks 3 Axle	Trucks 4 Axle	Trucks PCE	Total PCE Volume
1 Calico Road/Interstate 15 Southbound Ramps												
NBL	32	0	0	0	0	32	30	1	0	0	2	32
NBT	8	0	0	0	0	8	10	2	0	0	3	13
NBR	0	0	0	0	0	0	0	0	0	0	0	0
SBL	0	0	0	0	0	0	0	0	0	0	0	0
SBT	8	2	0	0	3	11	26	0	0	1	3	29
SBR	1	0	0	0	0	1	2	0	0	0	0	2
EBL	0	0	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0	0	0	0	0
WBL	0	0	0	0	0	0	0	0	0	0	0	0
WBT	0	1	0	0	2	2	2	0	0	0	0	2
WBR	1	0	0	0	0	1	4	0	0	0	0	4
North Leg												
Approach	9	2	0	0	3	12	28	0	0	1	3	31
Departure	9	0	0	0	0	9	14	2	0	0	3	17
Total	18	2	0	0	3	21	42	2	0	1	6	48
South Leg												
Approach	40	0	0	0	0	40	40	3	0	0	5	45
Departure	8	2	0	0	3	11	26	0	0	1	3	29
Total	48	2	0	0	3	51	66	3	0	1	8	74
East Leg												
Approach	1	1	0	0	2	3	6	0	0	0	0	6
Departure	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	1	0	0	2	3	6	0	0	0	0	6
West Leg												
Approach	0	0	0	0	0	0	0	0	0	0	0	0
Departure	33	1	0	0	2	35	34	1	0	0	2	36
Total	33	1	0	0	2	35	34	1	0	0	2	36
Total Approaches												
Approach	50	3	0	0	5	55	74	3	0	1	8	82
Departure	50	3	0	0	5	55	74	3	0	1	8	82
Total	100	6	0	0	10	110	148	6	0	2	16	164

Yermo Travel Stop
Table B-1 Existing Peak Hour Volumes
(Intersections With Classification Counts)

	AM Peak Hour						PM Peak Hour					
	Passenger Vehicles	Trucks 2 Axle	Trucks 3 Axle	Trucks 4 Axle	Trucks PCE	Total PCE Volume	Passenger Vehicles	Trucks 2 Axle	Trucks 3 Axle	Trucks 4 Axle	Trucks PCE	Total PCE Volume
2 Calico Road/Interstate 15 Northbound Ramps												
NBL	0	0	0	0	0	0	0	0	0	0	0	0
NBT	41	0	0	0	0	41	39	3	0	0	5	44
NBR	1	0	1	0	2	3	3	0	0	0	0	3
SBL	0	0	0	0	0	0	11	0	0	1	3	14
SBT	8	0	0	0	0	8	14	0	0	0	0	14
SBR	0	0	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	1	0	0	0	0	1
EBT	1	0	0	0	0	1	1	0	0	0	0	1
EBR	1	1	0	0	2	3	6	0	0	0	0	6
WBL	0	0	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0	0	0	0	0
North Leg												
Approach	8	0	0	0	0	8	25	0	0	1	3	28
Departure	41	0	0	0	0	41	40	3	0	0	5	45
Total	49	0	0	0	0	49	65	3	0	1	8	73
South Leg												
Approach	42	0	1	0	2	44	42	3	0	0	5	47
Departure	9	1	0	0	2	11	20	0	0	0	0	20
Total	51	1	1	0	4	55	62	3	0	0	5	67
East Leg												
Approach	0	0	0	0	0	0	0	0	0	0	0	0
Departure	2	0	1	0	2	4	15	0	0	1	3	18
Total	2	0	1	0	2	4	15	0	0	1	3	18
West Leg												
Approach	2	1	0	0	2	4	8	0	0	0	0	8
Departure	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	1	0	0	2	4	8	0	0	0	0	8
Total Approaches												
Approach	52	1	1	0	4	56	75	3	0	1	8	83
Departure	52	1	1	0	4	56	75	3	0	1	8	83
Total	104	2	2	0	8	112	150	6	0	2	16	166

Yermo Travel Stop
Table B-1 Existing Peak Hour Volumes
(Intersections With Classification Counts)

	AM Peak Hour						PM Peak Hour					
	Passenger Vehicles	Trucks 2 Axle	Trucks 3 Axle	Trucks 4 Axle	Trucks PCE	Total PCE Volume	Passenger Vehicles	Trucks 2 Axle	Trucks 3 Axle	Trucks 4 Axle	Trucks PCE	Total PCE Volume
3 Calico Road/Calico Boulevard												
NBL	0	0	0	0	0	0	0	0	0	0	0	0
NBT	33	0	0	0	0	33	31	2	0	0	3	34
NBR	1	0	0	0	0	1	0	0	0	0	0	0
SBL	3	1	0	0	2	5	9	0	0	0	0	9
SBT	5	0	0	0	0	5	11	0	0	0	0	11
SBR	0	0	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0	0	0	0	0
WBL	0	0	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0	0	0
WBR	9	0	0	0	0	9	11	1	0	0	2	13
North Leg												
Approach	8	1	0	0	2	10	20	0	0	0	0	20
Departure	42	0	0	0	0	42	42	3	0	0	5	47
Total	50	1	0	0	2	52	62	3	0	0	5	67
South Leg												
Approach	34	0	0	0	0	34	31	2	0	0	3	34
Departure	5	0	0	0	0	5	11	0	0	0	0	11
Total	39	0	0	0	0	39	42	2	0	0	3	45
East Leg												
Approach	9	0	0	0	0	9	11	1	0	0	2	13
Departure	4	1	0	0	2	6	9	0	0	0	0	9
Total	13	1	0	0	2	15	20	1	0	0	2	22
West Leg												
Approach	0	0	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
Total Approaches												
Approach	51	1	0	0	2	53	62	3	0	0	5	67
Departure	51	1	0	0	2	53	62	3	0	0	5	67
Total	102	2	0	0	4	106	124	6	0	0	10	134

Yermo Travel Stop
Table B-1 Existing Peak Hour Volumes
(Intersections With Classification Counts)

	AM Peak Hour						PM Peak Hour					
	Passenger Vehicles	Trucks 2 Axle	Trucks 3 Axle	Trucks 4 Axle	Trucks PCE	Total PCE Volume	Passenger Vehicles	Trucks 2 Axle	Trucks 3 Axle	Trucks 4 Axle	Trucks PCE	Total PCE Volume
4 Calico Road/Interstate 15 Northbound Off-Ramp												
NBL	0	0	0	0	0	0	0	0	0	0	0	0
NBT	37	0	1	0	2	39	31	2	0	0	3	34
NBR	0	0	0	0	0	0	0	0	0	0	0	0
SBL	0	0	0	0	0	0	0	0	0	0	0	0
SBT	5	0	0	0	0	5	11	0	0	0	0	11
SBR	0	0	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0	0	0
EBR	21	0	0	0	0	21	24	0	0	1	3	27
WBL	0	0	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0	0	0	0	0
North Leg												
Approach	5	0	0	0	0	5	11	0	0	0	0	11
Departure	37	0	1	0	2	39	31	2	0	0	3	34
Total	42	0	1	0	2	44	42	2	0	0	3	45
South Leg												
Approach	37	0	1	0	2	39	31	2	0	0	3	34
Departure	26	0	0	0	0	26	35	0	0	1	3	38
Total	63	0	1	0	2	65	66	2	0	1	6	72
East Leg												
Approach	0	0	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
West Leg												
Approach	21	0	0	0	0	21	24	0	0	1	3	27
Departure	0	0	0	0	0	0	0	0	0	0	0	0
Total	21	0	0	0	0	21	24	0	0	1	3	27
Total Approaches												
Approach	63	0	1	0	2	65	66	2	0	1	6	72
Departure	63	0	1	0	2	65	66	2	0	1	6	72
Total	126	0	2	0	4	130	132	4	0	2	12	144

Yermo Travel Stop
Table B-2 Existing Peak Hour Truck Percentages

	AM Peak Hour				PM Peak Hour			
	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %
1 Calico Road/Interstate 15 Southbound Ramps								
NBL	32	0	32		30	1	31	
NBT	8	0	8		10	2	12	
NBR	0	0	0		0	0	0	
SBL	0	0	0		0	0	0	
SBT	8	2	10		26	1	27	
SBR	1	0	1		2	0	2	
EBL	0	0	0		0	0	0	
EBT	0	0	0		0	0	0	
EBR	0	0	0		0	0	0	
WBL	0	0	0		0	0	0	
WBT	0	1	1		2	0	2	
WBR	1	0	1		4	0	4	
North Leg								
Approach	9	2	11		28	1	29	
Departure	9	0	9		14	2	16	
Total	18	2	20	10.0%	42	3	45	6.7%
South Leg								
Approach	40	0	40		40	3	43	
Departure	8	2	10		26	1	27	
Total	48	2	50	4.0%	66	4	70	5.7%
East Leg								
Approach	1	1	2		6	0	6	
Departure	0	0	0		0	0	0	
Total	1	1	2	50.0%	6	0	6	0.0%
West Leg								
Approach	0	0	0		0	0	0	
Departure	33	1	34		34	1	35	
Total	33	1	34	2.9%	34	1	35	2.9%
Total Approaches								
Approach	50	3	53		74	4	78	
Departure	50	3	53		74	4	78	
Total	100	6	106	5.7%	148	8	156	5.1%

Yermo Travel Stop
Table B-2 Existing Peak Hour Truck Percentages

	AM Peak Hour				PM Peak Hour			
	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %
2 Calico Road/Interstate 15 Northbound Ramps								
NBL	0	0	0		0	0	0	
NBT	41	0	41		39	3	42	
NBR	1	1	2		3	0	3	
SBL	0	0	0		11	1	12	
SBT	8	0	8		14	0	14	
SBR	0	0	0		0	0	0	
EBL	0	0	0		1	0	1	
EBT	1	0	1		1	0	1	
EBR	1	1	2		6	0	6	
WBL	0	0	0		0	0	0	
WBT	0	0	0		0	0	0	
WBR	0	0	0		0	0	0	
North Leg								
Approach	8	0	8		25	1	26	
Departure	41	0	41		40	3	43	
Total	49	0	49	0.0%	65	4	69	5.8%
South Leg								
Approach	42	1	43		42	3	45	
Departure	9	1	10		20	0	20	
Total	51	2	53	3.8%	62	3	65	4.6%
East Leg								
Approach	0	0	0		0	0	0	
Departure	2	1	3		15	1	16	
Total	2	1	3	33.3%	15	1	16	6.3%
West Leg								
Approach	2	1	3		8	0	8	
Departure	0	0	0		0	0	0	
Total	2	1	3	33.3%	8	0	8	0.0%
Total Approaches								
Approach	52	2	54		75	4	79	
Departure	52	2	54		75	4	79	
Total	104	4	108	3.7%	150	8	158	5.1%

Yermo Travel Stop
Table B-2 Existing Peak Hour Truck Percentages

	AM Peak Hour				PM Peak Hour			
	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %
3 Calico Road/Calico Boulevard								
NBL	0	0	0		0	0	0	
NBT	33	0	33		31	2	33	
NBR	1	0	1		0	0	0	
SBL	3	1	4		9	0	9	
SBT	5	0	5		11	0	11	
SBR	0	0	0		0	0	0	
EBL	0	0	0		0	0	0	
EBT	0	0	0		0	0	0	
EBR	0	0	0		0	0	0	
WBL	0	0	0		0	0	0	
WBT	0	0	0		0	0	0	
WBR	9	0	9		11	1	12	
North Leg								
Approach	8	1	9		20	0	20	
Departure	42	0	42		42	3	45	
Total	50	1	51	2.0%	62	3	65	4.6%
South Leg								
Approach	34	0	34		31	2	33	
Departure	5	0	5		11	0	11	
Total	39	0	39	0.0%	42	2	44	4.5%
East Leg								
Approach	9	0	9		11	1	12	
Departure	4	1	5		9	0	9	
Total	13	1	14	7.1%	20	1	21	4.8%
West Leg								
Approach	0	0	0		0	0	0	
Departure	0	0	0		0	0	0	
Total	0	0	0	0.0%	0	0	0	0.0%
Total Approaches								
Approach	51	1	52		62	3	65	
Departure	51	1	52		62	3	65	
Total	102	2	104	1.9%	124	6	130	4.6%

Yermo Travel Stop
Table B-2 Existing Peak Hour Truck Percentages

	AM Peak Hour				PM Peak Hour			
	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %	Passenger Vehicles	Total Trucks	Total Vehicle Volume	Truck %
4 Calico Road/Interstate 15 Northbound Off-Ramp								
NBL	0	0	0		0	0	0	
NBT	37	1	38		31	2	33	
NBR	0	0	0		0	0	0	
SBL	0	0	0		0	0	0	
SBT	5	0	5		11	0	11	
SBR	0	0	0		0	0	0	
EBL	0	0	0		0	0	0	
EBT	0	0	0		0	0	0	
EBR	21	0	21		24	1	25	
WBL	0	0	0		0	0	0	
WBT	0	0	0		0	0	0	
WBR	0	0	0		0	0	0	
North Leg								
Approach	5	0	5		11	0	11	
Departure	37	1	38		31	2	33	
Total	42	1	43	2.3%	42	2	44	4.5%
South Leg								
Approach	37	1	38		31	2	33	
Departure	26	0	26		35	1	36	
Total	63	1	64	1.6%	66	3	69	4.3%
East Leg								
Approach	0	0	0		0	0	0	
Departure	0	0	0		0	0	0	
Total	0	0	0	0.0%	0	0	0	0.0%
West Leg								
Approach	21	0	21		24	1	25	
Departure	0	0	0		0	0	0	
Total	21	0	21	0.0%	24	1	25	4.0%
Total Approaches								
Approach	63	1	64		66	3	69	
Departure	63	1	64		66	3	69	
Total	126	2	128	1.6%	132	6	138	4.3%

Yermo Travel Stop
Table B-3 Volume Balancing For Existing Conditions

	A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
	Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
1 Calico Road/Interstate 15 Southbound Ramps						
NBL	32		32	32		32
NBT	8		8	13		13
NBR	0		0	0		0
SBL	0		0	0		0
SBT	11		11	29		29
SBR	1		1	2		2
EBL	0		0	0		0
EBT	0		0	0		0
EBR	0		0	0		0
WBL	0		0	0		0
WBT	2		2	2		2
WBR	1		1	4		4
North Leg						
Approach	12	0	12	31	0	31
Departure	9	0	9	17	0	17
Total	21	0	21	48	0	48
South Leg						
Approach	40	0	40	45	0	45
Departure	11	0	11	29	0	29
Total	51	0	51	74	0	74
East Leg						
Approach	3	0	3	6	0	6
Departure	0	0	0	0	0	0
Total	3	0	3	6	0	6
West Leg						
Approach	0	0	0	0	0	0
Departure	35	0	35	36	0	36
Total	35	0	35	36	0	36
Total Approaches						
Approach	55	0	55	82	0	82
Departure	55	0	55	82	0	82
Total	110	0	110	164	0	164

Yermo Travel Stop
Table B-3 Volume Balancing For Existing Conditions

	A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
	Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
2 Calico Road/Interstate 15 Northbound Ramps						
NBL	0		0	0		0
NBT	41	-1	40	44		44
NBR	3		3	3		3
SBL	0		0	14	1	15
SBT	8	3	11	14	1	15
SBR	0		0	0		0
EBL	0		0	1		1
EBT	1		1	1		1
EBR	3		3	6		6
WBL	0		0	0		0
WBT	0		0	0		0
WBR	0		0	0		0
North Leg						
Approach	8	3	11	28	2	30
Departure	41	-1	40	45	0	45
Total	49	2	51	73	2	75
South Leg						
Approach	44	-1	43	47	0	47
Departure	11	3	14	20	1	21
Total	55	2	57	67	1	68
East Leg						
Approach	0	0	0	0	0	0
Departure	4	0	4	18	1	19
Total	4	0	4	18	1	19
West Leg						
Approach	4	0	4	8	0	8
Departure	0	0	0	0	0	0
Total	4	0	4	8	0	8
Total Approaches						
Approach	56	2	58	83	2	85
Departure	56	2	58	83	2	85
Total	112	4	116	166	4	170

Yermo Travel Stop
Table B-3 Volume Balancing For Existing Conditions

	A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
	Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
3 Calico Road/Calico Boulevard						
NBL	0		0	0		0
NBT	33	1	34	34		34
NBR	1		1	0		0
SBL	5	2	7	9		9
SBT	5	2	7	11	1	12
SBR	0		0	0		0
EBL	0		0	0		0
EBT	0		0	0		0
EBR	0		0	0		0
WBL	0		0	0		0
WBT	0		0	0		0
WBR	9		9	13		13
North Leg						
Approach	10	4	14	20	1	21
Departure	42	1	43	47	0	47
Total	52	5	57	67	1	68
South Leg						
Approach	34	1	35	34	0	34
Departure	5	2	7	11	1	12
Total	39	3	42	45	1	46
East Leg						
Approach	9	0	9	13	0	13
Departure	6	2	8	9	0	9
Total	15	2	17	22	0	22
West Leg						
Approach	0	0	0	0	0	0
Departure	0	0	0	0	0	0
Total	0	0	0	0	0	0
Total Approaches						
Approach	53	5	58	67	1	68
Departure	53	5	58	67	1	68
Total	106	10	116	134	2	136

Yermo Travel Stop
Table B-3 Volume Balancing For Existing Conditions

	A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
	Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
4 Calico Road/Interstate 15 Northbound Off-Ramp						
NBL	0		0	0		0
NBT	39	-4	35	34		34
NBR	0		0	0		0
SBL	0		0	0		0
SBT	5	2	7	11	1	12
SBR	0		0	0		0
EBL	0		0	0		0
EBT	0		0	0		0
EBR	21		21	27		27
WBL	0		0	0		0
WBT	0		0	0		0
WBR	0		0	0		0
North Leg						
Approach	5	2	7	11	1	12
Departure	39	-4	35	34	0	34
Total	44	-2	42	45	1	46
South Leg						
Approach	39	-4	35	34	0	34
Departure	26	2	28	38	1	39
Total	65	-2	63	72	1	73
East Leg						
Approach	0	0	0	0	0	0
Departure	0	0	0	0	0	0
Total	0	0	0	0	0	0
West Leg						
Approach	21	0	21	27	0	27
Departure	0	0	0	0	0	0
Total	21	0	21	27	0	27
Total Approaches						
Approach	65	-2	63	72	1	73
Departure	65	-2	63	72	1	73
Total	130	-4	126	144	2	146

Yermo Travel Stop
Table B-4 Existing Peak Hour Volume Summary

	AM Peak Hour			PM Peak Hour		
	Existing PCE	Project Trips	Existing With Project	Existing PCE	Project Trips	Existing With Project
1 Calico Road/Interstate 15 Southbound Ramps						
NBL	32	64	96	32	65	97
NBT	8	1	9	13	2	15
NBR	0	0	0	0	0	0
SBL	0	0	0	0	0	0
SBT	11	3	14	29	2	31
SBR	1	0	1	2	0	2
EBL	0	0	0	0	0	0
EBT	0	0	0	0	0	0
EBR	0	0	0	0	0	0
WBL	0	66	66	0	63	63
WBT	2	0	2	2	0	2
WBR	1	0	1	4	0	4
North Leg						
Approach	12	3	15	31	2	33
Departure	9	1	10	17	2	19
Total	21	4	25	48	4	52
South Leg						
Approach	40	65	105	45	67	112
Departure	11	69	80	29	65	94
Total	51	134	185	74	132	206
East Leg						
Approach	3	66	69	6	63	69
Departure	0	0	0	0	0	0
Total	3	66	69	6	63	69
West Leg						
Approach	0	0	0	0	0	0
Departure	35	64	99	36	65	101
Total	35	64	99	36	65	101
Total Approaches						
Approach	55	134	189	82	132	214
Departure	55	134	189	82	132	214
Total	110	268	378	164	264	428

Yermo Travel Stop
Table B-4 Existing Peak Hour Volume Summary

		AM Peak Hour			PM Peak Hour		
		Existing PCE	Project Trips	Existing With Project	Existing PCE	Project Trips	Existing With Project
2	**Calico Road/Interstate 15 Northbound Ramps**						
NBL		0	0	0	0	0	0
NBT		40	65	105	44	67	111
NBR		3	77	80	3	101	104
SBL		0	0	0	15	0	15
SBT		11	69	80	15	65	80
SBR		0	0	0	0	0	0
EBL		0	0	0	1	0	1
EBT		1	0	1	1	0	1
EBR		3	0	3	6	0	6
WBL		0	0	0	0	0	0
WBT		0	0	0	0	0	0
WBR		0	0	0	0	0	0
North Leg							
	Approach	11	69	80	30	65	95
	Departure	40	65	105	45	67	112
	Total	51	134	185	75	132	207
South Leg							
	Approach	43	142	185	47	168	215
	Departure	14	69	83	21	65	86
	Total	57	211	268	68	233	301
East Leg							
	Approach	0	0	0	0	0	0
	Departure	4	77	81	19	101	120
	Total	4	77	81	19	101	120
West Leg							
	Approach	4	0	4	8	0	8
	Departure	0	0	0	0	0	0
	Total	4	0	4	8	0	8
Total Approaches							
	Approach	58	211	269	85	233	318
	Departure	58	211	269	85	233	318
	Total	116	422	538	170	466	636

Yermo Travel Stop
Table B-4 Existing Peak Hour Volume Summary

	AM Peak Hour			PM Peak Hour		
	Existing PCE	Project Trips	Existing With Project	Existing PCE	Project Trips	Existing With Project
3 Calico Road/Calico Boulevard						
NBL	0	0	0	0	0	0
NBT	34	113	147	34	149	183
NBR	1	0	1	0	0	0
SBL	7	18	25	9	19	28
SBT	7	51	58	12	46	58
SBR	0	0	0	0	0	0
EBL	0	0	0	0	0	0
EBT	0	0	0	0	0	0
EBR	0	0	0	0	0	0
WBL	0	0	0	0	0	0
WBT	0	0	0	0	0	0
WBR	9	29	38	13	19	32
North Leg						
Approach	14	69	83	21	65	86
Departure	43	142	185	47	168	215
Total	57	211	268	68	233	301
South Leg						
Approach	35	113	148	34	149	183
Departure	7	51	58	12	46	58
Total	42	164	206	46	195	241
East Leg						
Approach	9	29	38	13	19	32
Departure	8	18	26	9	19	28
Total	17	47	64	22	38	60
West Leg						
Approach	0	0	0	0	0	0
Departure	0	0	0	0	0	0
Total	0	0	0	0	0	0
Total Approaches						
Approach	58	211	269	68	233	301
Departure	58	211	269	68	233	301
Total	116	422	538	136	466	602

Yermo Travel Stop
Table B-4 Existing Peak Hour Volume Summary

	AM Peak Hour			PM Peak Hour		
	Existing PCE	Project Trips	Existing With Project	Existing PCE	Project Trips	Existing With Project
4 Calico Road/Interstate 15 Northbound Off-Ramp						
NBL	0	0	0	0	0	0
NBT	35	113	148	34	149	183
NBR	0	0	0	0	0	0
SBL	0	0	0	0	0	0
SBT	7	51	58	12	46	58
SBR	0	0	0	0	0	0
EBL	0	0	0	0	0	0
EBT	0	0	0	0	0	0
EBR	21	82	103	27	103	130
WBL	0	0	0	0	0	0
WBT	0	0	0	0	0	0
WBR	0	0	0	0	0	0
North Leg						
Approach	7	51	58	12	46	58
Departure	35	113	148	34	149	183
Total	42	164	206	46	195	241
South Leg						
Approach	35	113	148	34	149	183
Departure	28	133	161	39	149	188
Total	63	246	309	73	298	371
East Leg						
Approach	0	0	0	0	0	0
Departure	0	0	0	0	0	0
Total	0	0	0	0	0	0
West Leg						
Approach	21	82	103	27	103	130
Departure	0	0	0	0	0	0
Total	21	82	103	27	103	130
Total Approaches						
Approach	63	246	309	73	298	371
Departure	63	246	309	73	298	371
Total	126	492	618	146	596	742

Yermo Travel Stop
Table B-4 Existing Peak Hour Volume Summary

		AM Peak Hour			PM Peak Hour		
		Existing PCE	Project Trips	Existing With Project	Existing PCE	Project Trips	Existing With Project
5	**Calico Road/Driveway 1**						
NBL			0	0		0	0
NBT		35	42	77	34	67	101
NBR			15	15		12	12
SBL			0	0		0	0
SBT		28	132	160	39	149	188
SBR			0	0		0	0
EBL			0	0		0	0
EBT			0	0		0	0
EBR			0	0		0	0
WBL			0	0		0	0
WBT			0	0		0	0
WBR			71	71		82	82
North Leg							
	Approach	28	132	160	39	149	188
	Departure	35	113	148	34	149	183
	Total	63	245	308	73	298	371
South Leg							
	Approach	35	57	92	34	79	113
	Departure	28	132	160	39	149	188
	Total	63	189	252	73	228	301
East Leg							
	Approach	0	71	71	0	82	82
	Departure	0	15	15	0	12	12
	Total	0	86	86	0	94	94
West Leg							
	Approach	0	0	0	0	0	0
	Departure	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Total Approaches							
	Approach	63	260	323	73	310	383
	Departure	63	260	323	73	310	383
	Total	126	520	646	146	620	766

Yermo Travel Stop
Table B-4 Existing Peak Hour Volume Summary

		AM Peak Hour			PM Peak Hour		
		Existing PCE	Project Trips	Existing With Project	Existing PCE	Project Trips	Existing With Project
6	**Calico Road/Driveway 2**						
NBL			0	0		0	0
NBT		35	12	47	34	7	41
NBR			19	19		15	15
SBL			134	134		155	155
SBT		28	-2	26	39	-6	33
SBR			0	0		0	0
EBL			0	0		0	0
EBT			0	0		0	0
EBR			0	0		0	0
WBL			10	10		27	27
WBT			0	0		0	0
WBR			44	44		72	72
North Leg							
	Approach	28	132	160	39	149	188
	Departure	35	56	91	34	79	113
	Total	63	188	251	73	228	301
South Leg							
	Approach	35	31	66	34	22	56
	Departure	28	8	36	39	21	60
	Total	63	39	102	73	43	116
East Leg							
	Approach	0	54	54	0	99	99
	Departure	0	153	153	0	170	170
	Total	0	207	207	0	269	269
West Leg							
	Approach	0	0	0	0	0	0
	Departure	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Total Approaches							
	Approach	63	217	280	73	270	343
	Departure	63	217	280	73	270	343
	Total	126	434	560	146	540	686

Yermo Travel Stop
Table B-4 Existing Peak Hour Volume Summary

		AM Peak Hour			PM Peak Hour		
		Existing PCE	Project Trips	Existing With Project	Existing PCE	Project Trips	Existing With Project
7	**Driveway 3/Calico Boulevard**						
NBL			29	29		21	21
NBT			0	0		0	0
NBR			3	3		11	11
SBL			0	0		0	0
SBT			0	0		0	0
SBR			0	0		0	0
EBL			0	0		0	0
EBT		8	-1	7	9	-2	7
EBR			19	19		21	21
WBL			15	15		12	12
WBT		9	-1	8	13	-2	11
WBR			0	0		0	0
North Leg							
	Approach	0	0	0	0	0	0
	Departure	0	0	0	0	0	0
	Total	0	0	0	0	0	0
South Leg							
	Approach	0	32	32	0	32	32
	Departure	0	34	34	0	33	33
	Total	0	66	66	0	65	65
East Leg							
	Approach	9	14	23	13	10	23
	Departure	8	2	10	9	9	18
	Total	17	16	33	22	19	41
West Leg							
	Approach	8	18	26	9	19	28
	Departure	9	28	37	13	19	32
	Total	17	46	63	22	38	60
Total Approaches							
	Approach	17	64	81	22	61	83
	Departure	17	64	81	22	61	83
	Total	34	128	162	44	122	166

Yermo Travel Stop
Table B-5 Opening Year Peak Hour Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project
1 Calico Road/Interstate 15 Southbound Ramps										
NBL	32	0	32	64	96	32	0	32	65	97
NBT	8	0	8	1	9	13	0	13	2	15
NBR	0	0	0	0	0	0	0	0	0	0
SBL	0	0	0	0	0	0	0	0	0	0
SBT	11	0	11	3	14	29	0	29	2	31
SBR	1	0	1	0	1	2	0	2	0	2
EBL	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0	0	0
WBL	0	0	0	66	66	0	0	0	63	63
WBT	2	0	2	0	2	2	0	2	0	2
WBR	1	0	1	0	1	4	0	4	0	4
North Leg										
Approach	12	0	12	3	15	31	0	31	2	33
Departure	9	0	9	1	10	17	0	17	2	19
Total	21	0	21	4	25	48	0	48	4	52
South Leg										
Approach	40	0	40	65	105	45	0	45	67	112
Departure	11	0	11	69	80	29	0	29	65	94
Total	51	0	51	134	185	74	0	74	132	206
East Leg										
Approach	3	0	3	66	69	6	0	6	63	69
Departure	0	0	0	0	0	0	0	0	0	0
Total	3	0	3	66	69	6	0	6	63	69
West Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	35	0	35	64	99	36	0	36	65	101
Total	35	0	35	64	99	36	0	36	65	101
Total Approaches										
Approach	55	0	55	134	189	82	0	82	132	214
Departure	55	0	55	134	189	82	0	82	132	214
Total	110	0	110	268	378	164	0	164	264	428

Yermo Travel Stop
Table B-5 Opening Year Peak Hour Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project
2 Calico Road/Interstate 15 Northbound Ramps										
NBL	0	0	0	0	0	0	0	0	0	0
NBT	40	1	41	65	106	44	1	45	67	112
NBR	3	0	3	77	80	3	0	3	101	104
SBL	0	0	0	0	0	15	0	15	0	15
SBT	11	0	11	69	80	15	0	15	65	80
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	1	0	1	0	1
EBT	1	0	1	0	1	1	0	1	0	1
EBR	3	0	3	0	3	6	0	6	0	6
WBL	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	11	0	11	69	80	30	0	30	65	95
Departure	40	1	41	65	106	45	1	46	67	113
Total	51	1	52	134	186	75	1	76	132	208
South Leg										
Approach	43	1	44	142	186	47	1	48	168	216
Departure	14	0	14	69	83	21	0	21	65	86
Total	57	1	58	211	269	68	1	69	233	302
East Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	4	0	4	77	81	19	0	19	101	120
Total	4	0	4	77	81	19	0	19	101	120
West Leg										
Approach	4	0	4	0	4	8	0	8	0	8
Departure	0	0	0	0	0	0	0	0	0	0
Total	4	0	4	0	4	8	0	8	0	8
Total Approaches										
Approach	58	1	59	211	270	85	1	86	233	319
Departure	58	1	59	211	270	85	1	86	233	319
Total	116	2	118	422	540	170	2	172	466	638

Yermo Travel Stop
Table B-5 Opening Year Peak Hour Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project
3 Calico Road/Calico Boulevard										
NBL	0	0	0	0	0	0	0	0	0	0
NBT	34	1	35	113	148	34	1	35	149	184
NBR	1	0	1	0	1	0	0	0	0	0
SBL	7	0	7	18	25	9	0	9	19	28
SBT	7	0	7	51	58	12	0	12	46	58
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0	0	0
WBL	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0
WBR	9	0	9	29	38	13	0	13	19	32
North Leg										
Approach	14	0	14	69	83	21	0	21	65	86
Departure	43	1	44	142	186	47	1	48	168	216
Total	57	1	58	211	269	68	1	69	233	302
South Leg										
Approach	35	1	36	113	149	34	1	35	149	184
Departure	7	0	7	51	58	12	0	12	46	58
Total	42	1	43	164	207	46	1	47	195	242
East Leg										
Approach	9	0	9	29	38	13	0	13	19	32
Departure	8	0	8	18	26	9	0	9	19	28
Total	17	0	17	47	64	22	0	22	38	60
West Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Total Approaches										
Approach	58	1	59	211	270	68	1	69	233	302
Departure	58	1	59	211	270	68	1	69	233	302
Total	116	2	118	422	540	136	2	138	466	604

Yermo Travel Stop
Table B-5 Opening Year Peak Hour Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project
4 Calico Road/Interstate 15 Northbound Off-Ramp										
NBL	0	0	0	0	0	0	0	0	0	0
NBT	35	1	36	113	149	34	1	35	149	184
NBR	0	0	0	0	0	0	0	0	0	0
SBL	0	0	0	0	0	0	0	0	0	0
SBT	7	0	7	51	58	12	0	12	46	58
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0
EBR	21	0	21	82	103	27	0	27	103	130
WBL	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	7	0	7	51	58	12	0	12	46	58
Departure	35	1	36	113	149	34	1	35	149	184
Total	42	1	43	164	207	46	1	47	195	242
South Leg										
Approach	35	1	36	113	149	34	1	35	149	184
Departure	28	0	28	133	161	39	0	39	149	188
Total	63	1	64	246	310	73	1	74	298	372
East Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
West Leg										
Approach	21	0	21	82	103	27	0	27	103	130
Departure	0	0	0	0	0	0	0	0	0	0
Total	21	0	21	82	103	27	0	27	103	130
Total Approaches										
Approach	63	1	64	246	310	73	1	74	298	372
Departure	63	1	64	246	310	73	1	74	298	372
Total	126	2	128	492	620	146	2	148	596	744

Yermo Travel Stop
Table B-5 Opening Year Peak Hour Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project
5 Calico Road/Driveway 1										
NBL	0	0	0	0	0	0	0	0	0	0
NBT	35	1	36	42	78	34	1	35	67	102
NBR	0	0	0	15	15	0	0	0	12	12
SBL	0	0	0	0	0	0	0	0	0	0
SBT	28	0	28	132	160	39	1	40	149	189
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0	0	0
WBL	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	71	71	0	0	0	82	82
North Leg										
Approach	28	0	28	132	160	39	1	40	149	189
Departure	35	1	36	113	149	34	1	35	149	184
Total	63	1	64	245	309	73	2	75	298	373
South Leg										
Approach	35	1	36	57	93	34	1	35	79	114
Departure	28	0	28	132	160	39	1	40	149	189
Total	63	1	64	189	253	73	2	75	228	303
East Leg										
Approach	0	0	0	71	71	0	0	0	82	82
Departure	0	0	0	15	15	0	0	0	12	12
Total	0	0	0	86	86	0	0	0	94	94
West Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Total Approaches										
Approach	63	1	64	260	324	73	2	75	310	385
Departure	63	1	64	260	324	73	2	75	310	385
Total	126	2	128	520	648	146	4	150	620	770

Yermo Travel Stop
Table B-5 Opening Year Peak Hour Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project
6 Calico Road/Driveway 2										
NBL	0	0	0	0	0	0	0	0	0	0
NBT	35	1	36	12	48	34	1	35	7	42
NBR	0	0	0	19	19	0	0	0	15	15
SBL	0	0	0	134	134	0	0	0	155	155
SBT	28	0	28	-2	26	39	1	40	-6	34
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0	0	0
WBL	0	0	0	10	10	0	0	0	27	27
WBT	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	44	44	0	0	0	72	72
North Leg										
Approach	28	0	28	132	160	39	1	40	149	189
Departure	35	1	36	56	92	34	1	35	79	114
Total	63	1	64	188	252	73	2	75	228	303
South Leg										
Approach	35	1	36	31	67	34	1	35	22	57
Departure	28	0	28	8	36	39	1	40	21	61
Total	63	1	64	39	103	73	2	75	43	118
East Leg										
Approach	0	0	0	54	54	0	0	0	99	99
Departure	0	0	0	153	153	0	0	0	170	170
Total	0	0	0	207	207	0	0	0	269	269
West Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Total Approaches										
Approach	63	1	64	217	281	73	2	75	270	345
Departure	63	1	64	217	281	73	2	75	270	345
Total	126	2	128	434	562	146	4	150	540	690

Yermo Travel Stop
Table B-5 Opening Year Peak Hour Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project	Existing PCE	Growth	Opening Year No Project	Project Trips	Opening Year With Project
7 Driveway 3/Calico Boulevard										
NBL	0	0	0	29	29	0	0	0	21	21
NBT	0	0	0	0	0	0	0	0	0	0
NBR	0	0	0	3	3	0	0	0	11	11
SBL	0	0	0	0	0	0	0	0	0	0
SBT	0	0	0	0	0	0	0	0	0	0
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0
EBT	8	0	8	-1	7	9	0	9	-2	7
EBR	0	0	0	19	19	0	0	0	21	21
WBL	0	0	0	15	15	0	0	0	12	12
WBT	9	0	9	-1	8	13	0	13	-2	11
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
South Leg										
Approach	0	0	0	32	32	0	0	0	32	32
Departure	0	0	0	34	34	0	0	0	33	33
Total	0	0	0	66	66	0	0	0	65	65
East Leg										
Approach	9	0	9	14	23	13	0	13	10	23
Departure	8	0	8	2	10	9	0	9	9	18
Total	17	0	17	16	33	22	0	22	19	41
West Leg										
Approach	8	0	8	18	26	9	0	9	19	28
Departure	9	0	9	28	37	13	0	13	19	32
Total	17	0	17	46	63	22	0	22	38	60
Total Approaches										
Approach	17	0	17	64	81	22	0	22	61	83
Departure	17	0	17	64	81	22	0	22	61	83
Total	34	0	34	128	162	44	0	44	122	166

Yermo Travel Stop
Table B-6 Year 2035 Peak Hour Volume Summary

		AM Peak Hour					PM Peak Hour				
		Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project	Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project
1	**Calico Road/Interstate 15 Southbound Ramps**										
NBL		32	10	42	64	106	32	10	42	65	107
NBT		8	2	10	1	11	13	4	17	2	19
NBR		0	0	0	0	0	0	0	0	0	0
SBL		0	0	0	0	0	0	0	0	0	0
SBT		11	3	14	3	17	29	9	38	2	40
SBR		1	0	1	0	1	2	1	3	0	3
EBL		0	0	0	0	0	0	0	0	0	0
EBT		0	0	0	0	0	0	0	0	0	0
EBR		0	0	0	0	0	0	0	0	0	0
WBL		0	0	0	66	66	0	0	0	63	63
WBT		2	1	3	0	3	2	1	3	0	3
WBR		1	0	1	0	1	4	1	5	0	5
North Leg											
	Approach	12	3	15	3	18	31	10	41	2	43
	Departure	9	2	11	1	12	17	5	22	2	24
	Total	21	5	26	4	30	48	15	63	4	67
South Leg											
	Approach	40	12	52	65	117	45	14	59	67	126
	Departure	11	3	14	69	83	29	9	38	65	103
	Total	51	15	66	134	200	74	23	97	132	229
East Leg											
	Approach	3	1	4	66	70	6	2	8	63	71
	Departure	0	0	0	0	0	0	0	0	0	0
	Total	3	1	4	66	70	6	2	8	63	71
West Leg											
	Approach	0	0	0	0	0	0	0	0	0	0
	Departure	35	11	46	64	110	36	12	48	65	113
	Total	35	11	46	64	110	36	12	48	65	113
Total Approaches											
	Approach	55	16	71	134	205	82	26	108	132	240
	Departure	55	16	71	134	205	82	26	108	132	240
	Total	110	32	142	268	410	164	52	216	264	480

Yermo Travel Stop
Table B-6 Year 2035 Peak Hour Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project	Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project
2 Calico Road/Interstate 15 Northbound Ramps										
NBL	0	0	0	0	0	0	0	0	0	0
NBT	40	12	52	65	117	44	14	58	67	125
NBR	3	1	4	77	81	3	1	4	101	105
SBL	0	0	0	0	0	15	5	20	0	20
SBT	11	3	14	69	83	15	5	20	65	85
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	1	0	1	0	1
EBT	1	0	1	0	1	1	0	1	0	1
EBR	3	1	4	0	4	6	2	8	0	8
WBL	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	11	3	14	69	83	30	10	40	65	105
Departure	40	12	52	65	117	45	14	59	67	126
Total	51	15	66	134	200	75	24	99	132	231
South Leg										
Approach	43	13	56	142	198	47	15	62	168	230
Departure	14	4	18	69	87	21	7	28	65	93
Total	57	17	74	211	285	68	22	90	233	323
East Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	4	1	5	77	82	19	6	25	101	126
Total	4	1	5	77	82	19	6	25	101	126
West Leg										
Approach	4	1	5	0	5	8	2	10	0	10
Departure	0	0	0	0	0	0	0	0	0	0
Total	4	1	5	0	5	8	2	10	0	10
Total Approaches										
Approach	58	17	75	211	286	85	27	112	233	345
Departure	58	17	75	211	286	85	27	112	233	345
Total	116	34	150	422	572	170	54	224	466	690

Yermo Travel Stop
Table B-6 Year 2035 Peak Hour Volume Summary

		AM Peak Hour					PM Peak Hour				
		Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project	Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project
3	**Calico Road/Calico Boulevard**										
NBL		0	0	0	0	0	0	0	0	0	0
NBT		34	11	45	113	158	34	11	45	149	194
NBR		1	0	1	0	1	0	0	0	0	0
SBL		7	2	9	18	27	9	3	12	19	31
SBT		7	2	9	51	60	12	4	16	46	62
SBR		0	0	0	0	0	0	0	0	0	0
EBL		0	0	0	0	0	0	0	0	0	0
EBT		0	0	0	0	0	0	0	0	0	0
EBR		0	0	0	0	0	0	0	0	0	0
WBL		0	0	0	0	0	0	0	0	0	0
WBT		0	0	0	0	0	0	0	0	0	0
WBR		9	3	12	29	41	13	4	17	19	36
North Leg											
	Approach	14	4	18	69	87	21	7	28	65	93
	Departure	43	14	57	142	199	47	15	62	168	230
	Total	57	18	75	211	286	68	22	90	233	323
South Leg											
	Approach	35	11	46	113	159	34	11	45	149	194
	Departure	7	2	9	51	60	12	4	16	46	62
	Total	42	13	55	164	219	46	15	61	195	256
East Leg											
	Approach	9	3	12	29	41	13	4	17	19	36
	Departure	8	2	10	18	28	9	3	12	19	31
	Total	17	5	22	47	69	22	7	29	38	67
West Leg											
	Approach	0	0	0	0	0	0	0	0	0	0
	Departure	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0
Total Approaches											
	Approach	58	18	76	211	287	68	22	90	233	323
	Departure	58	18	76	211	287	68	22	90	233	323
	Total	116	36	152	422	574	136	44	180	466	646

Yermo Travel Stop
Table B-6 Year 2035 Peak Hour Volume Summary

	AM Peak Hour					PM Peak Hour				
	Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project	Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project
4 Calico Road/Interstate 15 Northbound Off-Ramp										
NBL	0	0	0	0	0	0	0	0	0	0
NBT	35	11	46	113	159	34	11	45	149	194
NBR	0	0	0	0	0	0	0	0	0	0
SBL	0	0	0	0	0	0	0	0	0	0
SBT	7	2	9	51	60	12	4	16	46	62
SBR	0	0	0	0	0	0	0	0	0	0
EBL	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0
EBR	21	7	28	82	110	27	8	35	103	138
WBL	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0	0	0
North Leg										
Approach	7	2	9	51	60	12	4	16	46	62
Departure	35	11	46	113	159	34	11	45	149	194
Total	42	13	55	164	219	46	15	61	195	256
South Leg										
Approach	35	11	46	113	159	34	11	45	149	194
Departure	28	9	37	133	170	39	12	51	149	200
Total	63	20	83	246	329	73	23	96	298	394
East Leg										
Approach	0	0	0	0	0	0	0	0	0	0
Departure	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
West Leg										
Approach	21	7	28	82	110	27	8	35	103	138
Departure	0	0	0	0	0	0	0	0	0	0
Total	21	7	28	82	110	27	8	35	103	138
Total Approaches										
Approach	63	20	83	246	329	73	23	96	298	394
Departure	63	20	83	246	329	73	23	96	298	394
Total	126	40	166	492	658	146	46	192	596	788

Yermo Travel Stop
Table B-6 Year 2035 Peak Hour Volume Summary

		AM Peak Hour					PM Peak Hour				
		Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project	Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project
5	**Calico Road/Driveway 1**										
NBL		0	0	0	0	0	0	0	0	0	0
NBT		35	11	46	42	88	34	11	45	67	112
NBR		0	0	0	15	15	0	0	0	12	12
SBL		0	0	0	0	0	0	0	0	0	0
SBT		28	9	37	132	169	39	12	51	149	200
SBR		0	0	0	0	0	0	0	0	0	0
EBL		0	0	0	0	0	0	0	0	0	0
EBT		0	0	0	0	0	0	0	0	0	0
EBR		0	0	0	0	0	0	0	0	0	0
WBL		0	0	0	0	0	0	0	0	0	0
WBT		0	0	0	0	0	0	0	0	0	0
WBR		0	0	0	71	71	0	0	0	82	82
North Leg											
	Approach	28	9	37	132	169	39	12	51	149	200
	Departure	35	11	46	113	159	34	11	45	149	194
	Total	63	20	83	245	328	73	23	96	298	394
South Leg											
	Approach	35	11	46	57	103	34	11	45	79	124
	Departure	28	9	37	132	169	39	12	51	149	200
	Total	63	20	83	189	272	73	23	96	228	324
East Leg											
	Approach	0	0	0	71	71	0	0	0	82	82
	Departure	0	0	0	15	15	0	0	0	12	12
	Total	0	0	0	86	86	0	0	0	94	94
West Leg											
	Approach	0	0	0	0	0	0	0	0	0	0
	Departure	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0
Total Approaches											
	Approach	63	20	83	260	343	73	23	96	310	406
	Departure	63	20	83	260	343	73	23	96	310	406
	Total	126	40	166	520	686	146	46	192	620	812

Yermo Travel Stop
Table B-6 Year 2035 Peak Hour Volume Summary

		AM Peak Hour					PM Peak Hour				
		Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project	Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project
6	**Calico Road/Driveway 2**										
NBL		0	0	0	0	0	0	0	0	0	0
NBT		35	11	46	12	58	34	11	45	7	52
NBR		0	0	0	19	19	0	0	0	15	15
SBL		0	0	0	134	134	0	0	0	155	155
SBT		28	9	37	-2	35	39	12	51	-6	45
SBR		0	0	0	0	0	0	0	0	0	0
EBL		0	0	0	0	0	0	0	0	0	0
EBT		0	0	0	0	0	0	0	0	0	0
EBR		0	0	0	0	0	0	0	0	0	0
WBL		0	0	0	10	10	0	0	0	27	27
WBT		0	0	0	0	0	0	0	0	0	0
WBR		0	0	0	44	44	0	0	0	72	72
North Leg											
	Approach	28	9	37	132	169	39	12	51	149	200
	Departure	35	11	46	56	102	34	11	45	79	124
	Total	63	20	83	188	271	73	23	96	228	324
South Leg											
	Approach	35	11	46	31	77	34	11	45	22	67
	Departure	28	9	37	8	45	39	12	51	21	72
	Total	63	20	83	39	122	73	23	96	43	139
East Leg											
	Approach	0	0	0	54	54	0	0	0	99	99
	Departure	0	0	0	153	153	0	0	0	170	170
	Total	0	0	0	207	207	0	0	0	269	269
West Leg											
	Approach	0	0	0	0	0	0	0	0	0	0
	Departure	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0
Total Approaches											
	Approach	63	20	83	217	300	73	23	96	270	366
	Departure	63	20	83	217	300	73	23	96	270	366
	Total	126	40	166	434	600	146	46	192	540	732

Yermo Travel Stop
Table B-6 Year 2035 Peak Hour Volume Summary

		AM Peak Hour					PM Peak Hour				
		Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project	Existing PCE	Growth	Year 2035 No Project	Project Trips	Year 2035 With Project
7	**Driveway 3/Calico Boulevard**										
NBL		0	0	0	29	29	0	0	0	21	21
NBT		0	0	0	0	0	0	0	0	0	0
NBR		0	0	0	3	3	0	0	0	11	11
SBL		0	0	0	0	0	0	0	0	0	0
SBT		0	0	0	0	0	0	0	0	0	0
SBR		0	0	0	0	0	0	0	0	0	0
EBL		0	0	0	0	0	0	0	0	0	0
EBT		8	2	10	-1	9	9	3	12	-2	10
EBR		0	0	0	19	19	0	0	0	21	21
WBL		0	0	0	15	15	0	0	0	12	12
WBT		9	3	12	-1	11	13	4	17	-2	15
WBR		0	0	0	0	0	0	0	0	0	0
North Leg											
	Approach	0	0	0	0	0	0	0	0	0	0
	Departure	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0
South Leg											
	Approach	0	0	0	32	32	0	0	0	32	32
	Departure	0	0	0	34	34	0	0	0	33	33
	Total	0	0	0	66	66	0	0	0	65	65
East Leg											
	Approach	9	3	12	14	26	13	4	17	10	27
	Departure	8	2	10	2	12	9	3	12	9	21
	Total	17	5	22	16	38	22	7	29	19	48
West Leg											
	Approach	8	2	10	18	28	9	3	12	19	31
	Departure	9	3	12	28	40	13	4	17	19	36
	Total	17	5	22	46	68	22	7	29	38	67
Total Approaches											
	Approach	17	5	22	64	86	22	7	29	61	90
	Departure	17	5	22	64	86	22	7	29	61	90
	Total	34	10	44	128	172	44	14	58	122	180

Yermo Travel Stop
Table B-7 - Existing Friday/Sunday Peak Hour Freeway Segment Volumes

	Friday Peak Hour Volume										Sunday Peak Hour Volume									
	Northbound					Southbound					Northbound					Southbound				
Freeway Segment	Auto	Truck[1]	Total Vehicles[2]	Truck PCE[3]	Total PCE	Auto	Truck[2]	Total Vehicles[1]	Truck PCE	Total PCE	Auto	Truck[2]	Total Vehicles[1]	Truck PCE	Total PCE	Auto	Truck[2]	Total Vehicles[1]	Truck PCE	Total PCE
Interstate 15																				
South of Calico Road	2,397	592	2,989	888	3,285	1,468	363	1,831	545	2,013	1,383	341	1,724	512	1,895	2,258	558	2,816	837	3,095

[1] Trucks based total truck percentage from Caltrans' 2012 Annual Average Daily Truck Traffic volume data.

[2] Friday and Sunday total vehicle volumes provided by Caltrans' from Performance Measurement System (PeMS) collected on 4/25 and 4/27 2014.

[3] Truck PCE volume based on SANBAG CMP TIA Guidelines factor of 1.5.

APPENDIX C:

LEVEL OF SERVICE WORKSHEETS

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	0	2	1	32	8	0	0	11	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	3	1	41	10	0	0	14	1

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	107	107	10	15	0	0	10	0	0
Stage 1	92	92	-	-	-	-	-	-	-
Stage 2	15	15	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	895	787	1077	1616	-	-	1623	-	-
Stage 1	937	823	-	-	-	-	-	-	-
Stage 2	1013	887	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	872	0	1077	1616	-	-	1623	-	-
Mov Cap-2 Maneuver	872	0	-	-	-	-	-	-	-
Stage 1	913	0	-	-	-	-	-	-	-
Stage 2	1013	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.4	5.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1616	-	-	1077	1623	-	-
HCM Lane V/C Ratio	0.025	-	-	0.004	-	-	-
HCM Control Delay (s)	7.3	-	-	8.4	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	1	3	0	0	0	0	40	3	0	11	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	1	4	0	0	0	0	48	4	0	13	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	62	64	13	13	0	0	51	0	0
Stage 1	13	13	-	-	-	-	-	-	-
Stage 2	49	51	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	949	831	1073	1619	-	-	1568	-	-
Stage 1	1015	889	-	-	-	-	-	-	-
Stage 2	979	856	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	949	0	1073	1619	-	-	1568	-	-
Mov Cap-2 Maneuver	949	0	-	-	-	-	-	-	-
Stage 1	1015	0	-	-	-	-	-	-	-
Stage 2	979	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1619	-	-	1073	1568	-	-
HCM Lane V/C Ratio	-	-	-	0.004	-	-	-
HCM Control Delay (s)	0	-	-	8.4	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	9	34	1	7	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	10	39	1	8	8

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	63	39	0	0	40	0
Stage 1	39	-	-	-	-	-
Stage 2	24	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	948	1038	-	-	1583	-
Stage 1	989	-	-	-	-	-
Stage 2	1004	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	943	1038	-	-	1583	-
Mov Cap-2 Maneuver	943	-	-	-	-	-
Stage 1	989	-	-	-	-	-
Stage 2	999	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1038	1583	-
HCM Lane V/C Ratio	-	-	0.01	0.005	-
HCM Control Delay (s)	-	-	8.5	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	21	0	35	7	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	26	0	44	9	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	53	9	9	0	-	0
Stage 1	9	-	-	-	-	-
Stage 2	44	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	960	1079	1624	-	-	-
Stage 1	1019	-	-	-	-	-
Stage 2	984	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	960	1079	1624	-	-	-
Mov Cap-2 Maneuver	960	-	-	-	-	-
Stage 1	1019	-	-	-	-	-
Stage 2	984	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1624	-	1079	-	-
HCM Lane V/C Ratio	-	-	0.024	-	-
HCM Control Delay (s)	0	-	8.4	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	0	2	4	32	13	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	2	5	40	16	0

Major/Minor	Minor1			Major1		
Conflicting Flow All	132	133	16	38	0	0
Stage 1	95	95	-	-	-	-
Stage 2	37	38	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-
Pot Cap-1 Maneuver	867	761	1069	1585	-	-
Stage 1	934	820	-	-	-	-
Stage 2	991	867	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	845	0	1069	1585	-	-
Mov Cap-2 Maneuver	845	0	-	-	-	-
Stage 1	910	0	-	-	-	-
Stage 2	991	0	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	8.4	5.2
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1585	-	-	1069	1615	-	-
HCM Lane V/C Ratio	0.025	-	-	0.007	-	-	-
HCM Control Delay (s)	7.3	-	-	8.4	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	29	2
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	81	81	81
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	36	2

Major/Minor	Major2		
Conflicting Flow All	16	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1615	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1615	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	1	1	6	0	0	0	0	44	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	1	1	7	0	0	0	0	54	4

Major/Minor	Minor2						Major1		
Conflicting Flow All	110	112	18				18	0	0
Stage 1	55	55	-				-	-	-
Stage 2	55	57	-				-	-	-
Critical Hdwy	6.4	6.5	6.2				4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-				-	-	-
Critical Hdwy Stg 2	5.4	5.5	-				-	-	-
Follow-up Hdwy	3.5	4	3.3				2.2	-	-
Pot Cap-1 Maneuver	892	782	1066				1612	-	-
Stage 1	973	853	-				-	-	-
Stage 2	973	851	-				-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	881	0	1066				1612	-	-
Mov Cap-2 Maneuver	881	0	-				-	-	-
Stage 1	961	0	-				-	-	-
Stage 2	973	0	-				-	-	-

Approach	EB	NB
HCM Control Delay, s	8.5	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1612	-	-	1035	1560	-	-
HCM Lane V/C Ratio	-	-	-	0.009	0.012	-	-
HCM Control Delay (s)	0	-	-	8.5	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	15	15	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	82	82	82
Heavy Vehicles, %	0	0	0
Mvmt Flow	18	18	0

Major/Minor	Major2		
Conflicting Flow All	57	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1560	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1560	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	3.7
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	13	34	0	9	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	19	50	0	13	18

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	94	50	0	0	50	0
Stage 1	50	-	-	-	-	-
Stage 2	44	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	911	1024	-	-	1570	-
Stage 1	978	-	-	-	-	-
Stage 2	984	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	904	1024	-	-	1570	-
Mov Cap-2 Maneuver	904	-	-	-	-	-
Stage 1	978	-	-	-	-	-
Stage 2	976	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.6	0	3.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1024	1570	-
HCM Lane V/C Ratio	-	-	0.019	0.008	-
HCM Control Delay (s)	-	-	8.6	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	27	0	34	12	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	69	69	69	69	69	69
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	39	0	49	17	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	66	17	17	0	-	0
Stage 1	17	-	-	-	-	-
Stage 2	49	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	944	1068	1613	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	979	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	944	1068	1613	-	-	-
Mov Cap-2 Maneuver	944	-	-	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	979	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.5	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1613	-	1068	-	-
HCM Lane V/C Ratio	-	-	0.037	-	-
HCM Control Delay (s)	0	-	8.5	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	66	2	1	96	9	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	85	3	1	123	12	0

Major/Minor	Minor1			Major1		
Conflicting Flow All	277	277	12	19	0	0
Stage 1	258	258	-	-	-	-
Stage 2	19	19	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-
Pot Cap-1 Maneuver	717	634	1074	1611	-	-
Stage 1	790	698	-	-	-	-
Stage 2	1009	884	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	662	0	1074	1611	-	-
Mov Cap-2 Maneuver	662	0	-	-	-	-
Stage 1	730	0	-	-	-	-
Stage 2	1009	0	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	11.2	6.8
HCM LOS	B	

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1611	-	-	666	1620	-	-
HCM Lane V/C Ratio	0.076	-	-	0.133	-	-	-
HCM Control Delay (s)	7.4	-	-	11.2	0	-	-
HCM Lane LOS	A	-	-	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.5	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	14	1
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	78	78	78
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	18	1

Major/Minor	Major2		
Conflicting Flow All	12	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1620	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1620	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	1	3	0	0	0	0	105	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	1	4	0	0	0	0	125	95

Major/Minor	Minor2						Major1		
Conflicting Flow All	268	315	95				95	0	0
Stage 1	95	95	-				-	-	-
Stage 2	173	220	-				-	-	-
Critical Hdwy	6.4	6.5	6.2				4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-				-	-	-
Critical Hdwy Stg 2	5.4	5.5	-				-	-	-
Follow-up Hdwy	3.5	4	3.3				2.2	-	-
Pot Cap-1 Maneuver	726	604	967				1512	-	-
Stage 1	934	820	-				-	-	-
Stage 2	862	725	-				-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	726	0	967				1512	-	-
Mov Cap-2 Maneuver	726	0	-				-	-	-
Stage 1	934	0	-				-	-	-
Stage 2	862	0	-				-	-	-

Approach	EB	NB
HCM Control Delay, s	8.7	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1512	-	-	967	1361	-	-
HCM Lane V/C Ratio	-	-	-	0.005	-	-	-
HCM Control Delay (s)	0	-	-	8.7	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection			
Int Delay, s/veh			

Movement	SBL	SBT	SBR
Vol, veh/h	0	80	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	84	84	84
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	95	0

Major/Minor	Major2		
Conflicting Flow All	220	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1361	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1361	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	38	147	1	25	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	43	167	1	28	66

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	291	168	0	0	168	0
Stage 1	168	-	-	-	-	-
Stage 2	123	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	704	881	-	-	1422	-
Stage 1	867	-	-	-	-	-
Stage 2	907	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	690	881	-	-	1422	-
Mov Cap-2 Maneuver	690	-	-	-	-	-
Stage 1	867	-	-	-	-	-
Stage 2	889	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.3	0	2.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	881	1422	-
HCM Lane V/C Ratio	-	-	0.049	0.02	-
HCM Control Delay (s)	-	-	9.3	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	103	0	148	58	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	129	0	185	72	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	258	73	73	0	-	0
Stage 1	73	-	-	-	-	-
Stage 2	185	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	735	995	1540	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	852	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	735	995	1540	-	-	-
Mov Cap-2 Maneuver	735	-	-	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	852	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1540	-	995	-	-
HCM Lane V/C Ratio	-	-	0.129	-	-
HCM Control Delay (s)	0	-	9.2	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	71	77	15	0	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	77	84	16	0	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	266	92	0	0	100	0
Stage 1	92	-	-	-	-	-
Stage 2	174	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	727	971	-	-	1505	-
Stage 1	937	-	-	-	-	-
Stage 2	861	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	727	971	-	-	1505	-
Mov Cap-2 Maneuver	727	-	-	-	-	-
Stage 1	937	-	-	-	-	-
Stage 2	861	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	971	1505	-
HCM Lane V/C Ratio	-	-	0.079	-	-
HCM Control Delay (s)	-	-	9	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Int Delay, s/veh	5.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	44	47	19	134	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	11	48	51	21	146	28

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	381	61	0	0	72	0
Stage 1	61	-	-	-	-	-
Stage 2	320	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	625	1010	-	-	1541	-
Stage 1	967	-	-	-	-	-
Stage 2	741	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	565	1010	-	-	1541	-
Mov Cap-2 Maneuver	565	-	-	-	-	-
Stage 1	967	-	-	-	-	-
Stage 2	670	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	6.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	881	1541	-
HCM Lane V/C Ratio	-	-	0.067	0.095	-
HCM Control Delay (s)	-	-	9.4	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.3	-

Intersection	
Int Delay, s/veh	4.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	7	19	15	8	29	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	8	21	16	9	32	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	28	0	59	18
Stage 1	-	-	-	-	18	-
Stage 2	-	-	-	-	41	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1599	-	953	1066
Stage 1	-	-	-	-	1010	-
Stage 2	-	-	-	-	987	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1599	-	943	1066
Mov Cap-2 Maneuver	-	-	-	-	943	-
Stage 1	-	-	-	-	1010	-
Stage 2	-	-	-	-	977	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.7	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	953	-	-	1599	-
HCM Lane V/C Ratio	0.036	-	-	0.01	-
HCM Control Delay (s)	8.9	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	63	2	4	97	15	0	0	31	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	78	2	5	120	19	0	0	38	2

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	298	299	19	41	0	0	19	0	0
Stage 1	258	258	-	-	-	-	-	-	-
Stage 2	40	41	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	698	616	1065	1581	-	-	1611	-	-
Stage 1	790	698	-	-	-	-	-	-	-
Stage 2	988	865	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	645	0	1065	1581	-	-	1611	-	-
Mov Cap-2 Maneuver	645	0	-	-	-	-	-	-	-
Stage 1	730	0	-	-	-	-	-	-	-
Stage 2	988	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	6.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1581	-	-	661	1611	-	-
HCM Lane V/C Ratio	0.076	-	-	0.129	-	-	-
HCM Control Delay (s)	7.5	-	-	11.3	0	-	-
HCM Lane LOS	A	-	-	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	1	6	0	0	0	0	111	104	15	80	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	1	1	7	0	0	0	0	135	127	18	98	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	333	396	98	98	0	0	262	0	0
Stage 1	134	134	-	-	-	-	-	-	-
Stage 2	199	262	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	666	544	963	1508	-	-	1314	-	-
Stage 1	897	789	-	-	-	-	-	-	-
Stage 2	839	695	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	657	0	963	1508	-	-	1314	-	-
Mov Cap-2 Maneuver	657	0	-	-	-	-	-	-	-
Stage 1	884	0	-	-	-	-	-	-	-
Stage 2	839	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	0	1.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1508	-	-	903	1314	-	-
HCM Lane V/C Ratio	-	-	-	0.011	0.014	-	-
HCM Control Delay (s)	0	-	-	9	7.8	0	-
HCM Lane LOS	A	-	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	32	183	0	28	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	47	269	0	41	85

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	437	269	0	0	269	0
Stage 1	269	-	-	-	-	-
Stage 2	168	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	581	775	-	-	1306	-
Stage 1	781	-	-	-	-	-
Stage 2	867	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	562	775	-	-	1306	-
Mov Cap-2 Maneuver	562	-	-	-	-	-
Stage 1	781	-	-	-	-	-
Stage 2	838	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.9	0	2.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	775	1306	-
HCM Lane V/C Ratio	-	-	0.061	0.032	-
HCM Control Delay (s)	-	-	9.9	7.8	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	130	0	183	58	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	69	69	69	69	69	69
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	188	0	265	84	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	349	84	84	0	-	0
Stage 1	84	-	-	-	-	-
Stage 2	265	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	652	981	1526	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	652	981	1526	-	-	-
Mov Cap-2 Maneuver	652	-	-	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	784	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1526	-	981	-	-
HCM Lane V/C Ratio	-	-	0.192	-	-
HCM Control Delay (s)	0	-	9.5	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	82	101	12	0	188
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	89	110	13	0	204

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	320	116	0	0	123	0
Stage 1	116	-	-	-	-	-
Stage 2	204	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	678	942	-	-	1477	-
Stage 1	914	-	-	-	-	-
Stage 2	835	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	678	942	-	-	1477	-
Mov Cap-2 Maneuver	678	-	-	-	-	-
Stage 1	914	-	-	-	-	-
Stage 2	835	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	942	1477	-
HCM Lane V/C Ratio	-	-	0.095	-	-
HCM Control Delay (s)	-	-	9.2	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Int Delay, s/veh	6.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	27	72	41	15	155	33
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	29	78	45	16	168	36

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	426	53	0	0	61	0
Stage 1	53	-	-	-	-	-
Stage 2	373	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	589	1020	-	-	1555	-
Stage 1	975	-	-	-	-	-
Stage 2	701	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	524	1020	-	-	1555	-
Mov Cap-2 Maneuver	524	-	-	-	-	-
Stage 1	975	-	-	-	-	-
Stage 2	624	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.1	0	6.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	811	1555	-
HCM Lane V/C Ratio	-	-	0.133	0.108	-
HCM Control Delay (s)	-	-	10.1	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.4	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	7	21	12	11	21	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	8	23	13	12	23	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	30	0	57	19
Stage 1	-	-	-	-	19	-
Stage 2	-	-	-	-	38	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1596	-	955	1065
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	990	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1596	-	947	1065
Mov Cap-2 Maneuver	-	-	-	-	947	-
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	982	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.8	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	984	-	-	1596	-
HCM Lane V/C Ratio	0.035	-	-	0.008	-
HCM Control Delay (s)	8.8	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	0	2	1	32	8	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	3	1	41	10	0

Major/Minor	Minor1			Major1		
Conflicting Flow All	107	107	10	15	0	0
Stage 1	92	92	-	-	-	-
Stage 2	15	15	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-
Pot Cap-1 Maneuver	895	787	1077	1616	-	-
Stage 1	937	823	-	-	-	-
Stage 2	1013	887	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	872	0	1077	1616	-	-
Mov Cap-2 Maneuver	872	0	-	-	-	-
Stage 1	913	0	-	-	-	-
Stage 2	1013	0	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	8.4	5.8
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1616	-	-	1077	1623	-	-
HCM Lane V/C Ratio	0.025	-	-	0.004	-	-	-
HCM Control Delay (s)	7.3	-	-	8.4	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	11	1
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	78	78	78
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	14	1

Major/Minor	Major2		
Conflicting Flow All	10	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1623	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1623	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	1	3	0	0	0	0	41	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	1	4	0	0	0	0	49	4

Major/Minor	Minor2						Major1		
Conflicting Flow All	64	65	13				13	0	0
Stage 1	13	13	-				-	-	-
Stage 2	51	52	-				-	-	-
Critical Hdwy	6.4	6.5	6.2				4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-				-	-	-
Critical Hdwy Stg 2	5.4	5.5	-				-	-	-
Follow-up Hdwy	3.5	4	3.3				2.2	-	-
Pot Cap-1 Maneuver	947	830	1073				1619	-	-
Stage 1	1015	889	-				-	-	-
Stage 2	977	856	-				-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	947	0	1073				1619	-	-
Mov Cap-2 Maneuver	947	0	-				-	-	-
Stage 1	1015	0	-				-	-	-
Stage 2	977	0	-				-	-	-

Approach	EB	NB
HCM Control Delay, s	8.4	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1619	-	-	1073	1567	-	-
HCM Lane V/C Ratio	-	-	-	0.004	-	-	-
HCM Control Delay (s)	0	-	-	8.4	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	11	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	84	84	84
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	13	0

Major/Minor	Major2		
Conflicting Flow All	52	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1567	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1567	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	9	35	1	7	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	10	40	1	8	8

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	64	40	0	0	41	0
Stage 1	40	-	-	-	-	-
Stage 2	24	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	947	1037	-	-	1581	-
Stage 1	988	-	-	-	-	-
Stage 2	1004	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	942	1037	-	-	1581	-
Mov Cap-2 Maneuver	942	-	-	-	-	-
Stage 1	988	-	-	-	-	-
Stage 2	999	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1037	1581	-
HCM Lane V/C Ratio	-	-	0.01	0.005	-
HCM Control Delay (s)	-	-	8.5	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	21	0	36	7	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	26	0	45	9	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	54	9	9	0	-	0
Stage 1	9	-	-	-	-	-
Stage 2	45	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	959	1079	1624	-	-	-
Stage 1	1019	-	-	-	-	-
Stage 2	983	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	959	1079	1624	-	-	-
Mov Cap-2 Maneuver	959	-	-	-	-	-
Stage 1	1019	-	-	-	-	-
Stage 2	983	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1624	-	1079	-	-
HCM Lane V/C Ratio	-	-	0.024	-	-
HCM Control Delay (s)	0	-	8.4	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	0	2	4	32	13	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	2	5	40	16	0

Major/Minor	Minor1			Major1		
Conflicting Flow All	132	133	16	38	0	0
Stage 1	95	95	-	-	-	-
Stage 2	37	38	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-
Pot Cap-1 Maneuver	867	761	1069	1585	-	-
Stage 1	934	820	-	-	-	-
Stage 2	991	867	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	845	0	1069	1585	-	-
Mov Cap-2 Maneuver	845	0	-	-	-	-
Stage 1	910	0	-	-	-	-
Stage 2	991	0	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	8.4	5.2
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1585	-	-	1069	1615	-	-
HCM Lane V/C Ratio	0.025	-	-	0.007	-	-	-
HCM Control Delay (s)	7.3	-	-	8.4	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	29	2
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	81	81	81
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	36	2

Major/Minor	Major2		
Conflicting Flow All	16	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1615	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1615	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	1	1	6	0	0	0	0	45	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	1	1	7	0	0	0	0	55	4

Major/Minor	Minor2						Major1		
Conflicting Flow All	112	114	18				18	0	0
Stage 1	55	55	-				-	-	-
Stage 2	57	59	-				-	-	-
Critical Hdwy	6.4	6.5	6.2				4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-				-	-	-
Critical Hdwy Stg 2	5.4	5.5	-				-	-	-
Follow-up Hdwy	3.5	4	3.3				2.2	-	-
Pot Cap-1 Maneuver	890	780	1066				1612	-	-
Stage 1	973	853	-				-	-	-
Stage 2	971	850	-				-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	879	0	1066				1612	-	-
Mov Cap-2 Maneuver	879	0	-				-	-	-
Stage 1	961	0	-				-	-	-
Stage 2	971	0	-				-	-	-

Approach	EB	NB
HCM Control Delay, s	8.5	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1612	-	-	1035	1558	-	-
HCM Lane V/C Ratio	-	-	-	0.009	0.012	-	-
HCM Control Delay (s)	0	-	-	8.5	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	15	15	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	82	82	82
Heavy Vehicles, %	0	0	0
Mvmt Flow	18	18	0

Major/Minor	Major2		
Conflicting Flow All	59	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1558	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1558	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	3.7
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	13	35	0	9	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	19	51	0	13	18

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	95	51	0	0	51	0
Stage 1	51	-	-	-	-	-
Stage 2	44	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	909	1023	-	-	1568	-
Stage 1	977	-	-	-	-	-
Stage 2	984	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	902	1023	-	-	1568	-
Mov Cap-2 Maneuver	902	-	-	-	-	-
Stage 1	977	-	-	-	-	-
Stage 2	976	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.6	0	3.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1023	1568	-
HCM Lane V/C Ratio	-	-	0.019	0.008	-
HCM Control Delay (s)	-	-	8.6	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	27	0	35	12	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	69	69	69	69	69	69
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	39	0	51	17	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	68	17	17	0	-	0
Stage 1	17	-	-	-	-	-
Stage 2	51	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	942	1068	1613	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	977	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	942	1068	1613	-	-	-
Mov Cap-2 Maneuver	942	-	-	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	977	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.5	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1613	-	1068	-	-
HCM Lane V/C Ratio	-	-	0.037	-	-
HCM Control Delay (s)	0	-	8.5	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	66	2	1	96	9	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	85	3	1	123	12	0

Major/Minor	Minor1			Major1		
Conflicting Flow All	277	277	12	19	0	0
Stage 1	258	258	-	-	-	-
Stage 2	19	19	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-
Pot Cap-1 Maneuver	717	634	1074	1611	-	-
Stage 1	790	698	-	-	-	-
Stage 2	1009	884	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	662	0	1074	1611	-	-
Mov Cap-2 Maneuver	662	0	-	-	-	-
Stage 1	730	0	-	-	-	-
Stage 2	1009	0	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	11.2	6.8
HCM LOS	B	

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1611	-	-	666	1620	-	-
HCM Lane V/C Ratio	0.076	-	-	0.133	-	-	-
HCM Control Delay (s)	7.4	-	-	11.2	0	-	-
HCM Lane LOS	A	-	-	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.5	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	14	1
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	78	78	78
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	18	1

Major/Minor	Major2		
Conflicting Flow All	12	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1620	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1620	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	1	3	0	0	0	0	106	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	1	4	0	0	0	0	126	95

Major/Minor	Minor2						Major1		
Conflicting Flow All	269	316	95				95	0	0
Stage 1	95	95	-				-	-	-
Stage 2	174	221	-				-	-	-
Critical Hdwy	6.4	6.5	6.2				4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-				-	-	-
Critical Hdwy Stg 2	5.4	5.5	-				-	-	-
Follow-up Hdwy	3.5	4	3.3				2.2	-	-
Pot Cap-1 Maneuver	725	603	967				1512	-	-
Stage 1	934	820	-				-	-	-
Stage 2	861	724	-				-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	725	0	967				1512	-	-
Mov Cap-2 Maneuver	725	0	-				-	-	-
Stage 1	934	0	-				-	-	-
Stage 2	861	0	-				-	-	-

Approach	EB	NB
HCM Control Delay, s	8.7	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1512	-	-	967	1360	-	-
HCM Lane V/C Ratio	-	-	-	0.005	-	-	-
HCM Control Delay (s)	0	-	-	8.7	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	80	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	84	84	84
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	95	0

Major/Minor	Major2		
Conflicting Flow All	221	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1360	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1360	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	38	148	1	25	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	43	168	1	28	66

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	292	169	0	0	169	0
Stage 1	169	-	-	-	-	-
Stage 2	123	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	703	880	-	-	1421	-
Stage 1	866	-	-	-	-	-
Stage 2	907	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	689	880	-	-	1421	-
Mov Cap-2 Maneuver	689	-	-	-	-	-
Stage 1	866	-	-	-	-	-
Stage 2	889	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.3	0	2.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	880	1421	-
HCM Lane V/C Ratio	-	-	0.049	0.02	-
HCM Control Delay (s)	-	-	9.3	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	103	0	149	58	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	129	0	186	72	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	259	73	73	0	-	0
Stage 1	73	-	-	-	-	-
Stage 2	186	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	734	995	1540	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	734	995	1540	-	-	-
Mov Cap-2 Maneuver	734	-	-	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	851	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1540	-	995	-	-
HCM Lane V/C Ratio	-	-	0.129	-	-
HCM Control Delay (s)	0	-	9.2	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	71	78	15	0	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	77	85	16	0	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	267	93	0	0	101	0
Stage 1	93	-	-	-	-	-
Stage 2	174	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	727	970	-	-	1504	-
Stage 1	936	-	-	-	-	-
Stage 2	861	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	727	970	-	-	1504	-
Mov Cap-2 Maneuver	727	-	-	-	-	-
Stage 1	936	-	-	-	-	-
Stage 2	861	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	970	1504	-
HCM Lane V/C Ratio	-	-	0.08	-	-
HCM Control Delay (s)	-	-	9	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Int Delay, s/veh	5.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	44	48	19	134	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	11	48	52	21	146	28

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	383	63	0	0	73	0
Stage 1	63	-	-	-	-	-
Stage 2	320	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	624	1007	-	-	1540	-
Stage 1	965	-	-	-	-	-
Stage 2	741	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	564	1007	-	-	1540	-
Mov Cap-2 Maneuver	564	-	-	-	-	-
Stage 1	965	-	-	-	-	-
Stage 2	670	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	6.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	879	1540	-
HCM Lane V/C Ratio	-	-	0.067	0.095	-
HCM Control Delay (s)	-	-	9.4	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.3	-

Intersection	
Int Delay, s/veh	4.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	7	19	15	8	29	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	8	21	16	9	32	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	28	0	59	18
Stage 1	-	-	-	-	18	-
Stage 2	-	-	-	-	41	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1599	-	953	1066
Stage 1	-	-	-	-	1010	-
Stage 2	-	-	-	-	987	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1599	-	943	1066
Mov Cap-2 Maneuver	-	-	-	-	943	-
Stage 1	-	-	-	-	1010	-
Stage 2	-	-	-	-	977	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.7	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	953	-	-	1599	-
HCM Lane V/C Ratio	0.036	-	-	0.01	-
HCM Control Delay (s)	8.9	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	63	2	4	97	15	0	0	31	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	78	2	5	120	19	0	0	38	2

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	298	299	19	41	0	0	19	0	0
Stage 1	258	258	-	-	-	-	-	-	-
Stage 2	40	41	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	698	616	1065	1581	-	-	1611	-	-
Stage 1	790	698	-	-	-	-	-	-	-
Stage 2	988	865	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	645	0	1065	1581	-	-	1611	-	-
Mov Cap-2 Maneuver	645	0	-	-	-	-	-	-	-
Stage 1	730	0	-	-	-	-	-	-	-
Stage 2	988	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	6.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1581	-	-	661	1611	-	-
HCM Lane V/C Ratio	0.076	-	-	0.129	-	-	-
HCM Control Delay (s)	7.5	-	-	11.3	0	-	-
HCM Lane LOS	A	-	-	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	1	6	0	0	0	0	112	104	15	80	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	1	1	7	0	0	0	0	137	127	18	98	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	334	397	98	98	0	0	263	0	0
Stage 1	134	134	-	-	-	-	-	-	-
Stage 2	200	263	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	665	544	963	1508	-	-	1313	-	-
Stage 1	897	789	-	-	-	-	-	-	-
Stage 2	838	694	-	-	-	-	-	-	-
Platoon blocked, %					-	-		-	-
Mov Cap-1 Maneuver	656	0	963	1508	-	-	1313	-	-
Mov Cap-2 Maneuver	656	0	-	-	-	-	-	-	-
Stage 1	884	0	-	-	-	-	-	-	-
Stage 2	838	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	0	1.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1508	-	-	903	1313	-	-
HCM Lane V/C Ratio	-	-	-	0.011	0.014	-	-
HCM Control Delay (s)	0	-	-	9	7.8	0	-
HCM Lane LOS	A	-	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	32	184	0	28	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	47	271	0	41	85

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	439	271	0	0	271	0
Stage 1	271	-	-	-	-	-
Stage 2	168	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	579	773	-	-	1304	-
Stage 1	779	-	-	-	-	-
Stage 2	867	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	560	773	-	-	1304	-
Mov Cap-2 Maneuver	560	-	-	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	838	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	2.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	773	1304	-
HCM Lane V/C Ratio	-	-	0.061	0.032	-
HCM Control Delay (s)	-	-	10	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	130	0	184	58	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	69	69	69	69	69	69
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	188	0	267	84	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	351	84	84	0	-	0
Stage 1	84	-	-	-	-	-
Stage 2	267	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	650	981	1526	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	782	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	650	981	1526	-	-	-
Mov Cap-2 Maneuver	650	-	-	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	782	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1526	-	981	-	-
HCM Lane V/C Ratio	-	-	0.192	-	-
HCM Control Delay (s)	0	-	9.5	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	82	102	12	0	189
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	89	111	13	0	205

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	322	117	0	0	124	0
Stage 1	117	-	-	-	-	-
Stage 2	205	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	676	941	-	-	1475	-
Stage 1	913	-	-	-	-	-
Stage 2	834	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	676	941	-	-	1475	-
Mov Cap-2 Maneuver	676	-	-	-	-	-
Stage 1	913	-	-	-	-	-
Stage 2	834	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	941	1475	-
HCM Lane V/C Ratio	-	-	0.095	-	-
HCM Control Delay (s)	-	-	9.2	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Int Delay, s/veh	6.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	27	72	42	15	155	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	29	78	46	16	168	37

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	428	54	0	0	62	0
Stage 1	54	-	-	-	-	-
Stage 2	374	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	588	1019	-	-	1554	-
Stage 1	974	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	523	1019	-	-	1554	-
Mov Cap-2 Maneuver	523	-	-	-	-	-
Stage 1	974	-	-	-	-	-
Stage 2	623	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.1	0	6.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	810	1554	-
HCM Lane V/C Ratio	-	-	0.133	0.108	-
HCM Control Delay (s)	-	-	10.1	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.4	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	7	21	12	11	21	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	8	23	13	12	23	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	30	0	57	19
Stage 1	-	-	-	-	19	-
Stage 2	-	-	-	-	38	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1596	-	955	1065
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	990	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1596	-	947	1065
Mov Cap-2 Maneuver	-	-	-	-	947	-
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	982	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.8	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	984	-	-	1596	-
HCM Lane V/C Ratio	0.035	-	-	0.008	-
HCM Control Delay (s)	8.8	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	0	3	1	42	10	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	3	1	44	11	0

Major/Minor	Minor1			Major1		
Conflicting Flow All	114	115	11	16	0	0
Stage 1	99	99	-	-	-	-
Stage 2	15	16	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-
Pot Cap-1 Maneuver	887	779	1076	1615	-	-
Stage 1	930	817	-	-	-	-
Stage 2	1013	886	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	863	0	1076	1615	-	-
Mov Cap-2 Maneuver	863	0	-	-	-	-
Stage 1	905	0	-	-	-	-
Stage 2	1013	0	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	8.4	5.9
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1615	-	-	1076	1621	-	-
HCM Lane V/C Ratio	0.027	-	-	0.004	-	-	-
HCM Control Delay (s)	7.3	-	-	8.4	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	14	1
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	15	1

Major/Minor	Major2		
Conflicting Flow All	11	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1621	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1621	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	1	4	0	0	0	0	52	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	1	4	0	0	0	0	55	4

Major/Minor	Minor2						Major1		
Conflicting Flow All	72	74	15				15	0	0
Stage 1	15	15	-				-	-	-
Stage 2	57	59	-				-	-	-
Critical Hdwy	6.4	6.5	6.2				4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-				-	-	-
Critical Hdwy Stg 2	5.4	5.5	-				-	-	-
Follow-up Hdwy	3.5	4	3.3				2.2	-	-
Pot Cap-1 Maneuver	937	820	1070				1616	-	-
Stage 1	1013	887	-				-	-	-
Stage 2	971	850	-				-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	937	0	1070				1616	-	-
Mov Cap-2 Maneuver	937	0	-				-	-	-
Stage 1	1013	0	-				-	-	-
Stage 2	971	0	-				-	-	-

Approach	EB	NB
HCM Control Delay, s	8.4	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1616	-	-	1070	1558	-	-
HCM Lane V/C Ratio	-	-	-	0.005	-	-	-
HCM Control Delay (s)	0	-	-	8.4	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	14	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	15	0

Major/Minor	Major2		
Conflicting Flow All	59	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1558	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1558	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	12	45	1	9	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	13	47	1	9	9

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	76	48	0	0	48	0
Stage 1	48	-	-	-	-	-
Stage 2	28	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	932	1027	-	-	1572	-
Stage 1	980	-	-	-	-	-
Stage 2	1000	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	926	1027	-	-	1572	-
Mov Cap-2 Maneuver	926	-	-	-	-	-
Stage 1	980	-	-	-	-	-
Stage 2	994	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	3.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1027	1572	-
HCM Lane V/C Ratio	-	-	0.012	0.006	-
HCM Control Delay (s)	-	-	8.5	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	28	0	46	9	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	29	0	48	9	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	57	9	9	0	-	0
Stage 1	9	-	-	-	-	-
Stage 2	48	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	955	1079	1624	-	-	-
Stage 1	1019	-	-	-	-	-
Stage 2	980	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	955	1079	1624	-	-	-
Mov Cap-2 Maneuver	955	-	-	-	-	-
Stage 1	1019	-	-	-	-	-
Stage 2	980	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1624	-	1079	-	-
HCM Lane V/C Ratio	-	-	0.027	-	-
HCM Control Delay (s)	0	-	8.4	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	0	3	5	42	17	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	3	5	44	18	0

Major/Minor	Minor1			Major1		
Conflicting Flow All	148	149	18	43	0	0
Stage 1	106	106	-	-	-	-
Stage 2	42	43	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-
Pot Cap-1 Maneuver	849	746	1066	1579	-	-
Stage 1	923	811	-	-	-	-
Stage 2	986	863	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	825	0	1066	1579	-	-
Mov Cap-2 Maneuver	825	0	-	-	-	-
Stage 1	897	0	-	-	-	-
Stage 2	986	0	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	8.4	5.2
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1579	-	-	1066	1612	-	-
HCM Lane V/C Ratio	0.028	-	-	0.008	-	-	-
HCM Control Delay (s)	7.3	-	-	8.4	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	38	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	40	3

Major/Minor	Major2		
Conflicting Flow All	18	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1612	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1612	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	1	1	8	0	0	0	0	58	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	1	1	8	0	0	0	0	61	4

Major/Minor	Minor2						Major1		
Conflicting Flow All	126	128	21				21	0	0
Stage 1	63	63	-				-	-	-
Stage 2	63	65	-				-	-	-
Critical Hdwy	6.4	6.5	6.2				4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-				-	-	-
Critical Hdwy Stg 2	5.4	5.5	-				-	-	-
Follow-up Hdwy	3.5	4	3.3				2.2	-	-
Pot Cap-1 Maneuver	874	766	1062				1608	-	-
Stage 1	965	846	-				-	-	-
Stage 2	965	845	-				-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	862	0	1062				1608	-	-
Mov Cap-2 Maneuver	862	0	-				-	-	-
Stage 1	951	0	-				-	-	-
Stage 2	965	0	-				-	-	-

Approach	EB	NB
HCM Control Delay, s	8.5	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1608	-	-	1035	1550	-	-
HCM Lane V/C Ratio	-	-	-	0.01	0.014	-	-
HCM Control Delay (s)	0	-	-	8.5	7.4	0	-
HCM Lane LOS	A	-	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection			
Int Delay, s/veh			

Movement	SBL	SBT	SBR
Vol, veh/h	20	20	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	0	0	0
Mvmt Flow	21	21	0

Major/Minor	Major2		
Conflicting Flow All	65	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1550	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1550	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	3.7
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	17	45	0	12	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	18	47	0	13	17

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	89	47	0	0	47	0
Stage 1	47	-	-	-	-	-
Stage 2	42	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	917	1028	-	-	1573	-
Stage 1	981	-	-	-	-	-
Stage 2	986	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	910	1028	-	-	1573	-
Mov Cap-2 Maneuver	910	-	-	-	-	-
Stage 1	981	-	-	-	-	-
Stage 2	978	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.6	0	3.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1028	1573	-
HCM Lane V/C Ratio	-	-	0.017	0.008	-
HCM Control Delay (s)	-	-	8.6	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	35	0	45	16	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	37	0	47	17	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	64	17	17	0	-	0
Stage 1	17	-	-	-	-	-
Stage 2	47	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	947	1068	1613	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	981	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	947	1068	1613	-	-	-
Mov Cap-2 Maneuver	947	-	-	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	981	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.5	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1613	-	1068	-	-
HCM Lane V/C Ratio	-	-	0.034	-	-
HCM Control Delay (s)	0	-	8.5	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	66	3	1	106	11	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	85	4	1	136	14	0

Major/Minor	Minor1			Major1		
Conflicting Flow All	308	309	14	23	0	0
Stage 1	286	286	-	-	-	-
Stage 2	22	23	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-
Pot Cap-1 Maneuver	688	609	1072	1605	-	-
Stage 1	767	679	-	-	-	-
Stage 2	1006	880	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	630	0	1072	1605	-	-
Mov Cap-2 Maneuver	630	0	-	-	-	-
Stage 1	702	0	-	-	-	-
Stage 2	1006	0	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	11.6	6.7
HCM LOS	B	

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1605	-	-	634	1617	-	-
HCM Lane V/C Ratio	0.085	-	-	0.142	-	-	-
HCM Control Delay (s)	7.5	-	-	11.6	0	-	-
HCM Lane LOS	A	-	-	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	17	1
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	78	78	78
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	22	1

Major/Minor	Major2		
Conflicting Flow All	14	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1617	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1617	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	1	4	0	0	0	0	117	81
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	1	5	0	0	0	0	139	96

Major/Minor	Minor2						Major1		
Conflicting Flow All	287	335	99				99	0	0
Stage 1	99	99	-				-	-	-
Stage 2	188	236	-				-	-	-
Critical Hdwy	6.4	6.5	6.2				4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-				-	-	-
Critical Hdwy Stg 2	5.4	5.5	-				-	-	-
Follow-up Hdwy	3.5	4	3.3				2.2	-	-
Pot Cap-1 Maneuver	708	589	962				1507	-	-
Stage 1	930	817	-				-	-	-
Stage 2	849	713	-				-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	708	0	962				1507	-	-
Mov Cap-2 Maneuver	708	0	-				-	-	-
Stage 1	930	0	-				-	-	-
Stage 2	849	0	-				-	-	-

Approach	EB	NB
HCM Control Delay, s	8.8	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1507	-	-	962	1343	-	-
HCM Lane V/C Ratio	-	-	-	0.006	-	-	-
HCM Control Delay (s)	0	-	-	8.8	0	-	-
HCM Lane LOS	A	-	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	83	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	84	84	84
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	99	0

Major/Minor	Major2		
Conflicting Flow All	236	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1343	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1343	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	41	158	1	27	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	47	180	1	31	68

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	310	180	0	0	181	0
Stage 1	180	-	-	-	-	-
Stage 2	130	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	687	868	-	-	1407	-
Stage 1	856	-	-	-	-	-
Stage 2	901	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	671	868	-	-	1407	-
Mov Cap-2 Maneuver	671	-	-	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	880	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	2.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	868	1407	-
HCM Lane V/C Ratio	-	-	0.054	0.022	-
HCM Control Delay (s)	-	-	9.4	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	110	0	159	60	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	138	0	199	75	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	274	75	75	0	-	0
Stage 1	75	-	-	-	-	-
Stage 2	199	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	720	992	1537	-	-	-
Stage 1	953	-	-	-	-	-
Stage 2	839	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	720	992	1537	-	-	-
Mov Cap-2 Maneuver	720	-	-	-	-	-
Stage 1	953	-	-	-	-	-
Stage 2	839	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1537	-	992	-	-
HCM Lane V/C Ratio	-	-	0.139	-	-
HCM Control Delay (s)	0	-	9.2	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	71	88	15	0	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	77	96	16	0	184

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	288	104	0	0	112	0
Stage 1	104	-	-	-	-	-
Stage 2	184	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	707	956	-	-	1490	-
Stage 1	925	-	-	-	-	-
Stage 2	852	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	707	956	-	-	1490	-
Mov Cap-2 Maneuver	707	-	-	-	-	-
Stage 1	925	-	-	-	-	-
Stage 2	852	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	956	1490	-
HCM Lane V/C Ratio	-	-	0.081	-	-
HCM Control Delay (s)	-	-	9.1	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Int Delay, s/veh	5.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	44	58	19	134	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	11	48	63	21	146	38

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	402	73	0	0	84	0
Stage 1	73	-	-	-	-	-
Stage 2	329	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	608	995	-	-	1526	-
Stage 1	955	-	-	-	-	-
Stage 2	734	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	548	995	-	-	1526	-
Mov Cap-2 Maneuver	548	-	-	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	662	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	864	1526	-
HCM Lane V/C Ratio	-	-	0.068	0.095	-
HCM Control Delay (s)	-	-	9.5	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.3	-

Intersection	
Int Delay, s/veh	4.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	9	19	15	11	29	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	10	21	16	12	32	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	30	0	65	20
Stage 1	-	-	-	-	20	-
Stage 2	-	-	-	-	45	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1596	-	946	1064
Stage 1	-	-	-	-	1008	-
Stage 2	-	-	-	-	983	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1596	-	937	1064
Mov Cap-2 Maneuver	-	-	-	-	937	-
Stage 1	-	-	-	-	1008	-
Stage 2	-	-	-	-	973	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.2	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	948	-	-	1596	-
HCM Lane V/C Ratio	0.037	-	-	0.01	-
HCM Control Delay (s)	8.9	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	6.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	0	63	3	5	107	19	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	78	4	6	132	23	0

Major/Minor	Minor1			Major1		
Conflicting Flow All	339	341	23	53	0	0
Stage 1	288	288	-	-	-	-
Stage 2	51	53	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-
Pot Cap-1 Maneuver	661	584	1060	1566	-	-
Stage 1	766	677	-	-	-	-
Stage 2	977	855	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	605	0	1060	1566	-	-
Mov Cap-2 Maneuver	605	0	-	-	-	-
Stage 1	701	0	-	-	-	-
Stage 2	977	0	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	11.7	6.4
HCM LOS	B	

Minor Lane/Major Mvmt	NBL	NBT	NBR	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1566	-	-	625	1605	-	-
HCM Lane V/C Ratio	0.084	-	-	0.14	-	-	-
HCM Control Delay (s)	7.5	-	-	11.7	0	-	-
HCM Lane LOS	A	-	-	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	0	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	0	40	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	81	81	81
Heavy Vehicles, %	0	0	0
Mvmt Flow	0	49	4

Major/Minor	Major2		
Conflicting Flow All	23	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1605	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1605	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	1	1	8	0	0	0	0	125	105
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0
Mvmt Flow	1	1	10	0	0	0	0	152	128

Major/Minor	Minor2						Major1		
Conflicting Flow All	368	432	104				104	0	0
Stage 1	152	152	-				-	-	-
Stage 2	216	280	-				-	-	-
Critical Hdwy	6.4	6.5	6.2				4.1	-	-
Critical Hdwy Stg 1	5.4	5.5	-				-	-	-
Critical Hdwy Stg 2	5.4	5.5	-				-	-	-
Follow-up Hdwy	3.5	4	3.3				2.2	-	-
Pot Cap-1 Maneuver	636	519	956				1500	-	-
Stage 1	881	775	-				-	-	-
Stage 2	825	683	-				-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	623	0	956				1500	-	-
Mov Cap-2 Maneuver	623	0	-				-	-	-
Stage 1	863	0	-				-	-	-
Stage 2	825	0	-				-	-	-

Approach	EB	NB
HCM Control Delay, s	9	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	SBL	SBT	SBR
Capacity (veh/h)	1500	-	-	902	1294	-	-
HCM Lane V/C Ratio	-	-	-	0.014	0.019	-	-
HCM Control Delay (s)	0	-	-	9	7.8	0	-
HCM Lane LOS	A	-	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	-	-

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	20	85	0
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	82	82	82
Heavy Vehicles, %	0	0	0
Mvmt Flow	24	104	0

Major/Minor	Major2		
Conflicting Flow All	280	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1294	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1294	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	1.5
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	36	194	0	31	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	53	285	0	46	91

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	467	285	0	0	285	0
Stage 1	285	-	-	-	-	-
Stage 2	182	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	558	759	-	-	1289	-
Stage 1	768	-	-	-	-	-
Stage 2	854	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	537	759	-	-	1289	-
Mov Cap-2 Maneuver	537	-	-	-	-	-
Stage 1	768	-	-	-	-	-
Stage 2	822	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.1	0	2.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	759	1289	-
HCM Lane V/C Ratio	-	-	0.07	0.035	-
HCM Control Delay (s)	-	-	10.1	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	138	0	194	62	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	69	69	69	69	69	69
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	200	0	281	90	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	371	90	90	0	-	0
Stage 1	90	-	-	-	-	-
Stage 2	281	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	634	973	1518	-	-	-
Stage 1	939	-	-	-	-	-
Stage 2	771	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	634	973	1518	-	-	-
Mov Cap-2 Maneuver	634	-	-	-	-	-
Stage 1	939	-	-	-	-	-
Stage 2	771	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.7	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1518	-	973	-	-
HCM Lane V/C Ratio	-	-	0.206	-	-
HCM Control Delay (s)	0	-	9.7	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	82	112	12	0	200
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	89	122	13	0	217

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	345	128	0	0	135	0
Stage 1	128	-	-	-	-	-
Stage 2	217	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	656	927	-	-	1462	-
Stage 1	903	-	-	-	-	-
Stage 2	824	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	656	927	-	-	1462	-
Mov Cap-2 Maneuver	656	-	-	-	-	-
Stage 1	903	-	-	-	-	-
Stage 2	824	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.3	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	927	1462	-
HCM Lane V/C Ratio	-	-	0.096	-	-
HCM Control Delay (s)	-	-	9.3	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Int Delay, s/veh	6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	27	72	52	15	155	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	29	78	57	16	168	49

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	451	65	0	0	73	0
Stage 1	65	-	-	-	-	-
Stage 2	386	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	570	1005	-	-	1540	-
Stage 1	963	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	506	1005	-	-	1540	-
Mov Cap-2 Maneuver	506	-	-	-	-	-
Stage 1	963	-	-	-	-	-
Stage 2	614	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	5.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	792	1540	-
HCM Lane V/C Ratio	-	-	0.136	0.109	-
HCM Control Delay (s)	-	-	10.3	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.4	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	10	21	12	15	21	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	11	23	13	16	23	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	34	0	64	22
Stage 1	-	-	-	-	22	-
Stage 2	-	-	-	-	42	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1591	-	947	1061
Stage 1	-	-	-	-	1006	-
Stage 2	-	-	-	-	986	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1591	-	939	1061
Mov Cap-2 Maneuver	-	-	-	-	939	-
Stage 1	-	-	-	-	1006	-
Stage 2	-	-	-	-	978	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.2	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	978	-	-	1591	-
HCM Lane V/C Ratio	0.036	-	-	0.008	-
HCM Control Delay (s)	8.8	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3285*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1729*	pc/h/ln
S	*66.8*	mph
D = v_p / S	*25.9*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Existing

Project Description Yermo Travel Stop

Site Information

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D	150	☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	3251	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	34	V_D =	veh/h
		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	3251	0.95	Level	0	0	1.000	1.00	3422
Ramp	34	0.95	Level	0	0	1.000	1.00	36
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} = 3422 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	3422	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3386	Exhibit 13-8	4800	No
V_R	36	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3422	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 = 32.3 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.431 (Exhibit 13-12)

S_R= 57.9 mph (Exhibit 13-12)

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

S = 57.9 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3251*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1711*	pc/h/ln
S	*67.0*	mph
D = v_p / S	*25.5*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Friday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Existing

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	150
Deceleration Lane Length L_D	
Freeway Volume, V_F	3251
Ramp Volume, V_R	5
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	3251	0.95	Level	0	0	1.000	1.00	3422
Ramp	5	0.95	Level	0	0	1.000	1.00	5
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} = 3422 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}	3427	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3427	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 = 31.3 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.431 (Exibit 13-11)
S_R = 57.9 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 57.9 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3256*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1714*	pc/h/ln
S	*66.9*	mph
D = v_p / S	*25.6*	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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1969*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1036*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.8*	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		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Existing

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 1965	V_D = veh/h
	Ramp Volume, V_R: 4	
	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	1965	0.95	Level	0	0	1.000	1.00	2068
Ramp	4	0.95	Level	0	0	1.000	1.00	4
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} = 2068 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	2068	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2064	Exhibit 13-8	4800	No
V_R	4	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2068	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 = 20.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.428 (Exhibit 13-12)

S_R= 58.0 mph (Exhibit 13-12)

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

S = 58.0 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1965*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1034*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.8*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Friday Peak Hour

Site Information

Freeway/Dir of Travel	Southbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Existing

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	200
Deceleration Lane Length L_D	
Freeway Volume, V_F	1965
Ramp Volume, V_R	48
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	1965	0.95	Level	0	0	1.000	1.00	2068
Ramp	48	0.95	Level	0	0	1.000	1.00	51
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} = 2068 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}	2119	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2119	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 = 20.7 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.339 (Exibit 13-11)
S_R= 60.5 mph (Exhibit 13-11)
S_0= N/A mph (Exhibit 13-11)
S = 60.5 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2013*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1059*	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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1895*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*997*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.2*	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		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Existing

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 1856	V_D = veh/h
	Ramp Volume, V_R: 39	
	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	1856	0.95	Level	0	0	1.000	1.00	1954
Ramp	39	0.95	Level	0	0	1.000	1.00	41
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} = 1954 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	1954	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1913	Exhibit 13-8	4800	No
V_R	41	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1954	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 = 19.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.432 (Exhibit 13-12)

S_R= 57.9 mph (Exhibit 13-12)

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

S = 57.9 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1856*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*977*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.0*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Existing

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp	
☐ Yes	☐ On	☐ Yes	☐ On
☑ No	☐ Off	☑ No	☐ Off
L_{up} =	ft	L_{down} =	ft
V_u =	veh/h	V_D =	veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	150
Deceleration Lane Length L_D	
Freeway Volume, V_F	1856
Ramp Volume, V_R	20
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	1856	0.95	Level	0	0	1.000	1.00	1954
Ramp	20	0.95	Level	0	0	1.000	1.00	21
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} = 1954 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}	1975	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1975	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 = 19.9 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.339 (Exibit 13-11)

S_R = 60.5 mph (Exhibit 13-11)

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

S = 60.5 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1876*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*987*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.1*	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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3061*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1611*	pc/h/ln
S	*68.0*	mph
D = v_p / S	*23.7*	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

Analyst		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Existing

Project Description Yermo Travel Stop

Site Information

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D	150	☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	3054	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	7	V_D =	veh/h
		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	3054	0.95	Level	0	0	1.000	1.00	3215
Ramp	7	0.95	Level	0	0	1.000	1.00	7
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} = 3215 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	3215	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3208	Exhibit 13-8	4800	No
V_R	7	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3215	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 = 30.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.429 (Exhibit 13-12)

S_R= 58.0 mph (Exhibit 13-12)

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

S = 58.0 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3054*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1607*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Southbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Existing

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 200	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 3054	V_D = veh/h
	Ramp Volume, V_R: 41	
	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	3054	0.95	Level	0	0	1.000	1.00	3215
Ramp	41	0.95	Level	0	0	1.000	1.00	43
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} = 3215 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}	3258	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3258	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 = 29.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.408 (Exibit 13-11)

S_R = 58.6 mph (Exhibit 13-11)

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

S = 58.6 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Existing*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3095*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1629*	pc/h/ln
S	*67.9*	mph
D = v_p / S	*24.0*	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	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1899*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*999*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.3*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Existing Plus Project

Project Description Yermo Travel Stop

Site Information

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 1797	V_D = veh/h
	Ramp Volume, V_R: 102	
	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	1797	0.95	Level	0	0	1.000	1.00	1892
Ramp	102	0.95	Level	0	0	1.000	1.00	107
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} = 1892 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	1892	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1785	Exhibit 13-8	4800	No
V_R	107	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1892	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 = 19.2 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.438 (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)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1797*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*946*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*13.5*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	
Agency or Company	LSA Associates
Date Performed	8/18/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Existing Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	150
Deceleration Lane Length L_D	
Freeway Volume, V_F	1797
Ramp Volume, V_R	81
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	1797	0.95	Level	0	0	1.000	1.00	1892
Ramp	81	0.95	Level	0	0	1.000	1.00	85
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} = 1892 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}	1977	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1977	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 = 19.9 (pc/mi/ln)
LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.339 (Exibit 13-11)
S_R = 60.5 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 60.5 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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1878*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*988*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.1*	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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3063*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1612*	pc/h/ln
S	*68.0*	mph
D = v_p / S	*23.7*	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		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Existing Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2953	V_D = veh/h
	Ramp Volume, V_R: 110	
	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	2953	0.95	Level	0	0	1.000	1.00	3108
Ramp	110	0.95	Level	0	0	1.000	1.00	116
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} = 3108 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	3108	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2992	Exhibit 13-8	4800	No
V_R	116	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3108	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 = 29.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.438 (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)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2953*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1554*	pc/h/ln
S	*68.5*	mph
D = v_p / S	*22.7*	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 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

Analyst		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd On
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Existing Plus Project

Project Description Yermo Travel Stop

Site Information

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp
☐ Yes	☐ On	Acceleration Lane Length, L_A	200	☐ Yes ☐ On
☑ No	☐ Off	Deceleration Lane Length L_D		☑ No ☐ Off
L_{up} =	ft	Freeway Volume, V_F	2953	L_{down} = ft
V_u =	veh/h	Ramp Volume, V_R	146	V_D = veh/h
		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	2953	0.95	Level	0	0	1.000	1.00	3108
Ramp	146	0.95	Level	0	0	1.000	1.00	154
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} = 3108 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}	3262	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3262	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 = 29.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.409 (Exibit 13-11)

S_R= 58.6 mph (Exhibit 13-11)

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

S = 58.6 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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3099*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1631*	pc/h/ln
S	*67.8*	mph
D = v_p / S	*24.0*	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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1900*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1000*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.3*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Existing Plus Project

Project Description Yermo Travel Stop

Site Information

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 1780	V_D = veh/h
	Ramp Volume, V_R: 120	
	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	1780	0.95	Level	0	0	1.000	1.00	1874
Ramp	120	0.95	Level	0	0	1.000	1.00	126
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} = 1874 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	1874	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1748	Exhibit 13-8	4800	No
V_R	126	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1874	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 = 19.0 (pc/mi/ln)

LOS = B (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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1780*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*937*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*13.4*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Existing Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	150
Deceleration Lane Length L_D	
Freeway Volume, V_F	1780
Ramp Volume, V_R	97
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	1780	0.95	Level	0	0	1.000	1.00	1874
Ramp	97	0.95	Level	0	0	1.000	1.00	102
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} = 1874 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}	1976	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1976	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 = 19.9 (pc/mi/ln)
LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.339 (Exibit 13-11)
S_R= 60.5 mph (Exhibit 13-11)
S_0= N/A mph (Exhibit 13-11)
S = 60.5 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1877*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*988*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.1*	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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3063*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1612*	pc/h/ln
S	*68.0*	mph
D = v_p / S	*23.7*	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 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		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Existing Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2924	V_D = veh/h
	Ramp Volume, V_R: 139	
	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	2924	0.95	Level	0	0	1.000	1.00	3078
Ramp	139	0.95	Level	0	0	1.000	1.00	146
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} = 3078 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	3078	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2932	Exhibit 13-8	4800	No
V_R	146	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3078	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 = 29.4 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.441 (Exhibit 13-12)

S_R= 57.6 mph (Exhibit 13-12)

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

S = 57.6 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2924*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1539*	pc/h/ln
S	*68.7*	mph
D = v_p / S	*22.4*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Southbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Existing Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	200
Deceleration Lane Length L_D	
Freeway Volume, V_F	2924
Ramp Volume, V_R	174
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	2924	0.95	Level	0	0	1.000	1.00	3078
Ramp	174	0.95	Level	0	0	1.000	1.00	183
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} = 3078 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}	3261	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3261	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 = 29.6 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.409 (Exibit 13-11)
S_R= 58.6 mph (Exhibit 13-11)
S_0= N/A mph (Exhibit 13-11)
S = 58.6 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Existing Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3098*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1631*	pc/h/ln
S	*67.8*	mph
D = v_p / S	*24.0*	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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3343*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1759*	pc/h/ln
S	*66.4*	mph
D = v_p / S	*26.5*	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 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		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Opening Year

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 3309	V_D = veh/h
	Ramp Volume, V_R: 35	
	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	3309	0.95	Level	0	0	1.000	1.00	3483
Ramp	35	0.95	Level	0	0	1.000	1.00	37
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} = 3483 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	3483	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3446	Exhibit 13-8	4800	No
V_R	37	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3483	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 = 0.431 (Exhibit 13-12)

S_R= 57.9 mph (Exhibit 13-12)

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

S = 57.9 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3309*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1742*	pc/h/ln
S	*66.6*	mph
D = v_p / S	*26.2*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Friday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Opening Year

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	150
Deceleration Lane Length L_D	
Freeway Volume, V_F	3309
Ramp Volume, V_R	5
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	3309	0.95	Level	0	0	1.000	1.00	3483
Ramp	5	0.95	Level	0	0	1.000	1.00	5
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} = 3483 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}	3488	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3488	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 = 0.438 (Exibit 13-11)
S_R = 57.7 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 57.7 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3314*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1744*	pc/h/ln
S	*66.6*	mph
D = v_p / S	*26.2*	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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2004*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1055*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Opening Year

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2000	V_D = veh/h
	Ramp Volume, V_R: 4	
	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	2000	0.95	Level	0	0	1.000	1.00	2105
Ramp	4	0.95	Level	0	0	1.000	1.00	4
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} = 2105 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	2105	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2101	Exhibit 13-8	4800	No
V_R	4	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2105	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 = 21.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.428 (Exhibit 13-12)

S_R = 58.0 mph (Exhibit 13-12)

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

S = 58.0 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2000*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1053*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*15.0*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd On
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Opening Year

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 200	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2000	V_D = veh/h
	Ramp Volume, V_R: 49	
	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	2000	0.95	Level	0	0	1.000	1.00	2105
Ramp	49	0.95	Level	0	0	1.000	1.00	52
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} = 2105 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}	2157	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2157	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 = 21.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.341 (Exibit 13-11)

S_R = 60.5 mph (Exhibit 13-11)

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

S = 60.5 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2049*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1078*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*15.4*	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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1928*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1015*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.5*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Opening Year

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 1889	V_D = veh/h
	Ramp Volume, V_R: 40	
	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	1889	0.95	Level	0	0	1.000	1.00	1988
Ramp	40	0.95	Level	0	0	1.000	1.00	42
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} = 1988 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	1988	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1946	Exhibit 13-8	4800	No
V_R	42	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1988	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 = 20.0 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.432 (Exhibit 13-12)

S_R= 57.9 mph (Exhibit 13-12)

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

S = 57.9 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1889*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*994*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.2*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Opening Year

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	150
Deceleration Lane Length L_D	
Freeway Volume, V_F	1889
Ramp Volume, V_R	20
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	1889	0.95	Level	0	0	1.000	1.00	1988
Ramp	20	0.95	Level	0	0	1.000	1.00	21
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} = 1988 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}	2009	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2009	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 = 20.2 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.340 (Exibit 13-11)
S_R = 60.5 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 60.5 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1909*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1005*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.4*	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 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	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3115*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1639*	pc/h/ln
S	*67.8*	mph
D = v_p / S	*24.2*	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		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Opening Year

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 3108	V_D = veh/h
	Ramp Volume, V_R: 7	
	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	3108	0.95	Level	0	0	1.000	1.00	3272
Ramp	7	0.95	Level	0	0	1.000	1.00	7
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} = 3272 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	3272	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3265	Exhibit 13-8	4800	No
V_R	7	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3272	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 = 31.0 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.429 (Exhibit 13-12)

S_R = 58.0 mph (Exhibit 13-12)

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

S = 58.0 mph (Exhibit 13-13)

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3108*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1636*	pc/h/ln
S	*67.8*	mph
D = v_p / S	*24.1*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Southbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Opening Year

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	200
Deceleration Lane Length L_D	
Freeway Volume, V_F	3108
Ramp Volume, V_R	42
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	3108	0.95	Level	0	0	1.000	1.00	3272
Ramp	42	0.95	Level	0	0	1.000	1.00	44
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} = 3272 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}	3316	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3316	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 = 30.1 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.414 (Exibit 13-11)
S_R = 58.4 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 58.4 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3150*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1658*	pc/h/ln
S	*67.6*	mph
D = v_p / S	*24.5*	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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3347*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1762*	pc/h/ln
S	*66.3*	mph
D = v_p / S	*26.6*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Opening Year Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 3210	V_D = veh/h
	Ramp Volume, V_R: 138	
	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	3210	0.95	Level	0	0	1.000	1.00	3379
Ramp	138	0.95	Level	0	0	1.000	1.00	145
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} = 3379 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	3379	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3234	Exhibit 13-8	4800	No
V_R	145	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3379	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 = 32.0 (pc/mi/ln)

LOS = D (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)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3210*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1689*	pc/h/ln
S	*67.2*	mph
D = v_p / S	*25.1*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	8/18/2014
Analysis Time Period	Friday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Opening Year Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A	150	☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	3210	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	106	V_D =	veh/h
		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	3210	0.95	Level	0	0	1.000	1.00	3379
Ramp	106	0.95	Level	0	0	1.000	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} = 3379 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}	3491	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3491	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 = 0.438 (Exibit 13-11)

S_R = 57.7 mph (Exhibit 13-11)

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

S = 57.7 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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3316*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1745*	pc/h/ln
S	*66.6*	mph
D = v_p / S	*26.2*	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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2006*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1056*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Opening Year Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 1939	V_D = veh/h
	Ramp Volume, V_R: 67	
	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	1939	0.95	Level	0	0	1.000	1.00	2041
Ramp	67	0.95	Level	0	0	1.000	1.00	71
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} = 2041 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	2041	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1970	Exhibit 13-8	4800	No
V_R	71	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2041	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 = 20.5 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.434 (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)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1939*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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

Analyst	
Agency or Company	LSA Associates
Date Performed	8/18/2014
Analysis Time Period	Friday Peak Hour

Site Information

Freeway/Dir of Travel	Southbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Opening Year Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	200
Deceleration Lane Length L_D	
Freeway Volume, V_F	1939
Ramp Volume, V_R	114
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	1939	0.95	Level	0	0	1.000	1.00	2041
Ramp	114	0.95	Level	0	0	1.000	1.00	120
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} = 2041 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}	2161	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2161	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 = 21.0 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.341 (Exibit 13-11)
S_R= 60.5 mph (Exhibit 13-11)
S_0= N/A mph (Exhibit 13-11)
S = 60.5 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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2053*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1081*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*15.4*	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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1932*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1017*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.5*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	
Agency or Company	LSA Associates
Date Performed	8/18/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd Off
Jurisdiction	
Analysis Year	Opening Year Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D	150	☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	1830	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	103	V_D =	veh/h
		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	1830	0.95	Level	0	0	1.000	1.00	1926
Ramp	103	0.95	Level	0	0	1.000	1.00	108
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} = 1926 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	1926	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1818	Exhibit 13-8	4800	No
V_R	108	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1926	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 = 19.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.438 (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)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1830*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*963*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*13.8*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	8/18/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Opening Year Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A	150	☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	1830	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	81	V_D =	veh/h
		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	1830	0.95	Level	0	0	1.000	1.00	1926
Ramp	81	0.95	Level	0	0	1.000	1.00	85
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} = 1926 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}	2011	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2011	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 = 20.2 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.340 (Exibit 13-11)

S_R = 60.5 mph (Exhibit 13-11)

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

S = 60.5 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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*1911*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1006*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.4*	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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3117*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1641*	pc/h/ln
S	*67.7*	mph
D = v_p / S	*24.2*	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		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Opening Year Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2978	V_D = veh/h
	Ramp Volume, V_R: 139	
	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	2978	0.95	Level	0	0	1.000	1.00	3135
Ramp	139	0.95	Level	0	0	1.000	1.00	146
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} = 3135 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	3135	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2989	Exhibit 13-8	4800	No
V_R	146	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3135	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 = 29.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.441 (Exhibit 13-12)

S_R= 57.6 mph (Exhibit 13-12)

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

S = 57.6 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3007*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1583*	pc/h/ln
S	*68.3*	mph
D = v_p / S	*23.2*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	8/18/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Southbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Opening Year Plus Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	200
Deceleration Lane Length L_D	
Freeway Volume, V_F	3007
Ramp Volume, V_R	147
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	3007	0.95	Level	0	0	1.000	1.00	3165
Ramp	147	0.95	Level	0	0	1.000	1.00	155
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} = 3165 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}	3320	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3320	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 = 30.0 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.415 (Exibit 13-11)
S_R = 58.4 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 58.4 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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Opening Year Plus Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*3154*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1660*	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	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4495*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2366*	pc/h/ln
S	*54.2*	mph
D = v_p / S	*43.6*	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		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Year 2035

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 4449	V_D = veh/h
	Ramp Volume, V_R: 46	
	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	4449	0.95	Level	0	0	1.000	1.00	4683
Ramp	46	0.95	Level	0	0	1.000	1.00	48
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} = 4683 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	4683	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	4635	Exhibit 13-8	4800	No
V_R	48	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4683	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 = 43.2 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.432 (Exhibit 13-12)

S_R = 57.9 mph (Exhibit 13-12)

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

S = 57.9 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4449*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2342*	pc/h/ln
S	*54.9*	mph
D = v_p / S	*42.7*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Friday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Year 2035

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	150
Deceleration Lane Length L_D	
Freeway Volume, V_F	4449
Ramp Volume, V_R	7
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

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	4449	0.95	Level	0	0	1.000	1.00	4683
Ramp	7	0.95	Level	0	0	1.000	1.00	7
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} = 4683 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}	4690	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4690	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 = 41.1 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.735 (Exibit 13-11)

S_R = 49.4 mph (Exhibit 13-11)

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

S = 49.4 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4456*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2345*	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	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2695*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1418*	pc/h/ln
S	*69.4*	mph
D = v_p / S	*20.4*	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 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		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Year 2035

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2689	V_D = veh/h
	Ramp Volume, V_R: 5	
	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	2689	0.95	Level	0	0	1.000	1.00	2831
Ramp	5	0.95	Level	0	0	1.000	1.00	5
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} = 2831 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	2831	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2826	Exhibit 13-8	4800	No
V_R	5	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2831	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 = 27.2 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.428 (Exhibit 13-12)

S_R= 58.0 mph (Exhibit 13-12)

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

S = 58.0 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2689*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1415*	pc/h/ln
S	*69.5*	mph
D = v_p / S	*20.4*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Friday Peak Hour

Site Information

Freeway/Dir of Travel	Southbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Year 2035

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	200
Deceleration Lane Length L_D	
Freeway Volume, V_F	2689
Ramp Volume, V_R	66
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	2689	0.95	Level	0	0	1.000	1.00	2831
Ramp	66	0.95	Level	0	0	1.000	1.00	69
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} = 2831 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}	2900	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2900	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 = 26.8 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.378 (Exibit 13-11)
S_R= 59.4 mph (Exhibit 13-11)
S_0= N/A mph (Exhibit 13-11)
S = 59.4 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2755*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1450*	pc/h/ln
S	*69.3*	mph
D = v_p / S	*20.9*	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

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2594*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1365*	pc/h/ln
S	*69.7*	mph
D = v_p / S	*19.6*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Year 2035

Project Description Yermo Travel Stop

Site Information

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D	150	☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	2540	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	54	V_D =	veh/h
		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	2540	0.95	Level	0	0	1.000	1.00	2674
Ramp	54	0.95	Level	0	0	1.000	1.00	57
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} = 2674 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	2674	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2617	Exhibit 13-8	4800	No
V_R	57	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2674	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 = 25.9 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.433 (Exhibit 13-12)

S_R= 57.9 mph (Exhibit 13-12)

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

S = 57.9 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2540*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1337*	pc/h/ln
S	*69.8*	mph
D = v_p / S	*19.2*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Year 2035

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	150
Deceleration Lane Length L_D	
Freeway Volume, V_F	2540
Ramp Volume, V_R	28
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	2540	0.95	Level	0	0	1.000	1.00	2674
Ramp	28	0.95	Level	0	0	1.000	1.00	29
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} = 2674 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}	2703	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2703	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 = 25.6 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.369 (Exibit 13-11)
S_R= 59.7 mph (Exhibit 13-11)
S_0= N/A mph (Exhibit 13-11)
S = 59.7 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2568*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1352*	pc/h/ln
S	*69.7*	mph
D = v_p / S	*19.4*	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 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	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4189*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2205*	pc/h/ln
S	*58.3*	mph
D = v_p / S	*37.8*	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		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	4/29/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Year 2035

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 4180	V_D = veh/h
	Ramp Volume, V_R: 10	
	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	4180	0.95	Level	0	0	1.000	1.00	4400
Ramp	10	0.95	Level	0	0	1.000	1.00	11
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} = 4400 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	4400	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	4389	Exhibit 13-8	4800	No
V_R	11	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4400	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 = 40.7 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.429 (Exhibit 13-12)

S_R= 58.0 mph (Exhibit 13-12)

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

S = 58.0 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4180*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2200*	pc/h/ln
S	*58.4*	mph
D = v_p / S	*37.7*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	4/29/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Southbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Year 2035

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A	200	☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	4180	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	56	V_D =	veh/h
		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	4180	0.95	Level	0	0	1.000	1.00	4400
Ramp	56	0.95	Level	0	0	1.000	1.00	59
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} = 4400 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}	4459	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4459	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 = 39.0 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.644 (Exibit 13-11)

S_R = 52.0 mph (Exhibit 13-11)

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

S = 52.0 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	
Agency or Company	*LSA Associates*
Date Performed	*4/29/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4235*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2229*	pc/h/ln
S	*57.7*	mph
D = v_p / S	*38.6*	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	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4499*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2368*	pc/h/ln
S	*54.2*	mph
D = v_p / S	*43.7*	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		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Year 2035 With Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 4350	V_D = veh/h
	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	4350	0.95	Level	0	0	1.000	1.00	4579
Ramp	149	0.95	Level	0	0	1.000	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} = 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} = 4579 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	4579	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	4422	Exhibit 13-8	4800	No
V_R	157	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4579	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 = 42.3 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.442 (Exhibit 13-12)

S_R= 57.6 mph (Exhibit 13-12)

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

S = 57.6 mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4350*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2289*	pc/h/ln
S	*56.2*	mph
D = v_p / S	*40.7*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	8/18/2014
Analysis Time Period	Friday Peak Hour

Site Information

Freeway/Dir of Travel	Northbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Year 2035 With Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	150
Deceleration Lane Length L_D	
Freeway Volume, V_F	4350
Ramp Volume, V_R	108
Freeway Free-Flow Speed, S_{FF}	70.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

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	4350	0.95	Level	0	0	1.000	1.00	4579
Ramp	108	0.95	Level	0	0	1.000	1.00	114
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} = 4579 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}	4693	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4693	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 = 41.1 (pc/mi/ln)
LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.736 (Exibit 13-11)
S_R = 49.4 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 49.4 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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4458*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2697*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1419*	pc/h/ln
S	*69.4*	mph
D = v_p / S	*20.4*	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

Analyst		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Year 2035 With Project

Project Description Yermo Travel Stop

Site Information

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D	150	☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	2628	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	68	V_D =	veh/h
		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	2628	0.95	Level	0	0	1.000	1.00	2766
Ramp	68	0.95	Level	0	0	1.000	1.00	72
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} = 2766 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	2766	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2694	Exhibit 13-8	4800	No
V_R	72	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2766	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 = 26.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.434 (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)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2628*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1383*	pc/h/ln
S	*69.6*	mph
D = v_p / S	*19.9*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd On
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Friday Peak Hour	Analysis Year	Year 2035 With Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 200	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2628	V_D = veh/h
	Ramp Volume, V_R: 131	
	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	2628	0.95	Level	0	0	1.000	1.00	2766
Ramp	131	0.95	Level	0	0	1.000	1.00	138
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} = 2766 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}	2904	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2904	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 = 26.8 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.378 (Exibit 13-11)

S_R = 59.4 mph (Exhibit 13-11)

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

S = 59.4 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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Friday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2759*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1452*	pc/h/ln
S	*69.3*	mph
D = v_p / S	*21.0*	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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*South of Calico Road Off-Ramp*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2598*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1367*	pc/h/ln
S	*69.7*	mph
D = v_p / S	*19.6*	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	

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Year 2035 With Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2481	V_D = veh/h
	Ramp Volume, V_R: 117	
	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	2481	0.95	Level	0	0	1.000	1.00	2612
Ramp	117	0.95	Level	0	0	1.000	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} = 2612 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	2612	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2489	Exhibit 13-8	4800	No
V_R	123	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2612	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 = 25.4 (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)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*Calico Rd Off to Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2481*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1306*	pc/h/ln
S	*69.9*	mph
D = v_p / S	*18.7*	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		Freeway/Dir of Travel	Northbound
Agency or Company	LSA Associates	Junction	Calico Rd On
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Year 2035 With Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A	150	☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	2481	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	89	V_D =	veh/h
		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	2481	0.95	Level	0	0	1.000	1.00	2612
Ramp	89	0.95	Level	0	0	1.000	1.00	94
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} = 2612 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}	2706	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2706	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 = 25.6 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.369 (Exibit 13-11)

S_R = 59.7 mph (Exhibit 13-11)

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

S = 59.7 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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Northbound*
From/To	*North of Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*2570*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*1353*	pc/h/ln
S	*69.7*	mph
D = v_p / S	*19.4*	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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*North of Calico Rd Off*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4191*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2206*	pc/h/ln
S	*58.3*	mph
D = v_p / S	*37.9*	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		Freeway/Dir of Travel	Southbound
Agency or Company	LSA Associates	Junction	Calico Rd Off
Date Performed	8/18/2014	Jurisdiction	
Analysis Time Period	Sunday Peak Hour	Analysis Year	Year 2035 With Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 150	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 4079	V_D = veh/h
	Ramp Volume, V_R: 113	
	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	4079	0.95	Level	0	0	1.000	1.00	4294
Ramp	113	0.95	Level	0	0	1.000	1.00	119
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} = 4294 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	4294	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	4175	Exhibit 13-8	4800	No
V_R	119	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4294	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 = 39.8 (pc/mi/ln)

LOS = E (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)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*Calico Rd Off-Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4079*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2147*	pc/h/ln
S	*59.6*	mph
D = v_p / S	*36.0*	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

Analyst	
Agency or Company	LSA Associates
Date Performed	8/18/2014
Analysis Time Period	Sunday Peak Hour

Site Information

Freeway/Dir of Travel	Southbound
Junction	Calico Rd On
Jurisdiction	
Analysis Year	Year 2035 With Project

Project Description Yermo Travel Stop

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 200	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 4079	V_D = veh/h
	Ramp Volume, V_R: 161	
	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	4079	0.95	Level	0	0	1.000	1.00	4294
Ramp	161	0.95	Level	0	0	1.000	1.00	169
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} = 4294 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}	4463	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4463	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 = 39.0 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.645 (Exibit 13-11)

S_R = 51.9 mph (Exhibit 13-11)

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

S = 51.9 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	
Agency or Company	*LSA Associates*
Date Performed	*8/18/2014*
Analysis Time Period	*Sunday Peak Hour*

Site Information

Highway/Direction of Travel	*Southbound*
From/To	*South of Calico Rd On*
Jurisdiction	
Analysis Year	*Year 2035 With Project*

Project Description *Yermo Travel Stop*

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

Flow Inputs

Volume, V	*4239*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*0*
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*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*1.000*

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)	*2231*	pc/h/ln
S	*57.7*	mph
D = v_p / S	*38.7*	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

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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	