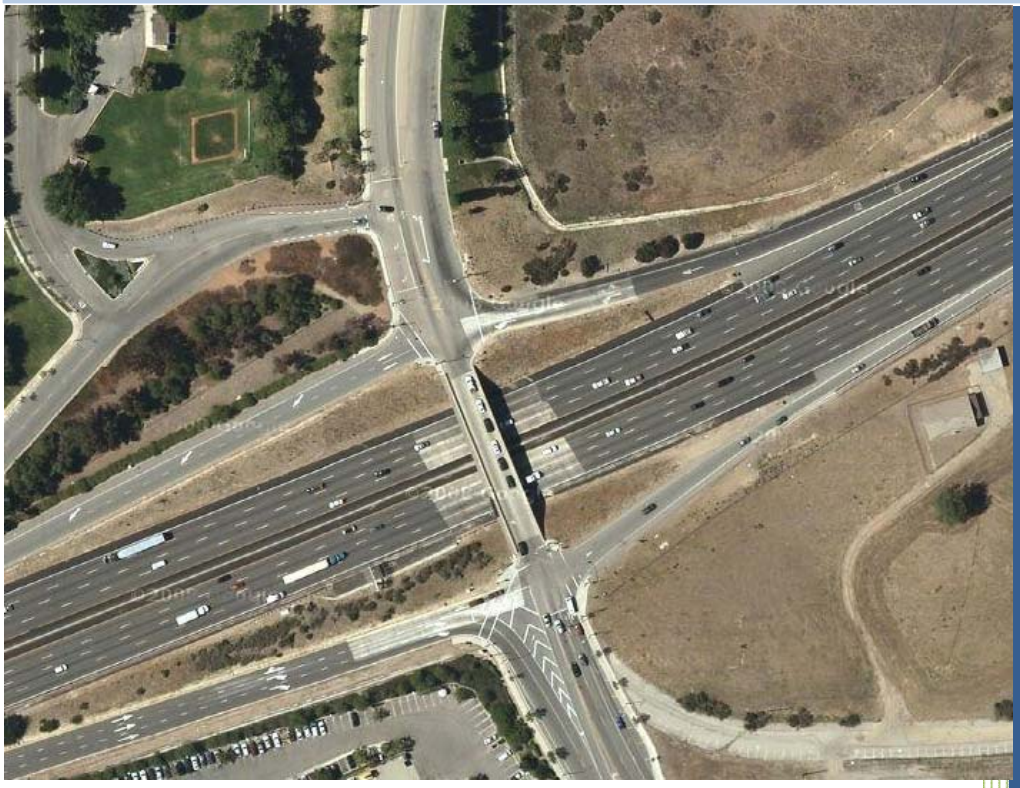
Lost Hills Road Interchange Project Report

Traffic Analysis



Submitted To:

City of Calabasas and

Huitt-Zollars, Inc.

Submitted By:

DKS Associates

TRANSPORTATION SOLUTIONS

January 5, 2011

LOST HILLS ROAD INTERCHANGE PROJECT REPORT (EA 07-242300)

TRAFFIC ANALYSIS

PREPARED FOR

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1. EXECUTIVE SUMMARY

1.1 Purpose and Need

The proposed improvement will substantially enhance the traffic operation at this interchange. The ramp locations are currently operating at LOS C or better during the peak hours. It should be noted that the actual operating conditions tend to be worse than the theoretical level of service calculation due to lane merging on the bridge and queue back up between intersections. Based on the future (2040) forecasts, the intersection of Lost Hills Road/US-101 northbound ramps is forecast to operate at LOS D in the a.m. peak hour and LOS F in the p.m. peak hour.

1.2 Project Location

US-101 provides the primary regional access for the City of Calabasas and adjacent cities with the western part of Calabasas served by the interchanges at Lost Hills Road and Las Virgenes Road. Lost Hills Road is a north-south arterial street that extends from the Calabasas Landfill north of Canwood Street to its southerly termination at Las Virgenes Road. There are signalized intersections at the off and on-ramp locations for the existing diamond interchange.

1.3 Project Alternatives

The traffic analysis in support of the Project Report analyzes six alternatives to improve the Lost Hills Interchange during the project completion year (2012) and future year (2040) horizon. The following presents a description of each alternative evaluated in this report.

- **Alternative 1 (No-Build) –** Alternative 1 considers no improvements to the Lost Hills Road Interchange by the year 2040.
- **Alternative 2 (Transportation Management Systems) –** Alternative 2 considers no capacity improvements to the Lost Hills Road Interchange. This alternative includes improvement to traffic signal timing and coordination at the interchange (i.e. video detection, CCTV).
- **Alternative 3 (Roundabout) –** Alternative 3 considers the construction of a new overcrossing to meet the Caltrans design standards, a four-legged roundabout at the north side and south side of US-101.
- **Alternative 4 (Expanded Diamond Interchange) –** Alternative 4 considers the construction of a new overcrossing, but retains the same diamond interchange configuration. Canwood Street will be maintained at its current location.
- **Alternative 5 (Partial Cloverleaf) –** Alternative 5 considers the construction of a new overcrossing to meet Caltrans design standards, and a new partial cloverleaf on-ramp for northbound Lost Hills Road to northbound US-101. Access to the residential community to the northwest of the interchange would be relocated to Driver Avenue.
- **Alternative 6 (Full Standard Diamond Interchange) –** Alternative 6 considers the construction of a new overcrossing to meet the Caltrans design standards, but retains the same diamond interchange configuration. Access to the residential community to the northwest of the interchange would be relocated to Driver Road.
- **Alternative 7 (Cloverleaf) –** Alternative 7 considers the construction of a new overcrossing to meet Caltrans design standards, a new cloverleaf on-ramp for northbound US-101, and the closure of the existing US-101 northbound on-ramp. The new cloverleaf on-ramp for US-101 northbound would be located 500 feet north of Canwood Street, and serve both northbound and southbound traffic on

Lost Hills Road. Access to the residential community to the northwest of the interchange would remain at Canwood Street. This alternative includes the signalization of Lost Hills Road/US-101 northbound ramps and Lost Hills Road/Canwood Street.

1.4 Project Study Area

The project study area includes the intersections and freeway facilities located within close proximity to the Lost Hills Interchange. The following locations were included in the analysis.

Intersections

1. Lost Hills Road/Canwood Street
2. Lost Hills Road/US-101 northbound ramps
3. Lost Hills Road/US-101 southbound ramps
4. Lost Hills Road/Agoura Road

Freeway Mainline Segments

1. US-101 northbound between Las Virgenes Road and Lost Hills Road
2. US-101 northbound between Lost Hills Road and Liberty Canyon Road
3. US-101 southbound between Liberty Canyon Road and Lost Hills Road
4. US-101 southbound between Lost Hills Road and Las Virgenes Road

Freeway Ramps

1. US-101 northbound off-ramp at Lost Hills Road
2. US-101 northbound on-ramp at Lost Hills Road
3. US-101 southbound off-ramp at Lost Hills Road
4. US-101 southbound on-ramp at Lost Hills Road

1.5 Findings and Recommendations

1.5.1 Intersection Levels of Service

The study area intersections are operating at acceptable LOS during the a.m. and p.m. peak hours in the Existing Conditions based on Caltrans performance criteria. The following provides results for the project alternatives during the Project Completion Year (2012) and Future (2040) Conditions.

- **Alternative 1 (No-Build) –** The intersections of Lost Hills Road/US-101 northbound ramps are forecast to operate at unacceptable LOS in the 2012 and 2040 conditions. Lost Hills Road/US-101 southbound ramps are forecast to operate at unacceptable LOS during the Future (2040) Condition.
- **Alternative 2 (Transportation Systems Management) –** No capacity improvements to the Lost Hills Road Interchange are recommended. This alternative includes improvement to traffic signal timing and coordination at the interchange (i.e. video detection, CCTV). As these improvements are considered short-term, this alternative is not analyzed in the future (2040) traffic conditions.
- **Alternative 3 (Roundabout) –** The roundabout intersections would not operate at acceptable LOS in the Future (2040) Conditions.
- **Alternative 4 (Expanded Diamond Interchange) –** The ramp intersections would operate at acceptable LOS, with the exception of Lost Hills Road/US-101 northbound ramps in the a.m. and p.m. peak hour. Refinements to the traffic signal are recommended to improve the LOS at this location.

- **Alternative 5 (Partial Cloverleaf) –** The US-101 northbound and southbound ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours. However, it creates additional merge points on northbound US-101 at the interchange, and it the relocates the access to the community at Canwood Street, thus changing traffic patterns in the community.
- **Alternative 6 (Full Standard Diamond Interchange) –** The ramp intersections would operate at acceptable LOS, with the exception of Lost Hills Road/US-101 northbound ramps in the a.m. and p.m. peak hour. Refinements to the traffic signal are recommended to improve the LOS at this location.
- **Alternative 7 (Cloverleaf) –** The US-101 northbound and southbound ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours. The alternative provides signalization for all intersections within the Lost Hills Road Interchange in order to provide a coordinated network, less merge points along northbound US-101 (one merge vs. two merges), and maintains the existing access and travel patterns to the community at Canwood Street.

1.5.2 Freeway Mainline Levels of Service

The freeway mainline segments are operating at unacceptable LOS (LOS D and E) during the a.m. and p.m. peak hours in the Existing, Project Completion Year (2012), and Future (2040) Conditions. Future widening of US-101 would improve the freeway mainline to acceptable LOS in the Future (2040) Conditions. Improvement to the freeway mainline is not a part of this project.

1.5.3 Freeway Ramp Levels of Service

The freeway ramps are operating at acceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (p.m. peak hour) and US-101 southbound on-ramp at Lost Hills Road (a.m. peak hour) in the Existing Conditions. In the Future (2040) Condition, all freeway ramps are forecast to operate at unacceptable LOS during the a.m. and p.m. peak hours. Future widening of US-101 and the addition of merge/diverge lanes would improve the freeway ramps to acceptable LOS.

2. INTRODUCTION

This report presents the Traffic Impact Analysis (TIA) prepared by DKS Associates (DKS) for the Lost Hills Interchange Project Report (proposed project) in the City of Calabasas (City). This TIA has been prepared consistent with the policies of the California Department of Transportation (Caltrans).

2.1 Project Location

US-101 provides the primary regional access for the City of Calabasas and adjacent cities with the western part of Calabasas served by the interchanges at Lost Hills Road and Las Virgenes Road. Lost Hills Road is a north-south arterial street that extends from the Calabasas Landfill north of Canwood Street to its southerly termination at Las Virgenes Road. There are signalized intersections at the off and on-ramp locations for the existing diamond interchange. **Figure 1** provides the location of the proposed project.

2.2 Purpose and Need

The purpose of this project is to improve mobility and safety by reducing existing and forecasted traffic congestion on US-101 within the project limits. This project would reduce congestion and is expected to enhance traffic operations by adding capacity in an area that experiences delays during peak hours and enhance safety within the project limits, while minimizing environmental and socio-economic impacts.

The US-101 Freeway provides the primary regional access for the City of Calabasas and adjacent cities, with the western part of Calabasas served by the interchanges at Lost Hills Road and Las Virgenes Road. The proposed improvement to Lost Hills Road Overcrossing and US-101 Freeway interchange would substantially enhance the traffic operation at the interchange. The ramp intersections are currently operating at a level of service (LOS) C for the AM and PM peak hours. It should be noted that the actual operating conditions tend to be worse than indicated by the theoretical level of service calculation due to lane merging on the bridge and queue backup between intersections. Based on the traffic forecasts for 2040, level of service (LOS) F will occur for the PM peak hour. A Project Study Report (PSR) and Preliminary Environment Analysis Report (PEAR) were completed in 2007 for the Proposed Project (Caltrans, 2007).

In addition to the limited traffic mobility, the existing overcrossing is too narrow for the amount of traffic. The Lost Hills Road Overcrossing provides the only emergency access to the residential community to the north and improving the operating conditions at the interchange will result in an overall operational improvement. Per Caltrans Retrofit Program Manager, the bridge requires seismic restrainer evaluation due to the current higher design criteria of Peak Rock Acceleration magnitude from 0.4g to 0.5g. The structure is 6km from a M6.25 fault and could possibly be vulnerable for near fault effects and vertical acceleration effects. A secondary concern is that the vertical clearance to a more acceptable yet deficient value of 15.42 ft. The current overcrossing has a four span configuration with column bents located within the median and along the outside shoulders of the US-101 Freeway. This configuration cannot accommodate any future additional lanes on the US-101 Freeway.

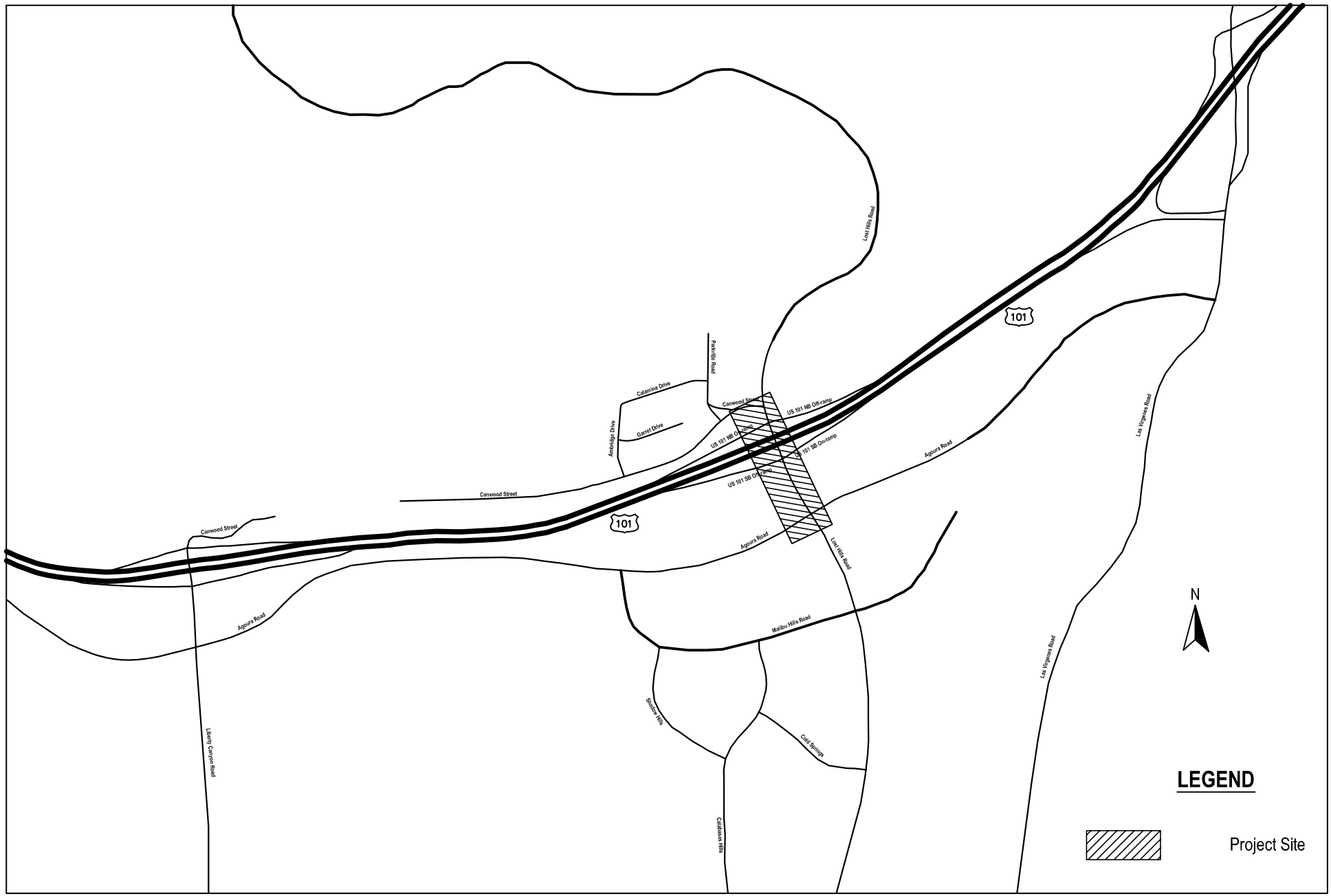

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Figure 1
Project Location

The proposed project is intended to achieve the following goals:

- To improve existing and future traffic flows for the future growth conditions in the area.
- To decrease travel times for travelers.
- To improve safety for local residents and regional commuters.
- To facilitate the efficient flow of goods and services through this area.

2.3 Project Alternatives

This Traffic Analysis in support of the Project Report analyzes seven alternatives to improve the Lost Hills Interchange in a future year (2040) horizon. The following presents a description of each alternative evaluated in this report.

Alternative 1 (No-Build)
Alternative 1 considers no improvements to the Lost Hills Interchange by the year 2040. The existing features include a non-standard vertical clearance of the Lost Hills Road Overcrossing, with non-standard shoulders, an abrupt northbound merge on the bridge, and lack of left-turn storage. The existing bridge is approximately 39 feet wide with a 7 foot sidewalk and 32 feet of roadway. The existing north end of the bridge has two lanes, one in each direction, while the existing south end accommodates three lanes; two lanes entering northbound onto the bridge and one lane southbound. The two northbound lanes merge abruptly into one lane in the middle of the bridge. This alternative would not address the existing substandard design or accommodate the future growth in traffic in the region. **Figure 2** illustrates the existing design of the Lost Hills Road Interchange.

Alternative 2 (Transportation Systems Management)
Alternative 2 considers no capacity improvements to the Lost Hills Road Interchange. This alternative includes improvement to traffic signal timing and coordination at the interchange (i.e. video detection, CCTV). This may help increase the efficiency of traffic flow, but based on the projected increase in traffic and demand, this would not be a sufficient alternative to serve the future traffic demand. As these improvements are considered short-term, this alternative is not analyzed in the future (2040) traffic conditions.

Alternative 3 (Roundabout)
Alternative 3 considers the construction of a new overcrossing, a four-legged roundabout at the north side and south side of US-101. The existing Canwood Street access to the community will be closed except for emergency vehicle access. Access to the residential community will be created at Driver Road. **Figure 3** illustrates the proposed design for Alternative 3.

Alternative 4 (Expanded Diamond Interchange)
Alternative 4 considers the construction of a new overcrossing, but retains the same diamond interchange configuration. The new overcrossing would provide five lanes, which would provide two northbound through lanes, two southbound through lanes, and one back-to-back northbound/southbound left-turn lane. Canwood Street will be maintained at its current location. **Figure 4** illustrates the proposed design for Alternative 4.

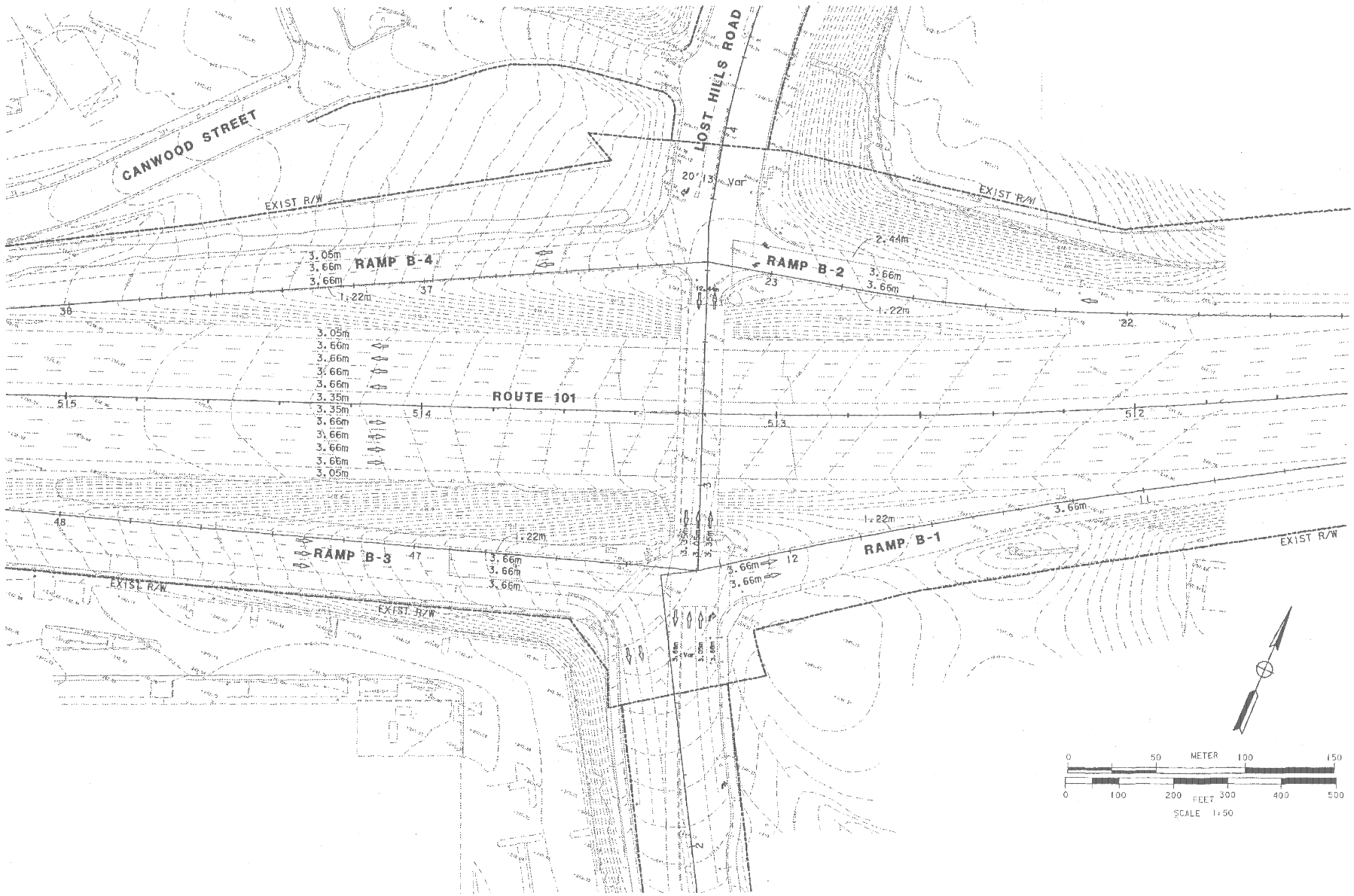

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Figure 2
Existing Design

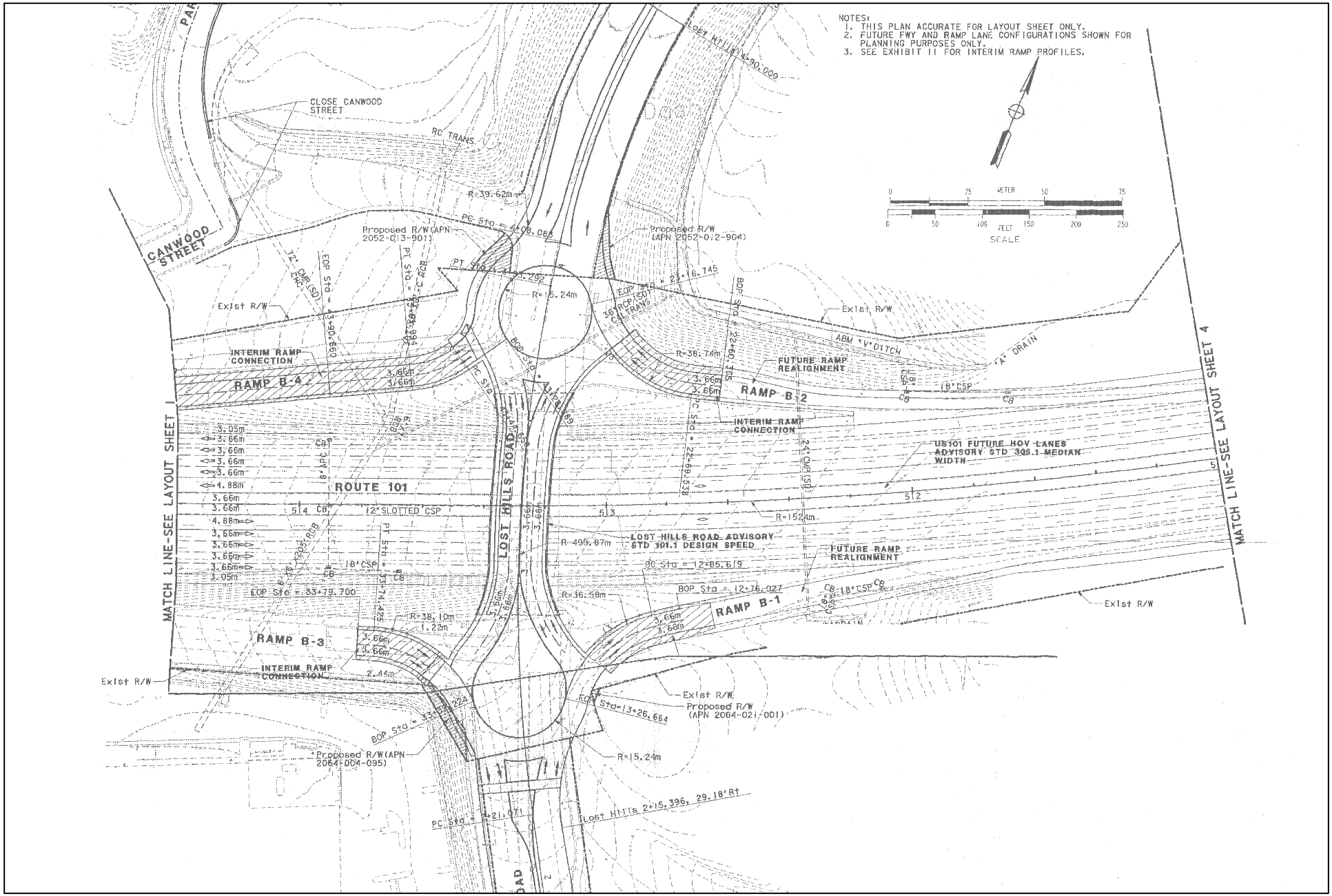

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Figure 3
Alternative 3
Roundabout Design

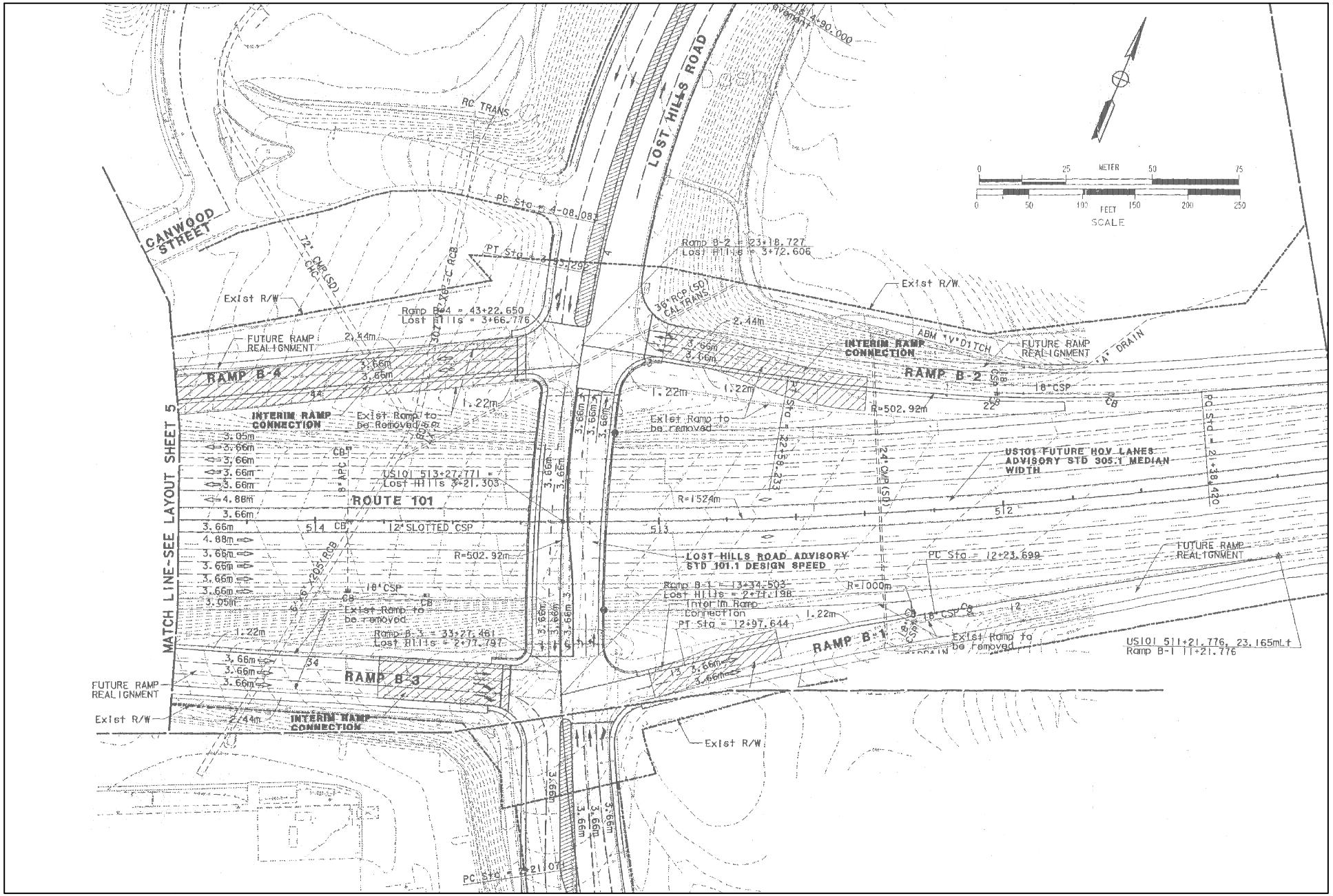

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Figure 4
Alternative 4
Expanded Diamond Design

Alternative 5 (Partial Cloverleaf)

Alternative 5 considers the construction of a new overcrossing, a new partial cloverleaf on-ramp at the northbound side of US-101. The new partial cloverleaf would create an additional merge point with the existing US-101 northbound on-ramp (southbound Lost Hills Road) at the interchange. The intersection of Lost Hills Road/US-101 northbound ramps would be stop-controlled in the westbound direction (US-101 northbound off-ramp). The Lost Hills Road/Canwood Street intersection would be closed down. A new roadway to access the residential community would be located north of the US-101 northbound ramps at Driver Road. The on/off ramps at the southbound US-101 will remain the same half-diamond configuration. The proposed partial cloverleaf will serve northbound Lost Hills Road to northbound US-101 traffic. **Figure 5** illustrates the proposed design for Alternative 5.

Alternative 6 (Full Standard Diamond)

Alternative 6 considers the construction of a new overcrossing to meet the Caltrans design standards, but retains the same diamond interchange configuration. The new bridge would provide five lanes, which would provide two northbound through lanes, two southbound through lanes, and one back-to-back northbound/southbound left-turn lane. A new roadway to access the residential community would be located north of the US-101 northbound ramps at Driver Road. **Figure 6** illustrates the proposed design for Alternative 6.

Alternative 7 (Cloverleaf)

Alternative 7 considers the construction of a new overcrossing, a new cloverleaf on-ramp at the northbound side of US-101, improvements to the US-101 southbound ramps, and closure of the existing US-101 northbound on-ramp. The new cloverleaf on-ramp will be located approximately 500 feet north of Canwood Street. The existing northbound US-101 on-ramp (on the southbound direction of Lost Hills Road) will be closed down, and all US-101 northbound traffic will utilize the new cloverleaf on-ramp. It should be noted that there would be one merge point along northbound US-101 with the Alternative 7 design. Canwood Street would remain (existing neighborhood access) as the primary access road to the residential community to the northwest. The intersections of Lost Hills Road/US-101 northbound ramps and Lost Hills Road/Canwood Street would be signalized as part of Alternative 7. The on/off ramps at the southbound US-101 will remain the same half-diamond configuration. **Figure 7** illustrates the proposed design for Alternative 7.

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Figure 5
Alternative 5
Partial Cloverleaf Design

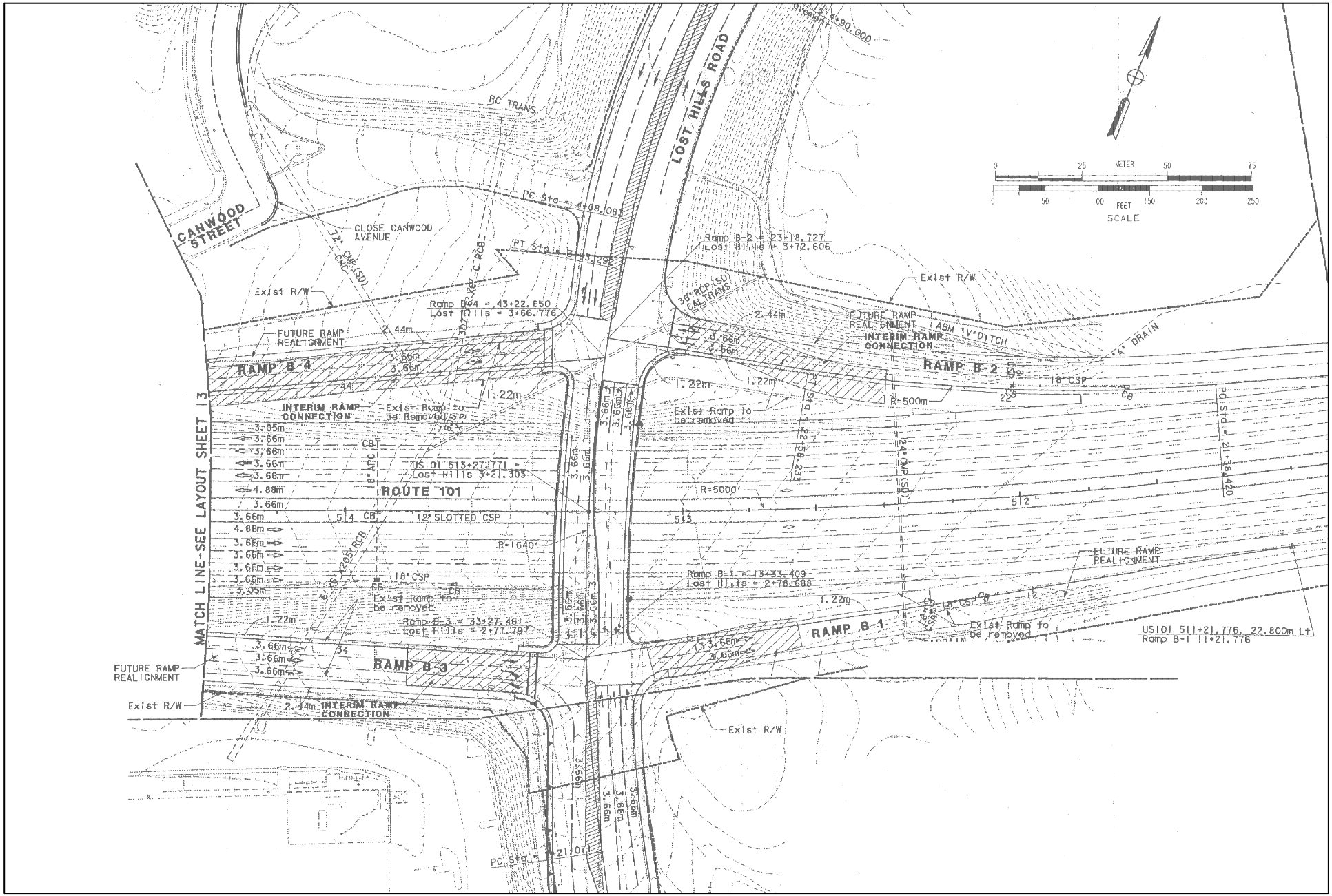

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Figure 6
Alternative 6
Full Standard Diamond Design

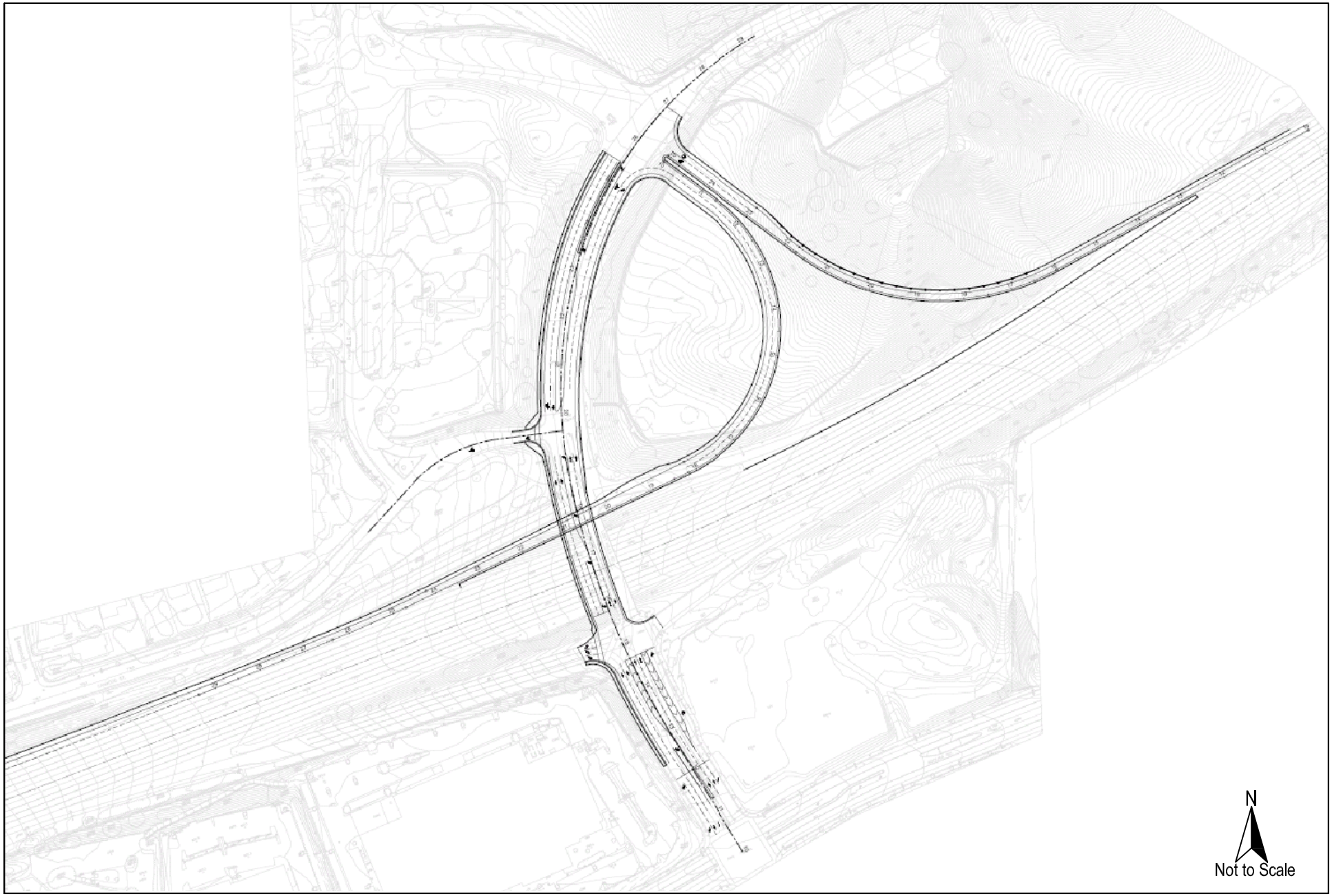

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Figure 7
Alternative 7
Modified Partial Cloverleaf Design

3. METHODOLOGY AND APPROACH

This traffic analysis is consistent with the measures of effectiveness referenced in the California Department of Transportation (Caltrans) Traffic Impact Study Guidelines (dated December 2002). DKS used the Highway Capacity Manual (HCM) 2000 to determine the level of service (LOS) for the State controlled intersections, local intersections freeway mainline, and freeway ramp locations. Intersection Capacity Utilization (ICU) 2003 methodology was used for analysis of roundabout intersections.

3.1 Intersection Levels of Service Methodology

3.1.1 ICU Methodology

Roundabouts. Traffic analysis for roundabout intersections was performed using the Intersection Capacity Utilization (ICU) 2003 methodology. The *Synchro* software package (version 7.0) was used to determine intersection LOS. *Synchro* is a computer program developed by Trafficware Corporation for conducting operational-level intersection capacity analyses as well as signal timing, phasing optimization, and coordination. **Table 1** provides the relationship between LOS and the ICU value (v/c ratio).

Table 1 – ICU 2003 Level of Service Definitions

Level of Service	Roundabout (volume to capacity)
A	0.0 – 55.0%
B	55.1% – 64.0%
C	64.1% – 73.0%
D	73.1% – 82.0%
E	82.1% – 91.0%
F	91.1% – 100.0%
G	100.1% – 109.0%
H	> 109.0%

3.1.2 HCM Methodology

Per Caltrans guidelines, the assessment of intersection conditions addresses LOS in terms of vehicle control delay (in seconds per vehicle) for signalized and unsignalized intersections. Control delay is the delay that is attributed to the traffic signal operations for signalized intersections (in seconds per vehicle). Control delay includes initial acceleration delay, queue move-up time, stopped delay, and final acceleration delay. *Synchro* (Version 7.0) was used to conduct the intersection analysis using the HCM methodology. *Synchro* is a computer program developed by Trafficware Corporation for conducting operational-level intersection capacity analyses as well as signal timing, phasing optimization, and coordination. In addition to *Synchro,* the *SimTraffic* software was used to provide a micro-simulation of coordinated network, and is used to provide a performance analysis per movement. **Table 2** provides the LOS corresponding to the control delay for signalized intersections, and approach delay for unsignalized intersections.

The degree of congestion at an intersection is described by LOS, which ranges from LOS A to LOS F, with LOS A representing free-flow conditions with little delay and LOS F representing over-saturated traffic flow throughout the peak hour. A complete description of level of service or LOS can be found in the Highway Research Board Special Report 209, *Highway Capacity Manual* (HCM 2000). The definitions and description of the six levels of service are provided in **Table 3**.

Table 2 – HCM Level of Service Definitions

Level of Service	Unsignalized Intersection Delay per Vehicle (in seconds)	Signalized Intersection Delay per Vehicle (in seconds)
A	≤ 10.0	≤ 10.0
B	> 10.0 – 15.0	> 10.0 – 20.0
C	> 15.0 – 25.0	> 20.0 – 35.0
D	> 25.0 – 35.0	> 35.0 – 55.0
E	> 35.0 – 50.0	> 55.0 – 80.0
F	> 50.0	> 80.0

Source: Highway Capacity Manual, Transportation Research Board, Special Report No. 209, Washington, D.C., 2000.

Table 3 – Level of Service Descriptions

LOS	Description	Capacity
A	Represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience is excellent.	0.000 – 0.600
B	Is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.	0.610 – 0.700
C	Is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.	0.710 – 0.800
D	Represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.	0.810 – 0.900
E	Represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver with the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver frustration is generally high. Operations at this level are generally unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.	0.910 – 1.000
F	Is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion.	> 1.000

Source: Highway Capacity Manual, Transportation Research Board, Special Report No. 209, Washington, D.C., 2000.

3.2 Freeway Mainline Methodology

The latest version of the Highway Capacity Software (HCS) consistent with the Highway Capacity Manual (HCM) 2000 was used to analyze the freeway mainline. The LOS criteria for freeway mainline analysis is referenced in the HCM 2000, Chapter 23. The LOS criteria are determined by the density [(pc/ln/mi) - passenger car/lane/mile] of each freeway segment and ramp. The HCS analysis was used to analyze the freeway mainline segments along the US-101. The freeway mainline includes the following criteria:

- Free-Flow Speed (FFS) = 65 mph (as obtained from the Caltrans Guide for the Preparation of Traffic Impact Studies, December 2002)
- General Terrain = Level
- Peak-Hour Factor (PHF) = 0.90

Table 4 shows the correlation between LOS and traffic flow density. LOS A represents a freeway segment with density less than or equal to 11 pc/mi/ln. LOS F represents a freeway segment with density greater than 45 pc/mi/ln.

Table 4 – Level of Service Criteria for Freeway Segments

LOS	Density (pc/mi/ln)
A	≤ 11.0
B	≥ 11.0 – 18.0
C	≥ 18.0 – 26.0
D	≥ 26.0 – 35.0
E	≥ 36.0 – 45.0
F	≥ 45.0

Source:
HCM 2000, Chapter 23, Basic Freeway Segments, p. 23-2
pc/mi/ln = passenger car per mile per lane

3.3 Freeway Ramp Merge/Diverge Methodology

The HCS was used to analyze the freeway ramps along US-101 during the existing and 2040 conditions. Based on the HCM 2000, the LOS for freeway ramps is determined by traffic-flow density. **Table 5** shows the correlation between LOS and traffic-flow density defined in the HCM 2000. LOS A represents traffic-flow density less than or equal to 10.0 pc/mi/ln. LOS F represents the overflow ramps with high density and congestion.

Table 5 – Level of Service Criteria for Ramps and Ramp Junctions

LOS	Density (pc/mi/ln)
A	≤ 10.0
B	≥ 10.0 – 20.0
C	≥ 20.0 – 28.0
D	≥ 28.0 – 35.0
E	≥ 35.0
F	Demand Exceeds Capacity

Source:
HCM 2000, Chapter 25, Ramp and Ramp Junction,
Exhibit 25-4, p. 25-5
pc/mi/ln = passenger car per mile per lane

3.4 Performance Criteria

Caltrans performance standard for freeway segments, signalized intersections and ramp terminals is LOS C. For freeway ramps, LOS D was considered the lowest acceptable level of service.

3.5 Project Study Area

The project study area includes the intersections and freeway facilities located within close proximity of the Lost Hills Interchange. The following locations were included in the analysis. **Figure 8** illustrates the project study area.

Intersections

1. Lost Hills Road/Canwood Street
2. Lost Hills Road/US-101 northbound ramps
3. Lost Hills Road/US-101 southbound ramps
4. Lost Hills Road/Agoura Road

Freeway Mainline Segments

1. US-101 northbound between Las Virgenes Road and Lost Hills Road
2. US-101 northbound between Lost Hills Road and Liberty Canyon Road
3. US-101 southbound between Liberty Canyon Road and Lost Hills Road
4. US-101 southbound between Lost Hills Road and Las Virgenes Road

Freeway Ramps

1. US-101 northbound off-ramp at Lost Hills Road
2. US-101 northbound on-ramp at Lost Hills Road
3. US-101 southbound off-ramp at Lost Hills Road
4. US-101 southbound on-ramp at Lost Hills Road

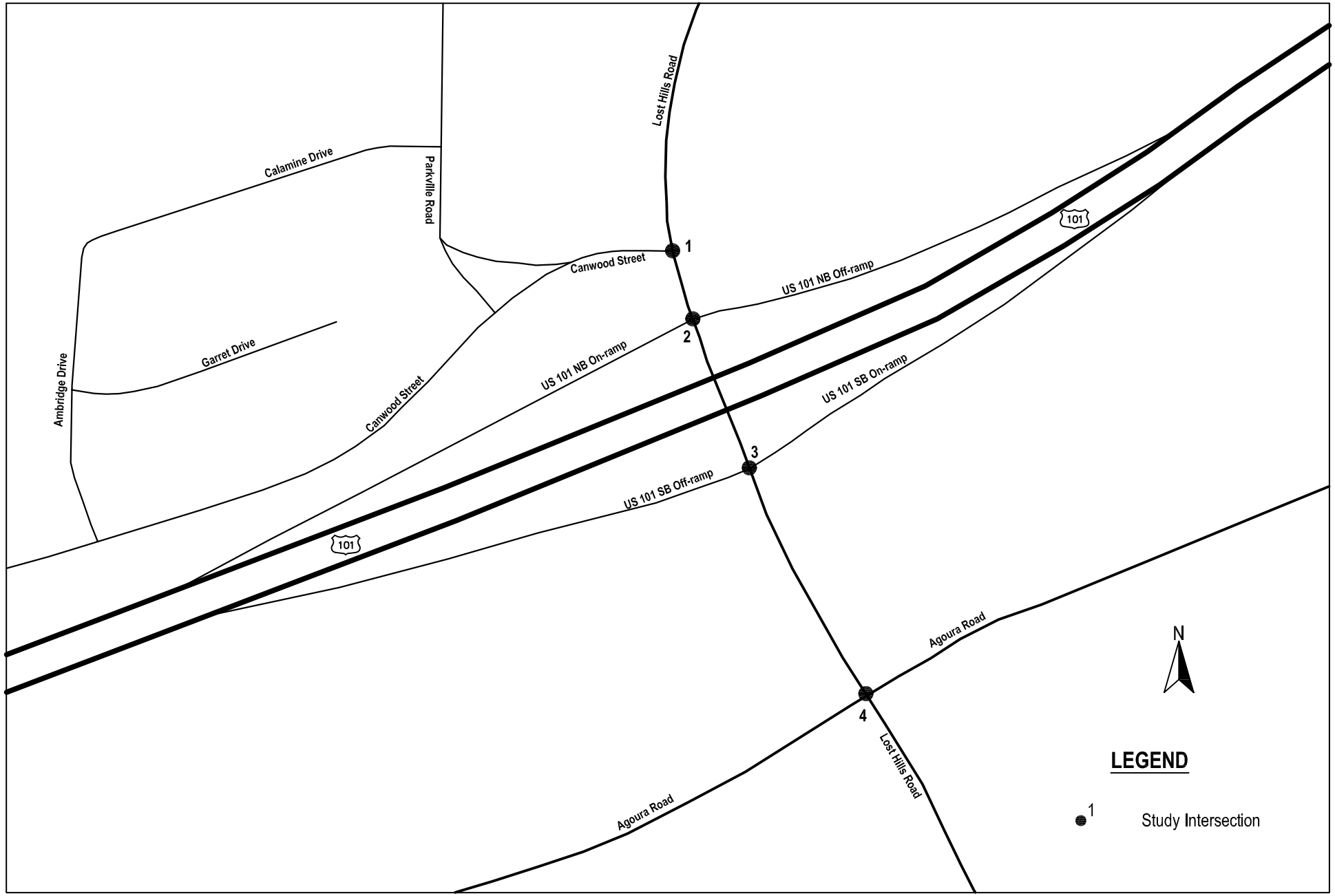

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Figure 8
Project Study Area

4. EXISTING CONDITIONS

4.1 Study Area Roadway Network

The project study area consists of the US-101 freeway, Lost Hills Road, and Agoura Road. A brief description of each facility is provided below.

US-101 Freeway

The US-101 freeway is oriented in an east-west direction at the Lost Hills Road Interchange. The freeway provides eight mixed-flow travel lanes with no High Occupancy Vehicle (HOV) lanes. The freeway provides regional access to the City of Calabasas and adjacent Cities, with interchanges at Lost Hills Road and Las Virgenes Road. The Liberty Canyon Road Interchange, located west of the Lost Hills Road Interchange, is in the City of Agoura Hills.

Lost Hills Road

Lost Hills Road is a north-south roadway that extends from the County Landfill to the north to Las Virgenes Road to the south. This roadway is a three-lane facility from the landfill to the northbound ramps, a two-lane facility at the freeway overcrossing, and a four-lane facility between the southbound ramps and Las Virgenes Road, with a speed limit of 45 miles per hour (mph).

Agoura Road

Agoura Road is an east-west roadway that extends between City of Westlake Village to the west, and ends at Las Virgenes Road. This roadway is a four-lane facility with a speed limit of 45 mph.

Canwood Street

Canwood Street is located north of the Lost Hills Road Interchange, and provides direct access to the residential community north of US-101 and west of Lost Hills Road. Canwood Street is a local street that connects to Lost Hills Road and other residential streets in the community.

4.2 Existing Bicycle and Pedestrian Circulation

Bicycle lanes are not provided along Lost Hills Road and the freeway interchange. Bicycle lanes are provided along Agoura Road, just south of the US-101. Pedestrian sidewalks are provided on both sides of Lost Hills Road, except north of the US-101 southbound ramps. Pedestrian sidewalks are provided along the west side of the interchange. Pedestrian crosswalks are provided at each intersection. It should be noted that there is an existing pedestrian safety issue at the intersection of US-101 southbound ramps/Lost Hills Road. Even though there are crosswalks provided, pedestrian conflicts occur at the eastbound free right-turn lane from the freeway off-ramp, since these vehicles do not stop at the intersection. In addition, due to the large number of vehicles destined/originating north on US-101, pedestrian conflicts occur at the pedestrian crosswalks at Lost Hills Road/US-101 northbound ramps, and Lost Hills Road/US-101 southbound ramps.

4.3 Existing Traffic Controls and Intersection Geometrics

Figure 9 illustrates the existing traffic controls and intersection geometrics within the study area. As shown, all the study area intersections are currently signalized with the exception of Lost Hills Road/Canwood Street which is stop-controlled.

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Figure 9
Existing Intersection
Geometrics & Traffic Controls

4.4 Existing Traffic Volumes

Existing intersection turn movement counts at the study area intersections were counted in March 2009 by National Data and Surveying Services (NDS), a qualified traffic data collection firm. For existing freeway mainline volumes along US-101, annual average daily trips (AADT), and truck percentages were provided from the Caltrans. It should be noted that the freeway traffic volumes were taken in 2007. The peak-hour volumes along US-101 were derived by applying the K and D factors to the AADT, which were provided on the Caltrans website. **Figure 10** illustrates the existing a.m. and p.m. peak-hour traffic volumes in the study area. The raw peak-hour intersection turn movements are provided in Appendix A.

4.5 Existing Intersection Level of Service

The existing a.m. and p.m. peak hour intersection volumes were used to calculate the existing levels of service at the study area intersections. The peak-hour volumes were input into the *Synchro* software to determine the LOS based on the HCM methodology. Signal timing data at these intersections was used in the HCM calculation. In addition, a heavy vehicle factor of approximately five percent was applied to account for the number of trucks trips within the vicinity of the interchange. This information was provided by the Caltrans Traffic Operations Department.

Table 6 presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, all study area intersections are operating at acceptable LOS during the a.m. and p.m. peak hours.

Table 6 – Existing Intersection Level of Service Summary

	AM Peak Hour		PM Peak Hour	
Intersection	Delay (sec)	LOS	Delay (sec)	LOS
Lost Hills Road/Canwood Street	6.2	A	6.0	A
Lost Hills Road/US-101 NB Off-Ramp	32.0	C	24.6	C
Lost Hills Road/US-101 SB Ramps	3.1	A	6.0	A
Lost Hills Road/Agoura Road	17.6	B	21.1	C

4.6 Existing Freeway Mainline Level of Service

The HCS software for freeway mainline analysis was used to determine the density along US-101. The existing a.m. and p.m. peak hour freeway mainline volumes were input into the software to calculate the existing levels of service along northbound and southbound US-101, north and south of the Lost Hills Road Interchange. A truck percentage of five percent (provided by Caltrans) and a peak-hour factor of 0.90 was assumed along the freeway mainline. **Table 7** presents the results of the existing freeway segment LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the freeway mainline segments are operating at unacceptable LOS (LOS D and E) during the a.m. and p.m. peak hours.

Table 7 – Existing Freeway Segment Level of Service Summary

	AM Peak Hour		PM Peak Hour	
Freeway Segment	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
US-101 northbound s/o Lost Hills Road	**27.6**	**D**	**36.5**	**E**
US-101 northbound n/o Lost Hills Road	**28.3**	**D**	**38.1**	**E**
US-101 southbound n/o Lost Hills Road	**35.0**	**D**	**28.7**	**D**
US-101 southbound s/o Lost Hills Road	**33.7**	**D**	**28.0**	**D**

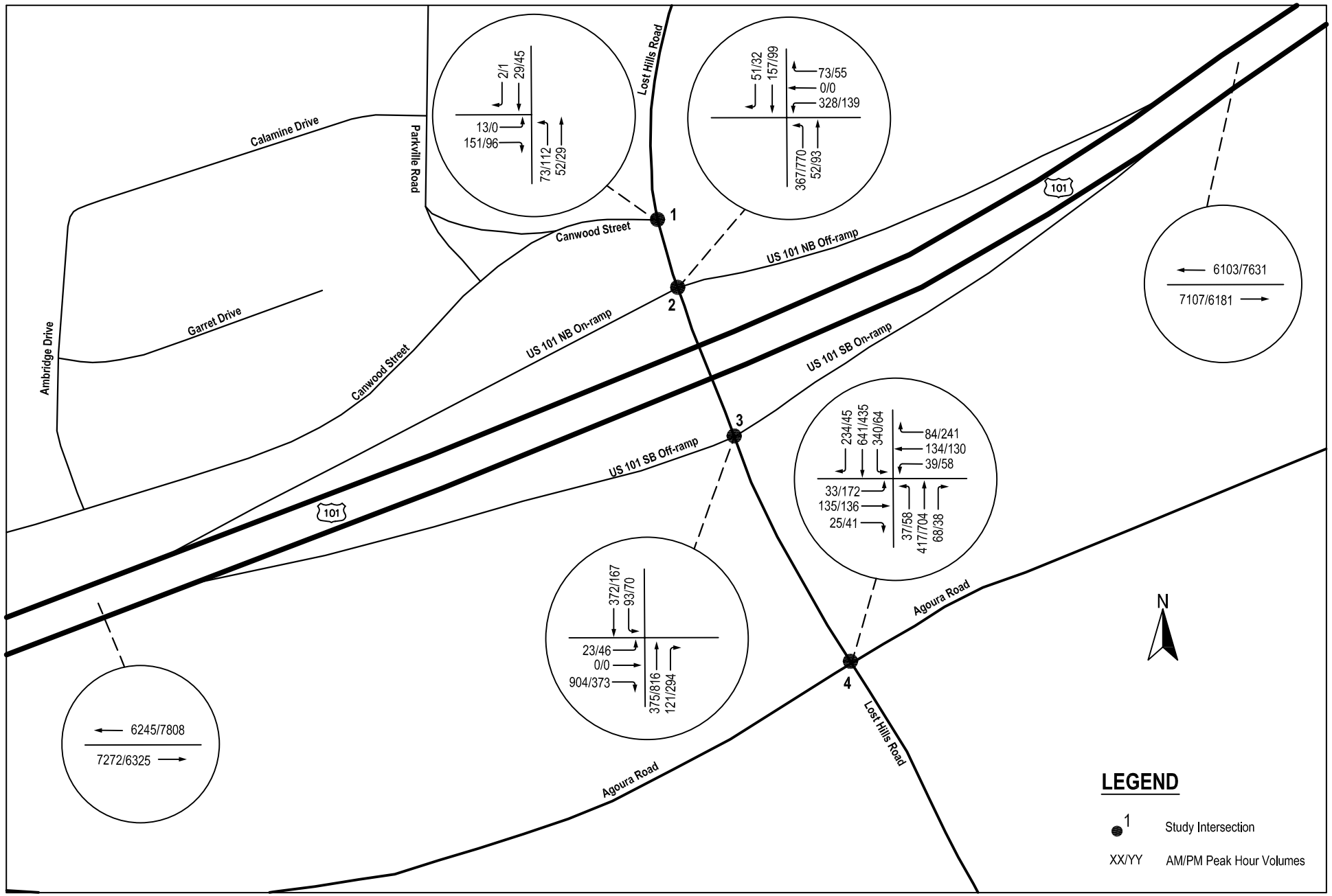

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Figure 10
Existing Traffic Volumes

4.7 Existing Freeway Ramp Level of Service

The HCS software for freeway ramp merge/diverge analysis was used to determine the delay at the on/off ramps along US-101 at Lost Hills Road. The existing a.m. and p.m. peak hour freeway ramp volumes were input into the software to calculate the existing levels of service. A truck percentage of five percent (provided by Caltrans) and a peak-hour factor of 0.90 was assumed along the freeway mainline. All study on and off ramps provide one merge/diverge lane.

Table 8 presents the results of the existing freeway ramp LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the freeway ramps are operating at acceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (p.m. peak hour) and US-101 southbound on-ramp at Lost Hills Road (a.m. peak hour).

Table 8 – Existing Freeway Ramp Level of Service Summary

Freeway Segment	Ramp Type	AM Peak Hour		PM Peak Hour	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
US-101 northbound off-ramp at Lost Hills Road	*Diverge*	3.3	A	8.7	A
US-101 northbound on-ramp at Lost Hills Road	*Merge*	27.5	C	--	**F**
US-101 southbound off-ramp at Lost Hills Road	*Diverge*	27.8	C	21.0	C
US-101 southbound on-ramp at Lost Hills Road	*Merge*	--	**F**	26.7	C

-- = Demand exceeds capacity (i.e. LOS F)

4.8 Existing Accident Rates

Table 9 shows the TASAS (Traffic Accident Surveillance and Analysis System) accident data supplied by Caltrans shows that the accident rate on route US-101 has been lower than the average for similar facilities statewide during a 36-month period from June 1, 2005 to May 31, 2008.

Table 9 – Accident Rate Calculation

Description	Number of Accidents			Accident Rate – ACCS/MVM					
				Actual			Average		
PM 31.7 – PM 32.3	*TOT*	*FAT*	*INJ*	*FAT*	*F+I*	*TOT*	*FAT*	*F+I*	*TOT*
Northbound	22	0	7	0.000	0.12	0.38	0.010	0.29	0.95
Southbound	46	0	15	0.000	0.26	0.79	0.010	0.29	0.95
PM 31.833	3	0	0	0.000	0.00	0.68	0.002	0.26	0.75
PM 31.850	5	0	1	0.000	0.23	1.17	0.004	0.42	1.20
PM 32.072	4	0	0	0.000	0.00	0.61	0.002	0.26	0.75
PM 32.080	3	0	1	0.000	0.14	0.41	0.004	0.42	1.20

During the reported period, the actual total accident rate on US-101 was 0.38 accidents per million vehicle miles in the northbound direction and 0.79 accidents per million vehicle miles in southbound direction. Both northbound and southbound directions of the main line are lower than the reported statewide average for similar facilities during the same time period (0.95 accidents per million vehicle miles).

Of the accidents in the project area in the northbound direction during the same three year period, 59.1 percent were due to hitting an object, 22.7 percent were sideswipe accidents, 13.6 percent were rear end collisions, and the remaining 4.5 percent were other accidents. Of the accidents in the project area in the southbound direction during the same three year period, 60.9 percent were rear end collisions, 21.7 percent were due to hitting an object, 13 percent were sideswipe accidents, 2.2 percent were broadside accidents, and the remaining 2.2 percent were overturn accidents.

5. PROJECT COMPLETION YEAR (2012) CONDITIONS

5.1 Project Completion Year (2012) Traffic Volumes

The Project Completion Year (2012) comprises of traffic conditions when the Lost Hills interchange is completed, which include all developments within the study area which have not yet been constructed, but have been approved, or are pending approval through a discretionary action or building permit issuance.

Cumulative traffic volumes are based on the addition of traffic volumes from approved and/or pending projects to the existing a.m. and p.m. peak hour traffic volumes. Related projects within the study area that have received approvals for development (approved plot plans, approved tentative tracts, approved conditional use permits, etc.) were identified, as well as projects pending approval. The City of Calabasas and County of Los Angeles provided a list of approved/pending project within the project study area. The trip generation for the approved/pending (cumulative) projects is provided in **Table 10**.

Table 10 – Cumulative Project Trip Generation Summary

			AM Peak Hour		PM Peak Hour	
Land Use	**Size**	**Daily**	**In**	**Out**	**In**	**Out**
E. Monte Calabasas (Shopping Center)	73,500 SF	5,560	78	50	254	264
County areas n/o US-101 and e/o Las Virgenes (Adult Housing)	263 DU	915	12	22	25	17
County areas n/o US-101 and w/o Las Virgenes (Single-Family)	110 DU	1,053	21	62	70	41
County areas n/or US-101 and w/o Lost Hills (Single-Family)	23 DU	220	4	13	15	9
Summit at Calabasas (Shopping Center)	70,100 SF	5,391	76	49	246	256
Hillcrest (Single-Family)	37 DU	354	7	21	24	14
County areas s/o Calabasas (Single-Family)	81 DU	775	15	46	52	30
Total Cumulative Trip Generation		**14,268**	**214**	**262**	**684**	**630**

Notes:
Trip rates taken from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 8th Edition (2008)
Pass-by trip reductions were based on percentages provided in the ITE Trip Generation Handbook
DU = Dwelling Unit
SF = Square Feet

In addition, the Los Angeles County Congestion Management Program (LACCMP) provides an overall growth rate of 21.1 percent would occur from 2001 to 2025, which is an ambient growth rate of 0.87 percent per year for the San Fernando Valley Area. For a conservative analysis, a 1.0 percent per year growth rate (3.0 percent total growth), along with trips generated by the approved/pending projects, was applied to the existing traffic volumes to determine the year 2012 traffic volumes. **Figure 11** illustrates the 2012 traffic volumes at the study intersections and freeway mainline.

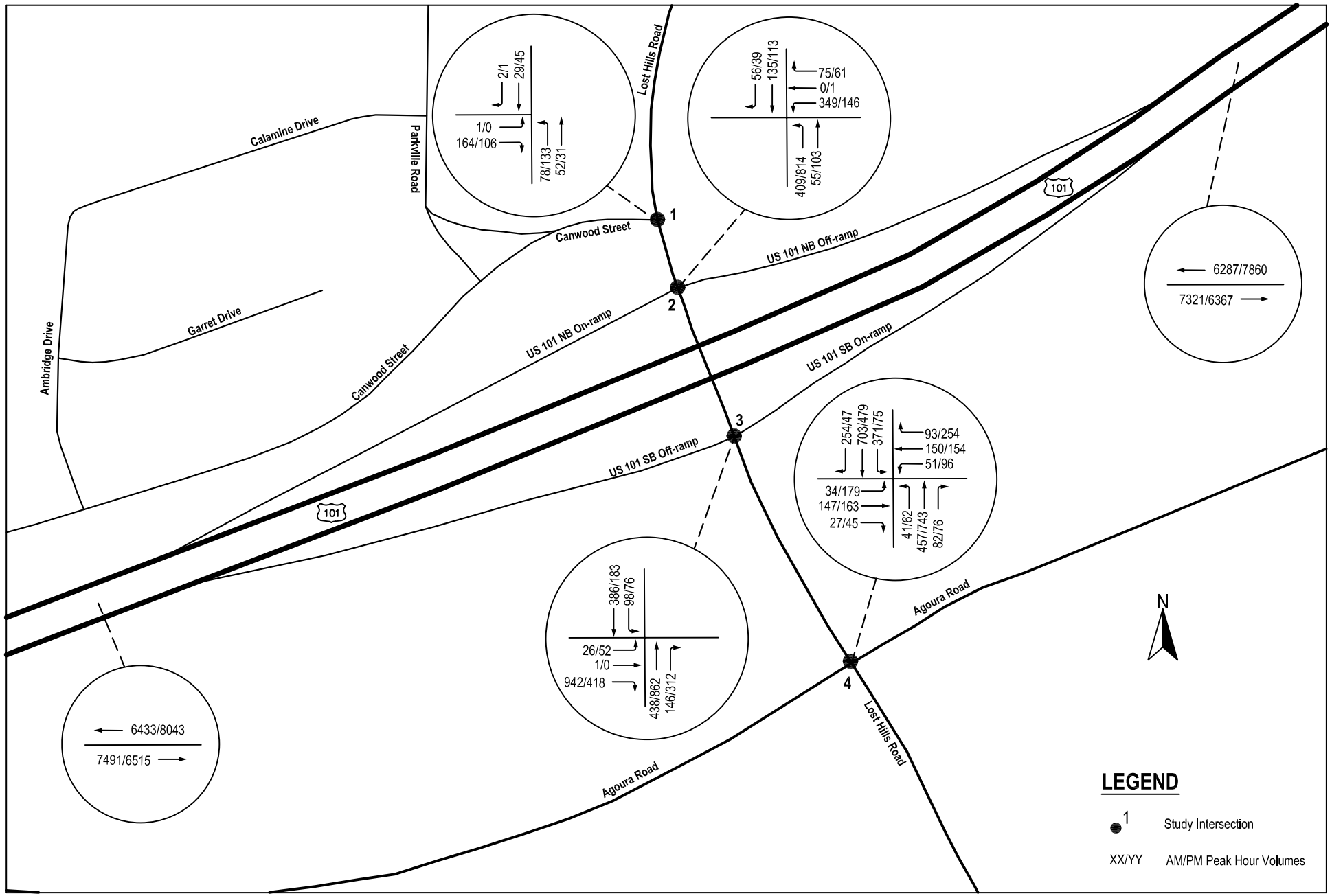

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Figure 11A
Future 2012 Traffic Volumes (Alterantives 1, 3, 4, and 6)

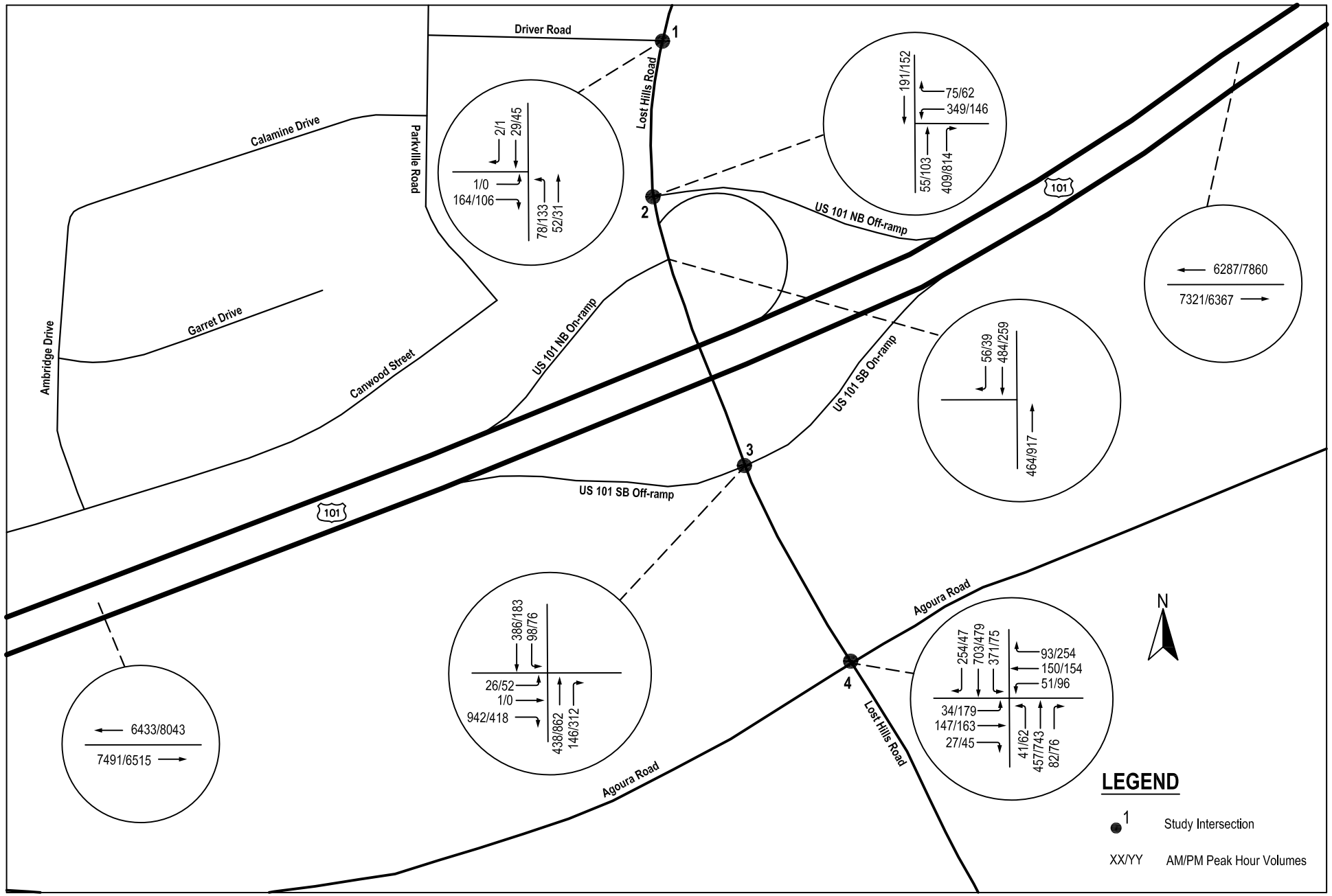

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Figure 11B
Project Completion Year (2012) Traffic Volumes (Alternative 5)

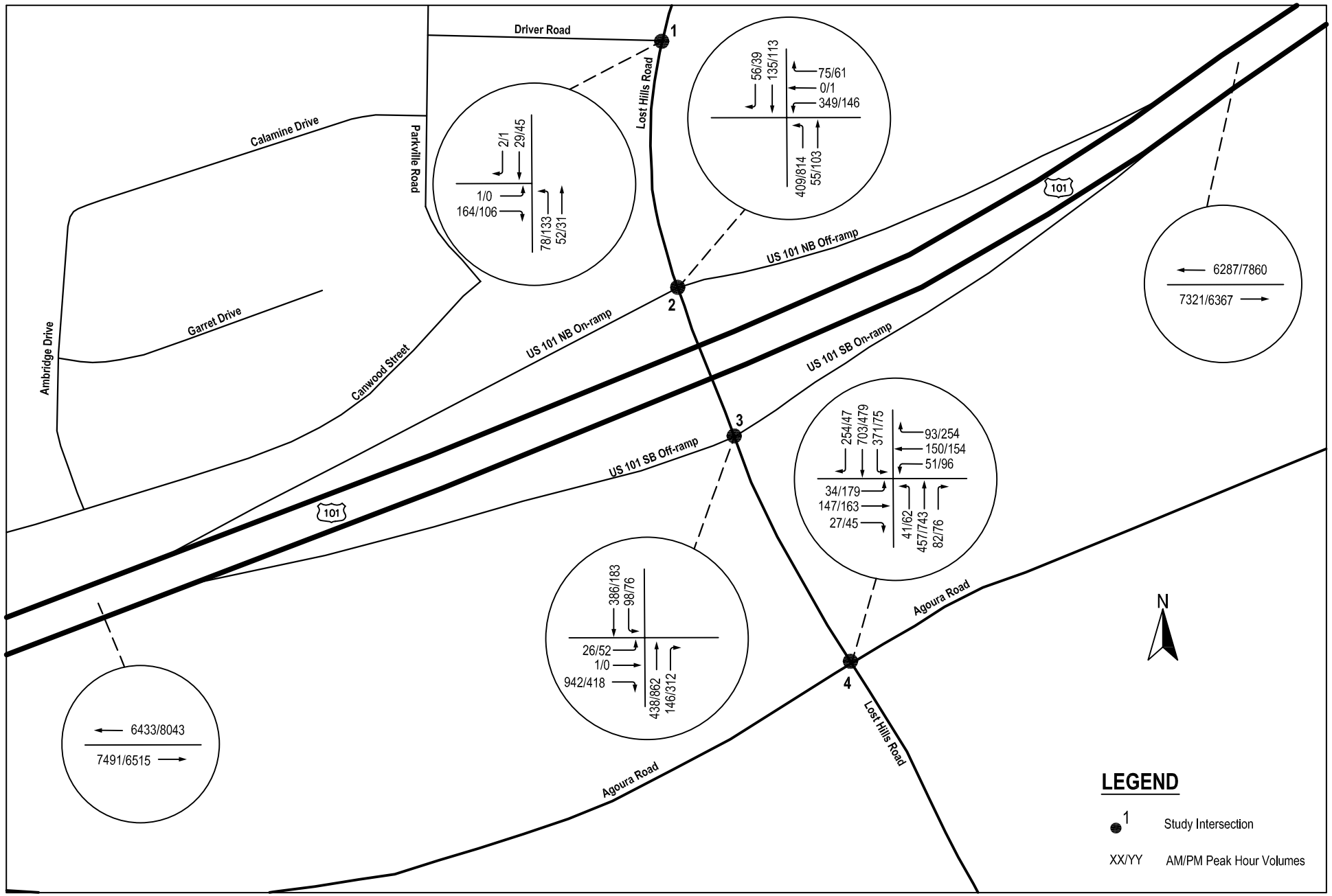

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Figure 11C
Project Completion Year (2012) Traffic Volumes (Alternatives 3 and 6)

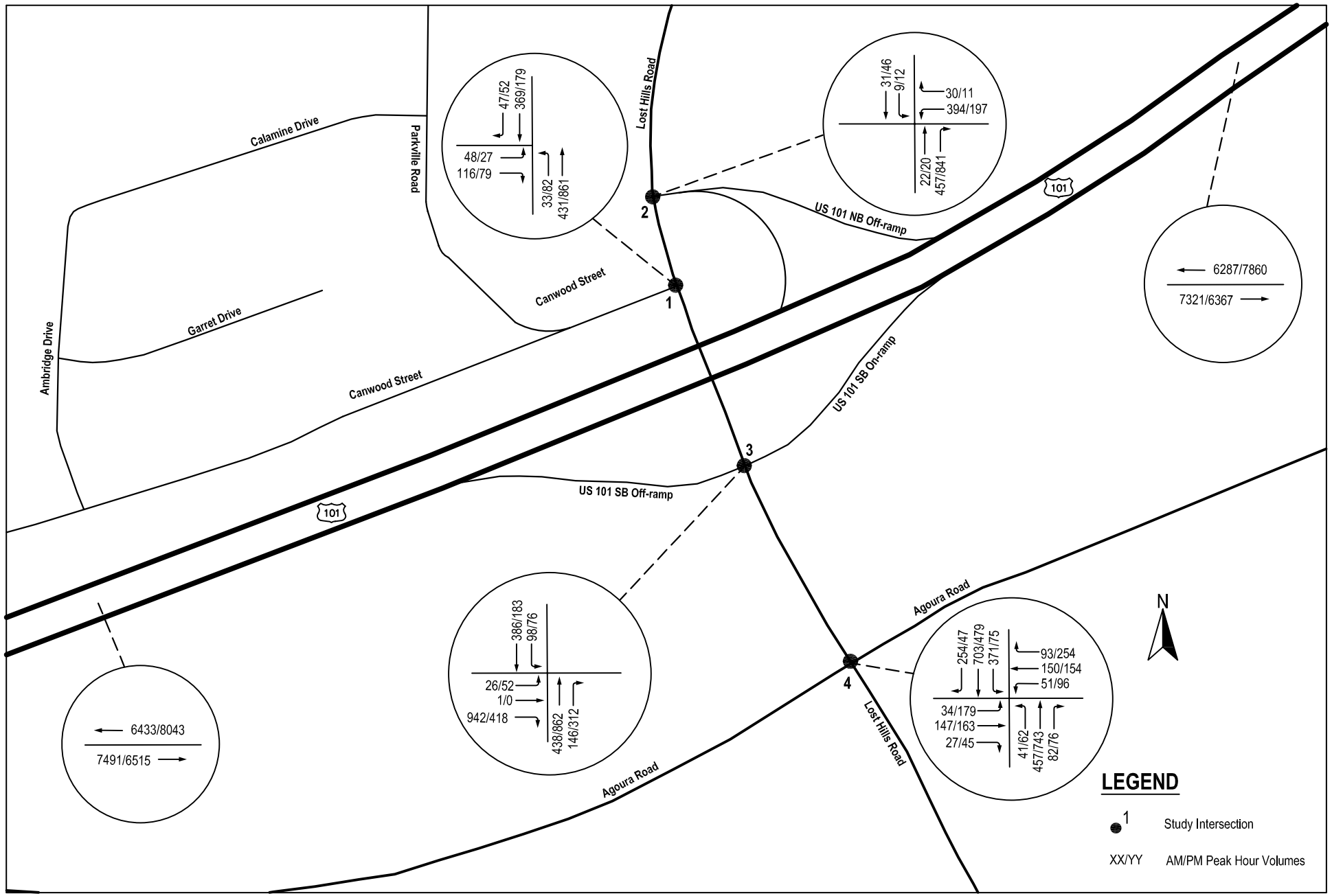

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Figure 11D
Project Completion Year (2012) Traffic Volumes (Alternative 7)

5.2 Project Completion (2012) Alternative 1 Conditions (No-Build)

5.2.1 Project Completion Year (2012) Alternative 1 (No-Build) Bicycle and Pedestrian Circulation

The bicycle and pedestrian circulation would not change from the existing conditions since this is a no-build alternative. Therefore, bicycle safety would not be improved in this alternative. Pedestrian access and safety would remain an issue to the community north of the interchange, as the existing sidewalks and crosswalks would not be improved.

5.2.2 Project Completion Year (2012) Alternative 1 (No-Build) Intersection Level of Service

2012 a.m. and p.m. peak hour intersection volumes were used to calculate the Project Completion Year (2012) Alternative 1 (No-Build) levels of service at the study area intersections. The peak-hour volumes were input into the *Synchro* software to determine the LOS based on the HCM methodology. Existing signal timing data at these intersections were used in the HCM calculation.

Table 11 presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, all study area intersections are forecast to operate at acceptable LOS during the 2012 a.m. and p.m. peak hours.

Table 11 – Project Completion Year (2012) Alternative 1 (No-Build) Intersection Level of Service Summary

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
Lost Hills Road/Canwood Street	6.4	A	8.9	A
Lost Hills Road/US-101 NB Ramps	33.8	C	33.2	C
Lost Hills Road/US-101 SB Ramps	3.3	A	5.9	A
Lost Hills Road/Agoura Road	19.9	B	21.9	C

5.2.3 Project Completion Year (2012) Alternative 1 (No-Build) Freeway Mainline Level of Service

The HCS software for freeway mainline analysis was used to determine the density along US-101. The future a.m. and p.m. peak hour freeway mainline volumes were input into the software to calculate the future levels of service along northbound and southbound US-101, north and south of the Lost Hills Interchange. A truck percentage of five percent (provided by Caltrans) and a peak-hour factor of 0.90 were assumed along the freeway mainline.

Table 12 presents the results of the future freeway segment LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the freeway mainline segments are forecast to operate at unacceptable LOS (LOS D or worse) during the a.m. and p.m. peak hours.

Table 12 – Project Completion Year (2012) Alternative 1 (No-Build) Freeway Segment Level of Service Summary

Freeway Segment	AM Peak Hour		PM Peak Hour	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
US-101 northbound s/o Lost Hills Road	**28.5**	**D**	**40.6**	**E**
US-101 northbound n/o Lost Hills Road	**29.3**	**D**	**42.9**	**E**
US-101 southbound n/o Lost Hills Road	**35.3**	**E**	**29.8**	**D**
US-101 southbound s/o Lost Hills Road	**35.4**	**D**	**29.0**	**D**

-- = Density exceeds 45.0 pc/mi/ln (i.e. LOS F)

The level of service analysis assumes US-101 as an eight-lane freeway (four lanes each direction). There are no planned improvements to widen the US-101 to a ten-lane freeway by the year 2012. However, the improvement to the Lost Hills Road Interchange is being proposed to accommodate future widening of US-101 by one lane in each direction.

The freeway mainline would not be altered as part of the proposed improvements. Therefore, the freeway mainline analysis results for Alternatives 2, 3, 4, 5, 6, or 7 would be the same as Alternative 1 (No-Build) for the Project Completion Year (2012) conditions.

5.2.4 Project Completion Year (2012) Alternative 1 (No-Build) Freeway Ramp Level of Service

The HCS software for freeway ramp merge/diverge analysis was used to determine the delay at the on/off ramps along US-101 at Lost Hills Road. The existing a.m. and p.m. peak hour freeway ramp volumes were input into the software to calculate the existing levels of service. A truck percentage of five percent (provided by Caltrans) and a peak-hour factor of 0.90 were assumed along the freeway mainline. All study on and off ramps provide one merge/diverge lane.

Table 13 presents the results of the Project Completion Year (2012) freeway ramp LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the freeway ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound on-ramp at Lost Hills Road (p.m. peak hour) and US-101 southbound on-ramp (a.m. peak hour).

Table 13 – Project Completion Year (2012) Alternative 1 (No-Build) Freeway Ramp Level of Service Summary

Freeway Ramp	Ramp Type	AM Peak Hour		PM Peak Hour	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
US-101 northbound off-ramp at Lost Hills Road	*Diverge*	4.2	A	9.7	A
US-101 northbound on-ramp at Lost Hills Road	*Merge*	28.5	D	--	**F**
US-101 southbound off-ramp at Lost Hills Road	*Diverge*	29.0	D	22.1	C
US-101 southbound on-ramp at Lost Hills Road	*Merge*	--	**F**	27.6	C

-- = Demand exceeds capacity (i.e. LOS F)

The level of service analysis assumes US-101 as an eight-lane freeway (four lanes each direction). There are no planned improvements to widen the US-101 to a ten-lane freeway by the year 2012. However, the improvement to the Lost Hills Road Interchange is being proposed to accommodate future widening of US-101 by one lane in each direction.

5.3 Project Completion Year (2012) Alternative 2 Conditions (Transportation Systems Management)

Alternative 2 considers no capacity improvements to the Lost Hills Road Interchange. This alternative includes improvement to traffic signal timing and coordination at the interchange (i.e. video detection, CCTV). This may help increase the efficiency of traffic flow, but based on the projected increase in traffic and demand, this would not be a sufficient alternative to serve the future traffic demand. As these improvements are considered short-term and do not involve any physical improvements to the overcrossing, this alternative is not analyzed in the Project Completion Year (2012) traffic conditions. In addition, the bicycle and pedestrian circulation would not change from the existing conditions since this alternative does not provide physical improvements.

5.4 Project Completion Year (2012) Alternative 3 Conditions (Roundabout)

5.4.1 Project Completion Year (2012) Alternative 3 (Roundabout) Bicycle and Pedestrian Circulation

Bicycle lanes would still be provided along Agoura Road, just south of the US-101. Along the new freeway overpass, a 4-foot striped shoulder would be provided as an alternative for a bicycle lane. The new striped shoulder would improve bicycle safety in the area of the interchange because the existing interchange does not provide one. Pedestrian sidewalks would still be provided on the east and west sides of Lost Hills Road, south of the interchange. The new freeway overpass will provide a pedestrian sidewalk on the west side of Lost Hills Road, which would connect with the pedestrian sidewalk north of the interchange. Pedestrian crosswalks will be provided at each leg of the roundabout. However, pedestrian safety would not be improved at the roundabout intersections since they would be yield-controlled, and would not provide a separate pedestrian walk phase.

5.4.2 Project Completion Year (2012) Alternative 3 (Roundabout) Intersection Level of Service

The 2012 a.m. and p.m. peak hour intersection volumes were used to calculate the Project Completion Year (2012) Alternative 3 (Roundabout) levels of service at the study area intersections. The peak-hour volumes were input into the *Synchro* software to determine the LOS based on the ICU 2003 methodology for the roundabout intersections, and the HCM methodology for the signalized and unsignalized intersections. **Figure 12** provides the future geometrics for Alternative 3. **Table 14** presents the results of the intersection LOS analysis. The HCM methodology was not analyzed for the roundabout configuration. The calculation sheets are provided in Appendix B.

Table 14 – Project Completion Year (2012) Alternative 3 (Roundabout) Intersection Level of Service Summary

Intersection	AM Peak Hour		PM Peak Hour	
	HCM/ICU	LOS	HCM/ICU	LOS
Lost Hills Road/Driver Road	9.2 sec	A	9.0 sec	A
Lost Hills Road/US-101 NB Ramps	70.7%	C	**82.1%**	**E**
Lost Hills Road/US-101 SB Ramps	61.2%	B	62.5%	B
Lost Hills Road/Agoura Road	19.3 sec	B	21.9 sec	C

5.4.3 Project Completion Year (2012) Alternative 3 Freeway Ramp Level of Service

Alternative 3 does not include the freeway on/off ramps to be widened to provide two diverge or merge lanes. As such, the results for the freeway ramp analysis would be the same as Alternative 1 (No-Build). Based on the results of the analysis, the freeway ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound on-ramp at Lost Hills Road (p.m. peak hour) and US-101 southbound on-ramp (a.m. peak hour).

5.4.4 Findings and Recommendations

Based on the results of the analysis, the proposed roundabout design at the US-101 northbound and southbound ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours based on Caltrans performance criteria, with the exception of Lost Hills Road/Driver Road and Lost Hills Road/US-101 northbound ramps (p.m. peak hour). In addition, the US-101 northbound on-ramp and US-101 southbound on-ramp would need to provide two merge lanes at the ramps. The additional lanes would improve the LOS at US-101 northbound on-ramp to LOS A. However, The US-101 southbound on-ramp would still operate at unacceptable LOS (LOS F). The widening of US-101 to a ten-lane freeway would improve the LOS at this location.

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Figure 12
Alternative 3 Roundabout
Geometrics & Traffic Controls

5.5 Project Completion Year (2012) Alternative 4 Conditions (Expanded Diamond Interchange)

5.5.1 Project Completion Year (2012) Alternative 4 (Expanded Diamond Interchange) Bicycle and Pedestrian Circulation

Bicycle lanes would still be provided along Agoura Road, just south of the US-101. Along the new freeway overpass, a 4-foot shoulder would be provided as an alternative for a bicycle lane. The new striped shoulder would improve bicycle safety in the area of the interchange because the existing interchange does not provide one.

Pedestrian sidewalks would still be provided on the east and west sides of Lost Hills Road, south of the interchange. The new freeway overpass will provide a pedestrian sidewalk on the west side of Lost Hills Road, which would connect with the pedestrian sidewalk north of the interchange. Pedestrian crosswalks will be provided along the west leg of US-101 southbound ramps/Lost Hills Road and US-101 northbound ramps/Lost Hills Road.

It should be noted that due to the large number of vehicles destined/originating north on US-101, pedestrian conflicts occur at the pedestrian crosswalks at Lost Hills Road/US-101 northbound ramps, and Lost Hills Road/US-101 southbound ramps. Alternative 4 would reconfigure the intersection of US-101 southbound ramps/Lost Hills Road. The existing eastbound free right-turn lane would be removed and would have a permissive right-turn phase. Pedestrian safety would be improved with the reconfiguration, as the pedestrian conflict with the free right-turn movements would be eliminated.

5.5.2 Project Completion Year (2012) Alternative 4 (Expanded Diamond Interchange) Intersection Level of Service

The 2012 a.m. and p.m. peak hour intersection volumes were used to calculate the Project Completion Year (2012) Alternative 4 (Expanded Diamond Interchange) levels of service at the study area intersections. **Figure 13** provides the future geometrics for Alternative 4. This assumes that the intersection of Lost Hills Road/US-101 northbound ramps provides dual northbound left-turn lanes and has protected left-turn phasing. **Table 15** presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B.

Table 15 – Project Completion Year (2012) Alternative 4 (Expanded Diamond Interchange) Intersection Level of Service Summary

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
Lost Hills Road/Canwood Street	9.1	A	8.9	A
Lost Hills Road/US-101 NB Ramps	33.2	C	**62.5**	**E**
Lost Hills Road/US-101 SB Ramps	21.7	C	13.7	B
Lost Hills Road/Agoura Road	26.3	C	30.3	C

5.5.3 Project Completion Year (2012) Alternative 4 (Expanded Diamond Interchange) Freeway Ramp Level of Service

Alternative 4 does not include the freeway on/off ramps to be widened to provide two diverge or merge lanes. As such, the results for the freeway ramp analysis would be the same as Alternative 1 (No-Build). Based on the results of the analysis, the freeway ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound on-ramp at Lost Hills Road (p.m. peak hour) and US-101 southbound on-ramp (a.m. peak hour).

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Figure 13
Alternative 4 Expanded Diamond
Interchange Geometrics and Traffic Contol

5.5.4 Findings and Recommendations

Based on the results of the analysis, the intersection of Lost Hills Road/US-101 northbound ramps is forecast to operate at unacceptable LOS (LOS E during the p.m. peak hour). The LOS at the Lost Hills Road/US-101 northbound ramps is unacceptable due to the high volume of northbound left-turn vehicles, accessing the northbound US-101. A split-phase traffic signal for the northbound and southbound approaches at Lost Hills Road/US-101 northbound ramps should be incorporated in Alternative 4. This added improvement would provide more green time for northbound left-turn vehicles to clear the intersection within a given cycle length.

In addition, the US-101 northbound on-ramp and US-101 southbound on-ramp would need to provide two merge lanes at the ramps. The additional lanes would improve the LOS at US-101 northbound on-ramp to LOS A. However, The US-101 southbound on-ramp would still operate at unacceptable LOS (LOS F). The widening of US-101 to a ten-lane freeway would improve the LOS at this location.

5.6 Project Completion Year (2012) Alternative 5 Conditions (Partial Cloverleaf)

5.6.1 Project Completion Year (2012) Alternative 5 (Partial Cloverleaf) Bicycle and Pedestrian Circulation

Bicycle lanes would still be provided along Agoura Road, just south of the US-101. Along the new freeway interchange, a 4-foot shoulder would be provided as an alternative for a bicycle lane. The new striped shoulder would improve bicycle safety in the area of the interchange because the existing interchange does not provide one.

Pedestrian sidewalks would still be provided on the east and west sides of Lost Hills Road, south of the interchange. The new freeway overpass will provide a pedestrian sidewalk on the west side of Lost Hills Road, which would connect with the pedestrian sidewalk north of the interchange. Pedestrian crosswalks will be provided along the west leg of US-101 southbound ramps/Lost Hills Road and at the US-101 northbound on-ramp (west side of Lost Hills Road).

Alternative 5 would reconfigure the intersections of US-101 southbound ramps/Lost Hills Road and US-101 northbound ramps/Lost Hills Road. At the intersection of US-101 southbound ramps/Lost Hills Road, the existing eastbound free right-turn lane would be removed and become a permissive right-turn phase. Pedestrian safety would be improved with the reconfiguration, as the pedestrian conflict with the free right-turn movements would be eliminated. At the intersection of US-101 northbound ramps/Lost Hills Road, the existing northbound left-turn movements would be eliminated, thus improving the pedestrian safety at the east leg of the intersection.

5.6.2 Project Completion Year (2012) Alternative 5 (Partial Cloverleaf) Intersection Level of Service Summary

The 2012 a.m. and p.m. peak hour intersection volumes were used to calculate the Project Completion Year (2012) Alternative 5 (Partial Cloverleaf) levels of service at the study area intersections. **Figure 14** provides the future geometrics for Alternative 5. This assumes that the intersection of Lost Hills Road/US-101 northbound off-ramp is stop-controlled in the westbound approach only.

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Figure 14
Alternative 5 Partial Cloverleaf
Geometrics and Traffic Control

Table 16 presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, all study area intersections are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours.

Table 16 – Project Completion Year (2012) Alternative 5 (Partial Cloverleaf) Intersection Level of Service Summary

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
Lost Hills Road/Driver Road	9.2	A	9.0	A
Lost Hills Road/US-101 NB Off-Ramp	11.2	B	10.3	B
Lost Hills Road/US-101 SB Ramps	21.7	C	14.6	B
Lost Hills Road/Agoura Road	26.3	C	28.6	C

5.6.3 Project Completion Year (2012) Alternative 5 (Partial Cloverleaf) Freeway Ramp Level of Service

The HCS software for freeway ramp merge/diverge analysis was used to determine the delay at the on/off ramps along US-101 at Lost Hills Road. The 2012 a.m. and p.m. peak hour freeway ramp volumes were input into the software to calculate the 2012 levels of service. A truck percentage of five percent and a peak-hour factor of 0.90 were assumed along the freeway mainline. All study on and off ramps provide one merge/diverge lane. It should be noted that the US-101 northbound on-ramp (southbound Lost Hills Road) and US-101 northbound on-ramp (northbound Lost Hills Road - loop ramp) would create an additional merge point along northbound US-101 at the interchange.

Table 17 presents the results of the 2012 Alternative 5 freeway ramp LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the freeway ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound on-ramps at northbound and southbound Lost Hills Road (p.m. peak hour) and US-101 southbound on-ramp at Lost Hills Road (a.m. peak hour).

Table 17 – Project Completion Year (2012) Alternative 5 (Partial Cloverleaf) Freeway Ramp Level of Service Summary

Freeway Ramp	Ramp Type	AM Peak Hour		PM Peak Hour	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
US-101 northbound off-ramp at Lost Hills Road	*Diverge*	4.2	A	9.7	A
US-101 northbound on-ramp at Lost Hills Road (southbound)	*Merge*	28.4	D	--	**F**
US-101 northbound on-ramp at Lost Hills Road (northbound - loop ramp)	*Merge*	27.7	C	--	**F**
US-101 southbound off-ramp at Lost Hills Road	*Diverge*	29.0	D	22.1	C
US-101 southbound on-ramp at Lost Hills Road	*Merge*	--	**F**	27.6	C

-- = Demand exceeds capacity (i.e. LOS F)

The level of service analysis assumes US-101 as an eight-lane freeway (four lanes each direction). The improvement to the Lost Hills Road Interchange is being proposed to accommodate future widening of US-101 by one lane in each direction.

5.6.4 Findings and Recommendations

Alternative 5 would provide acceptable LOS at the study intersections. However, it creates additional merge points on northbound US-101 at the interchange, and it the relocates the access to the community at Canwood Street, thus changing traffic patterns in the community. Furthermore, Alternative 5 does not include signalization of the Lost Hills Road/US-101 northbound ramps.

In addition, the US-101 northbound on-ramp and US-101 southbound on-ramp would need to provide two merge lanes at the ramps. The additional lanes would improve the LOS at US-101 northbound on-ramp to LOS A. However, The US-101 southbound on-ramp would still operate at unacceptable LOS (LOS F). The widening of US-101 to a ten-lane freeway would improve the LOS at this location.

5.7 Project Completion Year (2012) Alternative 6 Conditions (Full Standard Diamond)

5.7.1 Project Completion Year (2012) Alternative 6 (Full Standard Diamond) Bicycle and Pedestrian Circulation

Bicycle lanes would still be provided along Agoura Road, just south of the US-101. Along the new freeway overpass, a 4-foot shoulder would be provided as an alternative for a bicycle lane. The new striped shoulder would improve bicycle safety in the area of the interchange because the existing interchange does not provide one.

Pedestrian sidewalks would still be provided on the east and west sides of Lost Hills Road, south of the interchange. The new freeway overpass will provide a pedestrian sidewalk on the west side of Lost Hills Road, which would connect with the pedestrian sidewalk north of the interchange. Pedestrian crosswalks will be provided along the west leg of US-101 southbound ramps/Lost Hills Road and US-101 northbound ramps/Lost Hills Road.

It should be noted that due to the large number of vehicles destined/originating north on US-101, pedestrian conflicts occur at the pedestrian crosswalks at Lost Hills Road/US-101 northbound ramps, and Lost Hills Road/US-101 southbound ramps. Alternative 6 would reconfigure the intersection of US-101 southbound ramps/Lost Hills Road. The existing eastbound free right-turn lane would be removed and would have a permissive right-turn phase. Pedestrian safety would be improved with the reconfiguration, as the pedestrian conflict with the free right-turn movements would be eliminated.

5.7.2 Project Completion Year (2012) Alternative 6 (Full Standard Diamond) Level of Service

The 2012 a.m. and p.m. peak hour intersection volumes were used to calculate the Project Completion Year (2012) Alternative 6 (Full Standard Diamond) levels of service at the study area intersections. **Figure 15** provides the future geometrics for Alternative 6. This assumes that the intersection of Lost Hills Road/US-101 northbound ramps provides dual northbound left-turn lanes and has protected left-turn phasing. **Table 18** presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B.

Table 18 – Project Completion Year (2012) Alternative 6 (Full Standard Diamond) Intersection Level of Service Summary

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
Lost Hills Road/Driver Road	9.2	A	9.0	A
Lost Hills Road/US-101 NB Ramps	33.2	C	**62.5**	**E**
Lost Hills Road/US-101 SB Ramps	21.7	C	13.7	B
Lost Hills Road/Agoura Road	26.3	C	30.3	C

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Figure 15
Alternative 6 Full Standard
Diamond Geometrics and Traffic Control

5.7.3 Project Completion Year (2012) Alternative 6 Freeway Ramp Level of Service

Alternative 6 does not include the freeway on/off ramps to be widened to provide two diverge or merge lanes. As such, the results for the freeway ramp analysis would be the same as Alternative 1 (No-Build). Based on the results of the analysis, the freeway ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound on-ramp at Lost Hills Road (p.m. peak hour) and US-101 southbound on-ramp (a.m. peak hour).

5.7.4 Findings and Recommendations

Based on the results of the analysis, the intersection of Lost Hills Road/US-101 northbound ramps is forecast to operate at unacceptable LOS (LOS E during the p.m. peak hour). The LOS at the Lost Hills Road/US-101 northbound ramps is unacceptable due to the high volume of northbound left-turn vehicles, accessing the northbound US-101.

A split-phase traffic signal for the northbound and southbound approaches at Lost Hills Road/US-101 northbound ramps should be incorporated in Alternative 6. This added improvement would provide more green time for northbound left-turn vehicles to clear the intersection within a given cycle length.

In addition, the US-101 northbound on-ramp and US-101 southbound on-ramp would need to provide two merge lanes at the ramps. The additional lanes would improve the LOS at US-101 northbound on-ramp to LOS A. However, The US-101 southbound on-ramp would still operate at unacceptable LOS (LOS F). The widening of US-101 to a ten-lane freeway would improve the LOS at this location.

5.8 Project Completion Year (2012) Alternative 7 Conditions (Cloverleaf)

5.8.1 Project Completion Year (2012) Alternative 7 (Cloverleaf) Bicycle and Pedestrian Circulation

Bicycle lanes would still be provided along Agoura Road, just south of the US-101. Along the new freeway interchange, a 4-foot shoulder would be provided as an alternative for a bicycle lane. The new striped shoulder would improve bicycle safety in the area of the interchange because the existing interchange does not provide one.

Pedestrian sidewalks would still be provided on the east and west sides of Lost Hills Road, south of the interchange. The new freeway overpass will provide a pedestrian sidewalk on the west side of Lost Hills Road, which would connect with the pedestrian sidewalk north of the interchange. A pedestrian crosswalk will be provided along the west leg of US-101 southbound ramps/Lost Hills Road.

Alternative 7 would reconfigure the intersections of US-101 southbound ramps/Lost Hills Road and US-101 northbound ramps/Lost Hills Road. At the intersection of US-101 southbound ramps/Lost Hills Road, the existing eastbound free right-turn lane would be removed and become a permissive right-turn phase. Pedestrian safety would be improved with the reconfiguration, as the pedestrian conflict with the free right-turn movements would be eliminated. At the intersection of US-101 northbound ramps/Lost Hills Road, the existing westbound freeway on-ramp would be removed, as well as the need for a pedestrian crosswalk, thus eliminating the turning vehicles and improving the pedestrian safety.

5.8.2 Project Completion Year (2012) Alternative 7 (Cloverleaf) Intersection Level of Service

The 2012 a.m. and p.m. peak hour intersection volumes were used to calculate the Project Completion Year (2012) Alternative 7 (Cloverleaf) levels of service at the study area intersections. **Figure 16** provides the future geometrics for Alternative 7. It should be noted that Alternative 7 assumes the signalization of Lost Hills Road/US-101 northbound ramps and Lost Hills Road/Canwood Street.

The installation of a traffic signal at Lost Hills Road/Canwood Street would provide a controlled and less conflicted left-turn movement at Canwood Street for vehicles destined to the US-101 northbound on-ramp. Furthermore, the installation of a traffic signal at Lost Hills Road/US-101 northbound ramps would provide a coordinated network along Lost Hills Road at the ramps and intersections.

Since the traffic signals along Lost Hills Road were assumed to be coordinated, the *SimTraffic* software was used to analyze the study intersections. The *SimTraffic* software provides a micro-simulation of the traffic operations within a corridor. The software assumed that the cycle lengths and offsets at each traffic signal were optimized along the network corridor. **Table 19** presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the US-101 northbound and southbound ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours.

Table 19 – Project Completion Year (2012) Alternative 7 (Cloverleaf) Intersection Level of Service Summary

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
Lost Hills Road/Canwood Street	4.1	A	3.3	A
Lost Hills Road/US-101 NB Ramps	10.0	A	15.9	B
Lost Hills Road/US-101 SB Ramps	21.2	C	4.6	A
Lost Hills Road/Agoura Road	16.2	B	23.5	C

5.8.3 Project Completion Year (2012) Alternative 7 (Cloverleaf) Freeway Ramp Level of Service

The HCS software for freeway ramp merge/diverge analysis was used to determine the delay at the on/off ramps along US-101 at Lost Hills Road. The 2012 a.m. and p.m. peak hour freeway ramp volumes were input into the software to calculate the 2012 levels of service. A truck percentage of five percent and a peak-hour factor of 0.90 were assumed along the freeway mainline. All study on and off ramps provide one merge/diverge lane. It should be noted that the Alternative 7 design would only create one merge point on northbound US-101, which would reduce the number of merge points at the interchange.

Table 20 presents the results of the 2012 Alternative 7 freeway ramp LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the freeway ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound on-ramp at Lost Hills Road (p.m. peak hour) and US-101 southbound on-ramp at Lost Hills Road (a.m. peak hour).

Table 20 – Project Completion Year (2012) Alternative 7 (Cloverleaf) Freeway Ramp Level of Service Summary

Freeway Ramp	Ramp Type	AM Peak Hour		PM Peak Hour	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
US-101 northbound off-ramp at Lost Hills Road	*Diverge*	4.2	A	9.7	A
US-101 northbound on-ramp at Lost Hills Road (loop ramp)	*Merge*	28.5	D	--	**F**
US-101 southbound off-ramp at Lost Hills Road	*Diverge*	29.0	D	22.1	C
US-101 southbound on-ramp at Lost Hills Road	*Merge*	--	**F**	27.6	C

-- = Demand exceeds capacity (i.e. LOS F)

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Figure 16
Alternative 7 Modified Partial Cloverleaf
Geometrics and Traffic Control

The level of service analysis assumes US-101 as an eight-lane freeway (four lanes each direction). The improvement to the Lost Hills Road Interchange is being proposed to accommodate future widening of US-101 by one lane in each direction.

5.8.4 Findings and Recommendations

Alternative 7 would provide acceptable LOS at the study area intersections. The alternative would also provide signalization for all intersections within the Lost Hills Road Interchange in order to provide a coordinated network, less merge points along northbound US-101 (one merge vs. two merges), adequate intersection spacing, and maintains the existing access and travel patterns to the community at Canwood Street.

In addition, the US-101 northbound on-ramp and US-101 southbound on-ramp would need to provide two merge lanes at the ramps. The additional lanes would improve the LOS at US-101 northbound on-ramp to LOS A. However, The US-101 southbound on-ramp would still operate at unacceptable LOS (LOS F). The widening of US-101 to a ten-lane freeway would improve the LOS at this location.

6. FUTURE YEAR (2040) CONDITIONS

6.1 Future (2040) Bicycle and Pedestrian Circulation

Bicycle lanes would still be provided along Agoura Road, just south of the US-101. Along the new freeway overpass, a 4-foot shoulder would be provided as an alternative for a bicycle lane. The new striped shoulder would improve bicycle safety in the area of the interchange because the existing interchange does not provide one.

All project alternatives, with the exception of Alternative 1 (No-Build), would provide standard pedestrian sidewalks on the west side of Lost Hills Road at the new overcrossing, which would connect with the pedestrian sidewalk north of the interchange. Pedestrian sidewalks would still be provided on the east and west sides of Lost Hills Road, south of the interchange. A pedestrian crosswalk will be provided along the west leg of US-101 southbound ramps/Lost Hills Road (Alternatives 3, 4, 5, 6, and 7) and US -101 northbound ramps/Lost Hills Road (Alternatives 3, 4, 5, and 6)

With the implementation of Alternative 3, 4, and 6, pedestrian conflicts would occur due to the heavy traffic originating/destined north on US-101. In Alternative 3, pedestrian safety would not be improved at the roundabout intersections since they would be yield-controlled, and would not provide a separate pedestrian walk phase. Alternatives 4 and 6 would reconfigure the intersection of US-101 southbound ramps/Lost Hills Road. The existing eastbound free right-turn lane would be removed and would have a permissive right-turn phase. Pedestrian safety would be improved with the reconfiguration, as the pedestrian conflict with the free right-turn movements would be eliminated.

With the implementation of Alternatives 5 and 7, pedestrian circulation would be improved. Alternatives 5 and 7 would reconfigure the intersections of US-101 southbound ramps/Lost Hills Road and US-101 northbound ramps/Lost Hills Road. At the intersection of US-101 southbound ramps/Lost Hills Road, the existing eastbound free right-turn lane would be removed and become a permissive right-turn phase. Pedestrian safety would be improved with the reconfiguration, as the pedestrian conflict with the free right-turn movements would be eliminated. In Alternative 5, the existing northbound left-turn movements at the intersection of US-101 northbound ramps/Lost Hills Road would be eliminated. In Alternative 7, the existing westbound freeway on-ramp would be removed at the intersection of US-101 northbound ramps/Lost Hills Road, as well as the pedestrian crosswalk. These alternatives would eliminate the conflict with left-turn vehicles at the US-101 northbound ramps/Lost Hills Road and improving the pedestrian safety.

6.2 Future (2040) Traffic Volumes

The future year (2040) comprise of traffic conditions in a 30 year horizon, which include all developments within the study area which have not yet been constructed, but have been approved, or are pending approval through a discretionary action or building permit issuance. The same cumulative traffic volumes were applied to the existing a.m. and p.m. peak hour traffic volumes. In addition, a 1.0 percent per year growth rate (31.0 percent total growth) was applied to the existing traffic volumes to determine the future (2040) traffic volumes. **Figure 17** illustrates the future (2040) traffic volumes at the study intersections and freeway mainline.

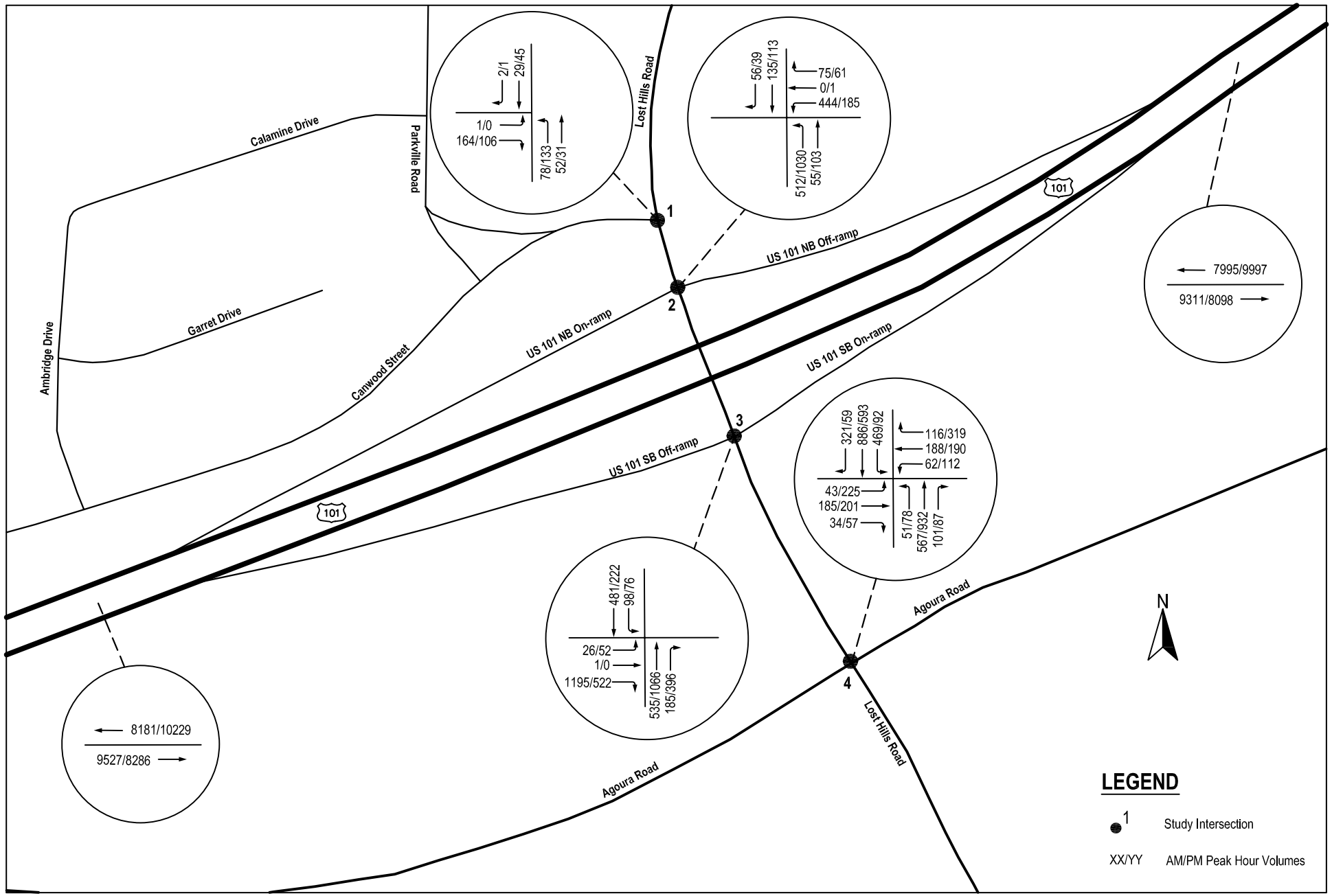

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Figure 17A
Future 2040 Traffic Volumes (Alternatives 1 and 4)

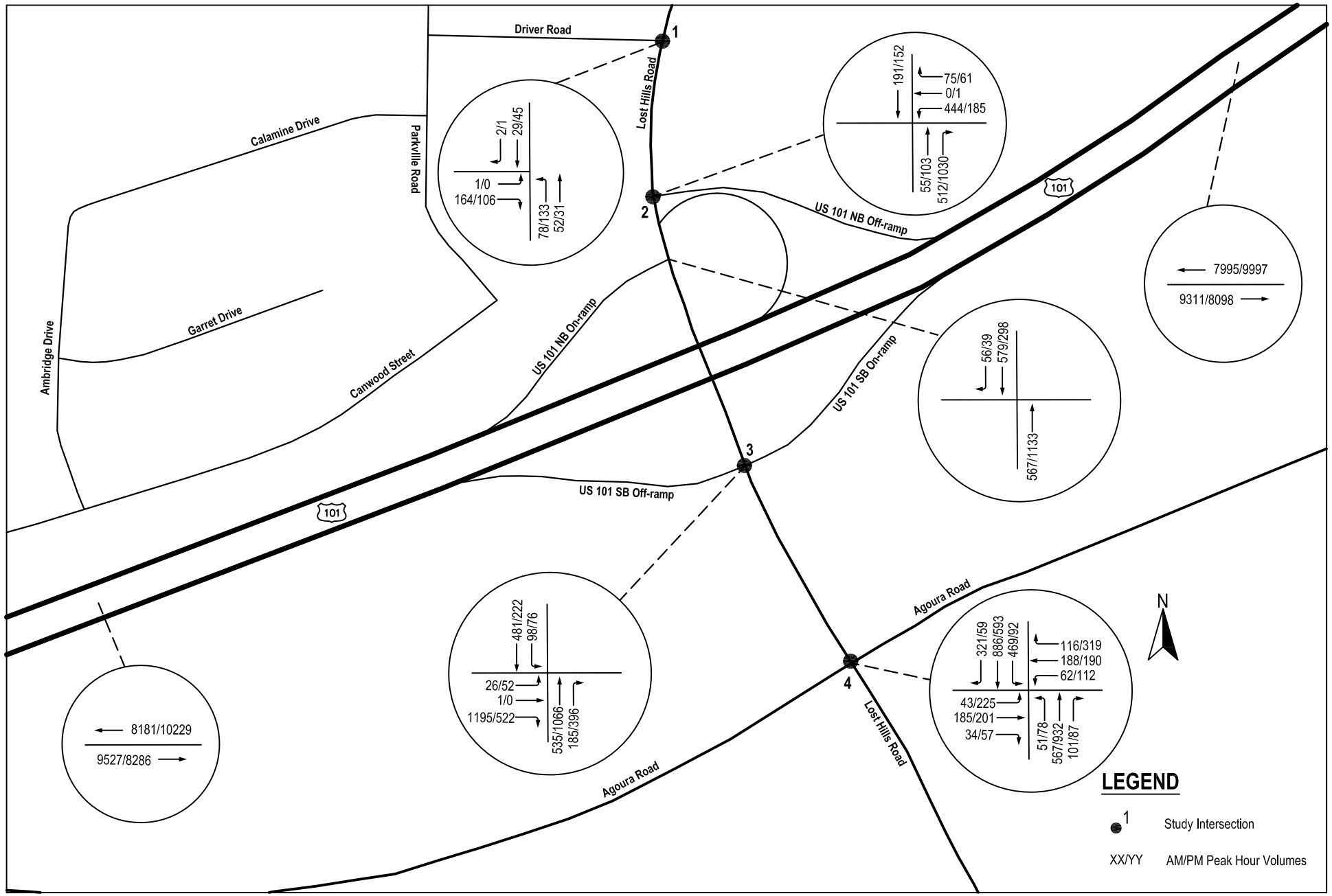

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Figure 17B
Future 2040 Traffic Volumes (Alternative 5)

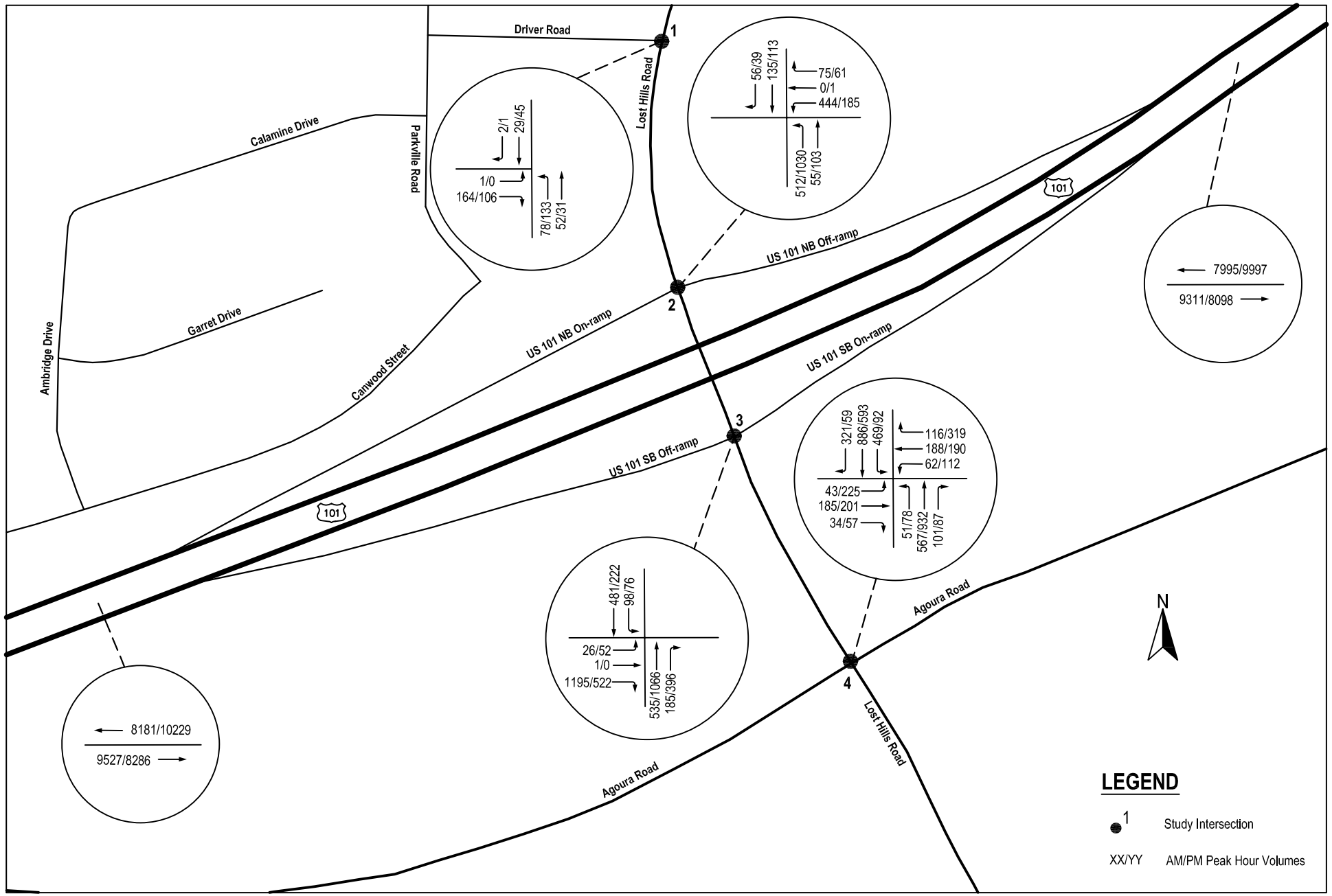

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Figure 17C
Future 2040 Traffic Volumes (Alternatives 3 and 6)

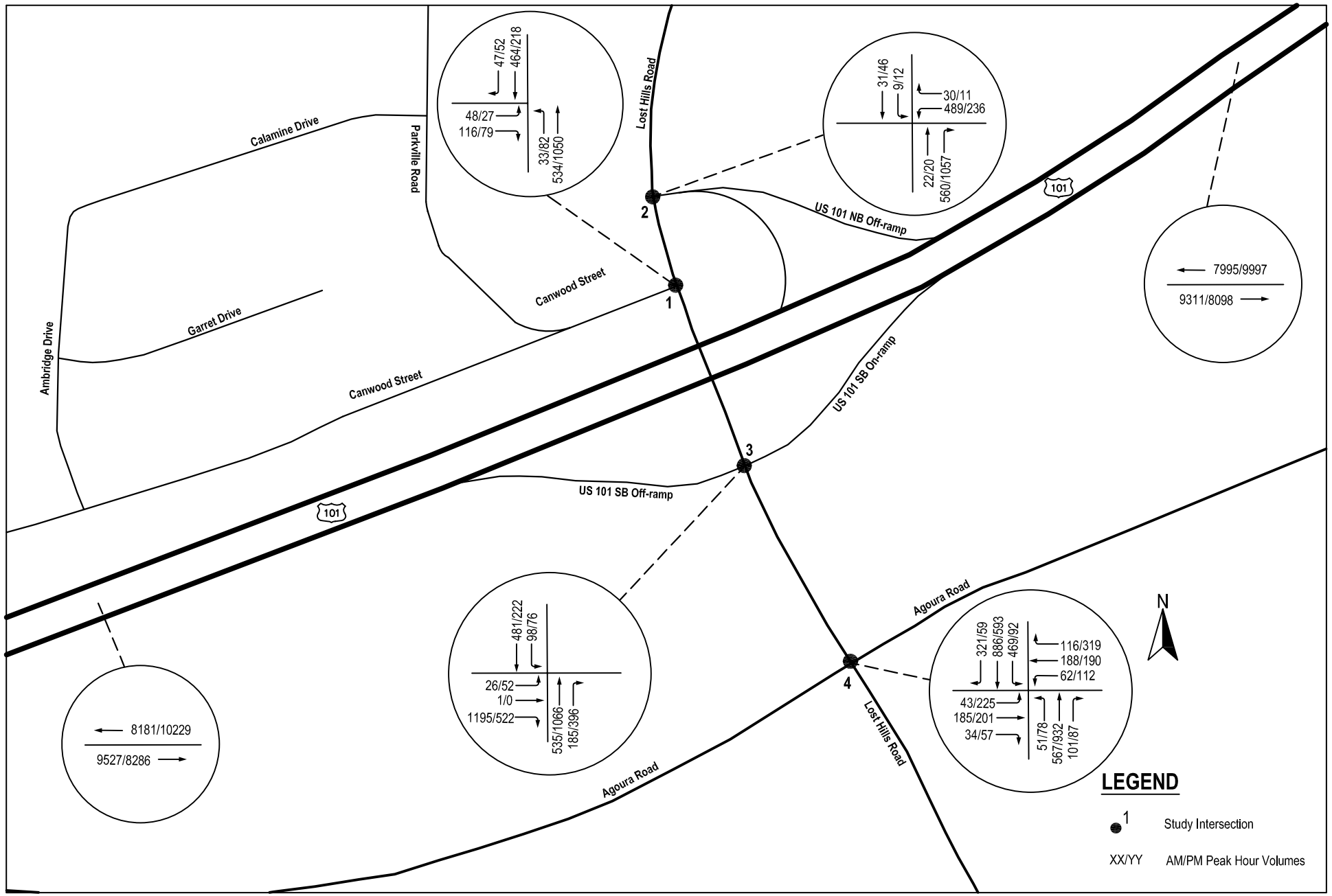

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Figure 17D
Future 2040 Traffic Volumes (Alternative 7)

6.3 Future (2040) Alternative 1 Conditions (No-Build)

6.3.1 Future (2040) Alternative 1 (No-Build) Intersection Level of Service

The future (2040) a.m. and p.m. peak hour intersection volumes were used to calculate the Future (2040) Alternative 1 (No-Build) levels of service at the study area intersections. The peak-hour volumes were input into the *Synchro* software to determine the LOS based on the HCM methodology.

Table 21 presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, all study area intersections are forecast to operate at acceptable LOS during the Future (2040) a.m. and p.m. peak hours, with the exception of Lost Hills Road/US-101 northbound ramps.

Table 21 – Future (2040) Alternative 1 (No-Build) Intersection Level of Service Summary

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
Lost Hills Road/Canwood Street	9.1	A	8.9	A
Lost Hills Road/US-101 NB Ramps	**49.3**	**D**	**105.7**	**F**
Lost Hills Road/US-101 SB Ramps	3.3	A	6.0	A
Lost Hills Road/Agoura Road	23.9	C	29.3	C

6.3.2 Future (2040) Alternative 1 (No-Build) Freeway Mainline Level of Service

The HCS software for freeway mainline analysis was used to determine the density along US-101. The future a.m. and p.m. peak hour freeway mainline volumes were input into the software to calculate the future levels of service along northbound and southbound US-101, north and south of the Lost Hills Interchange. A truck percentage of five percent and a peak-hour factor of 0.90 were assumed along the freeway mainline.
Table 22 presents the results of the future freeway segment LOS analysis. The calculation sheets are provided in Appendix B. The level of service analysis provides an analysis of US-101 as an eight-lane freeway (four lanes each direction) and ten-lane freeway (five lanes each direction). The improvement to the Lost Hills Road Interchange is being proposed to accommodate future widening of US-101 by one lane in each direction. Based on the results of the analysis, the freeway mainline segments are forecast to operate at unacceptable LOS (LOS D or worse) during the a.m. and p.m. peak hours as an eight-lane and ten-lane freeway.

Table 22 – Future (2040) Alternative 1 (No-Build) Freeway Segment Level of Service Summary

Freeway Segment	8-Lane				10-Lane			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
US-101 Northbound								
s/o Lost Hills Road	**42.2**	**E**	**--**	**F**	**28.6**	**D**	**41.6**	**E**
n/o Lost Hills Road	**44.7**	**E**	**--**	**F**	**29.4**	**D**	**44.0**	**E**
US-101 Southbound								
n/o Lost Hills Road	**--**	**F**	**--**	**F**	**37.5**	**E**	**29.9**	**D**
s/o Lost Hills Road	**--**	**F**	**43.6**	**E**	**35.9**	**E**	**29.1**	**D**

-- = Density exceeds 45.0 pc/mi/ln (i.e. LOS F)

The freeway mainline would not be altered as part of the proposed improvements. Therefore, the freeway mainline analysis results for Alternatives 2, 3, 4, 5, 6, or 7 would be the same as Alternative 1 (No-Build) for the Future (2020) conditions.

6.3.3 Future (2040) Alternative 1 (No-Build) Freeway Ramp Level of Service

The HCS software for freeway ramp merge/diverge analysis was used to determine the delay at the on/off ramps along US-101 at Lost Hills Road. The existing a.m. and p.m. peak hour freeway ramp volumes were input into the software to calculate the existing levels of service. A truck percentage of five percent and a peak-hour factor of 0.90 were assumed along the freeway mainline. All study area on and off ramps provide one merge/diverge lane.

Table 23 presents the results of the existing freeway ramp LOS analysis. The calculation sheets are provided in Appendix B. The level of service analysis provides an analysis of US-101 as an eight-lane freeway (four lanes each direction) and ten-lane freeway (five lanes each direction). The improvement to the Lost Hills Road Interchange is being proposed to accommodate future widening of US-101 by one lane in each direction. Based on the results of the analysis, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. peak hour) with US-101 as an eight-lane freeway. With the future widening of US-101 to a ten-lane freeway, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. or p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. and p.m. peak hour).

Table 23 – Future (2040) Alternative 1 (No-Build) Freeway Ramp Level of Service Summary

		8-Lane				10-Lane			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Freeway Ramp	Ramp Type	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
US-101 Northbound at Lost Hills Rd									
Off-ramp	*Diverge*	12.0	B	--	**F**	5.2	A	10.5	B
On-ramp	*Merge*	--	**F**	--	**F**	26.4	C	--	**F**
US-101 Southbound at Lost Hills Road									
Off-ramp	*Diverge*	--	**F**	--	**F**	--	**F**	23.1	C
On-ramp	*Merge*	--	**F**	--	**F**	--	**F**	25.4	C

-- = Demand exceeds capacity (i.e. LOS F)

6.4 Future (2040) Alternative 2 Conditions (Transportation Systems Management)

Alternative 2 considers no capacity improvements to the Lost Hills Road Interchange. This alternative includes improvement to traffic signal timing and coordination at the interchange (i.e. video detection, CCTV). This may help increase the efficiency of traffic flow, but based on the projected increase in traffic and demand, this would not be a sufficient alternative to serve the future traffic demand. As these improvements are considered short-term and do not involve any physical improvements to the overcrossing, this alternative is not analyzed in the future (2040) traffic conditions.

6.5 Future (2040) Alternative 3 Conditions (Roundabout)

6.5.1 Future (2040) Alternative 3 Intersection Level of Service

The future (2040) a.m. and p.m. peak hour intersection volumes were used to calculate the Future (2040) Alternative 3 (Roundabout) levels of service at the study area intersections. The peak-hour volumes were input into the *Synchro* software to determine the LOS based on the ICU 2003 methodology for the

roundabout intersections, and the HCM methodology for the signalized and unsignalized intersections. **Table 24** presents the results of the intersection LOS analysis for ICU methodology. The HCM methodology was not analyzed for the roundabout configuration. The calculation sheets are provided in Appendix B.

Table 24 – Future (2040) Alternative 3 (Roundabout) Intersection Level of Service Summary

Intersection	AM Peak Hour		PM Peak Hour	
	HCM/ICU	LOS	HCM/ICU	LOS
Lost Hills Road/Driver Road	9.2 sec	A	9.0 sec	A
Lost Hills Road/US-101 NB Ramps	**81.7%**	**D**	**96.2%**	**F**
Lost Hills Road/US-101 SB Ramps	73.0%	C	**74.1%**	**D**
Lost Hills Road/Agoura Road	23.0 sec	C	29.3 sec	C

6.5.2 Future (2040) Alternative 3 Freeway Ramp Level of Service

Alternative 3 does not include the freeway on/off ramps to be widened to provide two diverge or merge lanes. As such, the results for the freeway ramp analysis would be the same as Alternative 1 (No-Build). Based on the results of the analysis, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. peak hour) with US-101 as an eight-lane freeway. With the future widening of US-101 to a ten-lane freeway, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. or p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. and p.m. peak hour).

6.5.3 Findings and Recommendations

Based on the results of the analysis, the proposed roundabout design at the US-101 northbound and southbound ramps are forecast to operate at unacceptable LOS during the a.m. and p.m. peak hours. In addition, three study area freeway ramps are forecast to operate at unacceptable LOS. In addition to widening of US-101 to a ten-lane freeway, the US-101 northbound on-ramp, US-101 southbound off-ramp, and US-101 southbound on-ramp would need to provide two merge and diverge lanes at the ramps. The additional lanes would improve the LOS to LOS C or better.

6.6 Future (2040) Alternative 4 Conditions (Expanded Diamond Interchange)

6.6.1 Future (2040) Alternative 4 Intersection Level of Service

The future (2040) a.m. and p.m. peak hour intersection volumes were used to calculate the Future (2040) Alternative 4 (Expanded Diamond Interchange) levels of service at the study area intersections. **Table 25** presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B.

Table 25 – Future (2040) Alternative 4 (Expanded Diamond Interchange) Intersection Level of Service Summary

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
Lost Hills Road/Canwood Street	9.1	A	8.9	A
Lost Hills Road/US-101 NB Ramps	**37.3**	**D**	**75.8**	**E**
Lost Hills Road/US-101 SB Ramps	29.9	C	14.3	B
Lost Hills Road/Agoura Road	29.0	C	34.8	C

6.6.2 Future (2040) Alternative 4 Freeway Ramp Level of Service

Alternative 4 does not include the freeway on/off ramps to be widened to provide two diverge or merge lanes. As such, the results for the freeway ramp analysis would be the same as Alternative 1 (No-Build). Based on the results of the analysis, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. peak hour) with US-101 as an eight-lane freeway. With the future widening of US-101 to a ten-lane freeway, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. or p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. and p.m. peak hour).

6.6.3 Findings and Recommendations

Based on the results of the analysis, the intersection of Lost Hills Road/US-101 northbound ramps is forecast to operate at unacceptable LOS (LOS D during the a.m. peak hour and LOS E during the p.m. peak hour). The LOS at the Lost Hills Road/US-101 northbound ramps is unacceptable due to the high volume of northbound left-turn vehicles, accessing the northbound US-101.

A split-phase traffic signal would need to be incorporated for the northbound and southbound approaches at Lost Hills Road/US-101 northbound ramps to provide more green time for northbound left-turn vehicles to clear the intersection within a given cycle length.

In addition, three study area freeway ramps are forecast to operate at unacceptable LOS. In addition to widening of US-101 to a ten-lane freeway, the US-101 northbound on-ramp, US-101 southbound off-ramp, and US-101 southbound on-ramp would need to provide two merge and diverge lanes at the ramps. The additional lanes would improve the LOS to LOS C or better.

6.7 Future (2040) Alternative 5 Conditions (Partial Cloverleaf)

6.7.1 Future (2040) Alternative 5 Intersection Level of Service

The future (2040) a.m. and p.m. peak hour intersection volumes were used to calculate the Future (2040) Alternative 5 (Partial Cloverleaf) levels of service at the study area intersections. **Table 26** presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the study area intersections are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours.

Table 26 – Future (2040) Alternative 5 (Partial Cloverleaf) Intersection Level of Service Summary

	AM Peak Hour		PM Peak Hour	
Intersection	Delay (sec)	LOS	Delay (sec)	LOS
Lost Hills Road/Driver Road	9.2	A	9.0	A
Lost Hills Road/US-101 NB Off-Ramp	11.9	B	10.5	B
Lost Hills Road/US-101 SB Ramps	29.9	C	15.0	B
Lost Hills Road/Agoura Road	29.0	C	34.5	C

6.7.2 Future (2040) Alternative 5 Freeway Ramp Level of Service

The HCS software for freeway ramp merge/diverge analysis was used to determine the delay at the on/off ramps along US-101 at Lost Hills Road. The future (2040) a.m. and p.m. peak hour freeway ramp volumes were input into the software to calculate the future (2040) levels of service. A truck percentage of five percent and a peak-hour factor of 0.90 were assumed along the freeway mainline. All study on and off ramps provide one merge/diverge lane. It should be noted that the US-101 northbound on-ramp (southbound Lost Hills Road) and US-101 northbound on-ramp (northbound Lost Hills Road - loop ramp)

would create an additional merge point along northbound US-101 at the interchange.

The level of service analysis provides an analysis of US-101 as an eight-lane freeway (four lanes each direction) and ten-lane freeway (five lanes each direction). The improvement to the Lost Hills Road Interchange is being proposed to accommodate future widening of US-101 by one lane in each direction.

Table 27 presents the results of the Future (2040) Alternative 5 freeway ramp LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. peak hour), with US-101 as an eight-lane freeway. With the future widening of US-101 to a ten-lane freeway, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. or p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. and p.m. peak hour).

6.7.3 Findings and Recommendations

Alternative 5 is forecast to provide acceptable LOS at the study intersections in the Future (2040) Conditions. In addition, three study area freeway ramps are forecast to operate at unacceptable LOS. In addition to widening of US-101 to a ten-lane freeway, the US-101 northbound on-ramp, US-101 southbound off-ramp, and US-101 southbound on-ramp would need to provide two merge and diverge lanes at the ramps. The additional lanes would improve the LOS to LOS C or better.

Table 27 – Future (2040) Alternative 5 (Partial Cloverleaf) Freeway Ramp Level of Service Summary

Freeway Ramp	Ramp Type	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS
US-101 Northbound at Lost Hills Rd		**8-lane**				**10-lane**			
Off-ramp	*Diverge*	12.0	B	--	**F**	5.2	A	10.5	B
On-ramp (southbound)	*Merge*	--	**F**	--	**F**	26.0	C	--	**F**
On-ramp (northbound – loop)	*Merge*	--	**F**	--	**F**	26.3	C	--	**F**
US-101 Southbound at Lost Hills Road		**8-lane**				**10-lane**			
Off-ramp	*Diverge*	--	**F**	--	**F**	--	**F**	23.1	C
On-ramp	*Merge*	--	**F**	--	**F**	--	**F**	25.4	C

-- = Demand exceeds capacity (i.e. LOS F)

6.8 Future (2040) Alternative 6 Conditions (Full Standard Diamond)

6.8.1 Future (2040) Alternative 6 Intersection Level of Service

The future (2040) a.m. and p.m. peak hour intersection volumes were used to calculate the Future (2040) Alternative 6 (Full Standard Diamond) levels of service at the study area intersections. **Table 28** presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B.

Table 28 – Future (2040) Alternative 6 (Full Standard Diamond) Intersection Level of Service Summary

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
Lost Hills Road/Driver Road	9.2	A	9.0	A
Lost Hills Road/US-101 NB Ramps	**37.3**	**D**	**75.8**	**E**
Lost Hills Road/US-101 SB Ramps	29.9	C	14.3	B
Lost Hills Road/Agoura Road	29.0	C	34.8	C

6.8.2 Future (2040) Alternative 6 Freeway Ramp Level of Service

Alternative 6 does not include the freeway on/off ramps to be widened to provide two diverge or merge lanes. As such, the results for the freeway ramp analysis would be the same as Alternative 1 (No-Build). Based on the results of the analysis, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. peak hour) with US-101 as an eight-lane freeway. With the future widening of US-101 to a ten-lane freeway, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. or p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. and p.m. peak hour).

6.8.3 Findings and Recommendations

Based on the results of the analysis, study area intersections are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours, except the intersection of Lost Hills Road/US-101 northbound ramps. This intersection is forecast to operate at unacceptable LOS (LOS D during the a.m. peak hour and LOS E during the p.m. peak hour). The LOS at the Lost Hills Road/US-101 northbound ramp intersection is unacceptable due to the high volume of northbound left-turn vehicles, accessing northbound US-101. A split-phase traffic signal would need to be incorporated for the northbound and southbound approaches at Lost Hills Road/US-101 northbound ramps to provide more green time for northbound left-turn vehicles to clear the intersection within a given cycle length.

In addition, three study area freeway ramps are forecast to operate at unacceptable LOS. In addition to widening of US-101 to a ten-lane freeway, the US-101 northbound on-ramp, US-101 southbound off-ramp, and US-101 southbound on-ramp would need to provide two merge and diverge lanes at the ramps. The additional lanes would improve the LOS to LOS C or better.

6.9 Future (2040) Alternative 7 Conditions (Cloverleaf)

6.9.1 Future (2040) Alternative 7 Intersection Level of Service

The future (2040) a.m. and p.m. peak hour intersection volumes were used to calculate the Future (2040) Alternative 7 (Cloverleaf) levels of service at the study area intersections. It should be noted that Alternative 7 assumes the signalization of Lost Hills Road/US-101 northbound ramps and Lost Hills Road/Canwood Street. The installation of a traffic signal at Lost Hills Road/Canwood Street would provide a controlled and less conflicted left-turn movement at Canwood Street for vehicles destined to the US-101 northbound on-ramp. Furthermore, the installation of a traffic signal at Lost Hills Road/US-101 northbound ramps would provide a coordinated network along Lost Hills Road at the ramps and intersections. Since the traffic signals along Lost Hills Road were assumed to be coordinated, the *SimTraffic* software was used to analyze the study intersections. The *SimTraffic* software provides a micro-simulation of the traffic operations within a corridor. The software assumed that the cycle lengths and offsets at each traffic signal were optimized along the network corridor.

Table 29 presents the results of the intersection LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the study area intersections are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours.

Table 29 – Future (2040) Alternative 7 (Cloverleaf) Intersection Level of Service Summary

Intersection	AM Peak Hour Delay (sec)	AM Peak Hour LOS	PM Peak Hour Delay (sec)	PM Peak Hour LOS
Lost Hills Road/Canwood Street	2.9	A	2.5	A
Lost Hills Road/US-101 NB Ramps	9.0	A	10.4	B
Lost Hills Road/US-101 SB Ramps	15.5	B	3.1	A
Lost Hills Road/Agoura Road	15.9	B	19.6	B

6.9.2 Future (2040) Alternative 7 Freeway Ramp Level of Service

The HCS software for freeway ramp merge/diverge analysis was used to determine the delay at the on/off ramps along US-101 at Lost Hills Road. The future (2040) a.m. and p.m. peak hour freeway ramp volumes were input into the software to calculate the future (2040) levels of service. A truck percentage of five percent and a peak-hour factor of 0.90 were assumed along the freeway mainline. All study on and off ramps provide one merge/diverge lane. It should be noted that the Alternative 7 design would only create one merge point on northbound US-101, compared to the Alternative 5 design, which would reduce the number of merge points at the interchange.

The level of service analysis provides an analysis of US-101 as an eight-lane freeway (four lanes each direction) and ten-lane freeway (five lanes each direction). The improvement to the Lost Hills Road Interchange is being proposed to accommodate future widening of US-101 by one lane in each direction.
Table 30 presents the results of the Future (2040) Alternative 7 freeway ramp LOS analysis. The calculation sheets are provided in Appendix B. Based on the results of the analysis, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. peak hour) with US-101 as an eight-lane freeway. With the future widening of US-101 to a ten-lane freeway, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. or p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (a.m. and p.m. peak hour).

Table 30 – Future (2040) Alternative 7 (Cloverleaf) Freeway Ramp Level of Service Summary

Freeway Ramp	Ramp Type	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS
US-101 Northbound at Lost Hills Rd		**8-lane**				**10-lane**			
Off-ramp	*Diverge*	12.0	B	--	**F**	5.2	A	10.5	B
On-ramp	*Merge*	--	**F**	--	**F**	26.4	C	--	**F**
US-101 Southbound at Lost Hills Road		**8-lane**				**10-lane**			
Off-ramp	*Diverge*	--	**F**	--	**F**	--	**F**	23.1	C
On-ramp	*Merge*	--	**F**	--	**F**	--	**F**	25.4	C

-- = Demand exceeds capacity (i.e. LOS F)

6.9.3 Findings and Recommendations

Alternative 7 is forecast to provide acceptable LOS at the study intersections. The alternative would also provide signalization for all intersections within the Lost Hills Road Interchange in order to provide a coordinated network, less merge points along northbound US-101 (one merge vs. two merges), adequate intersection spacing, and maintains the existing access and travel patterns to the community at Canwood Street.

In addition, three study area freeway ramps are forecast to operate at unacceptable LOS. In addition to widening of US-101 to a ten-lane freeway, the US-101 northbound on-ramp, US-101 southbound off-ramp, and US-101 southbound on-ramp would need to provide two merge and diverge lanes at the ramps. The additional lanes would improve the LOS to LOS C or better.

7. CONCLUSIONS

7.1 Summary

The study area intersections are operating at acceptable LOS during the a.m. and p.m. peak hours in the Existing Conditions. By the Future (2040) Conditions, the intersection of Lost Hills Road/US-101 northbound ramps is forecast to operate at unacceptable LOS during the a.m. and p.m. peak hours.

The freeway mainline segments are operating at unacceptable LOS (LOS D and E) during the a.m. and p.m. peak hours in the Existing, Project Completion Year (2012) Conditions, and Future (2040) Conditions. The improvement to the Lost Hills Road Interchange is being proposed to accommodate future widening of US-101 by one lane in each direction.

The freeway ramps are operating at acceptable LOS in the Existing Condition during the a.m. and p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (p.m. peak hour) and US-101 southbound on-ramp at Lost Hills Road (a.m. peak hour). By the Future (2040) Condition, the freeway ramps are forecast to operate at unacceptable LOS during the a.m. and p.m. peak hours. The level of service analysis assumes US-101 as an eight-lane freeway (four lanes each direction). The improvement to the Lost Hills Road Interchange is being proposed to accommodate future widening of US-101. If US-101 were widened to a ten-lane freeway (five lanes each direction), the future level of service at the on/off ramps along US-101 at Lost Hills Road would improve.

All project alternatives, with the exception of Alternative 1 (No-Build), would provide standard pedestrian sidewalks along both sides of the Lost Hills Road Interchange. Pedestrian conflict may occur with the implementation of Alternative 3, 4, and 6 due to the heavy traffic destined northbound on US-101. However, with the implementation of Alternative 5 and 7, the ramp configuration for the Lost Hills Road/US-101 northbound ramps intersection would not create a conflict with pedestrians.

7.2 Findings and Recommendations

7.2.1 Bicycle and Pedestrian Circulation

Bicycle lanes would still be provided along Agoura Road, just south of the US-101. Along the new freeway overpass, a 4-foot shoulder would be provided as an alternative for a bicycle lane. The new striped shoulder would improve bicycle safety in the area of the interchange because the existing interchange does not provide one.

All project alternatives, with the exception of Alternative 1 (No-Build), would provide standard pedestrian sidewalks on the west side of Lost Hills Road at the new overcrossing, which would connect with the pedestrian sidewalk north of the interchange. Pedestrian sidewalks would still be provided on the east and west sides of Lost Hills Road, south of the interchange. A pedestrian crosswalk will be provided along the west leg of US-101 southbound ramps/Lost Hills Road (Alternatives 3, 4, 5, 6, and 7) and US -101 northbound ramps/Lost Hills Road (Alternatives 3, 4, 5, and 6)

With the implementation of Alternative 3, 4, and 6, pedestrian conflicts would occur due to the heavy traffic originating/destined north on US-101. In Alternative 3, pedestrian safety would not be improved at the roundabout intersections since they would be yield-controlled, and would not provide a separate pedestrian walk phase. Alternatives 4 and 6 would reconfigure the intersection of US-101 southbound ramps/Lost Hills Road. The existing eastbound free right-turn lane would be removed and would have a permissive right-turn phase. Pedestrian safety would be improved with the reconfiguration, as the pedestrian conflict with the free right-turn movements would be eliminated.

With the implementation of Alternative 5 and 7, pedestrian circulation would be improved. Alternatives 5 and 7 would reconfigure the intersections of US-101 southbound ramps/Lost Hills Road and US-101 northbound ramps/Lost Hills Road. At the intersection of US-101 southbound ramps/Lost Hills Road, the existing eastbound free right-turn lane would be removed and become a permissive right-turn phase. Pedestrian safety would be improved with the reconfiguration, as the pedestrian conflict with the free right-turn movements would be eliminated. In Alternative 5, the existing northbound left-turn movements at the intersection of US-101 northbound ramps/Lost Hills Road would be eliminated. In Alternative 7, the existing westbound freeway on-ramp would be removed at the intersection of US-101 northbound ramps/Lost Hills Road, as well as the pedestrian crosswalk. These alternatives would eliminate the conflict with turning vehicles at the US-101 northbound ramps/Lost Hills Road and improving the pedestrian safety.

7.2.2 Intersection Level of Service

Five alternatives were analyzed that would enhance the capacity at the intersections of Lost Hills Road/US-101 northbound ramps and Lost Hills Road/US-101 southbound ramps. The following summarizes the results for each alternative.

- **Alternative 3 (Roundabout).** The proposed roundabout design would operate at unacceptable LOS in the Future (2040) Condition. However, the design of the roundabout for the northbound ramps would include Canwood Street, thus eliminating the closely spaced intersections. Therefore, this alternative would meet Caltrans design standards, but not meet the performance criteria.
- **Alternative 4 (Expanded Diamond Interchange).** The proposed expanded diamond interchange design would widen the overcrossing to Caltrans design standards, and maintain the existing configuration. However, this alternative would not meet the Caltrans standards for intersection spacing between Canwood Street and the US-101 northbound ramps. In addition, the ramp intersections would operate at acceptable LOS, with the exception of Lost Hills Road/US-101 northbound ramps in the a.m. and p.m. peak hour. The proposed design would not alleviate the heavy northbound left-turn volumes destined northbound on the US-101. A split-phase traffic signal for the northbound and southbound approaches at the Lost Hills Road/US-101 northbound ramps should be incorporated to provide more green time for northbound left-turn vehicles to clear the intersection within a given cycle length.
- **Alternative 5 (Partial Cloverleaf).** This alternative would construct a new overcrossing, a new partial cloverleaf on-ramp at the northbound side of US-101. The Lost Hills Road/Canwood Street intersection would be closed down and a new roadway to access the residential community would be located north of the US-101 northbound ramps at Driver Road. This alternative will serve the heavy northbound Lost Hills Road to northbound US-101 traffic, but not meet the Caltrans standards for intersection spacing. In addition, the US-101 northbound and southbound ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours. Furthermore, the US-101 northbound on-ramp (southbound Lost Hills Road) and US-101 northbound on-ramp (northbound Lost Hills Road - loop ramp) would create an additional merge point along northbound US-101 at the interchange.

  The Alternative 5 design would provide acceptable LOS at the study intersections. However, it creates additional merge points on northbound US-101 at the interchange, and it the relocates the access to the community at Canwood Street, thus changing traffic patterns in the community. Furthermore, Alternative 5 does not include signalization of the Lost Hills Road/US-101 northbound ramps.

- **Alternative 6 (Full Standard Diamond Interchange).** The proposed full standard diamond interchange design would widen the overcrossing to Caltrans standards, and retains the existing configuration. A new roadway to access the residential community would be located north of the US-101 northbound ramps at Driver Road, which would not meet the Caltrans standards for intersection spacing. The ramp intersections would operate at acceptable LOS, with the exception of Lost Hills Road/US-101 northbound ramps in the a.m. and p.m. peak hour. Therefore, this alternative would meet Caltrans design standards, but not meet the Caltrans performance criteria.

  A split-phase traffic signal for the northbound and southbound approaches at Lost Hills Road/US-101 northbound ramps should be incorporated to provide more green time for northbound left-turn vehicles to clear the intersection within a given cycle length.

- **Alternative 7 (Cloverleaf).** The proposed design would construct a new overcrossing to meet Caltrans design standards, a new partial cloverleaf on-ramp for northbound US-101, and the closure of the existing US-101 northbound on-ramp. The new partial cloverleaf on-ramp for US-101 northbound would serve both northbound and southbound traffic on Lost Hills Road. The existing access to the residential community to the northwest of the interchange would remain at current alignment with Canwood Street. This alternative will serve the heavy northbound Lost Hills Road to northbound US-101 traffic.

  The US-101 northbound and southbound ramps are forecast to operate at acceptable LOS during the a.m. and p.m. peak hours based on Caltrans performance criteria. In addition, the signalization of Lost Hills Road/US-101 northbound ramps and Lost Hills Road/Canwood Street would benefit the corridor by providing controlled left-turn movements at Canwood Street, and by providing a coordinated network system at the ramps and intersections.

7.2.3 Freeway Mainline Level of Service

The freeway mainline segments are operating at unacceptable LOS (LOS D and E) during the a.m. and p.m. peak hours in the Existing, Project Completion Year (2012), and Future (2040) Conditions. Future widening of US-101 would improve the freeway mainline to acceptable LOS in the Future (2040) Conditions. Improvement to the freeway mainline is not a part of this project.

7.2.4 Freeway Ramp Level of Service

The freeway ramps are operating at acceptable LOS during the a.m. and p.m. peak hours, with the exception of US-101 northbound off-ramp at Lost Hills Road (p.m. peak hour) and US-101 southbound on-ramp at Lost Hills Road (a.m. peak hour) in the Existing Conditions. In the Future (2040) Condition, three study area freeway ramps are forecast to operate at unacceptable LOS. In addition to widening of US-101 to a ten-lane freeway, the US-101 northbound on-ramp, US-101 southbound off-ramp, and US-101 southbound on-ramp would need to provide two merge and diverge lanes at the ramps. The additional lanes would improve the LOS to LOS C or better.

APPENDIX A EXISTING TRAFFIC COUNTS

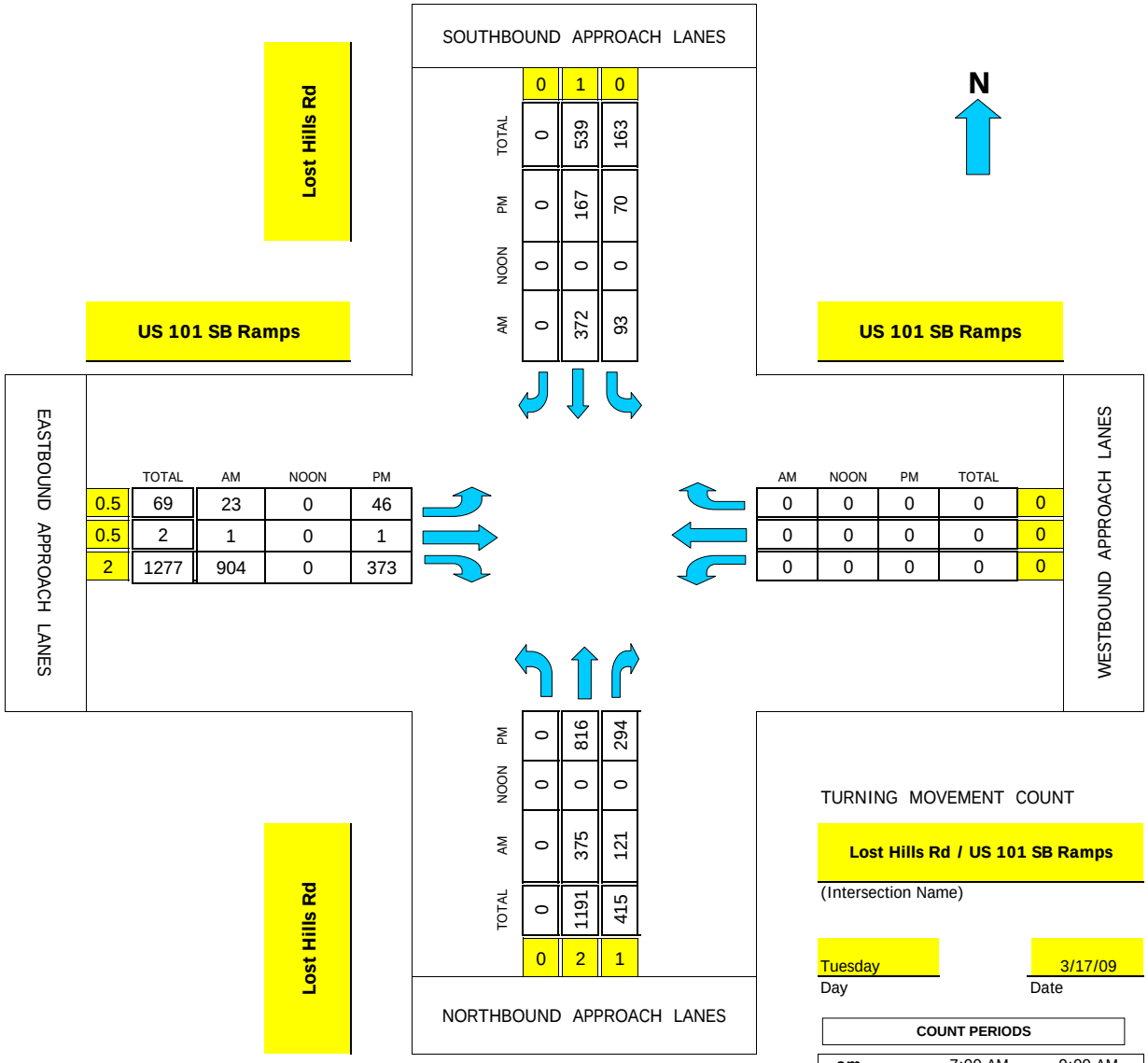
Intersection Turning Movement

Prepared by:

National Data & Surveying Services

TMC Summary of Lost Hills Rd/US 101 SB Ramps

Project #: 09-5093-003



	TOTAL	AM	NOON	PM
0	0	0	0	0
1	539	372	0	167
0	163	93	0	70

	TOTAL	AM	NOON	PM
0.5	69	23	0	46
0.5	2	1	0	1
2	1277	904	0	373

AM	NOON	PM	TOTAL	
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

	TOTAL	AM	NOON	PM
0	0	0	0	0
2	1191	375	0	816
1	415	121	0	294

TURNING MOVEMENT COUNT

Lost Hills Rd / US 101 SB Ramps

(Intersection Name)

Tuesday — Day

3/17/09 — Date

COUNT PERIODS			
am	7:00 AM	-	9:00 AM
noon		-	
pm	4:00 PM	-	6:00 PM

CONTROL: Signalized

AM PEAK HOUR	745 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	500 PM

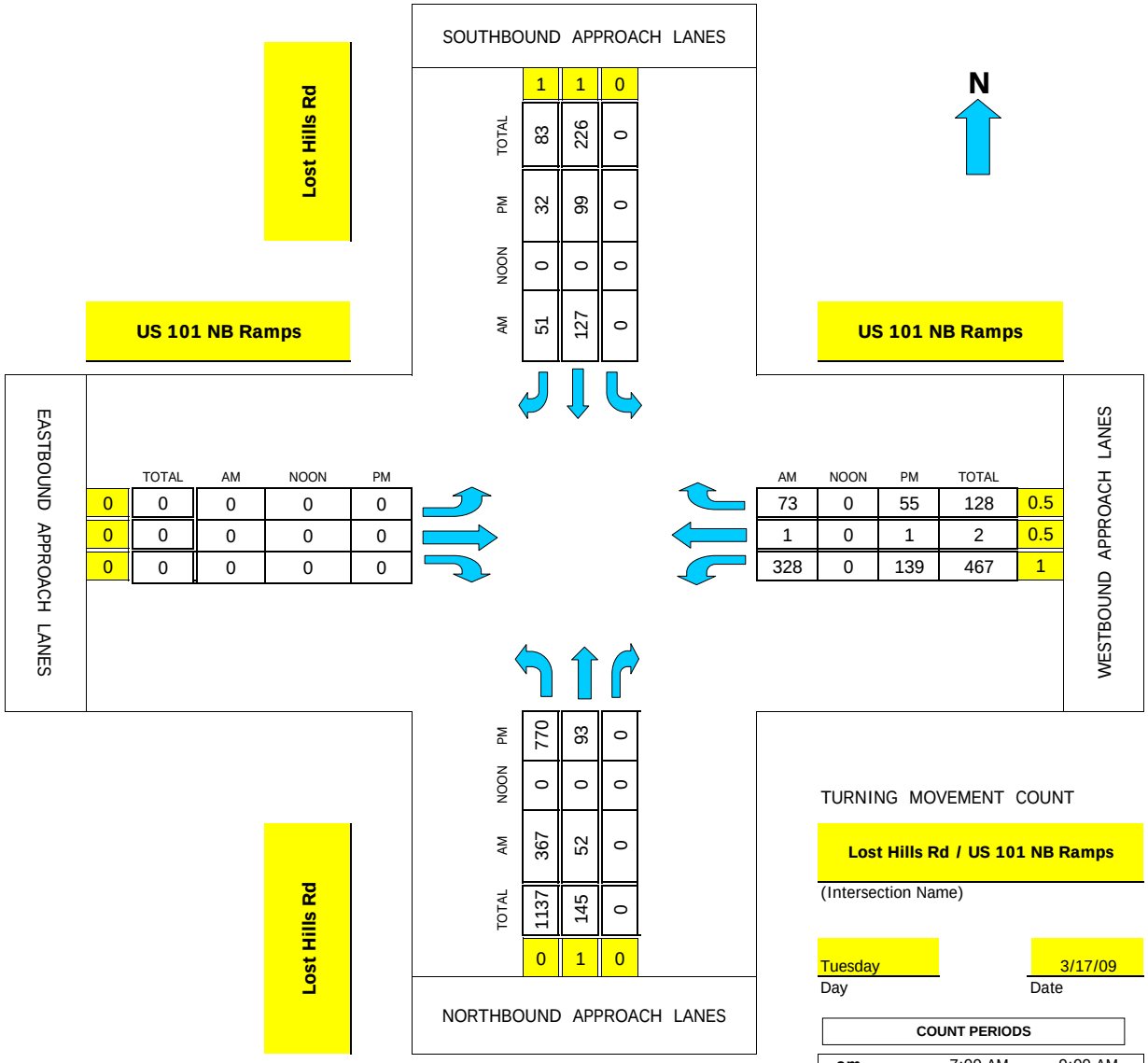
Intersection Turning Movement

Prepared by:

National Data & Surveying Services

TMC Summary of Lost Hills Rd/US 101 NB Ramps

Project #: 09-5093-002



TURNING MOVEMENT COUNT

Lost Hills Rd / US 101 NB Ramps

(Intersection Name)

Tuesday — Day

3/17/09 — Date

COUNT PERIODS			
am	7:00 AM	-	9:00 AM
noon		-	
pm	4:00 PM	-	6:00 PM

CONTROL: Signalized

AM PEAK HOUR	800 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	500 PM

Intersection Turning Movement

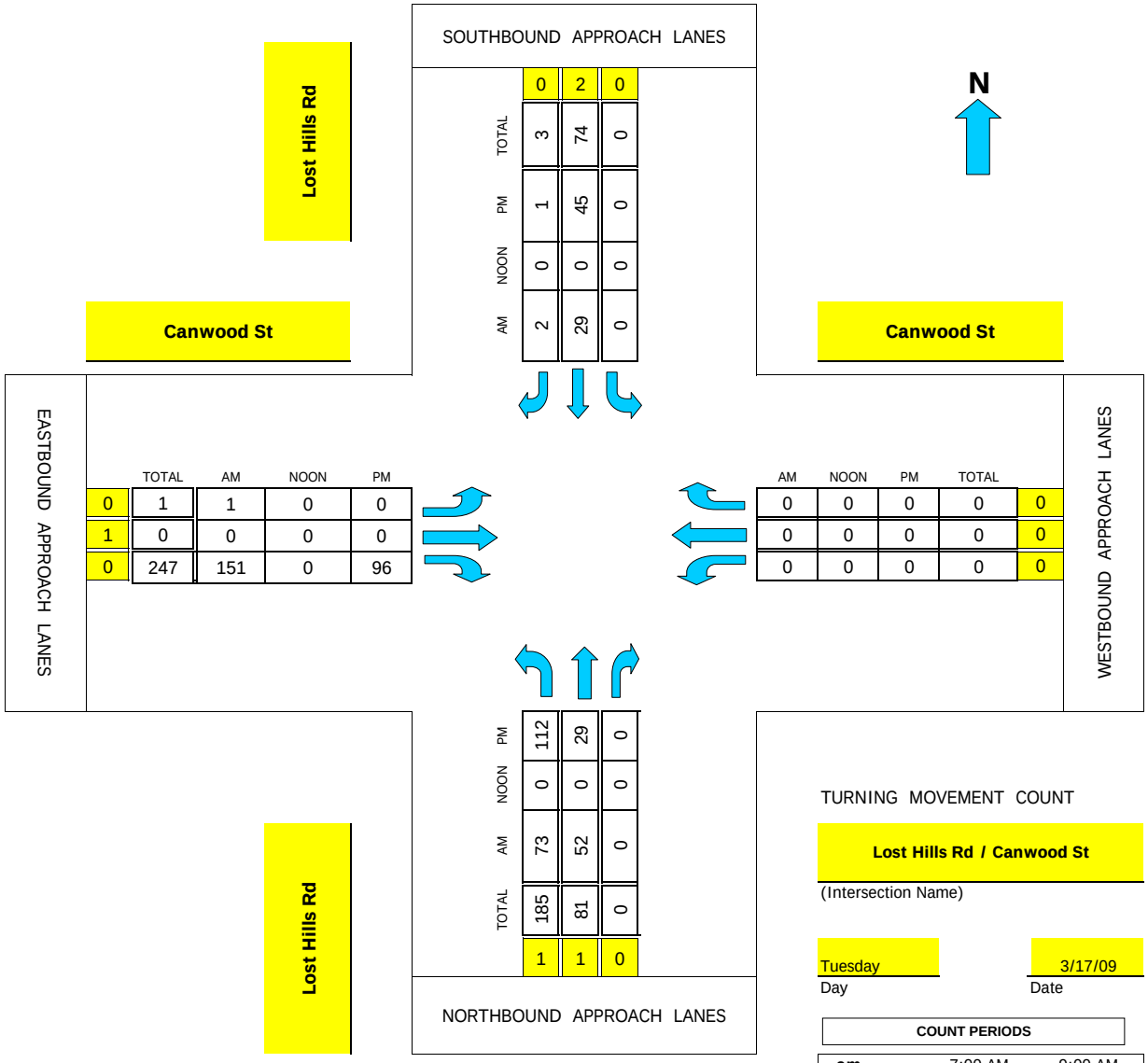
Prepared by:

NDS

National Data & Surveying Services

TMC Summary of Lost Hills Rd/Canwood St

Project #: 09-5093-001



	TOTAL	AM	NOON	PM
0	3	2	0	1
2	74	29	0	45
0	0	0	0	0

	TOTAL	AM	NOON	PM
0	1	1	0	0
1	0	0	0	0
0	247	151	0	96

	AM	NOON	PM	TOTAL
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

	TOTAL	AM	NOON	PM
1	185	73	0	112
1	81	52	0	29
0	0	0	0	0

TURNING MOVEMENT COUNT

Lost Hills Rd / Canwood St

(Intersection Name)

Tuesday — Day

3/17/09 — Date

COUNT PERIODS			
am	7:00 AM	-	9:00 AM
noon		-	
pm	4:00 PM	-	6:00 PM

CONTROL: 2-Way Stop (S/E)

AM PEAK HOUR	800 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	400 PM

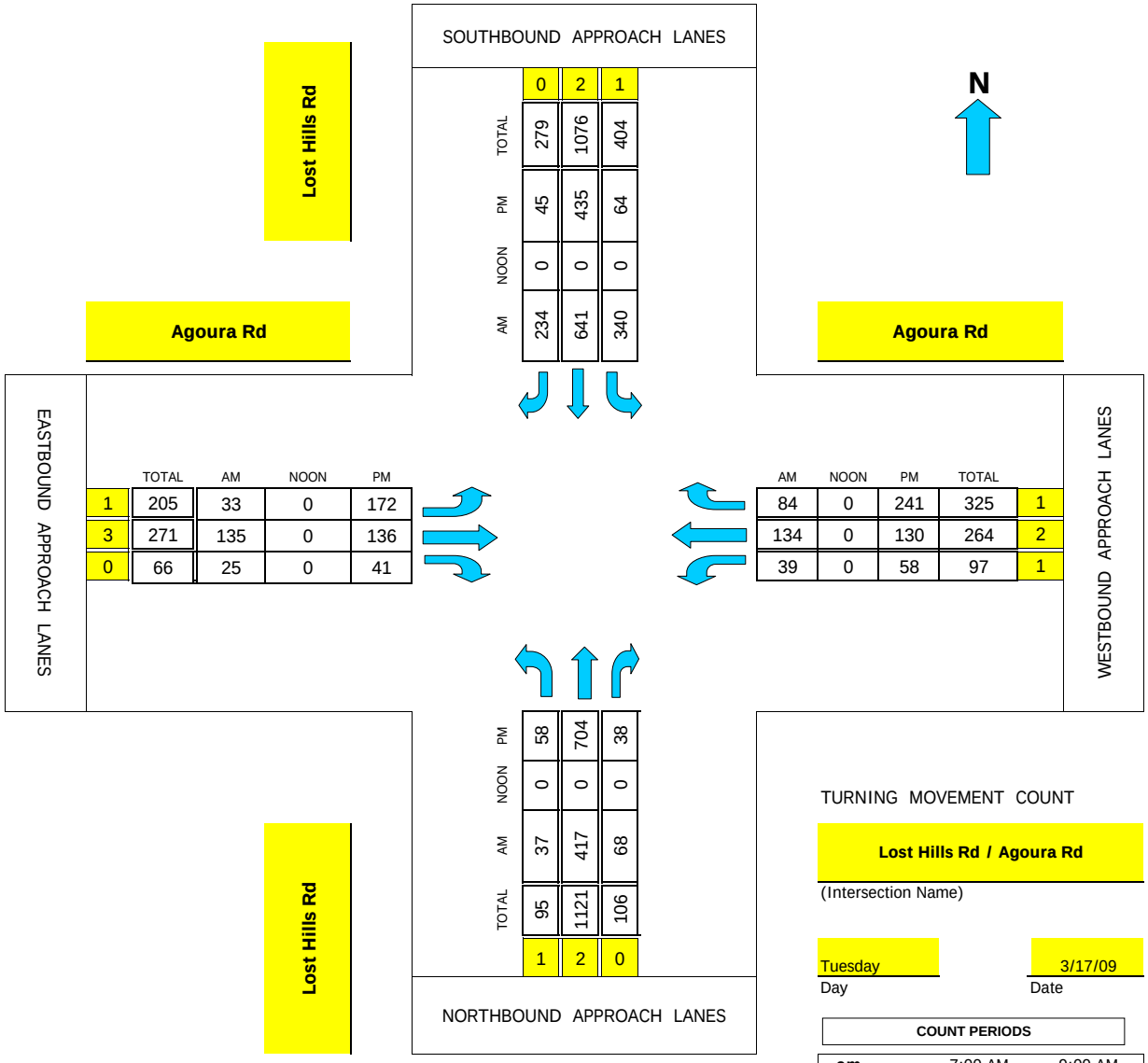
Intersection Turning Movement

Prepared by:

National Data & Surveying Services

TMC Summary of Lost Hills Rd / Agoura Rd

Project #: 09-5093-004



	TOTAL	AM	NOON	PM
0	279	234	0	45
2	1076	641	0	435
1	404	340	0	64

	TOTAL	AM	NOON	PM
1	205	33	0	172
3	271	135	0	136
0	66	25	0	41

	AM	NOON	PM	TOTAL
1	84	0	241	325
2	134	0	130	264
1	39	0	58	97

	TOTAL	AM	NOON	PM
1	95	37	0	58
2	1121	417	0	704
0	106	68	0	38

TURNING MOVEMENT COUNT

Lost Hills Rd / Agoura Rd

(Intersection Name)

Tuesday — Day

3/17/09 — Date

COUNT PERIODS			
am	7:00 AM	-	9:00 AM
noon		-	
pm	4:00 PM	-	6:00 PM

CONTROL: Signalized

AM PEAK HOUR	800 AM
NOON PEAK HOUR	0 AM
PM PEAK HOUR	500 PM

APPENDIX B LEVEL OF SERVICE WORKSHEETS

APPENDIX B -1 INTERSECTION LOS WORKSHEETS

EXISTING CONDITIONS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			4.0			4.0	4.0
Lane Util. Factor				1.00	1.00			1.00			1.00	1.00
Frt				1.00	0.85			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.96			1.00	1.00
Satd. Flow (prot)				1719	1538			1734			1810	1538
Flt Permitted				0.95	1.00			0.57			1.00	1.00
Satd. Flow (perm)				1719	1538			1029			1810	1538
Volume (vph)	0	0	0	328	0	73	367	52	0	0	127	51
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	364	0	81	408	58	0	0	141	57
RTOR Reduction (vph)	0	0	0	0	61	0	0	0	0	0	0	36
Lane Group Flow (vph)	0	0	0	364	20	0	0	466	0	0	141	21
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			pm+pt					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8			2					6
Actuated Green, G (s)				29.8	29.8			86.0			45.9	45.9
Effective Green, g (s)				31.1	31.1			86.2			46.1	46.1
Actuated g/C Ratio				0.25	0.25			0.69			0.37	0.37
Clearance Time (s)				5.3	5.3			4.2			4.2	4.2
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)				427	382			911			666	566
v/s Ratio Prot					0.01			c0.15			0.08	
v/s Ratio Perm				c0.21				c0.20				0.01
v/c Ratio				0.85	0.05			0.51			0.21	0.04
Uniform Delay, d1				44.9	35.9			9.4			27.1	25.4
Progression Factor				1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2				15.1	0.1			2.0			0.7	0.1
Delay (s)				60.0	35.9			11.5			27.9	25.5
Level of Service				E	D			B			C	C
Approach Delay (s)		0.0			55.6			11.5			27.2	
Approach LOS		A			E			B			C	

Intersection Summary			
HCM Average Control Delay	32.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	125.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	1	151	73	52	29	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	168	81	58	32	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				164		
pX, platoon unblocked						
vC, conflicting volume	253	17	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	253	17	34			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	84	95			
cM capacity (veh/h)	677	1057	1575			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	169	81	58	21	13
Volume Left	1	81	0	0	0
Volume Right	168	0	0	0	2
cSH	1053	1575	1700	1700	1700
Volume to Capacity	0.16	0.05	0.03	0.01	0.01
Queue Length 95th (ft)	14	4	0	0	0
Control Delay (s)	9.1	7.4	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	9.1	4.3		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	26.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00		1.00	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		0.99	
Satd. Flow (prot)		1726	2707					3438	1583		1792	
Flt Permitted		0.95	1.00					1.00	1.00		0.88	
Satd. Flow (perm)		1726	2707					3438	1583		1593	
Volume (vph)	23	1	904	0	0	0	0	375	121	93	372	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	26	1	1004	0	0	0	0	417	134	103	413	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	91	0	0	0
Lane Group Flow (vph)	0	27	1004	0	0	0	0	417	43	0	516	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	2%	5%	5%	5%
Turn Type	Perm		Free						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		Free						2	6		
Actuated Green, G (s)		0.9	30.2					9.6	9.6		19.8	
Effective Green, g (s)		2.2	30.2					9.8	9.8		20.0	
Actuated g/C Ratio		0.07	1.00					0.32	0.32		0.66	
Clearance Time (s)		5.3						4.2	4.2		4.2	
Vehicle Extension (s)		3.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		126	2707					1116	514		1096	
v/s Ratio Prot								0.12			0.10	
v/s Ratio Perm		0.02	c0.37						0.03		c0.22	
v/c Ratio		0.21	0.37					0.37	0.08		0.47	
Uniform Delay, d1		13.2	0.0					7.8	7.1		2.5	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		0.9	0.4					0.2	0.1		0.3	
Delay (s)		14.0	0.4					8.1	7.2		2.8	
Level of Service		B	A					A	A		A	
Approach Delay (s)		0.7			0.0			7.8			2.8	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	3.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	30.2	Sum of lost time (s)	0.0
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	33	135	25	39	134	84	37	417	68	340	641	234
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	37	150	28	43	149	93	41	463	76	378	712	260
RTOR Reduction (vph)	0	0	25	0	0	64	0	0	47	0	0	65
Lane Group Flow (vph)	37	150	3	43	149	29	41	463	29	378	712	195
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	2.8	7.3	7.3	4.2	8.7	21.0	2.9	18.2	18.2	21.0	36.3	36.3
Effective Green, g (s)	2.8	7.3	7.3	4.2	8.7	21.0	2.9	18.2	18.2	21.0	36.3	36.3
Actuated g/C Ratio	0.04	0.11	0.11	0.06	0.13	0.31	0.04	0.27	0.27	0.31	0.54	0.54
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	74	387	173	111	462	498	77	966	432	557	1926	862
v/s Ratio Prot	0.02	c0.04		c0.02	0.04	0.02	0.02	c0.13		c0.21	0.20	
v/s Ratio Perm			0.00						0.02			0.12
v/c Ratio	0.50	0.39	0.02	0.39	0.32	0.06	0.53	0.48	0.07	0.68	0.37	0.23
Uniform Delay, d1	31.3	27.6	26.5	30.0	26.3	16.0	31.2	20.3	18.0	19.9	8.7	7.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.2	0.6	0.0	2.2	0.4	0.0	6.9	0.4	0.1	3.3	0.1	0.1
Delay (s)	36.5	28.3	26.5	32.3	26.7	16.0	38.1	20.7	18.0	23.2	8.8	8.0
Level of Service	D	C	C	C	C	B	D	C	B	C	A	A
Approach Delay (s)		29.5			24.1			21.6			12.7	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	66.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			4.0			4.0	4.0
Lane Util. Factor				1.00	1.00			1.00			1.00	1.00
Frt				1.00	0.85			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.96			1.00	1.00
Satd. Flow (prot)				1719	1542			1732			1810	1538
Flt Permitted				0.95	1.00			0.62			1.00	1.00
Satd. Flow (perm)				1719	1542			1115			1810	1538
Volume (vph)	0	0	0	139	1	55	770	93	0	0	99	32
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	154	1	61	856	103	0	0	110	36
RTOR Reduction (vph)	0	0	0	0	52	0	0	0	0	0	0	21
Lane Group Flow (vph)	0	0	0	154	10	0	0	959	0	0	110	15
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			pm+pt					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8			2					6
Actuated Green, G (s)				15.0	15.0			86.0			45.9	45.9
Effective Green, g (s)				16.3	16.3			86.2			46.1	46.1
Actuated g/C Ratio				0.15	0.15			0.78			0.42	0.42
Clearance Time (s)				5.3	5.3			4.2			4.2	4.2
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)				254	227			1071			755	642
v/s Ratio Prot					0.01			c0.29			0.06	
v/s Ratio Perm				c0.09				c0.41				0.01
v/c Ratio				0.61	0.04			0.90			0.15	0.02
Uniform Delay, d1				44.1	40.4			8.9			20.0	19.0
Progression Factor				1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2				4.1	0.1			11.6			0.4	0.1
Delay (s)				48.2	40.5			20.4			20.4	19.0
Level of Service				D	D			C			C	B
Approach Delay (s)		0.0			46.0			20.4			20.0	
Approach LOS		A			D			C			C	

Intersection Summary			
HCM Average Control Delay	24.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	96	112	29	45	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	107	124	32	50	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				164		
pX, platoon unblocked						
vC, conflicting volume	332	26	51			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	332	26	51			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	92			
cM capacity (veh/h)	587	1044	1553			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	107	124	32	33	18
Volume Left	0	124	0	0	0
Volume Right	107	0	0	0	1
cSH	1044	1553	1700	1700	1700
Volume to Capacity	0.10	0.08	0.02	0.02	0.01
Queue Length 95th (ft)	9	7	0	0	0
Control Delay (s)	8.8	7.5	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	8.8	6.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	25.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00		1.00	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		0.99	
Satd. Flow (prot)		1719	2707					3438	1538		1783	
Flt Permitted		0.95	1.00					1.00	1.00		0.74	
Satd. Flow (perm)		1719	2707					3438	1538		1341	
Volume (vph)	46	0	373	0	0	0	0	816	294	70	167	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	51	0	414	0	0	0	0	907	327	78	186	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	179	0	0	0
Lane Group Flow (vph)	0	51	414	0	0	0	0	907	148	0	264	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Free						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		Free						2	6		
Actuated Green, G (s)		2.4	40.4					18.1	18.1		28.5	
Effective Green, g (s)		3.7	40.4					18.3	18.3		28.7	
Actuated g/C Ratio		0.09	1.00					0.45	0.45		0.71	
Clearance Time (s)		5.3						4.2	4.2		4.2	
Vehicle Extension (s)		3.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		157	2707					1557	697		1023	
v/s Ratio Prot								c0.26			c0.04	
v/s Ratio Perm		0.03	0.15						0.10		0.14	
v/c Ratio		0.32	0.15					0.58	0.21		0.26	
Uniform Delay, d1		17.2	0.0					8.2	6.7		2.1	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		1.2	0.1					0.6	0.2		0.1	
Delay (s)		18.4	0.1					8.8	6.8		2.2	
Level of Service		B	A					A	A		A	
Approach Delay (s)		2.1			0.0			8.3			2.2	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	40.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	172	136	41	58	130	241	58	704	38	64	435	45
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	191	151	46	64	144	268	64	782	42	71	483	50
RTOR Reduction (vph)	0	0	38	0	0	242	0	0	12	0	0	22
Lane Group Flow (vph)	191	151	8	64	144	26	64	782	30	71	483	28
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	10.0	12.5	12.5	4.8	7.3	6.7	4.8	28.8	28.8	6.7	30.7	30.7
Effective Green, g (s)	10.0	12.5	12.5	4.8	7.3	6.7	4.8	28.8	28.8	6.7	30.7	30.7
Actuated g/C Ratio	0.15	0.18	0.18	0.07	0.11	0.10	0.07	0.42	0.42	0.10	0.45	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	257	643	288	123	376	154	123	1481	663	172	1579	706
v/s Ratio Prot	c0.11	0.04		0.04	c0.04	0.02	0.04	c0.22		c0.04	0.14	
v/s Ratio Perm			0.01						0.02			0.02
v/c Ratio	0.74	0.23	0.03	0.52	0.38	0.17	0.52	0.53	0.04	0.41	0.31	0.04
Uniform Delay, d1	28.2	24.1	23.2	30.9	28.7	28.5	30.9	14.9	11.9	29.2	12.2	10.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.0	0.2	0.0	3.9	0.7	0.5	3.9	0.3	0.0	1.6	0.1	0.0
Delay (s)	39.2	24.3	23.2	34.8	29.3	29.0	34.8	15.3	11.9	30.8	12.3	10.8
Level of Service	D	C	C	C	C	C	C	B	B	C	B	B
Approach Delay (s)		31.5			29.9			16.5			14.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	68.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

PROJECT COMPLETION YEAR (2012) CONDITIONS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			4.0			4.0	4.0
Lane Util. Factor				1.00	1.00			1.00			1.00	1.00
Frt				1.00	0.85			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.96			1.00	1.00
Satd. Flow (prot)				1719	1538			1733			1810	1538
Flt Permitted				0.95	1.00			0.55			1.00	1.00
Satd. Flow (perm)				1719	1538			1004			1810	1538
Volume (vph)	0	0	0	349	0	75	409	55	0	0	135	56
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	388	0	83	454	61	0	0	150	62
RTOR Reduction (vph)	0	0	0	0	62	0	0	0	0	0	0	39
Lane Group Flow (vph)	0	0	0	388	21	0	0	515	0	0	150	23
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			pm+pt					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8			2					6
Actuated Green, G (s)				31.5	31.5			86.5			46.4	46.4
Effective Green, g (s)				32.3	32.3			86.2			46.1	46.1
Actuated g/C Ratio				0.26	0.26			0.68			0.36	0.36
Clearance Time (s)				4.8	4.8			3.7			3.7	3.7
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)				439	393			892			660	560
v/s Ratio Prot					0.01			c0.16			0.08	
v/s Ratio Perm				c0.23				c0.23				0.01
v/c Ratio				0.88	0.05			0.58			0.23	0.04
Uniform Delay, d1				45.3	35.6			10.6			27.9	25.9
Progression Factor				1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2				18.6	0.1			2.7			0.8	0.1
Delay (s)				63.9	35.6			13.3			28.7	26.1
Level of Service				E	D			B			C	C
Approach Delay (s)		0.0			58.9			13.3			27.9	
Approach LOS		A			E			B			C	

Intersection Summary			
HCM Average Control Delay	33.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	126.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	1	164	78	52	29	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	182	87	58	32	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				164		
pX, platoon unblocked						
vC, conflicting volume	264	17	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	264	17	34			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	83	94			
cM capacity (veh/h)	664	1057	1575			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	183	87	58	21	13
Volume Left	1	87	0	0	0
Volume Right	182	0	0	0	2
cSH	1053	1575	1700	1700	1700
Volume to Capacity	0.17	0.06	0.03	0.01	0.01
Queue Length 95th (ft)	16	4	0	0	0
Control Delay (s)	9.1	7.4	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	9.1	4.5		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00		1.00	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		0.99	
Satd. Flow (prot)		1726	2707					3438	1538		1791	
Flt Permitted		0.95	1.00					1.00	1.00		0.86	
Satd. Flow (perm)		1726	2707					3438	1538		1557	
Volume (vph)	26	1	942	0	0	0	0	438	146	98	386	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	29	1	1047	0	0	0	0	487	162	109	429	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	105	0	0	0
Lane Group Flow (vph)	0	30	1047	0	0	0	0	487	57	0	538	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Free						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		Free						2	6		
Actuated Green, G (s)		0.9	31.4					10.8	10.8		21.0	
Effective Green, g (s)		2.2	31.4					11.0	11.0		21.2	
Actuated g/C Ratio		0.07	1.00					0.35	0.35		0.68	
Clearance Time (s)		5.3						4.2	4.2		4.2	
Vehicle Extension (s)		3.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		121	2707					1204	539		1097	
v/s Ratio Prot								0.14			0.10	
v/s Ratio Perm		0.02	c0.39						0.04		c0.23	
v/c Ratio		0.25	0.39					0.40	0.11		0.49	
Uniform Delay, d1		13.8	0.0					7.7	6.9		2.5	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		1.1	0.4					0.2	0.1		0.3	
Delay (s)		14.9	0.4					7.9	7.0		2.8	
Level of Service		B	A					A	A		A	
Approach Delay (s)		0.8			0.0			7.7			2.8	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	3.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	31.4	Sum of lost time (s)	0.0
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	34	147	27	51	150	93	41	457	82	371	703	254
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	163	30	57	167	103	46	508	91	412	781	282
RTOR Reduction (vph)	0	0	27	0	0	72	0	0	46	0	0	94
Lane Group Flow (vph)	38	163	3	57	167	31	46	508	45	412	781	188
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	2.5	7.7	7.7	4.3	9.5	20.7	4.1	20.6	20.6	20.7	37.2	37.2
Effective Green, g (s)	2.5	7.7	7.7	4.3	9.5	20.7	4.1	20.6	20.6	20.7	37.2	37.2
Actuated g/C Ratio	0.04	0.11	0.11	0.06	0.14	0.30	0.06	0.30	0.30	0.30	0.54	0.54
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	64	393	176	110	485	473	105	1052	471	529	1900	850
v/s Ratio Prot	0.02	0.05		c0.03	c0.05	0.02	0.03	c0.14		c0.23	0.22	
v/s Ratio Perm			0.00						0.03			0.12
v/c Ratio	0.59	0.41	0.02	0.52	0.34	0.07	0.44	0.48	0.10	0.78	0.41	0.22
Uniform Delay, d1	32.9	28.7	27.4	31.5	27.1	17.4	31.5	20.0	17.6	22.2	9.5	8.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.9	0.7	0.0	4.1	0.4	0.1	2.9	0.4	0.1	7.1	0.1	0.1
Delay (s)	46.8	29.4	27.5	35.6	27.5	17.4	34.4	20.3	17.7	29.3	9.7	8.6
Level of Service	D	C	C	D	C	B	C	C	B	C	A	A
Approach Delay (s)		32.0			25.7			21.0			15.0	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	69.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			4.0			4.0	4.0
Lane Util. Factor				1.00	1.00			1.00			1.00	1.00
Frt				1.00	0.85			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.96			1.00	1.00
Satd. Flow (prot)				1719	1542			1733			1810	1538
Flt Permitted				0.95	1.00			0.60			1.00	1.00
Satd. Flow (perm)				1719	1542			1083			1810	1538
Volume (vph)	0	0	0	146	1	61	814	103	0	0	113	39
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	162	1	68	904	114	0	0	126	43
RTOR Reduction (vph)	0	0	0	0	58	0	0	0	0	0	0	25
Lane Group Flow (vph)	0	0	0	162	11	0	0	1018	0	0	126	18
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			pm+pt					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8			2					6
Actuated Green, G (s)				15.6	15.6			86.0			45.9	45.9
Effective Green, g (s)				16.9	16.9			86.2			46.1	46.1
Actuated g/C Ratio				0.15	0.15			0.78			0.41	0.41
Clearance Time (s)				5.3	5.3			4.2			4.2	4.2
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)				261	235			1051			751	638
v/s Ratio Prot					0.01			c0.31			0.07	
v/s Ratio Perm				c0.09				c0.44				0.01
v/c Ratio				0.62	0.05			0.97			0.17	0.03
Uniform Delay, d1				44.1	40.2			11.2			20.4	19.2
Progression Factor				1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2				4.5	0.1			21.2			0.5	0.1
Delay (s)				48.6	40.3			32.4			20.9	19.3
Level of Service				D	D			C			C	B
Approach Delay (s)		0.0			46.1			32.4			20.5	
Approach LOS		A			D			C			C	

Intersection Summary			
HCM Average Control Delay	33.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	111.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	106	133	31	45	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	118	148	34	50	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				164		
pX, platoon unblocked						
vC, conflicting volume	381	26	51			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	381	26	51			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	89	90			
cM capacity (veh/h)	538	1044	1553			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	118	148	34	33	18
Volume Left	0	148	0	0	0
Volume Right	118	0	0	0	1
cSH	1044	1553	1700	1700	1700
Volume to Capacity	0.11	0.10	0.02	0.02	0.01
Queue Length 95th (ft)	10	8	0	0	0
Control Delay (s)	8.9	7.6	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	8.9	6.1		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00		1.00	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		0.99	
Satd. Flow (prot)		1719	2707					3438	1538		1783	
Flt Permitted		0.95	1.00					1.00	1.00		0.72	
Satd. Flow (perm)		1719	2707					3438	1538		1301	
Volume (vph)	52	0	418	0	0	0	0	862	312	76	183	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	0	464	0	0	0	0	958	347	84	203	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	185	0	0	0
Lane Group Flow (vph)	0	58	464	0	0	0	0	958	162	0	287	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Free						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		Free						2	6		
Actuated Green, G (s)		2.5	41.5					19.2	19.2		29.5	
Effective Green, g (s)		3.8	41.5					19.4	19.4		29.7	
Actuated g/C Ratio		0.09	1.00					0.47	0.47		0.72	
Clearance Time (s)		5.3						4.2	4.2		4.2	
Vehicle Extension (s)		3.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		157	2707					1607	719		1004	
v/s Ratio Prot								c0.28			c0.04	
v/s Ratio Perm		0.03	0.17						0.11		0.16	
v/c Ratio		0.37	0.17					0.60	0.23		0.29	
Uniform Delay, d1		17.7	0.0					8.2	6.6		2.1	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		1.5	0.1					0.6	0.2		0.2	
Delay (s)		19.2	0.1					8.8	6.7		2.3	
Level of Service		B	A					A	A		A	
Approach Delay (s)		2.3			0.0			8.2			2.3	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	5.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	41.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	179	163	45	96	154	254	62	743	76	75	479	47
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	199	181	50	107	171	282	69	826	84	83	532	52
RTOR Reduction (vph)	0	0	43	0	0	254	0	0	22	0	0	21
Lane Group Flow (vph)	199	181	7	107	171	28	69	826	62	83	532	31
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	10.2	9.4	9.4	7.6	6.8	7.0	4.9	30.0	30.0	7.0	32.1	32.1
Effective Green, g (s)	10.2	9.4	9.4	7.6	6.8	7.0	4.9	30.0	30.0	7.0	32.1	32.1
Actuated g/C Ratio	0.15	0.13	0.13	0.11	0.10	0.10	0.07	0.43	0.43	0.10	0.46	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	475	213	192	344	158	124	1517	678	177	1623	726
v/s Ratio Prot	c0.11	c0.05		0.06	0.05	0.02	0.04	c0.23		c0.05	0.15	
v/s Ratio Perm			0.00						0.04			0.02
v/c Ratio	0.77	0.38	0.03	0.56	0.50	0.18	0.56	0.54	0.09	0.47	0.33	0.04
Uniform Delay, d1	28.8	27.6	26.3	29.6	30.0	28.9	31.5	14.9	11.9	29.7	12.1	10.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.3	0.5	0.1	3.5	1.1	0.5	5.3	0.4	0.1	2.0	0.1	0.0
Delay (s)	42.1	28.2	26.4	33.1	31.1	29.4	36.8	15.3	12.0	31.7	12.2	10.5
Level of Service	D	C	C	C	C	C	D	B	B	C	B	B
Approach Delay (s)		34.4			30.6			16.5			14.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL2	SEL
Right Turn Channelized												
Volume (veh/h)	349	0	45	30	409	33	22	20	9	2	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	388	0	50	33	454	37	24	22	10	2	1	0
Approach Volume (veh/h)		471					516	34				183
Crossing Volume (veh/h)		517					1	929				874
High Capacity (veh/h)		921					1383	660				690
High v/c (veh/h)		0.51					0.37	0.05				0.27
Low Capacity (veh/h)		743					1160	515				541
Low v/c (veh/h)		0.63					0.44	0.07				0.34

Intersection Summary			
Maximum v/c High	0.51		
Maximum v/c Low	0.63		
Intersection Capacity Utilization	70.7%	ICU Level of Service	C

Movement	SER	SER2
Right Turn Channelized		
Volume (veh/h)	115	49
Peak Hour Factor	0.90	0.90
Hourly flow rate (vph)	128	54
Approach Volume (veh/h)		
Crossing Volume (veh/h)		
High Capacity (veh/h)		
High v/c (veh/h)		
Low Capacity (veh/h)		
Low v/c (veh/h)		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	26	1	942	0	0	0	0	438	146	98	386	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	29	1	1047	0	0	0	0	487	162	109	429	0
Approach Volume (veh/h)		1077			0			649			538	
Crossing Volume (veh/h)		538			516			139			0	
High Capacity (veh/h)		906			922			1242			1385	
High v/c (veh/h)		1.19			0.00			0.52			0.39	
Low Capacity (veh/h)		730			744			1032			1161	
Low v/c (veh/h)		1.48			0.00			0.63			0.46	

Intersection Summary				
Maximum v/c High	1.19			
Maximum v/c Low	1.48			
Intersection Capacity Utilization	61.2%	ICU Level of Service	B	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	34	147	27	51	150	93	41	457	82	371	703	254
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	163	30	57	167	103	46	508	91	412	781	282
RTOR Reduction (vph)	0	0	27	0	0	73	0	0	42	0	0	136
Lane Group Flow (vph)	38	163	3	57	167	30	46	508	49	412	781	146
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	2.2	7.7	7.7	4.6	10.1	19.5	3.8	19.0	19.0	19.5	34.7	34.7
Effective Green, g (s)	2.2	7.7	7.7	4.6	10.1	19.5	3.8	19.0	19.0	19.5	34.7	34.7
Actuated g/C Ratio	0.03	0.12	0.12	0.07	0.15	0.29	0.06	0.28	0.28	0.29	0.52	0.52
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	58	408	182	122	535	462	101	1007	450	517	1838	822
v/s Ratio Prot	0.02	0.05		c0.03	c0.05	0.02	0.03	c0.14		c0.23	0.22	
v/s Ratio Perm			0.00						0.03			0.09
v/c Ratio	0.66	0.40	0.02	0.47	0.31	0.07	0.46	0.50	0.11	0.80	0.42	0.18
Uniform Delay, d1	31.9	27.4	26.2	29.9	25.3	17.1	30.5	20.0	17.6	21.8	9.9	8.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	23.6	0.6	0.0	2.8	0.3	0.1	3.2	0.4	0.1	8.3	0.2	0.1
Delay (s)	55.5	28.1	26.2	32.7	25.6	17.1	33.7	20.4	17.8	30.2	10.1	8.6
Level of Service	E	C	C	C	C	B	C	C	B	C	B	A
Approach Delay (s)		32.3			24.2			21.0			15.4	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	66.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Right Turn Channelized												
Volume (veh/h)	146	1	31	30	814	102	1	33	12	1	0	80
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	162	1	34	33	904	113	1	37	13	1	0	89
Approach Volume (veh/h)		231					1019	51			118	
Crossing Volume (veh/h)		1019					0	1216#			1118	
High Capacity (veh/h)		613					1385	521			565	
High v/c (veh/h)		0.38					0.74	0.10			0.21	
Low Capacity (veh/h)		474					1161	396			434	
Low v/c (veh/h)		0.49					0.88	0.13			0.27	

Intersection Summary			
Maximum v/c High	0.74		
Maximum v/c Low	0.88		
Intersection Capacity Utilization	82.1%	ICU Level of Service	E

Crossing flow exceeds 1200, method is not applicable

Movement	SER2
Right Turn Channelized	
Volume (veh/h)	26
Peak Hour Factor	0.90
Hourly flow rate (vph)	29
Approach Volume (veh/h)	
Crossing Volume (veh/h)	
High Capacity (veh/h)	
High v/c (veh/h)	
Low Capacity (veh/h)	
Low v/c (veh/h)	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	52	0	418	0	0	0	0	862	312	76	183	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	58	0	464	0	0	0	0	958	347	84	203	0
Approach Volume (veh/h)		522			0			1304			288	
Crossing Volume (veh/h)		288			1016			142			0	
High Capacity (veh/h)		1105			615			1239			1385	
High v/c (veh/h)		0.47			0.00			1.05			0.21	
Low Capacity (veh/h)		908			476			1029			1161	
Low v/c (veh/h)		0.58			0.00			1.27			0.25	

Intersection Summary				
Maximum v/c High	1.05			
Maximum v/c Low	1.27			
Intersection Capacity Utilization	62.5%	ICU Level of Service	B	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	179	163	45	96	154	254	62	743	76	75	479	47
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	199	181	50	107	171	282	69	826	84	83	532	52
RTOR Reduction (vph)	0	0	43	0	0	254	0	0	22	0	0	21
Lane Group Flow (vph)	199	181	7	107	171	28	69	826	62	83	532	31
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	10.2	9.4	9.4	7.6	6.8	7.0	4.9	30.0	30.0	7.0	32.1	32.1
Effective Green, g (s)	10.2	9.4	9.4	7.6	6.8	7.0	4.9	30.0	30.0	7.0	32.1	32.1
Actuated g/C Ratio	0.15	0.13	0.13	0.11	0.10	0.10	0.07	0.43	0.43	0.10	0.46	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	475	213	192	344	158	124	1517	678	177	1623	726
v/s Ratio Prot	c0.11	c0.05		0.06	0.05	0.02	0.04	c0.23		c0.05	0.15	
v/s Ratio Perm			0.00						0.04			0.02
v/c Ratio	0.77	0.38	0.03	0.56	0.50	0.18	0.56	0.54	0.09	0.47	0.33	0.04
Uniform Delay, d1	28.8	27.6	26.3	29.6	30.0	28.9	31.5	14.9	11.9	29.7	12.1	10.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.3	0.5	0.1	3.5	1.1	0.5	5.3	0.4	0.1	2.0	0.1	0.0
Delay (s)	42.1	28.2	26.4	33.1	31.1	29.4	36.8	15.3	12.0	31.7	12.2	10.5
Level of Service	D	C	C	C	C	C	D	B	B	C	B	B
Approach Delay (s)		34.4			30.6			16.5			14.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor				1.00	1.00		0.97	1.00			0.95	
Frt				1.00	0.85		1.00	1.00			0.96	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1719	1538		3335	1810			3287	
Flt Permitted				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)				1719	1538		3335	1810			3287	
Volume (vph)	0	0	0	349	0	75	409	55	0	0	135	56
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	388	0	83	454	61	0	0	150	62
RTOR Reduction (vph)	0	0	0	0	60	0	0	0	0	0	27	0
Lane Group Flow (vph)	0	0	0	388	23	0	454	61	0	0	185	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			Prot					
Protected Phases					8		5	2			6	
Permitted Phases				8								
Actuated Green, G (s)				25.5	25.5		17.4	58.4			37.0	
Effective Green, g (s)				25.5	25.5		17.4	58.4			37.0	
Actuated g/C Ratio				0.28	0.28		0.19	0.64			0.40	
Clearance Time (s)				4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)				477	427		631	1150			1323	
v/s Ratio Prot					0.01		c0.14	0.03			c0.06	
v/s Ratio Perm				c0.23								
v/c Ratio				0.81	0.05		0.72	0.05			0.14	
Uniform Delay, d1				31.0	24.4		35.0	6.3			17.4	
Progression Factor				1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2				10.2	0.1		3.9	0.1			0.2	
Delay (s)				41.2	24.4		38.9	6.4			17.6	
Level of Service				D	C		D	A			B	
Approach Delay (s)		0.0			38.2			35.0			17.6	
Approach LOS		A			D			D			B	

Intersection Summary			
HCM Average Control Delay	33.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	91.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	1	164	78	52	29	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	182	87	58	32	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				202		
pX, platoon unblocked						
vC, conflicting volume	264	17	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	264	17	34			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	83	94			
cM capacity (veh/h)	664	1057	1575			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	183	87	58	21	13
Volume Left	1	87	0	0	0
Volume Right	182	0	0	0	2
cSH	1053	1575	1700	1700	1700
Volume to Capacity	0.17	0.06	0.03	0.01	0.01
Queue Length 95th (ft)	16	4	0	0	0
Control Delay (s)	9.1	7.4	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	9.1	4.5		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1726	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.39	1.00	
Satd. Flow (perm)		1726	2707					3438	1538	702	3438	
Volume (vph)	26	1	942	0	0	0	0	438	146	98	386	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	29	1	1047	0	0	0	0	487	162	109	429	0
RTOR Reduction (vph)	0	0	319	0	0	0	0	0	89	0	0	0
Lane Group Flow (vph)	0	30	728	0	0	0	0	487	73	109	429	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		28.3	28.3					38.8	38.8	49.6	49.6	
Effective Green, g (s)		28.3	28.3					38.8	38.8	49.6	49.6	
Actuated g/C Ratio		0.33	0.33					0.45	0.45	0.58	0.58	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		569	892					1553	695	486	1985	
v/s Ratio Prot								c0.14		0.02	c0.12	
v/s Ratio Perm		0.02	c0.27						0.05	0.11		
v/c Ratio		0.05	0.82					0.31	0.11	0.22	0.22	
Uniform Delay, d1		19.7	26.4					15.0	13.6	8.6	8.8	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.0	5.8					0.5	0.3	0.2	0.2	
Delay (s)		19.7	32.3					15.6	13.9	8.8	9.0	
Level of Service		B	C					B	B	A	A	
Approach Delay (s)		31.9			0.0			15.1			9.0	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	21.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	85.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	34	147	27	51	150	93	41	457	82	371	703	254
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	163	30	57	167	103	46	508	91	412	781	282
RTOR Reduction (vph)	0	0	27	0	0	75	0	0	40	0	0	83
Lane Group Flow (vph)	38	163	3	57	167	28	46	508	51	412	781	199
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	4.3	10.8	10.8	7.3	13.8	28.2	5.0	42.2	42.2	28.2	65.4	65.4
Effective Green, g (s)	4.3	10.8	10.8	7.3	13.8	28.2	5.0	42.2	42.2	28.2	65.4	65.4
Actuated g/C Ratio	0.04	0.10	0.10	0.07	0.13	0.27	0.05	0.40	0.40	0.27	0.63	0.63
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	73	366	164	124	467	427	85	1429	639	478	2215	991
v/s Ratio Prot	0.02	c0.05		c0.03	c0.05	0.02	0.03	0.14		c0.23	c0.22	
v/s Ratio Perm			0.00						0.03			0.13
v/c Ratio	0.52	0.45	0.02	0.46	0.36	0.07	0.54	0.36	0.08	0.86	0.35	0.20
Uniform Delay, d1	49.1	44.0	42.1	46.7	41.3	28.4	48.6	21.7	19.2	36.3	9.4	8.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.5	0.9	0.0	2.7	0.5	0.1	6.9	0.7	0.2	14.7	0.4	0.5
Delay (s)	55.6	44.9	42.1	49.4	41.8	28.4	55.5	22.4	19.4	51.0	9.8	8.8
Level of Service	E	D	D	D	D	C	E	C	B	D	A	A
Approach Delay (s)		46.3			38.9			24.3			21.1	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	104.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor				1.00	1.00		0.97	1.00			0.95	
Frt				1.00	0.85		1.00	1.00			0.96	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1719	1542		3335	1810			3307	
Flt Permitted				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)				1719	1542		3335	1810			3307	
Volume (vph)	0	0	0	146	1	61	814	103	0	0	113	39
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	162	1	68	904	114	0	0	126	43
RTOR Reduction (vph)	0	0	0	0	59	0	0	0	0	0	16	0
Lane Group Flow (vph)	0	0	0	162	10	0	904	114	0	0	153	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			Prot					
Protected Phases					8		5	2			6	
Permitted Phases				8								
Actuated Green, G (s)				14.9	14.9		31.2	95.1			59.9	
Effective Green, g (s)				14.9	14.9		31.2	95.1			59.9	
Actuated g/C Ratio				0.13	0.13		0.26	0.81			0.51	
Clearance Time (s)				4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)				217	195		882	1459			1679	
v/s Ratio Prot					0.01		c0.27	0.06			c0.05	
v/s Ratio Perm				c0.09								
v/c Ratio				0.75	0.05		1.02	0.08			0.09	
Uniform Delay, d1				49.7	45.3		43.4	2.4			15.0	
Progression Factor				1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2				13.1	0.1		36.8	0.1			0.1	
Delay (s)				62.8	45.4		80.2	2.5			15.1	
Level of Service				E	D		F	A			B	
Approach Delay (s)		0.0			57.6			71.5			15.1	
Approach LOS		A			E			E			B	

Intersection Summary			
HCM Average Control Delay	62.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	118.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	106	133	31	45	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	118	148	34	50	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				202		
pX, platoon unblocked						
vC, conflicting volume	381	26	51			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	381	26	51			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	89	90			
cM capacity (veh/h)	538	1044	1553			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	118	148	34	33	18
Volume Left	0	148	0	0	0
Volume Right	118	0	0	0	1
cSH	1044	1553	1700	1700	1700
Volume to Capacity	0.11	0.10	0.02	0.02	0.01
Queue Length 95th (ft)	10	8	0	0	0
Control Delay (s)	8.9	7.6	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	8.9	6.1		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1719	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.26	1.00	
Satd. Flow (perm)		1719	2707					3438	1538	468	3438	
Volume (vph)	52	0	418	0	0	0	0	862	312	76	183	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	0	464	0	0	0	0	958	347	84	203	0
RTOR Reduction (vph)	0	0	421	0	0	0	0	0	93	0	0	0
Lane Group Flow (vph)	0	58	43	0	0	0	0	958	254	84	203	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		9.1	9.1					71.7	71.7	80.9	80.9	
Effective Green, g (s)		9.1	9.1					71.7	71.7	80.9	80.9	
Actuated g/C Ratio		0.09	0.09					0.73	0.73	0.83	0.83	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		160	251					2515	1125	453	2838	
v/s Ratio Prot								c0.28		c0.01	0.06	
v/s Ratio Perm		0.03	0.02						0.17	0.14		
v/c Ratio		0.36	0.17					0.38	0.23	0.19	0.07	
Uniform Delay, d1		41.7	41.0					4.9	4.2	2.2	1.6	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.4	0.3					0.4	0.5	0.2	0.0	
Delay (s)		43.1	41.3					5.3	4.7	2.4	1.6	
Level of Service		D	D					A	A	A	A	
Approach Delay (s)		41.5			0.0			5.2			1.9	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	98.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	179	163	45	96	154	254	62	743	76	75	479	47
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	199	181	50	107	171	282	69	826	84	83	532	52
RTOR Reduction (vph)	0	0	42	0	0	255	0	0	23	0	0	24
Lane Group Flow (vph)	199	181	8	107	171	27	69	826	61	83	532	28
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	16.0	17.4	17.4	10.0	11.4	10.4	7.5	54.9	54.9	10.4	57.8	57.8
Effective Green, g (s)	16.0	17.4	17.4	10.0	11.4	10.4	7.5	54.9	54.9	10.4	57.8	57.8
Actuated g/C Ratio	0.15	0.16	0.16	0.09	0.10	0.10	0.07	0.51	0.51	0.10	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	261	567	253	163	371	151	122	1787	800	169	1882	842
v/s Ratio Prot	c0.11	0.05		0.06	c0.05	0.02	0.04	c0.23		c0.05	c0.15	
v/s Ratio Perm			0.01						0.04			0.02
v/c Ratio	0.76	0.32	0.03	0.66	0.46	0.18	0.57	0.46	0.08	0.49	0.28	0.03
Uniform Delay, d1	44.5	40.4	38.5	47.7	45.8	45.2	49.0	17.4	13.8	46.6	14.0	12.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.4	0.3	0.1	9.2	0.9	0.6	5.9	0.9	0.2	2.2	0.4	0.1
Delay (s)	56.9	40.7	38.6	56.9	46.7	45.8	54.9	18.2	14.0	48.9	14.4	12.2
Level of Service	E	D	D	E	D	D	D	B	B	D	B	B
Approach Delay (s)		48.0			48.2			20.5			18.5	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM Average Control Delay	30.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	108.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	1	164	78	52	29	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	182	87	58	32	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				1167		
pX, platoon unblocked						
vC, conflicting volume	264	33	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	264	33	34			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	82	95			
cM capacity (veh/h)	685	1040	1577			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	183	87	58	34
Volume Left	1	87	0	0
Volume Right	182	0	0	2
cSH	1037	1577	1700	1700
Volume to Capacity	0.18	0.05	0.03	0.02
Queue Length 95th (ft)	16	4	0	0
Control Delay (s)	9.2	7.4	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.2	4.4		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	349	75	55	409	0	191
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	388	83	61	454	0	212
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			597			
pX, platoon unblocked						
vC, conflicting volume	167	61			61	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	167	61			61	
tC, single (s)	6.9	7.0			4.2	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	51	92			100	
cM capacity (veh/h)	798	982			1519	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	259	213	213	303	106	106
Volume Left	259	129	0	0	0	0
Volume Right	0	83	151	303	0	0
cSH	798	861	1700	1700	1700	1700
Volume to Capacity	0.32	0.25	0.13	0.18	0.06	0.06
Queue Length 95th (ft)	35	24	0	0	0	0
Control Delay (s)	11.7	10.5	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	11.2		0.0		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1726	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.39	1.00	
Satd. Flow (perm)		1726	2707					3438	1538	702	3438	
Volume (vph)	26	1	942	0	0	0	0	438	146	98	386	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	29	1	1047	0	0	0	0	487	162	109	429	0
RTOR Reduction (vph)	0	0	319	0	0	0	0	0	89	0	0	0
Lane Group Flow (vph)	0	30	728	0	0	0	0	487	73	109	429	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		28.3	28.3					38.8	38.8	49.6	49.6	
Effective Green, g (s)		28.3	28.3					38.8	38.8	49.6	49.6	
Actuated g/C Ratio		0.33	0.33					0.45	0.45	0.58	0.58	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		569	892					1553	695	486	1985	
v/s Ratio Prot								c0.14		0.02	c0.12	
v/s Ratio Perm		0.02	c0.27						0.05	0.11		
v/c Ratio		0.05	0.82					0.31	0.11	0.22	0.22	
Uniform Delay, d1		19.7	26.4					15.0	13.6	8.6	8.8	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.0	5.8					0.5	0.3	0.2	0.2	
Delay (s)		19.7	32.3					15.6	13.9	8.8	9.0	
Level of Service		B	C					B	B	A	A	
Approach Delay (s)		31.9			0.0			15.1			9.0	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	21.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	85.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	34	147	27	51	150	93	41	457	82	371	703	254
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	163	30	57	167	103	46	508	91	412	781	282
RTOR Reduction (vph)	0	0	27	0	0	75	0	0	39	0	0	83
Lane Group Flow (vph)	38	163	3	57	167	28	46	508	52	412	781	199
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	3.8	10.8	10.8	7.3	14.3	28.4	4.4	42.2	42.2	28.4	66.2	66.2
Effective Green, g (s)	3.8	10.8	10.8	7.3	14.3	28.4	4.4	42.2	42.2	28.4	66.2	66.2
Actuated g/C Ratio	0.04	0.10	0.10	0.07	0.14	0.27	0.04	0.40	0.40	0.27	0.63	0.63
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	64	365	163	123	483	429	74	1426	638	480	2238	1001
v/s Ratio Prot	0.02	c0.05		c0.03	c0.05	0.02	0.03	0.14		c0.23	c0.22	
v/s Ratio Perm			0.00						0.03			0.13
v/c Ratio	0.59	0.45	0.02	0.46	0.35	0.07	0.62	0.36	0.08	0.86	0.35	0.20
Uniform Delay, d1	49.7	44.1	42.2	46.8	41.0	28.3	49.3	21.8	19.3	36.2	9.1	8.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.9	0.9	0.0	2.7	0.4	0.1	15.1	0.7	0.2	14.1	0.4	0.4
Delay (s)	63.6	45.0	42.2	49.6	41.4	28.4	64.5	22.5	19.5	50.4	9.5	8.5
Level of Service	E	D	D	D	D	C	E	C	B	D	A	A
Approach Delay (s)		47.7			38.7			25.1			20.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	104.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	106	133	31	45	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	118	148	34	50	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				1173		
pX, platoon unblocked						
vC, conflicting volume	381	51	51			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	381	51	51			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	88	90			
cM capacity (veh/h)	563	1018	1555			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	118	148	34	51
Volume Left	0	148	0	0
Volume Right	118	0	0	1
cSH	1018	1555	1700	1700
Volume to Capacity	0.12	0.10	0.02	0.03
Queue Length 95th (ft)	10	8	0	0
Control Delay (s)	9.0	7.6	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.0	6.1		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	146	62	103	814	0	152
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	162	69	114	904	0	169
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			597			
pX, platoon unblocked						
vC, conflicting volume	199	114			114	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	199	114			114	
tC, single (s)	6.9	7.0			4.2	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	79	92			100	
cM capacity (veh/h)	763	907			1451	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	108	123	416	603	84	84
Volume Left	108	54	0	0	0	0
Volume Right	0	69	301	603	0	0
cSH	763	837	1700	1700	1700	1700
Volume to Capacity	0.14	0.15	0.24	0.35	0.05	0.05
Queue Length 95th (ft)	12	13	0	0	0	0
Control Delay (s)	10.5	10.0	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	10.3		0.0		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1719	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.27	1.00	
Satd. Flow (perm)		1719	2707					3438	1538	484	3438	
Volume (vph)	52	0	418	0	0	0	0	862	312	76	183	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	0	464	0	0	0	0	958	347	84	203	0
RTOR Reduction (vph)	0	0	425	0	0	0	0	0	76	0	0	0
Lane Group Flow (vph)	0	58	39	0	0	0	0	958	271	84	203	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		9.5	9.5					87.2	87.2	94.3	94.3	
Effective Green, g (s)		9.5	9.5					87.2	87.2	94.3	94.3	
Actuated g/C Ratio		0.08	0.08					0.78	0.78	0.84	0.84	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		146	230					2682	1200	442	2900	
v/s Ratio Prot								c0.28		c0.01	0.06	
v/s Ratio Perm		0.03	0.01						0.18	0.15		
v/c Ratio		0.40	0.17					0.36	0.23	0.19	0.07	
Uniform Delay, d1		48.4	47.5					3.8	3.3	1.9	1.5	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.8	0.4					0.4	0.4	0.2	0.0	
Delay (s)		50.2	47.9					4.1	3.7	2.1	1.5	
Level of Service		D	D					A	A	A	A	
Approach Delay (s)		48.1			0.0			4.0			1.7	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	111.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	179	163	45	96	154	254	62	743	76	75	479	47
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	199	181	50	107	171	282	69	826	84	83	532	52
RTOR Reduction (vph)	0	0	41	0	0	249	0	0	23	0	0	24
Lane Group Flow (vph)	199	181	9	107	171	33	69	826	61	83	532	28
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	15.8	18.7	18.7	8.8	11.7	11.7	7.3	48.8	48.8	8.5	50.0	50.0
Effective Green, g (s)	15.8	18.7	18.7	8.8	11.7	11.7	7.3	48.8	48.8	8.5	50.0	50.0
Actuated g/C Ratio	0.16	0.19	0.19	0.09	0.12	0.12	0.07	0.48	0.48	0.08	0.50	0.50
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	277	657	294	155	411	184	128	1713	766	149	1755	785
v/s Ratio Prot	c0.11	0.05		0.06	c0.05		0.04	c0.23		c0.05	0.15	
v/s Ratio Perm			0.01			0.02			0.04			0.02
v/c Ratio	0.72	0.28	0.03	0.69	0.42	0.18	0.54	0.48	0.08	0.56	0.30	0.04
Uniform Delay, d1	40.4	35.2	33.6	44.7	41.4	40.2	45.1	17.5	13.9	44.3	15.1	13.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.6	0.2	0.0	12.5	0.7	0.5	4.3	1.0	0.2	4.5	0.4	0.1
Delay (s)	49.0	35.5	33.7	57.1	42.1	40.7	49.4	18.5	14.2	48.8	15.5	13.1
Level of Service	D	D	C	E	D	D	D	B	B	D	B	B
Approach Delay (s)		41.5			44.2			20.3			19.5	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM Average Control Delay	28.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	100.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	1	164	78	52	29	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	182	87	58	32	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				580		
pX, platoon unblocked						
vC, conflicting volume	264	33	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	264	33	34			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	82	95			
cM capacity (veh/h)	685	1040	1577			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	183	87	58	34
Volume Left	1	87	0	0
Volume Right	182	0	0	2
cSH	1037	1577	1700	1700
Volume to Capacity	0.18	0.05	0.03	0.02
Queue Length 95th (ft)	16	4	0	0
Control Delay (s)	9.2	7.4	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.2	4.4		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor				1.00	1.00		0.97	1.00			0.95	
Frt				1.00	0.85		1.00	1.00			0.96	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1719	1538		3335	1810			3287	
Flt Permitted				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)				1719	1538		3335	1810			3287	
Volume (vph)	0	0	0	349	0	75	409	55	0	0	135	56
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	388	0	83	454	61	0	0	150	62
RTOR Reduction (vph)	0	0	0	0	60	0	0	0	0	0	27	0
Lane Group Flow (vph)	0	0	0	388	23	0	454	61	0	0	185	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			Prot					
Protected Phases					8		5	2			6	
Permitted Phases				8								
Actuated Green, G (s)				25.5	25.5		17.4	58.4			37.0	
Effective Green, g (s)				25.5	25.5		17.4	58.4			37.0	
Actuated g/C Ratio				0.28	0.28		0.19	0.64			0.40	
Clearance Time (s)				4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)				477	427		631	1150			1323	
v/s Ratio Prot					0.01		c0.14	0.03			c0.06	
v/s Ratio Perm				c0.23								
v/c Ratio				0.81	0.05		0.72	0.05			0.14	
Uniform Delay, d1				31.0	24.4		35.0	6.3			17.4	
Progression Factor				1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2				10.2	0.1		3.9	0.1			0.2	
Delay (s)				41.2	24.4		38.9	6.4			17.6	
Level of Service				D	C		D	A			B	
Approach Delay (s)		0.0			38.2			35.0			17.6	
Approach LOS		A			D			D			B	

Intersection Summary			
HCM Average Control Delay	33.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	91.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1726	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.39	1.00	
Satd. Flow (perm)		1726	2707					3438	1538	702	3438	
Volume (vph)	26	1	942	0	0	0	0	438	146	98	386	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	29	1	1047	0	0	0	0	487	162	109	429	0
RTOR Reduction (vph)	0	0	319	0	0	0	0	0	89	0	0	0
Lane Group Flow (vph)	0	30	728	0	0	0	0	487	73	109	429	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		28.3	28.3					38.8	38.8	49.6	49.6	
Effective Green, g (s)		28.3	28.3					38.8	38.8	49.6	49.6	
Actuated g/C Ratio		0.33	0.33					0.45	0.45	0.58	0.58	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		569	892					1553	695	486	1985	
v/s Ratio Prot								c0.14		0.02	c0.12	
v/s Ratio Perm		0.02	c0.27						0.05	0.11		
v/c Ratio		0.05	0.82					0.31	0.11	0.22	0.22	
Uniform Delay, d1		19.7	26.4					15.0	13.6	8.6	8.8	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.0	5.8					0.5	0.3	0.2	0.2	
Delay (s)		19.7	32.3					15.6	13.9	8.8	9.0	
Level of Service		B	C					B	B	A	A	
Approach Delay (s)		31.9			0.0			15.1			9.0	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	21.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	85.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	34	147	27	51	150	93	41	457	82	371	703	254
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	163	30	57	167	103	46	508	91	412	781	282
RTOR Reduction (vph)	0	0	27	0	0	75	0	0	40	0	0	83
Lane Group Flow (vph)	38	163	3	57	167	28	46	508	51	412	781	199
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	4.3	10.8	10.8	7.3	13.8	28.2	5.0	42.2	42.2	28.2	65.4	65.4
Effective Green, g (s)	4.3	10.8	10.8	7.3	13.8	28.2	5.0	42.2	42.2	28.2	65.4	65.4
Actuated g/C Ratio	0.04	0.10	0.10	0.07	0.13	0.27	0.05	0.40	0.40	0.27	0.63	0.63
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	73	366	164	124	467	427	85	1429	639	478	2215	991
v/s Ratio Prot	0.02	c0.05		c0.03	c0.05	0.02	0.03	0.14		c0.23	c0.22	
v/s Ratio Perm			0.00						0.03			0.13
v/c Ratio	0.52	0.45	0.02	0.46	0.36	0.07	0.54	0.36	0.08	0.86	0.35	0.20
Uniform Delay, d1	49.1	44.0	42.1	46.7	41.3	28.4	48.6	21.7	19.2	36.3	9.4	8.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.5	0.9	0.0	2.7	0.5	0.1	6.9	0.7	0.2	14.7	0.4	0.5
Delay (s)	55.6	44.9	42.1	49.4	41.8	28.4	55.5	22.4	19.4	51.0	9.8	8.8
Level of Service	E	D	D	D	D	C	E	C	B	D	A	A
Approach Delay (s)		46.3			38.9			24.3			21.1	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	104.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor				1.00	1.00		0.97	1.00			0.95	
Frt				1.00	0.85		1.00	1.00			0.96	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1719	1542		3335	1810			3307	
Flt Permitted				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)				1719	1542		3335	1810			3307	
Volume (vph)	0	0	0	146	1	61	814	103	0	0	113	39
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	162	1	68	904	114	0	0	126	43
RTOR Reduction (vph)	0	0	0	0	59	0	0	0	0	0	16	0
Lane Group Flow (vph)	0	0	0	162	10	0	904	114	0	0	153	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			Prot					
Protected Phases					8		5	2			6	
Permitted Phases				8								
Actuated Green, G (s)				14.9	14.9		31.2	95.1			59.9	
Effective Green, g (s)				14.9	14.9		31.2	95.1			59.9	
Actuated g/C Ratio				0.13	0.13		0.26	0.81			0.51	
Clearance Time (s)				4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)				217	195		882	1459			1679	
v/s Ratio Prot					0.01		c0.27	0.06			c0.05	
v/s Ratio Perm				c0.09								
v/c Ratio				0.75	0.05		1.02	0.08			0.09	
Uniform Delay, d1				49.7	45.3		43.4	2.4			15.0	
Progression Factor				1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2				13.1	0.1		36.8	0.1			0.1	
Delay (s)				62.8	45.4		80.2	2.5			15.1	
Level of Service				E	D		F	A			B	
Approach Delay (s)		0.0			57.6			71.5			15.1	
Approach LOS		A			E			E			B	

Intersection Summary			
HCM Average Control Delay	62.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	118.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	106	133	31	45	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	118	148	34	50	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				570		
pX, platoon unblocked						
vC, conflicting volume	381	51	51			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	381	51	51			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	88	90			
cM capacity (veh/h)	563	1018	1555			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	118	148	34	51
Volume Left	0	148	0	0
Volume Right	118	0	0	1
cSH	1018	1555	1700	1700
Volume to Capacity	0.12	0.10	0.02	0.03
Queue Length 95th (ft)	10	8	0	0
Control Delay (s)	9.0	7.6	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.0	6.1		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1719	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.26	1.00	
Satd. Flow (perm)		1719	2707					3438	1538	468	3438	
Volume (vph)	52	0	418	0	0	0	0	862	312	76	183	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	0	464	0	0	0	0	958	347	84	203	0
RTOR Reduction (vph)	0	0	421	0	0	0	0	0	93	0	0	0
Lane Group Flow (vph)	0	58	43	0	0	0	0	958	254	84	203	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		9.1	9.1					71.7	71.7	80.9	80.9	
Effective Green, g (s)		9.1	9.1					71.7	71.7	80.9	80.9	
Actuated g/C Ratio		0.09	0.09					0.73	0.73	0.83	0.83	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		160	251					2515	1125	453	2838	
v/s Ratio Prot								c0.28		c0.01	0.06	
v/s Ratio Perm		0.03	0.02						0.17	0.14		
v/c Ratio		0.36	0.17					0.38	0.23	0.19	0.07	
Uniform Delay, d1		41.7	41.0					4.9	4.2	2.2	1.6	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.4	0.3					0.4	0.5	0.2	0.0	
Delay (s)		43.1	41.3					5.3	4.7	2.4	1.6	
Level of Service		D	D					A	A	A	A	
Approach Delay (s)		41.5			0.0			5.2			1.9	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	98.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	179	163	45	96	154	254	62	743	76	75	479	47
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	199	181	50	107	171	282	69	826	84	83	532	52
RTOR Reduction (vph)	0	0	42	0	0	255	0	0	23	0	0	24
Lane Group Flow (vph)	199	181	8	107	171	27	69	826	61	83	532	28
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	16.0	17.4	17.4	10.0	11.4	10.4	7.5	54.9	54.9	10.4	57.8	57.8
Effective Green, g (s)	16.0	17.4	17.4	10.0	11.4	10.4	7.5	54.9	54.9	10.4	57.8	57.8
Actuated g/C Ratio	0.15	0.16	0.16	0.09	0.10	0.10	0.07	0.51	0.51	0.10	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	261	567	253	163	371	151	122	1787	800	169	1882	842
v/s Ratio Prot	c0.11	0.05		0.06	c0.05	0.02	0.04	c0.23		c0.05	c0.15	
v/s Ratio Perm			0.01						0.04			0.02
v/c Ratio	0.76	0.32	0.03	0.66	0.46	0.18	0.57	0.46	0.08	0.49	0.28	0.03
Uniform Delay, d1	44.5	40.4	38.5	47.7	45.8	45.2	49.0	17.4	13.8	46.6	14.0	12.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.4	0.3	0.1	9.2	0.9	0.6	5.9	0.9	0.2	2.2	0.4	0.1
Delay (s)	56.9	40.7	38.6	56.9	46.7	45.8	54.9	18.2	14.0	48.9	14.4	12.2
Level of Service	E	D	D	E	D	D	D	B	B	D	B	B
Approach Delay (s)		48.0			48.2			20.5			18.5	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM Average Control Delay	30.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	108.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

1: Canwood & LOST HILLS ROAD Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.1	0.1	0.0	0.1	0.1	0.0	0.3
Delay / Veh (s)	12.3	7.4	4.7	1.6	1.8	0.8	2.9
Total Stops	12	34	6	6	8	0	66
Travel Dist (mi)	3.2	6.8	0.4	5.8	12.8	0.4	29.4
Travel Time (hr)	0.2	0.4	0.0	0.3	0.6	0.0	1.4
Avg Speed (mph)	19	19	12	21	22	20	20
Fuel Used (gal)	0.2	0.4	0.0	1.1	2.9	0.0	4.6
HC Emissions (g)	1	1	0	2	5	0	9
CO Emissions (g)	25	21	4	100	223	1	375
NOx Emissions (g)	2	2	0	9	19	0	32
Vehicles Entered	18	40	12	156	137	5	368
Vehicles Exited	18	40	12	156	142	6	374
Hourly Exit Rate	54	120	36	468	426	18	1122
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: NB Off-Ramp & LOST HILLS ROAD Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.6	0.0	0.0	0.2	0.0	0.0	0.8
Delay / Veh (s)	18.2	7.3	0.5	3.5	8.7	1.4	9.0
Total Stops	88	6	0	32	2	2	130
Travel Dist (mi)	23.7	1.7	0.4	15.1	0.2	0.5	41.5
Travel Time (hr)	1.5	0.1	0.0	0.8	0.0	0.0	2.5
Avg Speed (mph)	16	20	32	19	7	20	17
Fuel Used (gal)	2.4	0.1	0.0	1.3	0.0	0.5	4.3
HC Emissions (g)	5	0	0	3	0	0	8
CO Emissions (g)	155	11	8	80	1	22	276
NOx Emissions (g)	13	1	0	7	0	1	22
Vehicles Entered	122	8	4	167	6	18	325
Vehicles Exited	118	8	4	164	6	18	318
Hourly Exit Rate	354	24	12	492	18	54	954
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

3: US 101 SB ramp & LOST HILLS ROAD Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.1	2.5	0.3	0.0	0.1	0.4	3.3
Delay / Veh (s)	26.8	24.1	6.9	1.7	12.7	8.6	15.6
Total Stops	6	342	38	16	28	54	484
Travel Dist (mi)	1.4	66.3	6.9	2.0	1.2	5.8	83.7
Travel Time (hr)	0.1	5.0	0.6	0.1	0.2	0.6	6.5
Avg Speed (mph)	13	14	12	16	7	10	13
Fuel Used (gal)	0.1	6.7	0.6	0.1	0.1	0.6	8.2
HC Emissions (g)	0	16	1	0	0	2	21
CO Emissions (g)	8	576	48	4	8	68	712
NOx Emissions (g)	1	38	4	0	1	6	51
Vehicles Entered	8	377	166	48	29	148	776
Vehicles Exited	8	368	166	48	28	146	764
Hourly Exit Rate	24	1104	498	144	84	438	2292
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	1	0	0	0	0	1

4: AGOURA ROAD & LOST HILLS ROAD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.2	0.3	0.0	0.2	0.3	0.1	0.2	0.9	0.1	0.8	0.8	0.1
Delay / Veh (s)	37.0	21.9	6.7	51.4	20.3	9.9	47.1	21.1	9.6	20.5	9.9	3.4
Total Stops	17	30	6	14	42	34	12	108	20	118	130	36
Travel Dist (mi)	2.9	8.6	1.3	2.7	9.3	7.2	0.5	6.1	1.4	8.5	16.5	3.9
Travel Time (hr)	0.3	0.5	0.1	0.3	0.6	0.4	0.2	1.1	0.2	1.2	1.3	0.3
Avg Speed (mph)	11	16	21	9	15	22	3	5	12	7	12	15
Fuel Used (gal)	0.2	0.6	0.1	0.3	1.1	0.6	0.2	1.0	0.2	0.9	2.1	0.3
HC Emissions (g)	1	2	0	1	2	2	0	3	1	2	4	1
CO Emissions (g)	21	77	6	19	77	71	12	71	19	49	154	22
NOx Emissions (g)	2	6	0	2	8	4	2	9	2	6	13	2
Vehicles Entered	15	45	7	15	56	42	12	147	31	146	281	67
Vehicles Exited	16	44	8	14	56	42	12	154	30	138	270	66
Hourly Exit Rate	48	132	24	42	168	126	36	462	90	414	810	198
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

4: AGOURA ROAD & LOST HILLS ROAD Performance by movement

Movement	All
Total Delay (hr)	3.8
Delay / Veh (s)	16.1
Total Stops	567
Travel Dist (mi)	68.8
Travel Time (hr)	6.4
Avg Speed (mph)	11
Fuel Used (gal)	7.5
HC Emissions (g)	19
CO Emissions (g)	598
NOx Emissions (g)	55
Vehicles Entered	864
Vehicles Exited	850
Hourly Exit Rate	2550
Denied Entry Before	0
Denied Entry After	0

Total Network Performance

Total Delay (hr)	9.3
Delay / Veh (s)	35.5
Total Stops	1285
Travel Dist (mi)	392.1
Travel Time (hr)	24.4
Avg Speed (mph)	16
Fuel Used (gal)	46.1
HC Emissions (g)	110
CO Emissions (g)	4474
NOx Emissions (g)	363
Vehicles Entered	956
Vehicles Exited	926
Hourly Exit Rate	2778
Denied Entry Before	0
Denied Entry After	1

1: Canwood & LOST HILLS ROAD Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.0	0.0	0.0	0.2	0.0	0.0	0.3
Delay / Veh (s)	5.0	4.0	5.1	2.4	1.7	1.1	2.6
Total Stops	4	22	12	27	2	2	69
Travel Dist (mi)	1.1	3.9	1.1	10.6	6.3	1.7	24.6
Travel Time (hr)	0.0	0.2	0.1	0.6	0.3	0.1	1.3
Avg Speed (mph)	21	21	12	19	22	20	20
Fuel Used (gal)	0.0	0.2	0.1	2.1	0.9	0.2	3.5
HC Emissions (g)	0	1	0	3	2	1	7
CO Emissions (g)	1	17	8	114	114	43	297
NOx Emissions (g)	0	1	1	12	9	3	26
Vehicles Entered	6	22	30	296	67	17	438
Vehicles Exited	6	22	30	298	64	16	436
Hourly Exit Rate	18	66	90	894	192	48	1308
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: NB Off-Ramp & LOST HILLS ROAD Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.5	0.0	0.0	0.6	0.0	0.0	1.1
Delay / Veh (s)	26.1	2.0	1.6	7.4	4.0	0.8	10.5
Total Stops	56	4	0	80	2	2	144
Travel Dist (mi)	13.7	0.8	0.9	25.6	0.2	0.3	41.5
Travel Time (hr)	1.1	0.0	0.0	1.7	0.0	0.0	2.8
Avg Speed (mph)	13	24	28	15	11	22	15
Fuel Used (gal)	1.0	0.1	0.8	2.2	0.0	0.1	4.2
HC Emissions (g)	3	0	1	5	0	0	9
CO Emissions (g)	89	2	37	91	1	18	237
NOx Emissions (g)	9	0	3	12	0	1	24
Vehicles Entered	74	4	14	282	6	12	392
Vehicles Exited	76	4	14	274	6	12	386
Hourly Exit Rate	228	12	42	822	18	36	1158
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

3: US 101 SB ramp & LOST HILLS ROAD Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.2	0.1	0.2	0.0	0.1	0.0	0.6
Delay / Veh (s)	52.6	2.6	2.2	1.1	11.4	0.8	3.1
Total Stops	12	0	34	10	17	0	73
Travel Dist (mi)	2.2	22.0	13.2	3.9	0.8	2.4	44.5
Travel Time (hr)	0.2	0.9	0.6	0.2	0.1	0.1	2.3
Avg Speed (mph)	9	24	21	17	7	21	20
Fuel Used (gal)	1.0	2.1	1.0	0.2	0.1	0.3	4.7
HC Emissions (g)	1	3	2	0	0	1	8
CO Emissions (g)	22	93	54	7	9	56	241
NOx Emissions (g)	4	7	6	0	1	4	22
Vehicles Entered	12	127	320	94	22	61	636
Vehicles Exited	10	128	322	96	22	62	640
Hourly Exit Rate	30	384	966	288	66	186	1920
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

4: AGOURA ROAD & LOST HILLS ROAD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.6	0.3	0.0	0.5	0.3	0.4	0.3	1.1	0.1	0.2	0.6	0.0
Delay / Veh (s)	39.1	24.6	9.3	31.1	26.8	16.0	41.3	15.7	8.5	40.0	12.7	2.1
Total Stops	59	32	16	41	35	73	24	148	10	18	88	8
Travel Dist (mi)	11.0	8.0	3.0	8.6	7.5	14.4	1.2	10.7	0.9	1.0	9.1	1.1
Travel Time (hr)	1.0	0.6	0.2	0.8	0.6	0.9	0.3	1.5	0.1	0.2	0.9	0.1
Avg Speed (mph)	11	14	21	13	14	18	4	8	13	5	11	17
Fuel Used (gal)	1.0	0.5	0.3	0.8	0.5	1.4	0.3	2.0	0.1	0.1	1.3	0.1
HC Emissions (g)	3	2	1	2	2	3	1	4	0	0	2	0
CO Emissions (g)	73	76	21	73	65	99	26	112	11	13	57	10
NOx Emissions (g)	6	6	1	6	4	7	4	14	1	1	7	1
Vehicles Entered	58	41	16	52	42	85	26	249	22	16	158	18
Vehicles Exited	60	42	18	54	40	86	24	246	22	14	156	18
Hourly Exit Rate	180	126	54	162	120	258	72	738	66	42	468	54
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	1	0	0	0	0	0	0

4: AGOURA ROAD & LOST HILLS ROAD Performance by movement

Movement	All
Total Delay (hr)	4.3
Delay / Veh (s)	19.7
Total Stops	552
Travel Dist (mi)	76.6
Travel Time (hr)	7.1
Avg Speed (mph)	12
Fuel Used (gal)	8.4
HC Emissions (g)	21
CO Emissions (g)	636
NOx Emissions (g)	58
Vehicles Entered	783
Vehicles Exited	780
Hourly Exit Rate	2340
Denied Entry Before	0
Denied Entry After	1

Total Network Performance

Total Delay (hr)	6.9
Delay / Veh (s)	28.6
Total Stops	848
Travel Dist (mi)	350.1
Travel Time (hr)	20.4
Avg Speed (mph)	18
Fuel Used (gal)	43.8
HC Emissions (g)	98
CO Emissions (g)	3928
NOx Emissions (g)	327
Vehicles Entered	870
Vehicles Exited	862
Hourly Exit Rate	2586
Denied Entry Before	0
Denied Entry After	1

FUTURE (2040) CONDITIONS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			4.0			4.0	4.0
Lane Util. Factor				1.00	1.00			1.00			1.00	1.00
Frt				1.00	0.85			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.96			1.00	1.00
Satd. Flow (prot)				1719	1538			1731			1810	1538
Flt Permitted				0.95	1.00			0.55			1.00	1.00
Satd. Flow (perm)				1719	1538			987			1810	1538
Volume (vph)	0	0	0	444	0	75	512	55	0	0	135	56
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	493	0	83	569	61	0	0	150	62
RTOR Reduction (vph)	0	0	0	0	60	0	0	0	0	0	0	40
Lane Group Flow (vph)	0	0	0	493	23	0	0	630	0	0	150	22
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			pm+pt					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8			2					6
Actuated Green, G (s)				34.7	34.7			85.8			45.8	45.8
Effective Green, g (s)				36.0	36.0			86.0			46.0	46.0
Actuated g/C Ratio				0.28	0.28			0.66			0.35	0.35
Clearance Time (s)				5.3	5.3			4.2			4.2	4.2
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)				476	426			859			640	544
v/s Ratio Prot					0.01			c0.20			0.08	
v/s Ratio Perm				c0.29				c0.28				0.01
v/c Ratio				1.04	0.05			0.73			0.23	0.04
Uniform Delay, d1				47.0	34.5			14.5			29.6	27.5
Progression Factor				1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2				50.8	0.1			5.5			0.9	0.1
Delay (s)				97.8	34.6			20.0			30.5	27.7
Level of Service				F	C			B			C	C
Approach Delay (s)		0.0			88.7			20.0			29.6	
Approach LOS		A			F			B			C	

Intersection Summary			
HCM Average Control Delay	49.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	1	164	78	52	29	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	182	87	58	32	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				164		
pX, platoon unblocked						
vC, conflicting volume	264	17	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	264	17	34			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	83	94			
cM capacity (veh/h)	664	1057	1575			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	183	87	58	21	13
Volume Left	1	87	0	0	0
Volume Right	182	0	0	0	2
cSH	1053	1575	1700	1700	1700
Volume to Capacity	0.17	0.06	0.03	0.01	0.01
Queue Length 95th (ft)	16	4	0	0	0
Control Delay (s)	9.1	7.4	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	9.1	4.5		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00		1.00	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		0.99	
Satd. Flow (prot)		1726	2707					3438	1538		1794	
Flt Permitted		0.95	1.00					1.00	1.00		0.86	
Satd. Flow (perm)		1726	2707					3438	1538		1553	
Volume (vph)	26	1	1195	0	0	0	0	535	185	98	481	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	29	1	1328	0	0	0	0	594	206	109	534	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	122	0	0	0
Lane Group Flow (vph)	0	30	1328	0	0	0	0	594	84	0	643	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Free						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		Free						2	6		
Actuated Green, G (s)		0.8	35.0					14.1	14.1		24.7	
Effective Green, g (s)		2.1	35.0					14.3	14.3		24.9	
Actuated g/C Ratio		0.06	1.00					0.41	0.41		0.71	
Clearance Time (s)		5.3						4.2	4.2		4.2	
Vehicle Extension (s)		3.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		104	2707					1405	628		1150	
v/s Ratio Prot								0.17			0.11	
v/s Ratio Perm		0.02	c0.49						0.05		c0.29	
v/c Ratio		0.29	0.49					0.42	0.13		0.56	
Uniform Delay, d1		15.7	0.0					7.4	6.5		2.4	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		1.5	0.6					0.2	0.1		0.6	
Delay (s)		17.3	0.6					7.6	6.6		3.0	
Level of Service		B	A					A	A		A	
Approach Delay (s)		1.0			0.0			7.3			3.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	3.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	35.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	43	185	34	62	188	116	51	567	101	469	886	321
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	206	38	69	209	129	57	630	112	521	984	357
RTOR Reduction (vph)	0	0	34	0	0	85	0	0	46	0	0	87
Lane Group Flow (vph)	48	206	4	69	209	44	57	630	66	521	984	270
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	4.3	8.9	8.9	6.7	11.3	29.4	4.8	24.4	24.4	29.4	49.0	49.0
Effective Green, g (s)	4.3	8.9	8.9	6.7	11.3	29.4	4.8	24.4	24.4	29.4	49.0	49.0
Actuated g/C Ratio	0.05	0.10	0.10	0.08	0.13	0.34	0.06	0.29	0.29	0.34	0.57	0.57
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	89	369	165	139	468	545	99	1011	452	609	2031	908
v/s Ratio Prot	0.03	0.06		c0.04	c0.06	0.03	0.03	c0.18		c0.29	0.28	
v/s Ratio Perm			0.00						0.04			0.17
v/c Ratio	0.54	0.56	0.02	0.50	0.45	0.08	0.58	0.62	0.15	0.86	0.48	0.30
Uniform Delay, d1	39.6	36.4	34.3	37.7	34.2	18.9	39.3	26.5	22.7	26.0	10.7	9.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.2	1.8	0.1	2.8	0.7	0.1	7.9	1.2	0.1	11.3	0.2	0.2
Delay (s)	45.7	38.2	34.4	40.5	34.8	19.0	47.2	27.7	22.9	37.4	10.9	9.5
Level of Service	D	D	C	D	C	B	D	C	C	D	B	A
Approach Delay (s)		39.0			30.8			28.4			18.1	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	85.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			4.0			4.0	4.0
Lane Util. Factor				1.00	1.00			1.00			1.00	1.00
Frt				1.00	0.85			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.96			1.00	1.00
Satd. Flow (prot)				1719	1542			1731			1810	1538
Flt Permitted				0.95	1.00			0.59			1.00	1.00
Satd. Flow (perm)				1719	1542			1068			1810	1538
Volume (vph)	0	0	0	185	1	61	1030	103	0	0	113	39
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	206	1	68	1144	114	0	0	126	43
RTOR Reduction (vph)	0	0	0	0	56	0	0	0	0	0	0	26
Lane Group Flow (vph)	0	0	0	206	13	0	0	1258	0	0	126	17
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			pm+pt					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8			2					6
Actuated Green, G (s)				18.7	18.7			86.0			45.9	45.9
Effective Green, g (s)				20.0	20.0			86.2			46.1	46.1
Actuated g/C Ratio				0.18	0.18			0.75			0.40	0.40
Clearance Time (s)				5.3	5.3			4.2			4.2	4.2
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)				301	270			1016			731	621
v/s Ratio Prot					0.01			c0.39			0.07	
v/s Ratio Perm				c0.12				c0.54				0.01
v/c Ratio				0.68	0.05			1.24			0.17	0.03
Uniform Delay, d1				44.1	39.2			14.0			21.8	20.5
Progression Factor				1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2				6.3	0.1			115.7			0.5	0.1
Delay (s)				50.4	39.3			129.7			22.3	20.6
Level of Service				D	D			F			C	C
Approach Delay (s)		0.0			47.6			129.7			21.9	
Approach LOS		A			D			F			C	

Intersection Summary			
HCM Average Control Delay	105.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	114.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	106	133	31	45	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	118	148	34	50	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				164		
pX, platoon unblocked						
vC, conflicting volume	381	26	51			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	381	26	51			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	89	90			
cM capacity (veh/h)	538	1044	1553			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	118	148	34	33	18
Volume Left	0	148	0	0	0
Volume Right	118	0	0	0	1
cSH	1044	1553	1700	1700	1700
Volume to Capacity	0.11	0.10	0.02	0.02	0.01
Queue Length 95th (ft)	10	8	0	0	0
Control Delay (s)	8.9	7.6	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	8.9	6.1		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00		1.00	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		0.95	1.00					1.00	1.00		0.99	
Satd. Flow (prot)		1719	2707					3438	1538		1787	
Flt Permitted		0.95	1.00					1.00	1.00		0.64	
Satd. Flow (perm)		1719	2707					3438	1538		1156	
Volume (vph)	52	0	522	0	0	0	0	1066	396	76	222	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	0	580	0	0	0	0	1184	440	84	247	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	199	0	0	0
Lane Group Flow (vph)	0	58	580	0	0	0	0	1184	241	0	331	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Free						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		Free						2	6		
Actuated Green, G (s)		4.4	52.3					28.5	28.5		38.4	
Effective Green, g (s)		5.7	52.3					28.7	28.7		38.6	
Actuated g/C Ratio		0.11	1.00					0.55	0.55		0.74	
Clearance Time (s)		5.3						4.2	4.2		4.2	
Vehicle Extension (s)		3.0						3.0	3.0		3.0	
Lane Grp Cap (vph)		187	2707					1887	844		924	
v/s Ratio Prot								c0.34			c0.04	
v/s Ratio Perm		0.03	c0.21						0.16		0.22	
v/c Ratio		0.31	0.21					0.63	0.29		0.36	
Uniform Delay, d1		21.5	0.0					8.1	6.3		2.4	
Progression Factor		1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2		0.9	0.2					0.7	0.2		0.2	
Delay (s)		22.4	0.2					8.8	6.5		2.7	
Level of Service		C	A					A	A		A	
Approach Delay (s)		2.2			0.0			8.2			2.7	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	52.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	225	201	57	112	190	319	78	932	87	92	593	59
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	250	223	63	124	211	354	87	1036	97	102	659	66
RTOR Reduction (vph)	0	0	50	0	0	312	0	0	22	0	0	23
Lane Group Flow (vph)	250	223	13	124	211	42	87	1036	75	102	659	43
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	17.0	18.7	18.7	9.7	11.4	10.6	8.2	33.4	33.4	10.6	35.8	35.8
Effective Green, g (s)	17.0	18.7	18.7	9.7	11.4	10.6	8.2	33.4	33.4	10.6	35.8	35.8
Actuated g/C Ratio	0.19	0.21	0.21	0.11	0.13	0.12	0.09	0.38	0.38	0.12	0.40	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	340	749	335	194	456	190	164	1337	598	212	1433	641
v/s Ratio Prot	c0.14	0.06		0.07	c0.06	0.03	0.05	c0.29		c0.06	0.19	
v/s Ratio Perm			0.01						0.05			0.03
v/c Ratio	0.74	0.30	0.04	0.64	0.46	0.22	0.53	0.77	0.12	0.48	0.46	0.07
Uniform Delay, d1	33.6	29.3	27.7	37.7	35.7	35.2	38.3	24.2	18.0	36.3	19.2	16.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.0	0.2	0.0	6.8	0.7	0.6	3.3	2.9	0.1	1.7	0.2	0.0
Delay (s)	41.6	29.5	27.8	44.4	36.4	35.8	41.5	27.1	18.1	38.1	19.5	16.1
Level of Service	D	C	C	D	D	D	D	C	B	D	B	B
Approach Delay (s)		35.0			37.5			27.4			21.5	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	88.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL2	SEL
Right Turn Channelized												
Volume (veh/h)	444	0	45	30	512	33	22	20	9	2	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	493	0	50	33	569	37	24	22	10	2	1	0
Approach Volume (veh/h)		577					630	34				183
Crossing Volume (veh/h)		631					1	1149				1094
High Capacity (veh/h)		840					1383	551				576
High v/c (veh/h)		0.69					0.46	0.06				0.32
Low Capacity (veh/h)		672					1160	421				443
Low v/c (veh/h)		0.86					0.54	0.08				0.41

Intersection Summary			
Maximum v/c High	0.69		
Maximum v/c Low	0.86		
Intersection Capacity Utilization	81.7%	ICU Level of Service	D

Movement	SER	SER2
Right Turn Channelized		
Volume (veh/h)	115	49
Peak Hour Factor	0.90	0.90
Hourly flow rate (vph)	128	54
Approach Volume (veh/h)		
Crossing Volume (veh/h)		
High Capacity (veh/h)		
High v/c (veh/h)		
Low Capacity (veh/h)		
Low v/c (veh/h)		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	26	1	1195	0	0	0	0	535	185	98	481	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	29	1	1328	0	0	0	0	594	206	109	534	0
Approach Volume (veh/h)		1358			0			800			643	
Crossing Volume (veh/h)		643			623			139			0	
High Capacity (veh/h)		832			846			1242			1385	
High v/c (veh/h)		1.63			0.00			0.64			0.46	
Low Capacity (veh/h)		665			677			1032			1161	
Low v/c (veh/h)		2.04			0.00			0.78			0.55	

Intersection Summary				
Maximum v/c High	1.63			
Maximum v/c Low	2.04			
Intersection Capacity Utilization	73.0%	ICU Level of Service	C	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	43	185	34	62	188	116	51	567	101	469	886	321
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	206	38	69	209	129	57	630	112	521	984	357
RTOR Reduction (vph)	0	0	33	0	0	84	0	0	44	0	0	132
Lane Group Flow (vph)	48	206	5	69	209	45	57	630	68	521	984	225
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	3.1	10.6	10.6	4.1	11.6	26.4	3.8	18.4	18.4	26.4	41.0	41.0
Effective Green, g (s)	3.1	10.6	10.6	4.1	11.6	26.4	3.8	18.4	18.4	26.4	41.0	41.0
Actuated g/C Ratio	0.04	0.14	0.14	0.05	0.15	0.35	0.05	0.24	0.24	0.35	0.54	0.54
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	73	497	222	96	544	554	89	862	386	619	1922	860
v/s Ratio Prot	0.03	0.06		c0.04	c0.06	0.03	0.03	c0.18		c0.29	0.28	
v/s Ratio Perm			0.00						0.04			0.14
v/c Ratio	0.66	0.41	0.02	0.72	0.38	0.08	0.64	0.73	0.18	0.84	0.51	0.26
Uniform Delay, d1	35.7	29.6	28.0	35.1	28.7	16.4	35.2	26.3	22.6	22.6	10.9	9.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	19.3	0.6	0.0	22.5	0.5	0.1	14.7	3.2	0.2	10.1	0.2	0.2
Delay (s)	55.0	30.2	28.0	57.7	29.2	16.5	49.8	29.5	22.8	32.7	11.1	9.4
Level of Service	E	C	C	E	C	B	D	C	C	C	B	A
Approach Delay (s)		34.0			30.0			30.0			16.8	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	75.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Right Turn Channelized												
Volume (veh/h)	185	1	31	30	1030	102	1	33	12	1	0	80
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	206	1	34	33	1144	113	1	37	13	1	0	89
Approach Volume (veh/h)		274					1259	51			118	
Crossing Volume (veh/h)		1259#					0	1499#			1401#	
High Capacity (veh/h)		503					1385	411			446	
High v/c (veh/h)		0.55					0.91	0.12			0.26	
Low Capacity (veh/h)		381					1161	305			334	
Low v/c (veh/h)		0.72					1.08	0.17			0.35	

Intersection Summary			
Maximum v/c High	0.91		
Maximum v/c Low	1.08		
Intersection Capacity Utilization	96.2%	ICU Level of Service	F

Crossing flow exceeds 1200, method is not applicable

Movement	SER2
Right Turn Channelized	
Volume (veh/h)	26
Peak Hour Factor	0.90
Hourly flow rate (vph)	29
Approach Volume (veh/h)	
Crossing Volume (veh/h)	
High Capacity (veh/h)	
High v/c (veh/h)	
Low Capacity (veh/h)	
Low v/c (veh/h)	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Volume (veh/h)	52	0	522	0	0	0	0	1066	396	76	222	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	58	0	580	0	0	0	0	1184	440	84	247	0
Approach Volume (veh/h)		638			0			1624			331	
Crossing Volume (veh/h)		331			1242#			142			0	
High Capacity (veh/h)		1068			510			1239			1385	
High v/c (veh/h)		0.60			0.00			1.31			0.24	
Low Capacity (veh/h)		874			387			1029			1161	
Low v/c (veh/h)		0.73			0.00			1.58			0.29	

Intersection Summary			
Maximum v/c High	1.31		
Maximum v/c Low	1.58		
Intersection Capacity Utilization	74.1%	ICU Level of Service	D

Crossing flow exceeds 1200, method is not applicable

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	225	201	57	112	190	319	78	932	87	92	593	59
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	250	223	63	124	211	354	87	1036	97	102	659	66
RTOR Reduction (vph)	0	0	50	0	0	312	0	0	22	0	0	23
Lane Group Flow (vph)	250	223	13	124	211	42	87	1036	75	102	659	43
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	17.0	18.7	18.7	9.7	11.4	10.6	8.2	33.4	33.4	10.6	35.8	35.8
Effective Green, g (s)	17.0	18.7	18.7	9.7	11.4	10.6	8.2	33.4	33.4	10.6	35.8	35.8
Actuated g/C Ratio	0.19	0.21	0.21	0.11	0.13	0.12	0.09	0.38	0.38	0.12	0.40	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	340	749	335	194	456	190	164	1337	598	212	1433	641
v/s Ratio Prot	c0.14	0.06		0.07	c0.06	0.03	0.05	c0.29		c0.06	0.19	
v/s Ratio Perm			0.01						0.05			0.03
v/c Ratio	0.74	0.30	0.04	0.64	0.46	0.22	0.53	0.77	0.12	0.48	0.46	0.07
Uniform Delay, d1	33.6	29.3	27.7	37.7	35.7	35.2	38.3	24.2	18.0	36.3	19.2	16.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.0	0.2	0.0	6.8	0.7	0.6	3.3	2.9	0.1	1.7	0.2	0.0
Delay (s)	41.6	29.5	27.8	44.4	36.4	35.8	41.5	27.1	18.1	38.1	19.5	16.1
Level of Service	D	C	C	D	D	D	D	C	B	D	B	B
Approach Delay (s)		35.0			37.5			27.4			21.5	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	88.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor				1.00	1.00		0.97	1.00			0.95	
Frt				1.00	0.85		1.00	1.00			0.96	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1719	1538		3335	1810			3287	
Flt Permitted				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)				1719	1538		3335	1810			3287	
Volume (vph)	0	0	0	444	0	75	512	55	0	0	135	56
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	493	0	83	569	61	0	0	150	62
RTOR Reduction (vph)	0	0	0	0	55	0	0	0	0	0	30	0
Lane Group Flow (vph)	0	0	0	493	28	0	569	61	0	0	182	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			Prot					
Protected Phases					8		5	2			6	
Permitted Phases				8								
Actuated Green, G (s)				33.2	33.2		21.9	58.5			32.6	
Effective Green, g (s)				33.2	33.2		21.9	58.5			32.6	
Actuated g/C Ratio				0.33	0.33		0.22	0.59			0.33	
Clearance Time (s)				4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)				572	512		733	1062			1075	
v/s Ratio Prot					0.02		c0.17	0.03			c0.06	
v/s Ratio Perm				c0.29								
v/c Ratio				0.86	0.05		0.78	0.06			0.17	
Uniform Delay, d1				31.1	22.6		36.6	8.8			23.9	
Progression Factor				1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2				12.7	0.0		5.2	0.1			0.3	
Delay (s)				43.8	22.6		41.8	8.9			24.2	
Level of Service				D	C		D	A			C	
Approach Delay (s)		0.0			40.7			38.6			24.2	
Approach LOS		A			D			D			C	

Intersection Summary			
HCM Average Control Delay	37.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	99.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	1	164	78	52	29	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	182	87	58	32	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				202		
pX, platoon unblocked						
vC, conflicting volume	264	17	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	264	17	34			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	83	94			
cM capacity (veh/h)	664	1057	1575			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	183	87	58	21	13
Volume Left	1	87	0	0	0
Volume Right	182	0	0	0	2
cSH	1053	1575	1700	1700	1700
Volume to Capacity	0.17	0.06	0.03	0.01	0.01
Queue Length 95th (ft)	16	4	0	0	0
Control Delay (s)	9.1	7.4	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	9.1	4.5		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1726	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.27	1.00	
Satd. Flow (perm)		1726	2707					3438	1538	496	3438	
Volume (vph)	26	1	1195	0	0	0	0	535	185	98	481	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	29	1	1328	0	0	0	0	594	206	109	534	0
RTOR Reduction (vph)	0	0	178	0	0	0	0	0	135	0	0	0
Lane Group Flow (vph)	0	30	1150	0	0	0	0	594	71	109	534	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		50.4	50.4					37.3	37.3	49.5	49.5	
Effective Green, g (s)		50.4	50.4					37.3	37.3	49.5	49.5	
Actuated g/C Ratio		0.47	0.47					0.35	0.35	0.46	0.46	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		806	1264					1188	532	320	1577	
v/s Ratio Prot								c0.17		0.03	c0.16	
v/s Ratio Perm		0.02	c0.42						0.05	0.13		
v/c Ratio		0.04	0.91					0.50	0.13	0.34	0.34	
Uniform Delay, d1		15.6	26.6					27.9	24.2	18.1	18.7	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.0	9.7					1.5	0.5	0.6	0.6	
Delay (s)		15.6	36.4					29.4	24.7	18.7	19.3	
Level of Service		B	D					C	C	B	B	
Approach Delay (s)		35.9			0.0			28.2			19.2	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	107.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	43	185	34	62	188	116	51	567	101	469	886	321
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	206	38	69	209	129	57	630	112	521	984	357
RTOR Reduction (vph)	0	0	34	0	0	87	0	0	44	0	0	87
Lane Group Flow (vph)	48	206	4	69	209	42	57	630	68	521	984	270
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	5.8	11.4	11.4	7.9	13.5	34.9	6.8	37.2	37.2	34.9	65.3	65.3
Effective Green, g (s)	5.8	11.4	11.4	7.9	13.5	34.9	6.8	37.2	37.2	34.9	65.3	65.3
Actuated g/C Ratio	0.05	0.11	0.11	0.07	0.13	0.32	0.06	0.35	0.35	0.32	0.61	0.61
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	96	376	168	130	445	514	112	1226	548	575	2152	962
v/s Ratio Prot	0.03	0.06		c0.04	c0.06	0.03	0.03	c0.18		c0.29	0.28	
v/s Ratio Perm			0.00						0.04			0.17
v/c Ratio	0.50	0.55	0.02	0.53	0.47	0.08	0.51	0.51	0.12	0.91	0.46	0.28
Uniform Delay, d1	49.4	45.6	43.0	48.0	43.6	25.1	48.7	27.9	24.0	34.7	11.4	9.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.1	1.6	0.1	4.1	0.8	0.1	3.6	1.5	0.5	17.8	0.7	0.7
Delay (s)	53.4	47.2	43.1	52.1	44.4	25.2	52.3	29.5	24.4	52.5	12.1	10.7
Level of Service	D	D	D	D	D	C	D	C	C	D	B	B
Approach Delay (s)		47.7			39.6			30.4			23.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	107.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor				1.00	1.00		0.97	1.00			0.95	
Frt				1.00	0.85		1.00	1.00			0.96	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1719	1542		3335	1810			3307	
Flt Permitted				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)				1719	1542		3335	1810			3307	
Volume (vph)	0	0	0	185	1	61	1030	103	0	0	113	39
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	206	1	68	1144	114	0	0	126	43
RTOR Reduction (vph)	0	0	0	0	59	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	0	0	206	10	0	1144	114	0	0	151	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			Prot					
Protected Phases					8		5	2			6	
Permitted Phases				8								
Actuated Green, G (s)				16.4	16.4		37.9	95.0			53.1	
Effective Green, g (s)				16.4	16.4		37.9	95.0			53.1	
Actuated g/C Ratio				0.14	0.14		0.32	0.80			0.44	
Clearance Time (s)				4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)				236	212		1059	1440			1471	
v/s Ratio Prot					0.01		c0.34	0.06			c0.05	
v/s Ratio Perm				c0.12								
v/c Ratio				0.87	0.05		1.08	0.08			0.10	
Uniform Delay, d1				50.5	44.7		40.8	2.7			19.3	
Progression Factor				1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2				27.9	0.1		52.0	0.1			0.1	
Delay (s)				78.4	44.8		92.8	2.8			19.4	
Level of Service				E	D		F	A			B	
Approach Delay (s)		0.0			69.9			84.6			19.4	
Approach LOS		A			E			F			B	

Intersection Summary			
HCM Average Control Delay	75.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	119.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	106	133	31	45	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	118	148	34	50	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				202		
pX, platoon unblocked						
vC, conflicting volume	381	26	51			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	381	26	51			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	89	90			
cM capacity (veh/h)	538	1044	1553			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	118	148	34	33	18
Volume Left	0	148	0	0	0
Volume Right	118	0	0	0	1
cSH	1044	1553	1700	1700	1700
Volume to Capacity	0.11	0.10	0.02	0.02	0.01
Queue Length 95th (ft)	10	8	0	0	0
Control Delay (s)	8.9	7.6	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	8.9	6.1		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1719	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.19	1.00	
Satd. Flow (perm)		1719	2707					3438	1538	350	3438	
Volume (vph)	52	0	522	0	0	0	0	1066	396	76	222	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	0	580	0	0	0	0	1184	440	84	247	0
RTOR Reduction (vph)	0	0	523	0	0	0	0	0	120	0	0	0
Lane Group Flow (vph)	0	58	57	0	0	0	0	1184	320	84	247	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		9.7	9.7					71.6	71.6	80.9	80.9	
Effective Green, g (s)		9.7	9.7					71.6	71.6	80.9	80.9	
Actuated g/C Ratio		0.10	0.10					0.73	0.73	0.82	0.82	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		169	266					2497	1117	361	2821	
v/s Ratio Prot								c0.34		c0.01	0.07	
v/s Ratio Perm		0.03	0.02						0.21	0.18		
v/c Ratio		0.34	0.21					0.47	0.29	0.23	0.09	
Uniform Delay, d1		41.5	40.9					5.6	4.7	3.0	1.7	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.2	0.4					0.6	0.6	0.3	0.1	
Delay (s)		42.7	41.3					6.3	5.3	3.3	1.8	
Level of Service		D	D					A	A	A	A	
Approach Delay (s)		41.5			0.0			6.0			2.2	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	225	201	57	112	190	319	78	932	87	92	593	59
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	250	223	63	124	211	354	87	1036	97	102	659	66
RTOR Reduction (vph)	0	0	53	0	0	237	0	0	23	0	0	26
Lane Group Flow (vph)	250	223	10	124	211	117	87	1036	74	102	659	40
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	18.4	17.5	17.5	12.8	11.9	13.6	8.0	52.1	52.1	13.6	57.7	57.7
Effective Green, g (s)	18.4	17.5	17.5	12.8	11.9	13.6	8.0	52.1	52.1	13.6	57.7	57.7
Actuated g/C Ratio	0.16	0.16	0.16	0.11	0.11	0.12	0.07	0.47	0.47	0.12	0.52	0.52
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	291	553	247	202	376	192	126	1646	736	215	1823	816
v/s Ratio Prot	c0.14	0.06		0.07	c0.06	c0.07	0.05	c0.29		0.06	0.19	
v/s Ratio Perm			0.01						0.05			0.03
v/c Ratio	0.86	0.40	0.04	0.61	0.56	0.61	0.69	0.63	0.10	0.47	0.36	0.05
Uniform Delay, d1	45.5	42.5	40.1	47.2	47.6	46.7	50.8	22.6	16.8	45.9	16.2	13.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.4	0.5	0.1	5.4	1.9	5.4	15.1	1.8	0.3	1.7	0.6	0.1
Delay (s)	67.0	43.0	40.2	52.7	49.5	52.0	65.9	24.5	17.1	47.5	16.7	13.6
Level of Service	E	D	D	D	D	D	E	C	B	D	B	B
Approach Delay (s)		53.9			51.4			26.8			20.3	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	112.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	1	164	78	52	29	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	182	87	58	32	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				1165		
pX, platoon unblocked						
vC, conflicting volume	264	33	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	264	33	34			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	82	95			
cM capacity (veh/h)	685	1040	1577			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	183	87	58	34
Volume Left	1	87	0	0
Volume Right	182	0	0	2
cSH	1037	1577	1700	1700
Volume to Capacity	0.18	0.05	0.03	0.02
Queue Length 95th (ft)	16	4	0	0
Control Delay (s)	9.2	7.4	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.2	4.4		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	444	75	55	512	0	191
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	493	83	61	569	0	212
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			597			
pX, platoon unblocked						
vC, conflicting volume	167	61			61	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	167	61			61	
tC, single (s)	6.9	7.0			4.2	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	38	92			100	
cM capacity (veh/h)	798	982			1519	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	329	248	251	379	106	106
Volume Left	329	164	0	0	0	0
Volume Right	0	83	190	379	0	0
cSH	798	852	1700	1700	1700	1700
Volume to Capacity	0.41	0.29	0.15	0.22	0.06	0.06
Queue Length 95th (ft)	51	30	0	0	0	0
Control Delay (s)	12.6	11.0	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	11.9		0.0		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	35.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1726	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.27	1.00	
Satd. Flow (perm)		1726	2707					3438	1538	496	3438	
Volume (vph)	26	1	1195	0	0	0	0	535	185	98	481	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	29	1	1328	0	0	0	0	594	206	109	534	0
RTOR Reduction (vph)	0	0	178	0	0	0	0	0	135	0	0	0
Lane Group Flow (vph)	0	30	1150	0	0	0	0	594	71	109	534	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		50.4	50.4					37.3	37.3	49.5	49.5	
Effective Green, g (s)		50.4	50.4					37.3	37.3	49.5	49.5	
Actuated g/C Ratio		0.47	0.47					0.35	0.35	0.46	0.46	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		806	1264					1188	532	320	1577	
v/s Ratio Prot								c0.17		0.03	c0.16	
v/s Ratio Perm		0.02	c0.42						0.05	0.13		
v/c Ratio		0.04	0.91					0.50	0.13	0.34	0.34	
Uniform Delay, d1		15.6	26.6					27.9	24.2	18.1	18.7	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.0	9.7					1.5	0.5	0.6	0.6	
Delay (s)		15.6	36.4					29.4	24.7	18.7	19.3	
Level of Service		B	D					C	C	B	B	
Approach Delay (s)		35.9			0.0			28.2			19.2	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	107.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	43	185	34	62	188	116	51	567	101	469	886	321
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	206	38	69	209	129	57	630	112	521	984	357
RTOR Reduction (vph)	0	0	34	0	0	87	0	0	43	0	0	87
Lane Group Flow (vph)	48	206	4	69	209	42	57	630	69	521	984	270
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	5.3	11.5	11.5	8.0	14.2	35.0	5.9	37.1	37.1	35.0	66.2	66.2
Effective Green, g (s)	5.3	11.5	11.5	8.0	14.2	35.0	5.9	37.1	37.1	35.0	66.2	66.2
Actuated g/C Ratio	0.05	0.11	0.11	0.07	0.13	0.33	0.05	0.34	0.34	0.33	0.62	0.62
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	87	378	169	132	467	515	97	1220	546	576	2177	974
v/s Ratio Prot	0.03	0.06		c0.04	c0.06	0.03	0.03	c0.18		c0.29	0.28	
v/s Ratio Perm			0.00						0.04			0.17
v/c Ratio	0.55	0.54	0.02	0.52	0.45	0.08	0.59	0.52	0.13	0.90	0.45	0.28
Uniform Delay, d1	50.0	45.6	43.0	48.0	43.1	25.2	49.7	28.1	24.2	34.7	11.0	9.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.4	1.6	0.1	3.7	0.7	0.1	8.8	1.6	0.5	17.6	0.7	0.7
Delay (s)	57.4	47.2	43.1	51.7	43.8	25.2	58.4	29.7	24.6	52.3	11.7	10.3
Level of Service	E	D	D	D	D	C	E	C	C	D	B	B
Approach Delay (s)		48.3			39.2			31.0			22.8	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	107.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	106	133	31	45	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	118	148	34	50	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				1161		
pX, platoon unblocked						
vC, conflicting volume	381	51	51			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	381	51	51			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	88	90			
cM capacity (veh/h)	563	1018	1555			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	118	148	34	51
Volume Left	0	148	0	0
Volume Right	118	0	0	1
cSH	1018	1555	1700	1700
Volume to Capacity	0.12	0.10	0.02	0.03
Queue Length 95th (ft)	10	8	0	0
Control Delay (s)	9.0	7.6	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.0	6.1		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	185	62	103	1030	0	152
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	206	69	114	1144	0	169
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			597			
pX, platoon unblocked						
vC, conflicting volume	199	114			114	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	199	114			114	
tC, single (s)	6.9	7.0			4.2	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	73	92			100	
cM capacity (veh/h)	763	907			1451	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	137	137	496	763	84	84
Volume Left	137	69	0	0	0	0
Volume Right	0	69	381	763	0	0
cSH	763	829	1700	1700	1700	1700
Volume to Capacity	0.18	0.17	0.29	0.45	0.05	0.05
Queue Length 95th (ft)	16	15	0	0	0	0
Control Delay (s)	10.8	10.2	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	10.5		0.0		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1719	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.20	1.00	
Satd. Flow (perm)		1719	2707					3438	1538	368	3438	
Volume (vph)	52	0	522	0	0	0	0	1066	396	76	222	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	0	580	0	0	0	0	1184	440	84	247	0
RTOR Reduction (vph)	0	0	528	0	0	0	0	0	99	0	0	0
Lane Group Flow (vph)	0	58	52	0	0	0	0	1184	341	84	247	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		10.1	10.1					87.3	87.3	94.4	94.4	
Effective Green, g (s)		10.1	10.1					87.3	87.3	94.4	94.4	
Actuated g/C Ratio		0.09	0.09					0.78	0.78	0.84	0.84	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		154	243					2668	1193	346	2885	
v/s Ratio Prot								c0.34		c0.01	0.07	
v/s Ratio Perm		0.03	0.02						0.22	0.20		
v/c Ratio		0.38	0.21					0.44	0.29	0.24	0.09	
Uniform Delay, d1		48.2	47.5					4.3	3.6	2.5	1.6	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.5	0.4					0.5	0.6	0.4	0.1	
Delay (s)		49.8	48.0					4.8	4.2	2.9	1.6	
Level of Service		D	D					A	A	A	A	
Approach Delay (s)		48.1			0.0			4.7			1.9	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	112.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	225	201	57	112	190	319	78	932	87	92	593	59
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	250	223	63	124	211	354	87	1036	97	102	659	66
RTOR Reduction (vph)	0	0	49	0	0	216	0	0	23	0	0	26
Lane Group Flow (vph)	250	223	14	124	211	138	87	1036	74	102	659	40
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	18.6	24.3	24.3	9.3	15.0	15.0	7.8	48.4	48.4	9.6	50.2	50.2
Effective Green, g (s)	18.6	24.3	24.3	9.3	15.0	15.0	7.8	48.4	48.4	9.6	50.2	50.2
Actuated g/C Ratio	0.17	0.23	0.23	0.09	0.14	0.14	0.07	0.45	0.45	0.09	0.47	0.47
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	306	799	357	153	493	221	128	1592	712	158	1651	739
v/s Ratio Prot	c0.14	0.06		0.07	0.06		0.05	c0.29		c0.06	0.19	
v/s Ratio Perm			0.01			c0.09			0.05			0.03
v/c Ratio	0.82	0.28	0.04	0.81	0.43	0.62	0.68	0.65	0.10	0.65	0.40	0.05
Uniform Delay, d1	42.9	34.4	32.5	48.3	42.4	43.6	48.7	23.0	17.1	47.4	18.8	15.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.4	0.2	0.0	26.7	0.6	5.4	13.4	2.1	0.3	8.7	0.7	0.1
Delay (s)	58.3	34.6	32.6	75.0	43.0	49.0	62.1	25.1	17.4	56.1	19.5	15.9
Level of Service	E	C	C	E	D	D	E	C	B	E	B	B
Approach Delay (s)		45.4			51.9			27.1			23.8	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	107.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	1	164	78	52	29	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	182	87	58	32	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				569		
pX, platoon unblocked						
vC, conflicting volume	264	33	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	264	33	34			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	82	95			
cM capacity (veh/h)	685	1040	1577			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	183	87	58	34
Volume Left	1	87	0	0
Volume Right	182	0	0	2
cSH	1037	1577	1700	1700
Volume to Capacity	0.18	0.05	0.03	0.02
Queue Length 95th (ft)	16	4	0	0
Control Delay (s)	9.2	7.4	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.2	4.4		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor				1.00	1.00		0.97	1.00			0.95	
Frt				1.00	0.85		1.00	1.00			0.96	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1719	1538		3335	1810			3287	
Flt Permitted				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)				1719	1538		3335	1810			3287	
Volume (vph)	0	0	0	444	0	75	512	55	0	0	135	56
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	493	0	83	569	61	0	0	150	62
RTOR Reduction (vph)	0	0	0	0	55	0	0	0	0	0	30	0
Lane Group Flow (vph)	0	0	0	493	28	0	569	61	0	0	182	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			Prot					
Protected Phases					8		5	2			6	
Permitted Phases				8								
Actuated Green, G (s)				33.2	33.2		21.9	58.5			32.6	
Effective Green, g (s)				33.2	33.2		21.9	58.5			32.6	
Actuated g/C Ratio				0.33	0.33		0.22	0.59			0.33	
Clearance Time (s)				4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)				572	512		733	1062			1075	
v/s Ratio Prot					0.02		c0.17	0.03			c0.06	
v/s Ratio Perm				c0.29								
v/c Ratio				0.86	0.05		0.78	0.06			0.17	
Uniform Delay, d1				31.1	22.6		36.6	8.8			23.9	
Progression Factor				1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2				12.7	0.0		5.2	0.1			0.3	
Delay (s)				43.8	22.6		41.8	8.9			24.2	
Level of Service				D	C		D	A			C	
Approach Delay (s)		0.0			40.7			38.6			24.2	
Approach LOS		A			D			D			C	

Intersection Summary			
HCM Average Control Delay	37.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	99.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1726	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.27	1.00	
Satd. Flow (perm)		1726	2707					3438	1538	496	3438	
Volume (vph)	26	1	1195	0	0	0	0	535	185	98	481	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	29	1	1328	0	0	0	0	594	206	109	534	0
RTOR Reduction (vph)	0	0	178	0	0	0	0	0	135	0	0	0
Lane Group Flow (vph)	0	30	1150	0	0	0	0	594	71	109	534	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		50.4	50.4					37.3	37.3	49.5	49.5	
Effective Green, g (s)		50.4	50.4					37.3	37.3	49.5	49.5	
Actuated g/C Ratio		0.47	0.47					0.35	0.35	0.46	0.46	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		806	1264					1188	532	320	1577	
v/s Ratio Prot								c0.17		0.03	c0.16	
v/s Ratio Perm		0.02	c0.42						0.05	0.13		
v/c Ratio		0.04	0.91					0.50	0.13	0.34	0.34	
Uniform Delay, d1		15.6	26.6					27.9	24.2	18.1	18.7	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.0	9.7					1.5	0.5	0.6	0.6	
Delay (s)		15.6	36.4					29.4	24.7	18.7	19.3	
Level of Service		B	D					C	C	B	B	
Approach Delay (s)		35.9			0.0			28.2			19.2	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	107.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	43	185	34	62	188	116	51	567	101	469	886	321
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	206	38	69	209	129	57	630	112	521	984	357
RTOR Reduction (vph)	0	0	34	0	0	87	0	0	44	0	0	87
Lane Group Flow (vph)	48	206	4	69	209	42	57	630	68	521	984	270
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	5.8	11.4	11.4	7.9	13.5	34.9	6.8	37.2	37.2	34.9	65.3	65.3
Effective Green, g (s)	5.8	11.4	11.4	7.9	13.5	34.9	6.8	37.2	37.2	34.9	65.3	65.3
Actuated g/C Ratio	0.05	0.11	0.11	0.07	0.13	0.32	0.06	0.35	0.35	0.32	0.61	0.61
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	96	376	168	130	445	514	112	1226	548	575	2152	962
v/s Ratio Prot	0.03	0.06		c0.04	c0.06	0.03	0.03	c0.18		c0.29	0.28	
v/s Ratio Perm			0.00						0.04			0.17
v/c Ratio	0.50	0.55	0.02	0.53	0.47	0.08	0.51	0.51	0.12	0.91	0.46	0.28
Uniform Delay, d1	49.4	45.6	43.0	48.0	43.6	25.1	48.7	27.9	24.0	34.7	11.4	9.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.1	1.6	0.1	4.1	0.8	0.1	3.6	1.5	0.5	17.8	0.7	0.7
Delay (s)	53.4	47.2	43.1	52.1	44.4	25.2	52.3	29.5	24.4	52.5	12.1	10.7
Level of Service	D	D	D	D	D	C	D	C	C	D	B	B
Approach Delay (s)		47.7			39.6			30.4			23.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	107.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor				1.00	1.00		0.97	1.00			0.95	
Frt				1.00	0.85		1.00	1.00			0.96	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1719	1542		3335	1810			3307	
Flt Permitted				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)				1719	1542		3335	1810			3307	
Volume (vph)	0	0	0	185	1	61	1030	103	0	0	113	39
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	206	1	68	1144	114	0	0	126	43
RTOR Reduction (vph)	0	0	0	0	59	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	0	0	206	10	0	1144	114	0	0	151	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			Prot					
Protected Phases					8		5	2			6	
Permitted Phases				8								
Actuated Green, G (s)				16.4	16.4		37.9	95.0			53.1	
Effective Green, g (s)				16.4	16.4		37.9	95.0			53.1	
Actuated g/C Ratio				0.14	0.14		0.32	0.80			0.44	
Clearance Time (s)				4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)				236	212		1059	1440			1471	
v/s Ratio Prot					0.01		c0.34	0.06			c0.05	
v/s Ratio Perm				c0.12								
v/c Ratio				0.87	0.05		1.08	0.08			0.10	
Uniform Delay, d1				50.5	44.7		40.8	2.7			19.3	
Progression Factor				1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2				27.9	0.1		52.0	0.1			0.1	
Delay (s)				78.4	44.8		92.8	2.8			19.4	
Level of Service				E	D		F	A			B	
Approach Delay (s)		0.0			69.9			84.6			19.4	
Approach LOS		A			E			F			B	

Intersection Summary			
HCM Average Control Delay	75.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	119.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	106	133	31	45	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	118	148	34	50	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				574		
pX, platoon unblocked						
vC, conflicting volume	381	51	51			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	381	51	51			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	88	90			
cM capacity (veh/h)	563	1018	1555			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	118	148	34	51
Volume Left	0	148	0	0
Volume Right	118	0	0	1
cSH	1018	1555	1700	1700
Volume to Capacity	0.12	0.10	0.02	0.03
Queue Length 95th (ft)	10	8	0	0
Control Delay (s)	9.0	7.6	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.0	6.1		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	0.88					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1719	2707					3438	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.19	1.00	
Satd. Flow (perm)		1719	2707					3438	1538	350	3438	
Volume (vph)	52	0	522	0	0	0	0	1066	396	76	222	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	0	580	0	0	0	0	1184	440	84	247	0
RTOR Reduction (vph)	0	0	523	0	0	0	0	0	120	0	0	0
Lane Group Flow (vph)	0	58	57	0	0	0	0	1184	320	84	247	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Perm		Perm						Perm	pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4						2	6		
Actuated Green, G (s)		9.7	9.7					71.6	71.6	80.9	80.9	
Effective Green, g (s)		9.7	9.7					71.6	71.6	80.9	80.9	
Actuated g/C Ratio		0.10	0.10					0.73	0.73	0.82	0.82	
Clearance Time (s)		4.0	4.0					4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		169	266					2497	1117	361	2821	
v/s Ratio Prot								c0.34		c0.01	0.07	
v/s Ratio Perm		0.03	0.02						0.21	0.18		
v/c Ratio		0.34	0.21					0.47	0.29	0.23	0.09	
Uniform Delay, d1		41.5	40.9					5.6	4.7	3.0	1.7	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.2	0.4					0.6	0.6	0.3	0.1	
Delay (s)		42.7	41.3					6.3	5.3	3.3	1.8	
Level of Service		D	D					A	A	A	A	
Approach Delay (s)		41.5			0.0			6.0			2.2	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	225	201	57	112	190	319	78	932	87	92	593	59
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	250	223	63	124	211	354	87	1036	97	102	659	66
RTOR Reduction (vph)	0	0	53	0	0	237	0	0	23	0	0	26
Lane Group Flow (vph)	250	223	10	124	211	117	87	1036	74	102	659	40
Turn Type	Prot		Perm	Prot		Over	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	18.4	17.5	17.5	12.8	11.9	13.6	8.0	52.1	52.1	13.6	57.7	57.7
Effective Green, g (s)	18.4	17.5	17.5	12.8	11.9	13.6	8.0	52.1	52.1	13.6	57.7	57.7
Actuated g/C Ratio	0.16	0.16	0.16	0.11	0.11	0.12	0.07	0.47	0.47	0.12	0.52	0.52
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	291	553	247	202	376	192	126	1646	736	215	1823	816
v/s Ratio Prot	c0.14	0.06		0.07	c0.06	c0.07	0.05	c0.29		0.06	0.19	
v/s Ratio Perm			0.01						0.05			0.03
v/c Ratio	0.86	0.40	0.04	0.61	0.56	0.61	0.69	0.63	0.10	0.47	0.36	0.05
Uniform Delay, d1	45.5	42.5	40.1	47.2	47.6	46.7	50.8	22.6	16.8	45.9	16.2	13.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.4	0.5	0.1	5.4	1.9	5.4	15.1	1.8	0.3	1.7	0.6	0.1
Delay (s)	67.0	43.0	40.2	52.7	49.5	52.0	65.9	24.5	17.1	47.5	16.7	13.6
Level of Service	E	D	D	D	D	D	E	C	B	D	B	B
Approach Delay (s)		53.9			51.4			26.8			20.3	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	112.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

1: Canwood & LOST HILLS ROAD Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.0	0.0	0.0	0.1	0.2	0.0	0.3
Delay / Veh (s)	15.7	4.9	8.4	1.9	6.0	1.9	4.1
Total Stops	3	20	4	2	24	1	54
Travel Dist (mi)	0.5	3.8	0.3	3.6	8.7	1.3	18.2
Travel Time (hr)	0.0	0.2	0.0	0.2	0.5	0.1	1.0
Avg Speed (mph)	16	21	9	20	17	19	18
Fuel Used (gal)	0.0	0.6	0.0	0.5	1.2	0.1	2.5
HC Emissions (g)	0	1	0	1	3	0	6
CO Emissions (g)	6	18	3	72	120	20	240
NOx Emissions (g)	0	2	0	6	11	1	21
Vehicles Entered	3	21	7	98	92	13	234
Vehicles Exited	3	21	7	98	94	13	236
Hourly Exit Rate	18	126	42	588	564	78	1416
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: NB Off-Ramp & LOST HILLS ROAD Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.3	0.0	0.0	0.3	0.0	0.0	0.6
Delay / Veh (s)	11.3	1.4	3.7	9.7	6.8	0.9	10.0
Total Stops	64	4	1	57	1	1	128
Travel Dist (mi)	18.6	1.0	0.2	9.0	0.1	0.1	28.9
Travel Time (hr)	1.0	0.0	0.0	0.6	0.0	0.0	1.7
Avg Speed (mph)	19	24	21	14	8	20	17
Fuel Used (gal)	1.2	0.1	0.0	0.7	0.0	0.1	2.2
HC Emissions (g)	3	0	0	2	0	0	6
CO Emissions (g)	111	13	6	41	0	1	172
NOx Emissions (g)	8	1	0	5	0	0	14
Vehicles Entered	97	5	2	99	2	4	209
Vehicles Exited	101	6	2	97	2	4	212
Hourly Exit Rate	606	36	12	582	12	24	1272
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

3: US 101 SB ramp & LOST HILLS ROAD Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	1.7	0.3	0.0	0.1	0.4	2.6
Delay / Veh (s)	31.5	30.7	11.7	1.3	23.1	15.4	21.2
Total Stops	4	231	25	6	16	59	341
Travel Dist (mi)	0.9	34.5	4.1	1.0	0.8	3.8	45.1
Travel Time (hr)	0.1	3.0	0.5	0.1	0.2	0.6	4.3
Avg Speed (mph)	12	12	9	16	4	7	11
Fuel Used (gal)	0.1	4.7	0.4	0.0	0.2	0.6	6.0
HC Emissions (g)	0	10	1	0	0	1	14
CO Emissions (g)	8	351	30	3	8	33	433
NOx Emissions (g)	1	25	4	0	2	5	37
Vehicles Entered	5	208	98	25	19	96	451
Vehicles Exited	5	189	101	25	20	98	438
Hourly Exit Rate	30	1134	606	150	120	588	2628
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	1	0	0	0	0	1

4: AGOURA ROAD & LOST HILLS ROAD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.1	0.3	0.0	0.1	0.1	0.0	0.1	0.5	0.0	0.5	0.4	0.1
Delay / Veh (s)	41.2	31.2	6.2	42.9	27.9	8.3	49.4	20.1	11.5	22.7	8.9	4.4
Total Stops	4	23	4	5	10	7	9	54	13	61	64	27
Travel Dist (mi)	1.0	6.0	1.4	1.0	2.7	2.9	0.4	3.8	0.6	4.3	8.5	3.8
Travel Time (hr)	0.1	0.5	0.1	0.1	0.2	0.1	0.1	0.7	0.1	0.6	0.7	0.3
Avg Speed (mph)	9	13	23	10	12	24	3	6	10	7	13	15
Fuel Used (gal)	0.1	0.5	0.1	0.1	0.2	0.2	0.1	0.7	0.1	0.6	1.3	0.4
HC Emissions (g)	0	1	0	0	1	1	0	2	0	1	2	1
CO Emissions (g)	8	55	14	7	37	36	8	50	9	23	87	17
NOx Emissions (g)	1	3	1	0	2	2	2	7	1	3	8	2
Vehicles Entered	6	31	7	5	17	17	9	86	16	78	149	66
Vehicles Exited	7	33	8	6	16	16	8	97	15	73	149	65
Hourly Exit Rate	42	198	48	36	96	96	48	582	90	438	894	390
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

4: AGOURA ROAD & LOST HILLS ROAD Performance by movement

Movement	All
Total Delay (hr)	2.2
Delay / Veh (s)	16.2
Total Stops	281
Travel Dist (mi)	36.3
Travel Time (hr)	3.6
Avg Speed (mph)	10
Fuel Used (gal)	4.3
HC Emissions (g)	11
CO Emissions (g)	353
NOx Emissions (g)	33
Vehicles Entered	487
Vehicles Exited	493
Hourly Exit Rate	2958
Denied Entry Before	0
Denied Entry After	0

Total Network Performance

Total Delay (hr)	6.3
Delay / Veh (s)	41.4
Total Stops	810
Travel Dist (mi)	229.8
Travel Time (hr)	15.2
Avg Speed (mph)	15
Fuel Used (gal)	27.4
HC Emissions (g)	68
CO Emissions (g)	2661
NOx Emissions (g)	222
Vehicles Entered	551
Vehicles Exited	545
Hourly Exit Rate	3270
Denied Entry Before	0
Denied Entry After	1

1: Canwood & LOST HILLS ROAD Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.0	0.0	0.0	0.2	0.0	0.0	0.3
Delay / Veh (s)	39.1	4.3	4.3	3.0	2.1	1.4	3.3
Total Stops	4	16	4	22	0	0	46
Travel Dist (mi)	0.4	3.1	0.5	7.0	3.8	0.9	15.7
Travel Time (hr)	0.0	0.1	0.0	0.4	0.2	0.0	0.9
Avg Speed (mph)	9	22	13	17	21	20	18
Fuel Used (gal)	0.0	0.2	0.1	0.9	0.7	0.3	2.1
HC Emissions (g)	0	1	0	2	1	0	5
CO Emissions (g)	2	25	4	91	66	17	205
NOx Emissions (g)	0	1	1	8	6	1	17
Vehicles Entered	2	18	15	194	42	9	280
Vehicles Exited	4	16	15	193	41	9	278
Hourly Exit Rate	24	96	90	1158	246	54	1668
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: NB Off-Ramp & LOST HILLS ROAD Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.4	0.0	0.0	0.6	0.0	0.0	1.1
Delay / Veh (s)	39.3	35.6	0.1	11.2	0.6	6.5	15.9
Total Stops	33	3	0	77	0	3	116
Travel Dist (mi)	7.1	0.6	0.2	17.1	0.1	0.2	25.2
Travel Time (hr)	0.7	0.1	0.0	1.3	0.0	0.0	2.1
Avg Speed (mph)	10	9	31	13	17	10	12
Fuel Used (gal)	0.6	0.1	0.0	1.3	0.0	0.2	2.3
HC Emissions (g)	2	0	0	3	0	0	5
CO Emissions (g)	61	8	2	52	0	8	131
NOx Emissions (g)	5	0	0	6	0	1	12
Vehicles Entered	37	3	2	195	2	8	247
Vehicles Exited	43	4	2	187	2	8	246
Hourly Exit Rate	258	24	12	1122	12	48	1476
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

3: US 101 SB ramp & LOST HILLS ROAD Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.1	0.1	0.2	0.0	0.1	0.0	0.6
Delay / Veh (s)	33.0	3.5	4.0	1.5	22.1	1.7	4.6
Total Stops	8	1	34	13	20	2	78
Travel Dist (mi)	1.3	16.3	8.6	2.9	0.7	1.3	31.1
Travel Time (hr)	0.1	0.7	0.5	0.2	0.1	0.1	1.7
Avg Speed (mph)	10	23	17	17	5	19	18
Fuel Used (gal)	0.5	0.8	0.8	0.1	0.1	0.1	2.5
HC Emissions (g)	0	3	2	0	0	0	6
CO Emissions (g)	12	88	67	6	6	22	202
NOx Emissions (g)	2	5	6	0	1	2	16
Vehicles Entered	9	94	208	69	18	35	433
Vehicles Exited	7	93	208	66	18	33	425
Hourly Exit Rate	42	558	1248	396	108	198	2550
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

4: AGOURA ROAD & LOST HILLS ROAD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.6	0.2	0.0	0.3	0.3	0.2	0.2	0.9	0.0	0.1	0.4	0.0
Delay / Veh (s)	52.1	31.1	11.1	52.9	31.2	18.3	42.1	19.3	12.0	25.6	12.7	4.1
Total Stops	51	16	7	23	31	41	13	111	10	12	46	9
Travel Dist (mi)	8.9	4.2	1.9	4.0	6.1	8.2	0.5	7.2	0.4	0.7	5.9	0.8
Travel Time (hr)	1.0	0.3	0.1	0.5	0.5	0.6	0.2	1.2	0.1	0.1	0.6	0.1
Avg Speed (mph)	10	13	20	9	12	17	3	6	10	6	10	15
Fuel Used (gal)	0.8	0.3	0.1	0.4	0.5	0.6	0.2	1.2	0.1	0.1	0.6	0.1
HC Emissions (g)	2	1	0	1	1	2	0	3	0	0	2	0
CO Emissions (g)	55	30	11	37	47	57	11	68	6	9	53	3
NOx Emissions (g)	5	2	1	4	4	4	2	10	1	2	4	0
Vehicles Entered	46	24	9	22	35	48	13	170	10	12	103	14
Vehicles Exited	43	20	10	21	33	50	14	174	9	13	102	14
Hourly Exit Rate	258	120	60	126	198	300	84	1044	54	78	612	84
Denied Entry Before	1	0	0	0	0	0	0	0	1	0	0	0
Denied Entry After	0	0	0	0	1	1	1	0	0	0	0	0

4: AGOURA ROAD & LOST HILLS ROAD Performance by movement

Movement	All
Total Delay (hr)	3.3
Delay / Veh (s)	23.5
Total Stops	370
Travel Dist (mi)	49.0
Travel Time (hr)	5.1
Avg Speed (mph)	10
Fuel Used (gal)	4.9
HC Emissions (g)	14
CO Emissions (g)	386
NOx Emissions (g)	40
Vehicles Entered	506
Vehicles Exited	503
Hourly Exit Rate	3018
Denied Entry Before	2
Denied Entry After	3

Total Network Performance

Total Delay (hr)	5.6
Delay / Veh (s)	35.8
Total Stops	618
Travel Dist (mi)	229.5
Travel Time (hr)	14.5
Avg Speed (mph)	16
Fuel Used (gal)	24.4
HC Emissions (g)	62
CO Emissions (g)	2409
NOx Emissions (g)	204
Vehicles Entered	568
Vehicles Exited	568
Hourly Exit Rate	3408
Denied Entry Before	2
Denied Entry After	3

APPENDIX B-2 FREEWAY MAINLINE LOS WORKSHEETS

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	3/31/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 NB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Flow Inputs and Adjustments

Volume, V	6103	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1695	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1738	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1738	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	63.0	mi/h
Number of lanes, N	4	
Density, D	27.6	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	3/31/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 SB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Flow Inputs and Adjustments

Volume, V	7272	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2020	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5*	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2071	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2071	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	59.1	mi/h
Number of lanes, N	4	
Density, D	35.0+	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	3/31/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 NB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Flow Inputs and Adjustments

Volume, V	6245	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1735	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1778	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1778	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	62.8	mi/h
Number of lanes, N	4	
Density, D	28.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	3/31/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 SB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Flow Inputs and Adjustments

Volume, V	7107	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1974	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2024	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2024	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	4	
Density, D	33.7	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	3/31/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 NB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Flow Inputs and Adjustments

Volume, V	7631	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2120	v
Trucks and buses		%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	1.000	
Driver population factor, vp	1.00	
Flow rate, vp	2120	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2120	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	58.1	mi/h
Number of lanes, N	4	
Density, D	36.5	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	3/31/2009
Analysis Time Period:	PM Peak
Freeway/Direction:	101 SB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Flow Inputs and Adjustments

Volume, V	6325	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1757	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1801	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1801	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	62.7	mi/h
Number of lanes, N	4	
Density, D	28.7	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	3/31/2009
Analysis Time Period:	PM Peak
Freeway/Direction:	101 NB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Flow Inputs and Adjustments

Volume, V	7808	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2169	v
Trucks and buses		%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	1.000	
Driver population factor, vp	1.00	
Flow rate, vp	2169	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2169	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	56.9	mi/h
Number of lanes, N	4	
Density, D	38.1	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	3/31/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 SB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Flow Inputs and Adjustments

Volume, V	6181	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1717	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1760	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1760	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	62.9	mi/h
Number of lanes, N	4	
Density, D	28.0	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 NB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Flow Inputs and Adjustments

Volume, V	6287	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1746	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1790	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1790	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	62.7	mi/h
Number of lanes, N	4	
Density, D	28.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 SB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Flow Inputs and Adjustments

Volume, V	7491	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2081	v
Trucks and buses		%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	1.000	
Driver population factor, vp	1.00	
Flow rate, vp	2081	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2081	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	58.9	mi/h
Number of lanes, N	4	
Density, D	35.3	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 NB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Flow Inputs and Adjustments

Volume, V	6433	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1787	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1832	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1832	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	62.4	mi/h
Number of lanes, N	4	
Density, D	29.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 SB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Flow Inputs and Adjustments

Volume, V	7321	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2034	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2084	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2084	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	58.9	mi/h
Number of lanes, N	4	
Density, D	35.4	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 NB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Flow Inputs and Adjustments

Volume, V	7860	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2183	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2238	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2238	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	55.1	mi/h
Number of lanes, N	4	
Density, D	40.6	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	PM Peak
Freeway/Direction:	101 SB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Flow Inputs and Adjustments

Volume, V	6515	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1810	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1855	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1855	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	62.2	mi/h
Number of lanes, N	4	
Density, D	29.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	PM Peak
Freeway/Direction:	101 NB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Flow Inputs and Adjustments

Volume, V	8043	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2234	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2290	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2290	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	53.4	mi/h
Number of lanes, N	4	
Density, D	42.9	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 SB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Flow Inputs and Adjustments

Volume, V	6367	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1769	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1813	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1813	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	62.6	mi/h
Number of lanes, N	4	
Density, D	29.0	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 NB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Flow Inputs and Adjustments

Volume, V	7995	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2221	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2276	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2276	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	53.9	mi/h
Number of lanes, N	4	
Density, D	42.2	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 SB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Flow Inputs and Adjustments

Volume, V	9527	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2646	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2713	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2713	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	4	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 NB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Flow Inputs and Adjustments

Volume, V	8181	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2273	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2329	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2329	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	52.1	mi/h
Number of lanes, N	4	
Density, D	44.7	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 SB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Flow Inputs and Adjustments

Volume, V	9311	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2586	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2651	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2651	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	4	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 NB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Flow Inputs and Adjustments

Volume, V	9997	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2777	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2846	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2846	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	4	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	PM Peak
Freeway/Direction:	101 SB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Flow Inputs and Adjustments

Volume, V	8286	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2302	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2359	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2359	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	4	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	PM Peak
Freeway/Direction:	101 NB
From/To:	North of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Flow Inputs and Adjustments

Volume, V	10229	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2841	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2912	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2912	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	4	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	NDS
Agency or Company:	
Date Performed:	4/21/2009
Analysis Time Period:	AM Peak
Freeway/Direction:	101 SB
From/To:	South of Lost Hills
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Flow Inputs and Adjustments

Volume, V	8098	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2249	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2306	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	63.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2306	pc/h/ln
Free-flow speed, FFS	63.5	mi/h
Average passenger-car speed, S	52.9	mi/h
Number of lanes, N	4	
Density, D	43.6	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

FREEWAY MAINLINE LOS WORKSHEETS (10 LANE)

Phone: Fax:
E-mail:

Operational Analysis

Analyst: NDS
Agency or Company:
Date Performed: 4/21/2009
Analysis Time Period: AM Peak
Freeway/Direction: 101 NB
From/To: North of Lost Hills
Jurisdiction:
Analysis Year: Future 2040
Description:

Flow Inputs and Adjustments

Volume, V	8181	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2273	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1863	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1863	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.3	mi/h
Number of lanes, N	5	
Density, D	29.4	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst: NDS
Agency or Company:
Date Performed: 4/21/2009
Analysis Time Period: AM Peak
Freeway/Direction: 101 SB
From/To: South of Lost Hills
Jurisdiction:
Analysis Year: Future 2040
Description:

Flow Inputs and Adjustments

Volume, V	9311	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2586	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2121	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2121	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.0	mi/h
Number of lanes, N	5	
Density, D	35.9	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst: NDS
Agency or Company:
Date Performed: 4/21/2009
Analysis Time Period: AM Peak
Freeway/Direction: 101 SB
From/To: North of Lost Hills
Jurisdiction:
Analysis Year: Future 2040
Description:

Flow Inputs and Adjustments

Volume, V	9527	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2646	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2170	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2170	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	57.8	mi/h
Number of lanes, N	5	
Density, D	37.5	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst: NDS
Agency or Company:
Date Performed: 4/21/2009
Analysis Time Period: AM Peak
Freeway/Direction: 101 NB
From/To: South of Lost Hills
Jurisdiction:
Analysis Year: Future 2040
Description:

Flow Inputs and Adjustments

Volume, V	7995	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2221	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1821	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1821	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.7	mi/h
Number of lanes, N	5	
Density, D	28.6	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst: NDS
Agency or Company:
Date Performed: 4/21/2009
Analysis Time Period: AM Peak
Freeway/Direction: 101 NB
From/To: South of Lost Hills
Jurisdiction:
Analysis Year: Future 2040
Description:

Flow Inputs and Adjustments

Volume, V	9997	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2777	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2277	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2277	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	54.7	mi/h
Number of lanes, N	5	
Density, D	41.6	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst: NDS
Agency or Company:
Date Performed: 4/21/2009
Analysis Time Period: AM Peak
Freeway/Direction: 101 SB
From/To: South of Lost Hills
Jurisdiction:
Analysis Year: Future 2040
Description:

Flow Inputs and Adjustments

Volume, V	8098	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2249	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1845	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1845	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.5	mi/h
Number of lanes, N	5	
Density, D	29.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst: NDS
Agency or Company:
Date Performed: 4/21/2009
Analysis Time Period: PM Peak
Freeway/Direction: 101 NB
From/To: North of Lost Hills
Jurisdiction:
Analysis Year: Future 2040
Description:

Flow Inputs and Adjustments

Volume, V	10229	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2841	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	2330	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	2330	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	52.9	mi/h
Number of lanes, N	5	
Density, D	44.0	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst: NDS
Agency or Company:
Date Performed: 4/21/2009
Analysis Time Period: PM Peak
Freeway/Direction: 101 SB
From/To: North of Lost Hills
Jurisdiction:
Analysis Year: Future 2040
Description:

Flow Inputs and Adjustments

Volume, V	8286	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2302	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, vp	1.00	
Flow rate, vp	1887	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.45	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Ideal	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1887	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.0	mi/h
Number of lanes, N	5	
Density, D	29.9	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

APPENDIX B-3 FREEWAY RAMP LOS WORKSHEETS

EXISTING RAMP LOS WORKSHEETS

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	3/31/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Off-Ramp
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6103	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	402	vph
Length of first accel/decel lane	3250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	6103		402				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	1695		112				v
Trucks and buses	0		0				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	1.000		1.000				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	6781		447				pcph

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P = 0.436 Using Equation 8

$$v_{12}^{FD} = v_R + (v_F - v_R) P_{FD} = 3209 \quad pc/h$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6781	9400	No
v_{12}	3209	4400	No
$v_{FO} = v_F - v_R$	6334	9400	No
v_R	447	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = 2.6$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, $D_S = 0.208$

Space mean speed in ramp influence area, $S_R = 60$ mph

Space mean speed in outer lanes, $S_0 = 68.2$ mph

Space mean speed for all vehicles, $S = 64.2$ mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	3/31/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6245	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	418	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6245	418		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	1735	116		v
Trucks and buses	0	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	1.000	1.000		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	6939	464		pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P = 0.558 Using Equation 4

$$v_{12}^{FM} = v_F (P_{FM}) = 3873 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7403	9400	No
v_{R12}	4337	4600	No

Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 26.8 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.403$

Space mean speed in ramp influence area, $S_R = 55.7$ mph

Space mean speed in outer lanes, $S_0 = 61.3$ mph

Space mean speed for all vehicles, $S = 57.9$ mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	3/31/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Off-Ramp
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	7272	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	928	vph
Length of first accel/decel lane	1400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	7272		928				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2020		258				v
Trucks and buses	0		0				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	1.000		1.000				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	8080		1031				pcph

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P = 0.436 Using Equation 8

$$v_{12}^{FD} = v_R + (v_F - v_R) P_{FD} = 4104 \quad pc/h$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8080	9400	No
v_{12}	4104	4400	No
$v_{FO} = v_F - v_R$	7049	9400	No
v_R	1031	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = 26.9$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $D_S = 0.261$

Space mean speed in ramp influence area, $S_R = 59$ mph

Space mean speed in outer lanes, $S_0 = 67.5$ mph

Space mean speed for all vehicles, $S = 62.9$ mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	3/31/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Onramp
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	7107	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	214	vph
Length of first accel/decel lane	1860	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7107	214		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	1974	59		v
Trucks and buses	0	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	1.000	1.000		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	7897	238		pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P = 0.565 Using Equation 4

$$v_{12}^{FM} = v_F (P_{FM}) = 4463 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8135	9400	No
v_{R12}	4701	4600	Yes

Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 30.4 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 0.546	
Space mean speed in ramp influence area,	S_R = 52.5	mph
Space mean speed in outer lanes,	S_0 = 60.6	mph
Space mean speed for all vehicles,	S = 55.6	mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	3/31/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Off-Ramp
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	7631	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	195	vph
Length of first accel/decel lane	3250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	7631		195				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2120		54				v
Trucks and buses	0		0				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	1.000		1.000				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	8479		217				pcph

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P = 0.436 Using Equation 8

$$v_{12}^{FD} = v_R + (v_F - v_R) P_{FD} = 3819 \quad pc/h$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8479	9400	No
v_{12}	3819	4400	No
$v_{FO} = v_F - v_R$	8262	9400	No
v_R	217	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = 7.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, $D_S = 0.188$

Space mean speed in ramp influence area, $S_R = 61$ mph

Space mean speed in outer lanes, $S_0 = 66.1$ mph

Space mean speed for all vehicles, $S = 63.6$ mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	3/31/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	7808	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	802	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7808	802		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2169	223		v
Trucks and buses	0	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	1.000	1.000		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	8676	891		pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P = 0.505 Using Equation 4

$$v_{12}^{FM} = v_F (P_{FM}) = 4380 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9567	9400	Yes
v_{R12}	5271	4600	Yes

Level of Service Determination (if not F)

$$\text{Density, } D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 33.9 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 0.864	
Space mean speed in ramp influence area,	S_R = 45.1	mph
Space mean speed in outer lanes,	S_0 = 59.1	mph
Space mean speed for all vehicles,	S = 50.5	mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	3/31/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Off-Ramp
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6325	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	420	vph
Length of first accel/decel lane	1400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	6325		420				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	1757		117				v
Trucks and buses	0		0				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	1.000		1.000				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	7028		467				pcph

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P = 0.436 Using Equation 8

$$v_{12}^{FD} = v_R + (v_F - v_R) P_{FD} = 3328 \quad pc/h$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7028	9400	No
v_{12}	3328	4400	No
$v_{FO} = v_F - v_R$	6561	9400	No
v_R	467	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = 20.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	$D_S = 0.210$	
Space mean speed in ramp influence area,	$S_R = 60$	mph
Space mean speed in outer lanes,	$S_0 = 68.0$	mph
Space mean speed for all vehicles,	$S = 64.0$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	3/31/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Onramp
Jurisdiction:	
Analysis Year:	Existing 2007
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6181	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	364	vph
Length of first accel/decel lane	1860	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6181	364		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	1717	101		v
Trucks and buses	0	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	1.000	1.000		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	6868	404		pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P = 0.544 Using Equation 4

$$v_{12}^{FM} = v_F (P_{FM}) = 3739 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7272	9400	No
v_{R12}	4143	4600	No

Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 25.9 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.362$

Space mean speed in ramp influence area, $S_R = 56.7$ mph

Space mean speed in outer lanes, $S_0 = 61.2$ mph

Space mean speed for all vehicles, $S = 58.5$ mph

2012 RAMP LOS WORKSHEETS

SB Off Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	7491	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	969	vph
Length of first accel/decel lane	1400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	7491		969				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2081		269				v
Trucks and buses	5		5				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	0.976		0.976				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	8531		1104				pcph

SB Off Ramp AM

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4342 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8531	9400	No
v_{12}	4342	4400	No
$v_{FO} = v_F - v_R$	7427	9400	No
v_R	1104	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 29.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.267

Space mean speed in ramp influence area, S_R = 59 mph

Space mean speed in outer lanes, S_0 = 67.0 mph

Space mean speed for all vehicles, S = 62.6 mph

NB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6433	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	465	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6433	465		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	1787	129		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	7326	530		pcph

NB On Ramp AM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.550 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4029 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7856	9400	No
v_{R12}	4559	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 28.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.477

Space mean speed in ramp influence area, S_R = 54.0 mph

Space mean speed in outer lanes, S_0 = 60.9 mph

Space mean speed for all vehicles, S = 56.7 mph

NB Off Ramp AM

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Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6287	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	424	vph
Length of first accel/decel lane	3250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	6287		424			vph
Peak-hour factor, PHF	0.90		0.90			
Peak 15-min volume, v15	1746		118			v
Trucks and buses	5		5			%
Recreational vehicles	0		0			%
Terrain type:	Level		Level		Level	
Grade	0.00	%	0.00	%		%
Length	0.00	mi	0.00	mi		mi
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			
Heavy vehicle adjustment, fHV	0.976		0.976			
Driver population factor, fP	1.00		1.00			

NB Off Ramp AM

Flow rate, vp 7160 483 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3394 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7160	9400	No
v_{12}	3394	4400	No
$v_{FO} = v_F - v_R$	6677	9400	No
v_R	483	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 4.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, D_S = 0.211

Space mean speed in ramp influence area, S_R = 60 mph

Space mean speed in outer lanes, S_0 = 67.9 mph

Space mean speed for all vehicles, S = 64.0 mph

SB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Onramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	7321	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	244	vph
Length of first accel/decel lane	1860	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7321	244		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2034	68		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	8338	278		pcph

SB On Ramp AM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.560 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4670 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8616	9400	No
v_{R12}	4948	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 32.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 0.666	
Space mean speed in ramp influence area,	S_R = 49.7	mph
Space mean speed in outer lanes,	S_0 = 60.2	mph
Space mean speed for all vehicles,	S = 53.7	mph

5A-Diamond NB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6433	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	56	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6433	56		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	1787	16		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

5A-Diamond NB On Ramp AM

Flow rate, vp 7326 64 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.608 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4455 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7390	9400	No
v_{R12}	4519	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 28.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.463

Space mean speed in ramp influence area, S_R = 54.4 mph

Space mean speed in outer lanes, S_0 = 61.6 mph

Space mean speed for all vehicles, S = 57.0 mph

5A-Loop NB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6433	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	409	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6433	409		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	1787	114		v
Trucks and buses	0	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	1.000	1.000		
Driver population factor, fP	1.00	1.00		

5A-Loop NB On Ramp AM

Flow rate, vp 7148 454 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.559 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 3999 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7602	9400	No
v_{R12}	4453	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 27.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.440

Space mean speed in ramp influence area, S_R = 54.9 mph

Space mean speed in outer lanes, S_0 = 61.1 mph

Space mean speed for all vehicles, S = 57.3 mph

Alt 7 Loop Ramp AM
HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	Alt 7 NB Loop-Ramp

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6433	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	465	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6433	465		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	1787	129		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	7326	530		pcph

Alt 7 Loop Ramp AM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.550 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4029 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7856	9400	No
v_{R12}	4559	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 28.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.477	
Space mean speed in ramp influence area,	S_R = 54.0	mph
Space mean speed in outer lanes,	S_0 = 60.9	mph
Space mean speed for all vehicles,	S = 56.7	mph

SB Off Ramp PM
HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6515	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	470	vph
Length of first accel/decel lane	1400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	6515		470				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	1810		131				v
Trucks and buses	5		5				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	0.976		0.976				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	7420		535				pcph

SB Off Ramp PM

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3537 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7420	9400	No
v_{12}	3537	4400	No
$v_{FO} = v_F - v_R$	6885	9400	No
v_R	535	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 22.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.216

Space mean speed in ramp influence area, S_R = 60 mph

Space mean speed in outer lanes, S_0 = 67.6 mph

Space mean speed for all vehicles, S = 63.8 mph

NB On Ramp PM
HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8043	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	853	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8043	853		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2234	237		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	9160	971		pcph

NB On Ramp PM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.495 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4532 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	10131	9400	Yes
v_{R12}	5503	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 35.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.062

Space mean speed in ramp influence area, S_R = 40.6 mph

Space mean speed in outer lanes, S_0 = 58.4 mph

Space mean speed for all vehicles, S = 47.1 mph

NB Off Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	7860	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	208	vph
Length of first accel/decel lane	3250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	7860		208				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2183		58				v
Trucks and buses	5		5				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	0.976		0.976				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	8952		237				pcph

NB Off Ramp PM

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4037 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8952	9400	No
v_{12}	4037	4400	No
$v_{FO} = v_F - v_R$	8715	9400	No
v_R	237	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 9.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, D_S = 0.189

Space mean speed in ramp influence area, S_R = 61 mph

Space mean speed in outer lanes, S_0 = 65.6 mph

Space mean speed for all vehicles, S = 63.3 mph

SB On Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Onramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	6367	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	388	vph
Length of first accel/decel lane	1860	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6367	388		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	1769	108		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

SB On Ramp PM

Flow rate, vp 7251 442 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.540 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 3913 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7693	9400	No
v_{R12}	4355	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 27.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.420

Space mean speed in ramp influence area, S_R = 55.3 mph

Space mean speed in outer lanes, S_O = 60.8 mph

Space mean speed for all vehicles, S = 57.6 mph

5A- Loop NB On Ramp PM
HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8043	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	814	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8043	814		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2234	226		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	9160	927		pcph

5A- Loop NB On Ramp PM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.500 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4583 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	10087	9400	Yes
v_{R12}	5510	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 35.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.069	
Space mean speed in ramp influence area,	S_R = 40.4	mph
Space mean speed in outer lanes,	S_0 = 58.6	mph
Space mean speed for all vehicles,	S = 47.0	mph

5A- Diamond NB On Ramp PM
HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8043	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	39	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8043	39		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2234	11		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	9160	44		pcph

5A- Diamond NB On Ramp PM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.611 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 5594 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9204	9400	No
v_{R12}	5638	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 37.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.200

Space mean speed in ramp influence area, S_R = 37.4 mph

Space mean speed in outer lanes, S_0 = 60.4 mph

Space mean speed for all vehicles, S = 43.9 mph

Alt 7 Loop Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2012
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8043	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	853	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8043	853		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2234	237		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	9160	971		pcph

Alt 7 Loop Ramp PM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.495 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4532 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	10131	9400	Yes
v_{R12}	5503	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 35.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.062	
Space mean speed in ramp influence area,	S_R = 40.6	mph
Space mean speed in outer lanes,	S_0 = 58.4	mph
Space mean speed for all vehicles,	S = 47.1	mph

2040 RAMP LOS WORKSHEETS (8 LANE)

SB Off Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	9527	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	1222	vph
Length of first accel/decel lane	1400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	9527		1222				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2646		339				v
Trucks and buses	5		5				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	0.976		0.976				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	10850		1392				pcph

SB Off Ramp AM

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 5516 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	10850	9400	Yes
v_{12}	5516	4400	Yes
$v_{FO} = v_F - v_R$	9458	9400	No
v_R	1392	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 39.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.293

Space mean speed in ramp influence area, S_R = 58 mph

Space mean speed in outer lanes, S_0 = 64.8 mph

Space mean speed for all vehicles, S = 61.3 mph

NB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8181	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	568	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8181	568		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2273	158		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

NB On Ramp AM

Flow rate, vp 9317 647 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.535 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4987 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9964	9400	Yes
v_{R12}	5634	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 36.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.196	
Space mean speed in ramp influence area,	S_R = 37.5	mph
Space mean speed in outer lanes,	S_0 = 59.0	mph
Space mean speed for all vehicles,	S = 44.6	mph

NB Off Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	7995	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	519	vph
Length of first accel/decel lane	3250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	7995		519				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2221		144				v
Trucks and buses	5		5				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	0.976		0.976				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	9105		591				pcph

NB Off Ramp AM

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4303 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	9105	9400	No
v_{12}	4303	4400	No
$v_{FO} = v_F - v_R$	8514	9400	No
v_R	591	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 12.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.221

Space mean speed in ramp influence area, S_R = 60 mph

Space mean speed in outer lanes, S_0 = 65.8 mph

Space mean speed for all vehicles, S = 62.9 mph

SB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	9311	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	283	vph
Length of first accel/decel lane	1860	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	9311	283		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2586	79		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	10604	322		pcph

SB On Ramp AM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.555 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 5881 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	10926	9400	Yes
v_{R12}	6203	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 42.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 2.044	
Space mean speed in ramp influence area,	S_R = 18.0	mph
Space mean speed in outer lanes,	S_0 = 58.1	mph
Space mean speed for all vehicles,	S = 25.6	mph

5A- Loop NB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8181	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	512	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8181	512		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2273	142		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	9317	583		pcph

5A- Loop NB On Ramp AM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.543 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 5062 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9900	9400	Yes
v_{R12}	5645	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 36.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.208	
Space mean speed in ramp influence area,	S_R = 37.2	mph
Space mean speed in outer lanes,	S_0 = 59.1	mph
Space mean speed for all vehicles,	S = 44.3	mph

5 - Diamond NB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8181	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	56	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8181	56		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2273	16		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

5 - Diamond NB On Ramp AM

Flow rate, vp 9317 64 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.608 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 5666 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9381	9400	No
v_{R12}	5730	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 37.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.306	
Space mean speed in ramp influence area,	S_R = 35.0	mph
Space mean speed in outer lanes,	S_0 = 60.2	mph
Space mean speed for all vehicles,	S = 41.8	mph

Alt 7 - NB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8181	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	568	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8181	568		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2273	158		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

Alt 7 - NB On Ramp AM

Flow rate, vp 9317 647 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.535 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4987 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9964	9400	Yes
v_{R12}	5634	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 36.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.196	
Space mean speed in ramp influence area,	S_R = 37.5	mph
Space mean speed in outer lanes,	S_0 = 59.0	mph
Space mean speed for all vehicles,	S = 44.6	mph

SB Off Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8286	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	574	vph
Length of first accel/decel lane	1400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	8286		574				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2302		159				v
Trucks and buses	5		5				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	0.976		0.976				
Driver population factor, fP	1.00		1.00				

SB Off Ramp PM

Flow rate, vp 9437 654 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4483 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	9437	9400	Yes
v_{12}	4483	4400	Yes
$v_{FO} = v_F - v_R$	8783	9400	No
v_R	654	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 30.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.227

Space mean speed in ramp influence area, S_R = 60 mph

Space mean speed in outer lanes, S_0 = 65.5 mph

Space mean speed for all vehicles, S = 62.7 mph

NB On Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	10229	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	1069	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	10229	1069		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2841	297		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	11650	1217		pcph

NB On Ramp PM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.464 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 5406 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	12867	9400	Yes
v_{R12}	6623	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 44.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 3.038

Space mean speed in ramp influence area, S_R = mph

Space mean speed in outer lanes, S_0 = 53.5 mph

Space mean speed for all vehicles, S = 110.3 mph

NB Off Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	9997	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	247	vph
Length of first accel/decel lane	3250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	9997		247				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2777		69				v
Trucks and buses	5		5				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	0.976		0.976				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	11385		281				pcph

NB Off Ramp PM

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 5122 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	11385	9400	Yes
v_{12}	5122	4400	Yes
$v_{FO} = v_F - v_R$	11104	9400	No
v_R	281	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 19.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	D_S = 0.193	
Space mean speed in ramp influence area,	S_R = 61	mph
Space mean speed in outer lanes,	S_0 = 63.0	mph
Space mean speed for all vehicles,	S = 61.9	mph

SB On Ramp PM
HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8098	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	472	vph
Length of first accel/decel lane	1860	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8098	472		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2249	131		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	9223	538		pcph

SB On Ramp PM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.528 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4866 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9761	9400	Yes
v_{R12}	5404	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 35.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 0.983	
Space mean speed in ramp influence area,	S_R = 42.4	mph
Space mean speed in outer lanes,	S_0 = 59.0	mph
Space mean speed for all vehicles,	S = 48.5	mph

5A- Loop NB On Ramp PM
HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	10229	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	1030	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	10229	1030		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2841	286		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	11650	1173		pcph

5A- Loop NB On Ramp PM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.470 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 5470 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	12823	9400	Yes
v_{R12}	6643	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 44.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 3.098

Space mean speed in ramp influence area, S_R = mph

Space mean speed in outer lanes, S_0 = 53.7 mph

Space mean speed for all vehicles, S = 111.5 mph

5A- Diamond NB On Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	10229	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	39	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	10229	39		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2841	11		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

5A- Diamond NB On Ramp PM

Flow rate, vp 11650 44 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.611 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 7114 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	11694	9400	Yes
v_{R12}	7158	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 49.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 5.114

Space mean speed in ramp influence area, S_R = mph

Space mean speed in outer lanes, S_0 = 58.6 mph

Space mean speed for all vehicles, S = 151.2 mph

Alt 7 - NB On Ramp PM
HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	65.0	mph
Volume on freeway	10229	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	1069	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	10229	1069		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2841	297		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	11650	1217		pcph

Alt 7 - NB On Ramp PM

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.464 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 5406 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	12867	9400	Yes
v_{R12}	6623	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 44.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 3.038

Space mean speed in ramp influence area, S_R = mph

Space mean speed in outer lanes, S_0 = 53.5 mph

Space mean speed for all vehicles, S = 110.3 mph

2040 RAMP LOS WORKSHEETS (10 LANE)

NB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8181	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	568	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8181	568		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2273	158		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

NB On Ramp AM

Flow rate, vp 9317 647 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.535 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 3649 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7464	11750	No
v_{R12}	4296	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 26.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.391

Space mean speed in ramp influence area, S_R = 56.0 mph

Space mean speed in outer lanes, S_0 = 61.1 mph

Space mean speed for all vehicles, S = 58.1 mph

SB Off Ramp AM (1lane)

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	9527	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	1222	vph
Length of first accel/decel lane	1400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	9527		1222				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2646		339				v
Trucks and buses	5		5				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	0.976		0.976				
Driver population factor, fP	1.00		1.00				

SB Off Ramp AM (1lane)

Flow rate, vp 10850 1392 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4570 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8680	9400	No
v_{12}	4570	4400	Yes
$v_{FO} = v_F - v_R$	7288	9400	No
v_R	1392	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 31.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.293

Space mean speed in ramp influence area, S_R = 58 mph

Space mean speed in outer lanes, S_0 = 67.2 mph

Space mean speed for all vehicles, S = 62.2 mph

Alt 5- Loop NB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8181	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	512	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8181	512		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2273	142		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

Alt 5- Loop NB On Ramp AM

Flow rate, vp 9317 583 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.543 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 3704 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7400	11750	No
v_{R12}	4287	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 26.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.389	
Space mean speed in ramp influence area,	S_R = 56.1	mph
Space mean speed in outer lanes,	S_0 = 61.2	mph
Space mean speed for all vehicles,	S = 58.1	mph

Alt 7 - NB On Ramp AM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	AM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8181	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	568	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8181	568		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2273	158		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

Alt 7 - NB On Ramp AM

Flow rate, vp 9317 647 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.535 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 3649 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7464	11750	No
v_{R12}	4296	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 26.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.391	
Space mean speed in ramp influence area,	S_R = 56.0	mph
Space mean speed in outer lanes,	S_0 = 61.1	mph
Space mean speed for all vehicles,	S = 58.1	mph

NB On Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	10229	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	1069	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	10229	1069		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2841	297		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

NB On Ramp PM

Flow rate, vp 11650 1217 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.464 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4246 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	10367	11750	No
v_{R12}	5463	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 35.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.024	
Space mean speed in ramp influence area,	S_R = 41.4	mph
Space mean speed in outer lanes,	S_0 = 57.6	mph
Space mean speed for all vehicles,	S = 47.8	mph

SB Off Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8286	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	574	vph
Length of first accel/decel lane	1400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	8286		574				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2302		159				v
Trucks and buses	5		5				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	0.976		0.976				
Driver population factor, fP	1.00		1.00				

SB Off Ramp PM

Flow rate, vp 9437 654 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3661 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7550	9400	No
v_{12}	3661	4400	No
$v_{FO} = v_F - v_R$	6896	9400	No
v_R	654	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 23.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.227

Space mean speed in ramp influence area, S_R = 60 mph

Space mean speed in outer lanes, S_0 = 67.6 mph

Space mean speed for all vehicles, S = 63.6 mph

SB On Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 SB
Junction:	SB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	8098	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	472	vph
Length of first accel/decel lane	1860	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8098	472		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2249	131		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

SB On Ramp PM

Flow rate, vp 9223 538 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.528 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 3547 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7261	11750	No
v_{R12}	4085	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 25.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.348

Space mean speed in ramp influence area, S_R = 57.0 mph

Space mean speed in outer lanes, S_0 = 61.1 mph

Space mean speed for all vehicles, S = 58.7 mph

NB Off Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Off-Ramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	9997	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	247	vph
Length of first accel/decel lane	3250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	9997		247				vph
Peak-hour factor, PHF	0.90		0.90				
Peak 15-min volume, v15	2777		69				v
Trucks and buses	5		5				%
Recreational vehicles	0		0				%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%		%	
Length	0.00	mi	0.00	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				
Heavy vehicle adjustment, fHV	0.976		0.976				
Driver population factor, fP	1.00		1.00				
Flow rate, vp	11385		281				pcph

NB Off Ramp PM

Estimation of V12 Diverge Areas

L_{EQ} = 0.00 (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4130 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	9108	9400	No
v_{12}	4130	4400	No
$v_{FO} = v_F - v_R$	8827	9400	No
v_R	281	2200	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 10.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.193

Space mean speed in ramp influence area, S_R = 61 mph

Space mean speed in outer lanes, S_0 = 65.5 mph

Space mean speed for all vehicles, S = 63.2 mph

5A- Diamond NB On Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	10229	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	39	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	10229	39		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2841	11		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

5A- Diamond NB On Ramp PM

Flow rate, vp 11650 44 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.611 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 5588 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9194	11750	No
v_{R12}	5632	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 37.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.194	
Space mean speed in ramp influence area,	S_R = 37.5	mph
Space mean speed in outer lanes,	S_0 = 60.4	mph
Space mean speed for all vehicles,	S = 44.0	mph

5A- Loop NB On Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	10229	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	1030	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	10229	1030		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2841	286		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

5A- Loop NB On Ramp PM

Flow rate, vp 11650 1173 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.470 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4296 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	10323	11750	No
v_{R12}	5469	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 35.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.030	
Space mean speed in ramp influence area,	S_R = 41.3	mph
Space mean speed in outer lanes,	S_0 = 57.7	mph
Space mean speed for all vehicles,	S = 47.7	mph

Alt 7 - NB On Ramp PM

HCS2000: Ramps and Ramp Junctions Release 4.1a

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	NDS
Agency/Co.:	
Date performed:	4/21/2009
Analysis time period:	PM Peak
Freeway/dir or travel:	101 NB
Junction:	NB Onramp
Jurisdiction:	
Analysis Year:	Future 2040
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	65.0	mph
Volume on freeway	10229	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	1069	vph
Length of first accel/decel lane	1965	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	10229	1069		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	2841	297		v
Trucks and buses	5	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.976		
Driver population factor, fP	1.00	1.00		

Alt 7 - NB On Ramp PM

Flow rate, vp 11650 1217 pcph

Estimation of V12 Merge Areas

L_{EQ} = 0.00 (Equation 25-2 or 25-3)

P_{FM} = 0.464 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 4246 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	10367	11750	No
v_{R12}	5463	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 35.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.024	
Space mean speed in ramp influence area,	S_R = 41.4	mph
Space mean speed in outer lanes,	S_0 = 57.6	mph
Space mean speed for all vehicles,	S = 47.8	mph