

**TRAFFIC TECHNICAL REPORT  
FOR THE  
I-405/AVALON BOULEVARD INTERCHANGE  
IMPROVEMENT PROJECT  
PROJECT REPORT  
AND  
INITIAL STUDY/ENVIRONMENTAL ASSESSMENT**

DECEMBER 2007

PREPARED FOR  
CITY OF CARSON

PREPARED BY



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Prepared for:

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## I. INTRODUCTION

This technical report summarizes the traffic analyses conducted by Fehr & Peers/Kaku Associates in support of the Project Report (PR) and Initial Study/Environmental Assessment (IS/EA) for the Interstate 405 (I-405) freeway improvement project at Avalon Boulevard in the City of Carson, California.

The project is in the City of Carson in the County of Los Angeles. It lies approximately 1.36 miles southeast (south by route orientation) of the I-405 interchange with Main Street and 0.69 miles northwest (north by route orientation) of the interchange with Carson Street.

Figure 1 illustrates the project location and the study area. As indicated in the figure, the interchange includes an I-405 northbound off-ramp (single lane, northbound turn only), and a northbound on-ramp (two lanes with accommodation for both northbound and southbound travelers on Avalon Boulevard). It also includes an I-405 southbound off-ramp (two lanes opening into two northbound turn lanes and one southbound turn lane at Avalon Boulevard), and a southbound loop on-ramp that serves southbound Avalon Boulevard only.

The report begins by describing existing traffic conditions within the project study area. The methodologies utilized to develop future traffic forecasts, and the resultant forecasts, are then presented. Finally, the impact of the project alternatives on forecast future traffic conditions are evaluated. Four types of analyses are presented: intersection level of service (LOS), freeway ramp operations, freeway mainline level of service, and queuing.

A Supplemental Project Study Report (SPSR) was prepared for the subject project (EA 07186 – 23390K) and approved in March 2003.

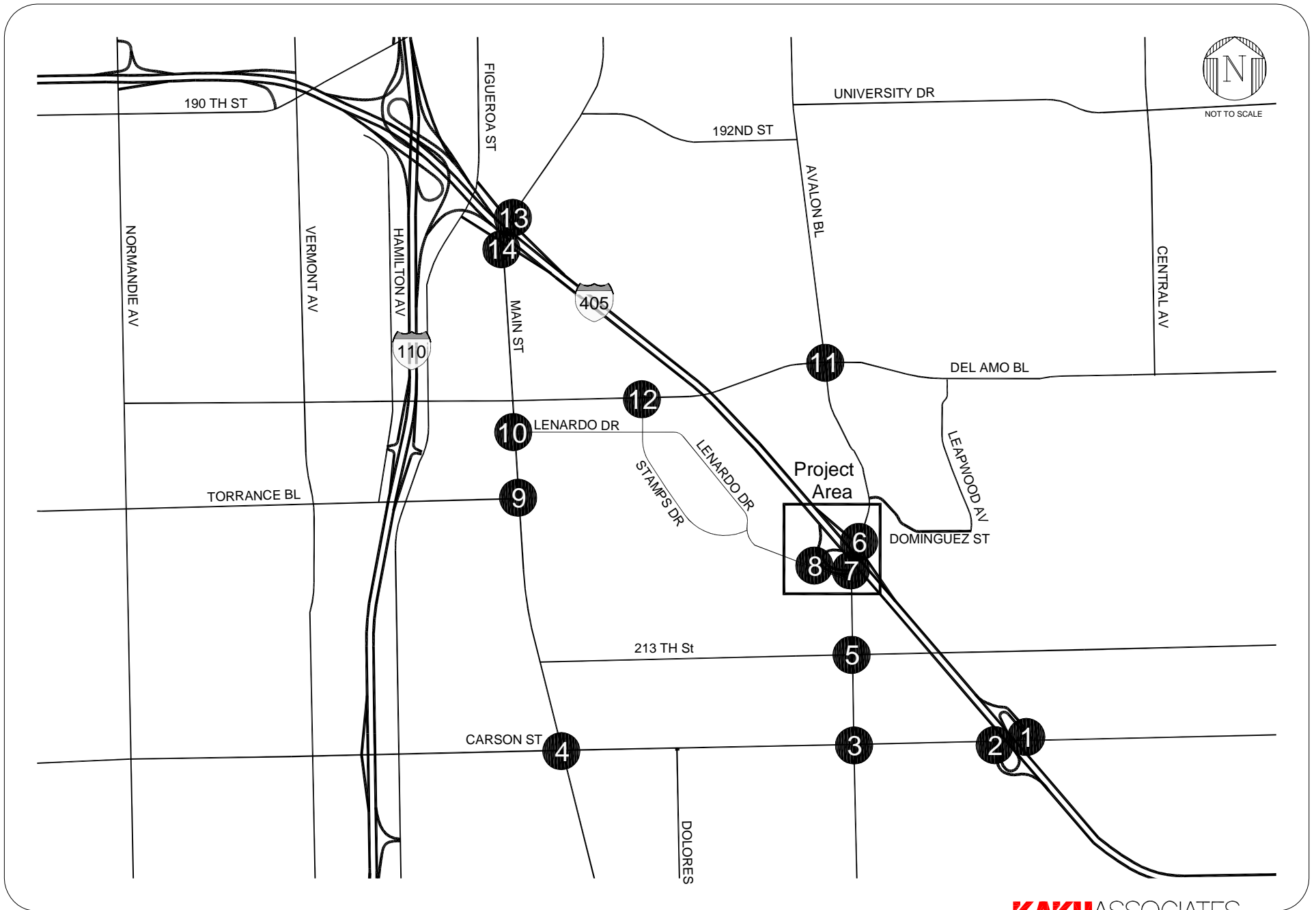


FIGURE 1  
PROJECT LOCATION AND STUDY AREA

## **PROJECT SCENARIOS**

Two project scenarios are analyzed in this report.

### **No Build Alternative**

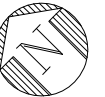
If the project were not built, there would be no alterations to the existing interchange. The No Build Alternative would include regional growth and other cumulative projects in the area including development on the Carson Marketplace project site but with only two access locations (to Del Amo Boulevard and to Main Street) because Lenardo Drive would not be extended to Avalon Boulevard (which would provide direct access to the Carson Marketplace site in the Build Alternative). Proposed transportation improvements described in the Carson Marketplace Project Environmental Impact Report at other study intersections are assumed to be in place in the No Build Alternative.

### **Build Alternative**

The proposed Build Alternative would improve the configuration of the existing interchange of Avalon Boulevard at I-405. As illustrated in Figure 2, the interchange would be redesigned to link the site of the Carson Marketplace project to the interchange and Avalon Boulevard with an extension of Lenardo Drive to Avalon Boulevard. The existing southbound ramps lying between the Carson Marketplace site and Avalon Boulevard would be realigned and a new southbound on-ramp would be provided east of Avalon Boulevard. In addition, the northbound on- and off-ramps would be improved to increase their capacity and turning movements. Minor modifications would be made along Avalon Boulevard to provide an appropriate interface with the new ramps. Following is a brief description of the improvements proposed:

- Lenardo Drive would be extended to intersect with Avalon Boulevard where a new I-405 southbound on-ramp is proposed as an east leg to the intersection. Following is the lane configuration proposed at the Avalon Boulevard/Lenardo Drive intersection:
  - Southbound Avalon Boulevard lane configuration of two through lanes and one right-turn lane.





NOT TO SCALE



SOURCE: DMJM HARRIS|AECOM

FIGURE 2  
PROPOSED PROJECT PLAN

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- Northbound Avalon Boulevard lane configuration of one left-turn lane, one through lane, and one shared through/right-turn lane for traffic onto the new I-405 southbound on-ramp.
  - Eastbound Lenardo Drive lane configuration of two left-turn lanes, one through lane, one shared through/right-turn lane, and one free-flow right-turn lane.
- The existing I-405 southbound on- and off-ramps are proposed to intersect Lenardo Drive as the north leg of a proposed new 'T' intersection. Following is the lane configuration proposed at the I-405 southbound ramps/Lenardo Drive intersection:
    - Southbound off-ramp lane configuration of two left-turn lanes and a right-turn lane.
    - Westbound Lenardo lane configuration of two through lanes and one free-flow right-turn lane.
    - Eastbound Lenardo lane configuration of three through lanes.
  - A part of the proposed improvements at the Avalon Boulevard interchange with I-405 is to provide left-turn capability from the I-405 northbound off-ramp to southbound Avalon Boulevard. Following is the lane configuration proposed at the Avalon Boulevard/I-405 northbound ramps intersection:
    - Southbound Avalon lane configuration of three through lanes and an exclusive right-turn lane onto the I-405 northbound on-ramp.
    - Northbound I-405 off-ramp lane configuration of two left-turn lanes and one free-flow right-turn lane.
    - Northbound Avalon lane configuration of two left-turn lanes and two through lanes.

## STUDY AREA

Figure 1 illustrates the location of the project and the intersections analyzed in this document:

- I-405 northbound ramps & Carson Street
- I-405 southbound ramps & Carson Street
- Avalon Boulevard & Carson Street
- Main Street & Carson Street
- Avalon Boulevard & 213<sup>th</sup> Street
- Avalon Boulevard & I-405 northbound ramps
- Avalon Boulevard & Lenardo Drive/I-405 southbound on-ramp
- I-405 southbound ramps & Lenardo Drive (future project intersection)
- Main Street & Torrance Boulevard
- Main Street & Lenardo Drive (future Carson Marketplace intersection)
- Avalon Boulevard & Del Amo Boulevard
- Stamps Drive & Del Amo Boulevard (future Carson Marketplace intersection)

- Main Street & I-405 northbound ramps
- Main Street & I-405 southbound ramps

Freeway LOS analysis was conducted for the following freeway mainline segments:

- I-405 northbound – Carson Street to Avalon Boulevard
- I-405 northbound – Avalon Boulevard to Main Street
- I-405 southbound – Main Street to Avalon Boulevard
- I-405 southbound – Avalon Boulevard to Carson Street

The following freeway ramps were analyzed for ramp-freeway junction areas of influence:

- I-405 northbound off-ramp at Main Street
- I-405 southbound on-ramp at Main Street
- I-405 southbound off-ramp at Lenardo Street
- I-405 southbound on-ramp at Avalon Boulevard
- I-405 northbound on-ramp at Avalon Boulevard
- I-405 northbound off-ramp at Avalon Boulevard
- I-405 southbound on-ramp at Carson Street
- I-405 southbound off-ramp at Carson Street
- I-405 northbound on-ramp at Carson Street
- I-405 northbound off-ramp at Carson Street

Finally, freeway-weaving analysis was conducted for the following freeway segments:

- Northbound – Carson Street to Avalon Boulevard
- Southbound – Avalon Boulevard to Carson Street

## **TRAFFIC ANALYSIS YEARS**

The following traffic scenarios are analyzed in the report:

- Existing (2006) conditions
- Opening year (2010) conditions, No Build Alternative
- Opening year (2010) conditions, Build Alternative
- Design year (2030) conditions, No Build Alternative
- Design year (2030) conditions, Build Alternative

In addition, construction period impacts are evaluated against projected year 2010 conditions.

## II. EXISTING TRAFFIC CONDITIONS

The assessment of existing traffic conditions involved collection of traffic volume data and conducting level of service analyses at the study intersections, ramp-weaving sections, and freeway mainline segments.

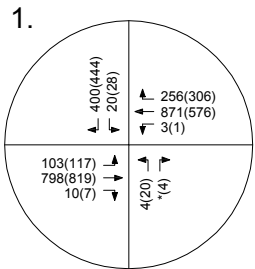
### EXISTING TRAFFIC VOLUMES

Existing AM and PM peak hour traffic volumes for analyzed intersections in the study area were obtained from the Draft Environmental Impact Report for the Carson Marketplace project (October 2005). These traffic volumes were factored up at a rate of 0.5% per year for one year to represent 2006 conditions. Figure 3 illustrates existing (2006) AM and PM peak hour traffic volumes at the analyzed intersections.

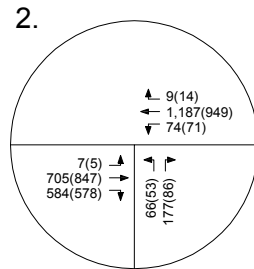
Figure 4 illustrates the freeway traffic volume data for the I-405 freeway analyzed segment and ramp locations. This existing freeway traffic volume data was obtained from the California Department of Transportation (Caltrans). The traffic volumes do not include the high occupancy vehicle (HOV) lane volume data. Caltrans count data for the freeway mainline are included in Appendix A.

### EXISTING LEVEL OF SERVICE ANALYSIS

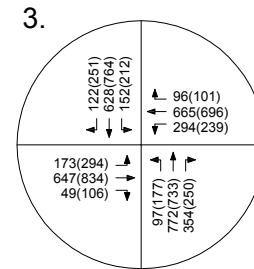
LOS analysis was conducted for the analyzed intersections, freeway mainline segments, freeway-ramp merge/diverge areas, and ramp weaving areas using the existing traffic volumes data mentioned above. The analyses were conducted using appropriate procedures from *Highway Capacity Manual 2000* (HCM) (Transportation Research Board, 2000) as implemented by the Highway Capacity Software (HCS) package. The existing lane configurations at the study intersections are diagrammed in Appendix B and the existing level of service worksheets are included in Appendix C.



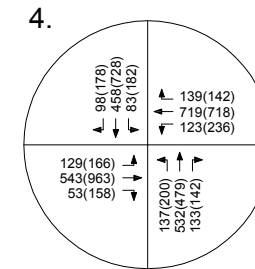
I-405 NB Ramps & Carson St



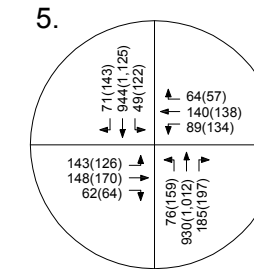
I-405 SB Ramps & Carson St



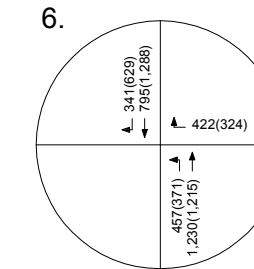
Avalon Bl & Carson St



Main St & Carson St



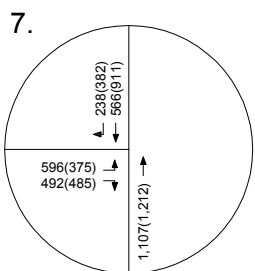
Avalon Bl & 213th St



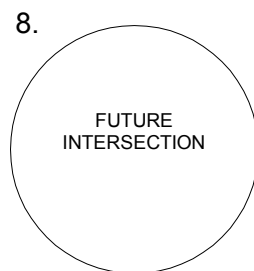
Avalon Bl & I-405 NB Ramps



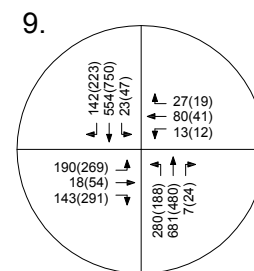
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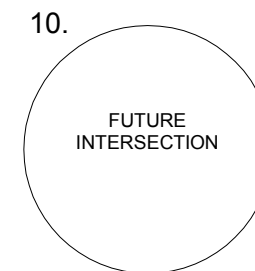
Avalon Bl & I-405 SB Ramps



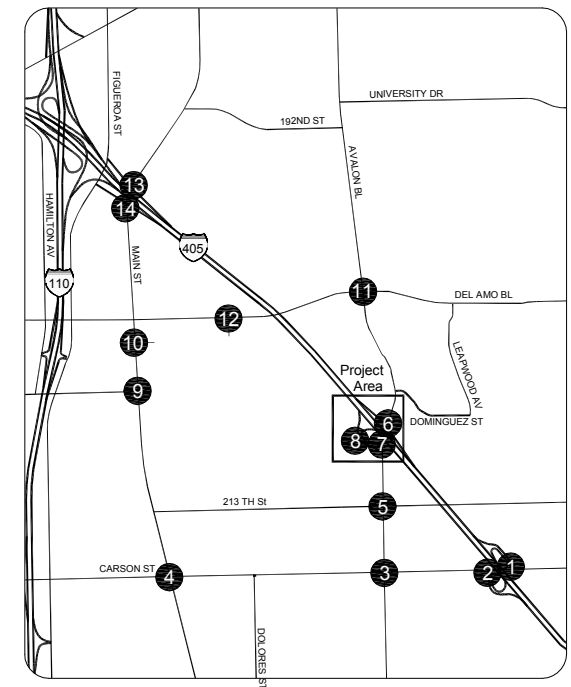
I-405 SB Ramps & Lenardo Dr



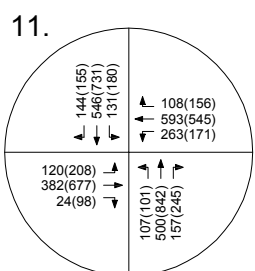
Main St & Torrance Bl



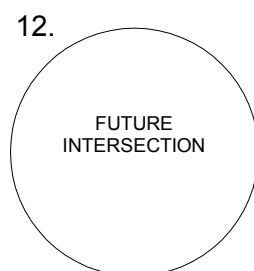
Main St & Lenardo Dr



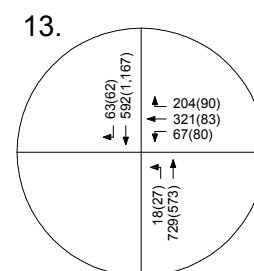
**Legend**  
 ← ##(##) Peak Hour Volumes AM(PM).



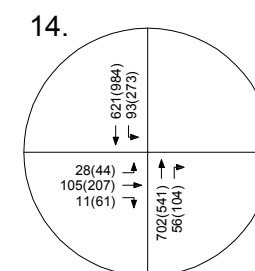
Avalon Bl & Del Amo Bl



Stamps Dr & Del Amo Bl



Main St & I-405 NB Off-Ramp

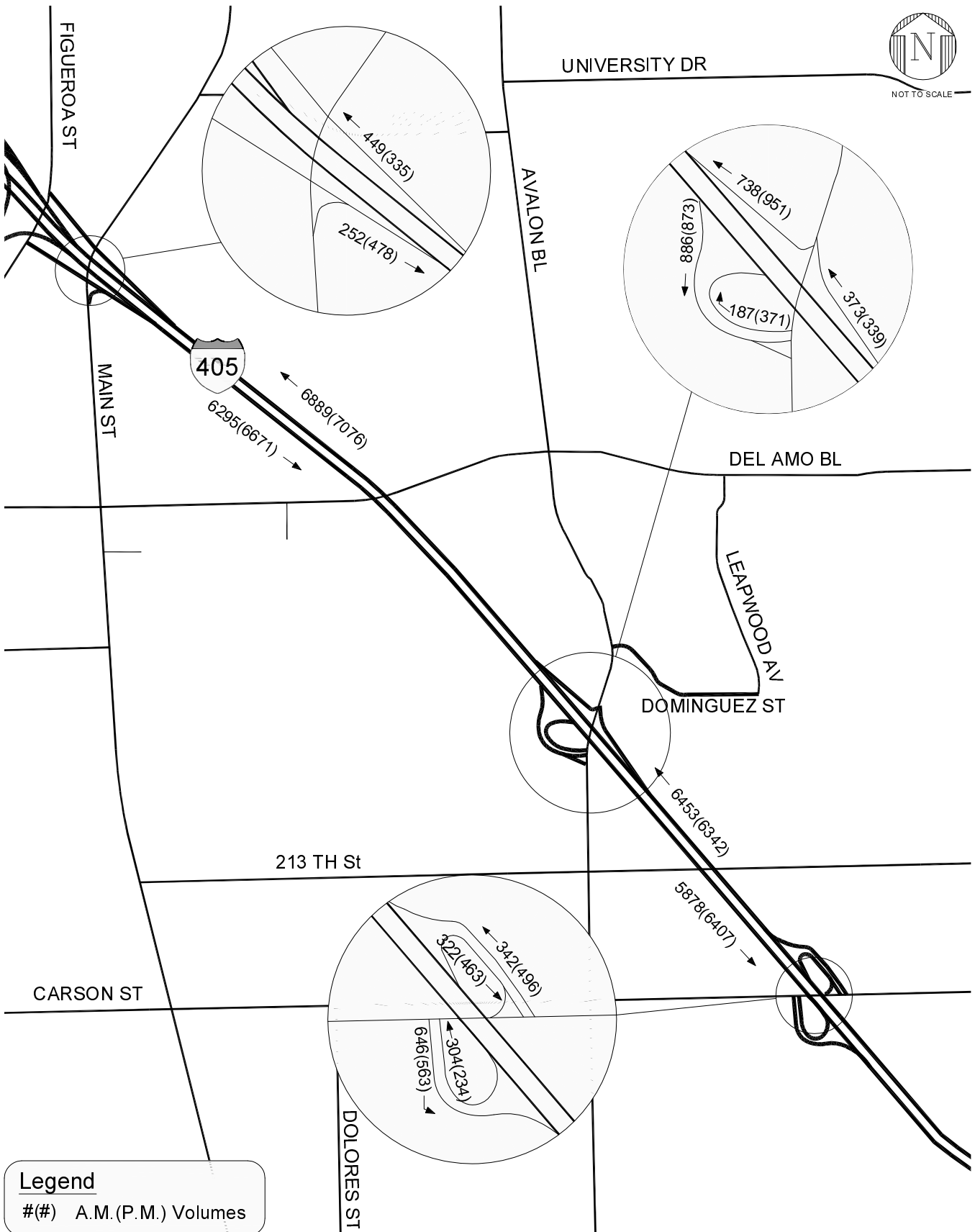


Main St & I-405 SB On-Ramp

FIGURE 3  
 EXISTING (YEAR 2006) TRAFFIC VOLUMES AT STUDY INTERSECTIONS



NOT TO SCALE



Note: Freeway mainline volumes do not include HOV lanes.

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**FIGURE 4**  
**EXISTING (YEAR 2006)**  
**TRAFFIC VOLUMES ON FREEWAY MAINLINE AND RAMPS**

### **Existing Intersection Levels of Service**

In accordance with policies established by Caltrans, the "Operational Analysis" method from HCM 2000 for signalized intersections was used to perform the intersection level of service analysis. The HCM operational method determines two key operating characteristics of signalized intersections. The first characteristic is the average stopped delay experienced per vehicle. The second is the volume-to-capacity (V/C) ratio at intersections based on the amount of traffic traveling through the intersection, the travel lane geometries, and other factors affecting capacity such as on-street parking, bus operations near the intersection, and pedestrian volumes at the street crosswalks. These characteristics are used to evaluate the operational effectiveness of each signalized intersection, which is described generally in terms of LOS.

Level of service categories range from excellent, nearly free-flow conditions at LOS A to overloaded, stop-and-go conditions at LOS F. The LOS definitions and the relationship between LOS and average control delay using the HCM methodology are provided in Table 1. The LOS definitions and the ranges of control delay shown in Table 1 represent average conditions for all vehicles at an intersection across an entire hour. Motorists on certain movements and/or during peak times experience delays longer than the average condition within the peak hour.

Table 2 presents the results of the existing intersection level of service calculations. As can be seen in the table, the study intersections are operating at LOS D or better during both the AM and PM peak hours.

### **Existing Freeway Mainline Segments Level of Service**

The HCM freeway segment methodology was used to analyze the capacity and LOS of basic freeway segments. A basic freeway segment can be characterized by three performance measures: density in terms of passenger cars per mile per lane, speed in terms of mean passenger-car speed, and V/C ratio. Each of these measures is an indication of how well the freeway is accommodating traffic flow. The measure used to provide an estimate of LOS is density. Table 3 presents the LOS thresholds for a basic freeway segment.

**TABLE 1  
LEVEL OF SERVICE DEFINITIONS FOR  
SIGNALIZED INTERSECTIONS**

Level of Service	Average Total Delay (seconds/vehicle)	Definition
A	$\leq 10.0$	This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.
B	$> 10.0$ and $\leq 20.0$	This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of delay.
C	$> 20.0$ and $\leq 35.0$	These higher delays may result from only fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a given green phase does not serve queued vehicles, and overflows occur. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.
D	$> 35.0$ and $\leq 55.0$	At this LOS, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	$> 55.0$ and $\leq 80.0$	These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent.
F	$> 80.0$	This level, considered unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of lane groups. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also contribute significantly to high delay levels.

Source: 2000 Highway Capacity Manual (Transportation Research Board, 2000).



**TABLE 2  
EXISTING (YEAR 2006) INTERSECTION LEVELS OF SERVICE**

Intersection	Peak Hour	Existing	
		Delay <sup>[1]</sup>	LOS <sup>[2]</sup>
1 Carson St & I-405 NB Ramps	AM	5.4	A
	PM	4.8	A
2 Carson St & I-405 SB Ramps	AM	6.3	A
	PM	6.7	A
3 Avalon Bl & Carson St	AM	30.4	C
	PM	42.4	D
4 Main St & Carson St	AM	25.4	C
	PM	42.5	D
5 Avalon Bl & 213th St	AM	14.7	B
	PM	17.9	B
6 Avalon Bl & I-405 NB Ramps	AM	7.0	A
	PM	7.9	A
7 Avalon Bl & I-405 SB Ramps	AM	8.9	A
	PM	6.3	A
8 Lenardo Dr & I-405 SB Ramps	AM PM	Future Intersection [3]	
9 Main St & Torrance Bl	AM	22.8	C
	PM	26.6	C
10 Main St & Lenardo Dr	AM PM	Future Intersection [4]	
11 Avalon Bl & Del Amo Bl	AM	25.1	C
	PM	30.6	C
12 Stamps Dr & Del Amo Bl	AM PM	Future Intersection [4]	
13 Main St & I-405 NB Ramps	AM	13.4	B
	PM	11.8	B
14 Main St & I-405 SB Ramps	AM	9.5	A
	PM	15.5	B

**Notes:**

- [1] Average delay in seconds per vehicle.
- [2] Delay and level of service (LOS) calculated using 2000 Highway Capacity Manual level-of-service methodology.
- [3] Intersection does not exist; to be constructed as part of I-405/Avalon interchange improvement project.
- [4] Intersection does not exist; to be constructed as part of Carson Marketplace project.

**TABLE 3  
LEVEL OF SERVICE DEFINITIONS FOR  
FREEWAY MAINLINE AND RAMP ANALYSES**

**LOS Criteria for Freeway Segments [1]**

<b>LOS</b>	<b>Density Range (pc/mi/ln)</b>
A	0-11
B	>11-18
C	>18-26
D	>26-35
E	>35-45
F	>45

**LOS Criteria for Merge and Diverge Areas [2]**

<b>LOS</b>	<b>Density Range (pc/mi/ln)</b>
A	≤ 10
B	>10-20
C	>20-28
D	>28-35
E	>35
F	Demand exceeds capacity

**LOS Criteria for Weaving Segments [3]**

<b>LOS</b>	<b>Density Range (pc/mi/ln)</b>
A	≤ 10.0
B	>10.0-20.0
C	>20.0-28.0
D	>28.0-35.0
E	>35.0-43.0
F	> 43.0

Sources:

1. Highway Capacity Manual 2000, Exhibit 23-3
2. Highway Capacity Manual 2000, Exhibit 25-4
3. Highway Capacity Manual 2000, Exhibit 24-2

Table 4 presents the results of the existing freeway mainline segments LOS using density as the measure of effectiveness. As shown in the table, the northbound segment from Avalon Boulevard to Main Street operates at LOS E during the AM peak hour and the southbound segments from Main Street to Avalon Boulevard and from Avalon Boulevard to Carson Street operate at LOS E during the PM peak hour.

Actual measured loop data provided by Caltrans from the PeMS monitoring system indicates that, in the northbound direction during the AM peak period and in the southbound direction during the PM peak period, actual speeds drop and densities increase substantially even though the observed traffic volumes are lower than in the hour preceding the peak period. This indicates that these segments are operating under oversaturated conditions or are nearing saturated conditions. The HCM basic freeway segment methodology does not simulate this condition. Therefore, in order to replicate this condition to the extent possible, the peak hour factor input to the methodology was adjusted to force a higher density and worse level of service for a given traffic volume for the AM peak hour northbound and the PM peak hour southbound. This adjustment is reflected in the data presented in Table 4.

### **Existing Freeway-Ramp Junction Areas of Influence Levels of Service**

The HCM LOS methodology for ramp-freeway junctions focuses on the operation of ramp-freeway junctions and on the characteristics of ramp roadways themselves. The LOS in merge and diverge influence areas is determined by density for all cases of stable operation, represented by LOS A through E. LOS F exists when the total flow departing from the merger area exceeds the capacity of the downstream freeway segment. Table 3 displays the LOS criteria for merge and diverge areas.

Table 4 presents the results of existing freeway-ramp junction areas of influence LOS analysis. As can be seen, except for the two locations of Avalon Boulevard northbound on-ramp and Avalon Boulevard southbound off-ramp, all other analyzed freeway-ramp junction areas along the I-405 freeway are operating at LOS D or better.

**TABLE 4  
EXISTING (YEAR 2006) FREEWAY MAINLINE AND RAMP ANALYSES**

**BASIC FREEWAY SEGMENT<sup>1</sup>**

SEGMENT	EXISTING (2006)			
	AM		PM	
	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS
Northbound - Carson St to Avalon Bl	32.6	D	28.3	D
Northbound - Avalon Bl to Main St	38.8	E	32.9	D
Southbound - Main St to Avalon Bl	28.0	D	41.7	E
Southbound - Avalon Bl to Carson St	25.9	C	38.2	E

**RAMP-FREEWAY JUNCTION AREAS OF INFLUENCE<sup>2</sup>**

RAMP	EXISTING (2006)			
	AM		PM	
	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS
Carson St northbound off-ramp	32.3	D	32.7	D
Carson St northbound on-ramp	23.8	C	23.4	C
Avalon Bl northbound off-ramp	32.7	D	32.4	D
Avalon Bl northbound on-ramp	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>
Main St northbound off-ramp	28.7	D	28.7	D
Main St southbound on-ramp	18.1	B	19.3	B
Avalon Bl southbound off-ramp	35.1	E	36.8	E
Avalon Bl southbound on-ramp	22.2	C	23.7	C
Carson St southbound off-ramp	28.1	D	31.6	D
Carson St southbound on-ramp	22.2	C	23.5	C

**FREEWAY WEAVING SEGMENT<sup>3</sup>**

SEGMENT	EXISTING (2006)			
	AM		PM	
	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS
Northbound - Carson St to Avalon Bl	80.7	F	83.1	F
Southbound - Avalon Bl to Carson St	65.9	F	75.6	F

<sup>1</sup> Basic freeway segment LOS criteria per Highway Capacity Manual, 2000, Exhibit 23-2.

<sup>2</sup> Ramp-freeway junction LOS criteria per Highway Capacity Manual, 2000, Exhibit 25-4.

<sup>3</sup> Freeway weaving segment LOS criteria per Highway Capacity Manual, 2000, Exhibit 24-2.

<sup>4</sup> Basic freeway segments, ramp junctions, and weaving areas level of service are measured with density (pc/mi/ln).

<sup>5</sup> LOS F exists when the total flow departing from the merge area exceeds the capacity of the downstream freeway segments. No density will be predicted for such cases - Exhibit 25-4, Highway Capacity Manual 2000.

### **Existing Freeway Ramp Weaving Levels of Service**

The HCM LOS methodology for weaving segments determines LOS by comparing the computed density with the criteria in Table 3. A single LOS is used to characterize total flow in the weaving segment, although it is recognized that in some situations non-weaving vehicles may achieve higher-quality operations than weaving vehicles.

Table 4 presents the results of existing freeway ramp weaving analysis. As can be seen in the table, both of the analyzed weaving segments, I-405 northbound Carson Street to Avalon Boulevard and I-405 southbound Avalon Boulevard to Carson Street, are operating at LOS F.

### III. ACCIDENT ANALYSIS

This section discusses the Traffic Accident Surveillance and Analysis System (TASAS) accident statistics obtained from Caltrans for a 1.5-mile segment of Interstate 405 including the on- and off-ramps at the Avalon Boulevard and I-405 interchange. Table 5 presents a summary of the TASAS data for the three-year period between July 1, 2002 and June 30, 2005. The table shows a comparison of the actual accident rates recorded with the statewide average rates for the following locations:

- I-405 post-mile 11.224/12.596, north of Avalon Boulevard Interchange (post-mile 11.22)
- I-405 post-mile 10.541/11.224, south of Avalon Boulevard Interchange (post-mile 11.22)
- I-405 northbound off-ramp to northbound Avalon Boulevard
- I-405 southbound on-ramp from southbound Avalon Boulevard
- I-405 northbound on-ramp from Avalon Boulevard
- I-405 southbound off-ramp from Avalon Boulevard

As can be seen in Table 5, the accident rates recorded of the I-405 mainline segments north and south of the Avalon Boulevard interchange are lower than the statewide average rates for similar facilities.

A lower accident rate than the statewide average rates was found for the following other two ramp facilities analyzed at the Avalon Boulevard interchange:

- I-405 northbound off-ramp to northbound Avalon Boulevard: A total of one accident was recorded for this location with no fatalities or injuries. The accident involved a sideswipe with the cause recorded as “other violations.”
- I-405 southbound off-ramp to Avalon Boulevard: A total of eight accidents were recorded for this location with no fatalities and one injury. The accidents recorded include two each of rear end, broadside, and “hit object” collisions, and included a sideswipe and a head-on collision. Four of the eight accidents recorded were recorded as caused by “other violation” and one each due to influence of alcohol, failure to yield, and speeding, with one accident’s cause is unknown.

**TABLE 5  
ACCIDENT RATES - 07/01/2002 THROUGH 06/30/2005**

Location	Actual Rate per MVM <sup>1</sup>			Statewide Average Rates per MVM <sup>1</sup>		
	Fatal <sup>2</sup>	F + I <sup>3</sup>	Total	Fatal <sup>2</sup>	F + I <sup>3</sup>	Total
LA 405 - PM 11.224/12.596 (North)	0.000	0.19	0.75	0.004	0.32	1.07
LA 405 - PM 10.541/11.224 (South)	0.000	0.14	0.69	0.006	0.34	1.10
LA 405 NB off to NB Avalon BI - PM 11.120	0.000	0.00	0.21	0.006	0.33	0.90
LA 405 SB on from SB Avalon BI - PM 11.276	0.228	0.23	0.91	0.003	0.32	0.85
LA 405 NB on from Avalon BI - PM 11.390	0.000	0.26	0.96	0.002	0.32	0.80
LA 405 SB off to Avalon BI - PM 11.409	0.000	0.06	0.49	0.005	0.61	1.50

Source: Caltrans District 7 TASAS Table B

<sup>1</sup> MVM - Million Vehicle Miles

<sup>2</sup> Fatality

<sup>3</sup> Fatality + Injury

Higher than average accident rates were recorded for the following two locations:

- I-405 southbound on-ramp from southbound Avalon Boulevard (fatality rate and total rate): A total of four accidents were recorded for this location during the three-year period, with one fatality and one injury. These accidents included one each of a sideswipe, a rear end, a broadside and a “hit object” accident. Two of the four accidents were caused by speeding and one by an improper turn.
- I-405 northbound on-ramp from Avalon Boulevard (total rate): A total of 15 accidents were recorded for this location during the three-year period, with no fatalities and six injuries. Two-thirds or 10 of the 15 accidents were broadsides, while the rest were rear end, “hit object,” and sideswipe. Eight of the 15 accidents were caused by “other violations,” while three were due to speeding, two were due to improper turn, one resulted from a failure to yield and one is unknown.

The new ramps and ramp modifications are designed to meet or exceed applicable Caltrans Highway Design Manual standards. Therefore, there is no reason to expect an increase in accident rates due to the proposed modifications.



## **IV. TRAFFIC FORECASTS**

This section describes the methodologies used to develop the future traffic forecasts for the I-405 improvements at Avalon Boulevard and presents the resultant forecasts. The traffic projections incorporate two components: background ambient traffic growth and traffic generated by anticipated large development projects in the vicinity of the interchange.

### **PROJECTION METHODOLOGY**

#### **Intersection and Freeway Ramps**

Caltrans procedures require that traffic analyses be conducted for the project design year (defined as 20 years beyond the implementation year). The long-term ambient growth factor for the design year traffic forecasts was developed after the review of Southern California Association of Governments (SCAG) year 2000 and 2030 travel demand model volume data. An ambient simple growth factor of 0.5% per year was derived to reflect the effects of regional growth and development by the year 2030. Adjustments based on this factor were applied to the base year 2006 traffic volume data to reflect the effect of ambient growth by both the year 2010 and the year 2030, to which traffic generated by specific large development projects in the vicinity of the interchange was then added.

#### **Freeway Mainline**

Traffic forecasts were prepared for the I-405 freeway mainline segments on either side of the Avalon Boulevard interchange between Main Street and Avalon Boulevard and between Avalon Boulevard and Carson Street. The methodology for developing the freeway mainline forecasts differed from that described above for the surface street intersections and freeway ramps, because freeway mainline volumes are primarily driven by regional growth and travel demand while surface street and ramp volumes are more related to the anticipated sub-area growth.

The ambient growth factor for the freeway mainline was estimated using an approach similar to that used for the intersection and freeway ramps. SCAG year 2000 and 2030 model data were compared and a long-term simple growth factor of 0.25% per year was established for the freeway mainline. The opening year and design year traffic forecasts were developed by applying the ambient growth factor to the existing year 2006 freeway mainline traffic count data obtained from the Caltrans Traffic Monitoring Group and then adding traffic generated by specific large development projects in the vicinity of the interchange.

### **Proposed Development in the Study Area**

The second factor used in the development of the future traffic forecasts is the effect of specific known projects in the vicinity of the project. Listings of proposed developments in the vicinity of the study area were obtained from *Traffic Impact Study for the Carson Marketplace* (Kaku Associates, Inc., October 2005) prepared as part of the Carson Marketplace Environmental Impact Report. A review of the socioeconomic forecasts in the 2004 SCAG regional travel demand model indicates that the estimated ambient traffic growth has accounted for the most of the smaller-scale and some large scale development in the area except for significant new trip generation by the following four projects: the Carson Marketplace, the Dominguez Technology Center, Home Depot Center Phase II development, and the 19503 Normandie Avenue commercial development (see Appendix D). As shown in Table 6, these four projects are projected to generate approximately 91,780 daily trips, including approximately 4,490 trips during the morning peak hour and 8,430 trips during the afternoon peak hour. The traffic generated by the four significant related projects was added to the existing plus ambient traffic volumes on the study intersections, freeway segments, and ramp locations to represent future base traffic conditions. All of the generated traffic was included in the design year (2030) traffic forecasts. To be conservative, all of the generated traffic was also included in the opening year (2010) traffic forecasts.

### **Transportation Improvements**

The following transportation improvements proposed at various intersections in the Carson Marketplace Environmental Impact Report as mitigation for the Carson Marketplace

**TABLE 6  
MAJOR DEVELOPMENT PROJECTS IN THE STUDY AREA NOT INCLUDED IN SCAG DATA**

PROJECT LOCATION	LAND-USE	SIZE	TRIP GENERATION						
			DAILY	AM PEAK HOUR			PM PEAK HOUR		
				IN	OUT	TOTAL	IN	OUT	TOTAL
19503 Normandie Avenue	Shopping Center	160.000 KSF	6,870	101	64	165	288	312	600
Dominguez Technology Center	Technology	840.997 KSF	5,862	681	93	774	99	725	824
	Industrial	693.822 KSF	2,317	280	46	326	64	255	319
	Office	567.673 KSF	1,885	239	33	272	44	217	261
	<i>Subtotal</i>		<u>10,064</u>	<u>1,200</u>	<u>172</u>	<u>1,372</u>	<u>207</u>	<u>1,197</u>	<u>1,404</u>
CSUDH/Home Depot Center Phase II	Hotel	200 Rooms	1,784	78	56	134	69	71	140
	Administrative Offices	30.000 KSF	100	12	2	14	2	12	14
	Athletic Performance Center	30.000 KSF	1,290	53	39	92	109	64	173
	Training Facilities	50.000 KSF	2,150	89	64	153	181	107	288
	Dormitories	240 Beds	571	40	10	50	15	35	50
	<i>Subtotal</i>		<u>5,895</u>	<u>272</u>	<u>171</u>	<u>443</u>	<u>376</u>	<u>289</u>	<u>665</u>
Carson Marketplace	Regional Retail Center	1370.00 KSF	36,129	466	280	746	1,576	1,710	3,286
	Neighborhood Retail Center	130.00 KSF	5,285	100	64	164	228	240	468
	Residential	1550 DU	7,671	102	462	564	453	230	683
	Hotel	300 Rooms	3,058	98	62	160	94	83	177
	Restaurants	81.125 KSF	11,127	418	328	746	383	273	656
	Commercial Recreation/Entertainment	214.000 KSF	5,681	82	48	130	221	270	491
	<i>Subtotal</i>		<u>68,951</u>	<u>1,266</u>	<u>1,244</u>	<u>2,510</u>	<u>2,955</u>	<u>2,806</u>	<u>5,761</u>
	<b>Total</b>		<b>91,780</b>	<b>2,839</b>	<b>1,651</b>	<b>4,490</b>	<b>3,826</b>	<b>4,604</b>	<b>8,430</b>

Source: Traffic Impact Study for the Carson Marketplace (Kaku Associates, October 2005).

project have been assumed to be in place as part of both the No Project and With Project alternatives:

- Main Street and Torrance Boulevard - A proposed improvement of restriping the eastbound approach to include one left-turn lane and a through/right-turn lane.
- Main Street and Carson Street - The following improvements are proposed:
  - Addition of a second westbound left-turn lane for a westbound configuration of two left-turn lanes, two through lanes, and a shared through/right-turn lane.
  - Addition of a second eastbound left-turn lane for a eastbound configuration of two left-turn lanes, two through lanes, and a shared through/right-turn lane.
- Avalon Boulevard and Carson Street - The following improvements are proposed at this location:
  - Addition of a southbound right-turn lane for a configuration of one left-turn lane, three through lanes, and a right-turn lane.
  - Addition of a westbound right-turn lane for a configuration of two left-turn lanes, two through lanes, and a right-turn lane.
  - Addition of a northbound right-turn lane for a configuration of one left-turn lane, three through lanes, and a right-turn lane.
  - Addition of an eastbound right-turn lane for a configuration of two left-turn lanes, two through lanes, and a right-turn lane.

## **PROJECT ALTERNATIVES**

Traffic forecasts were prepared for two project alternatives: the No Build Alternative and the Build Alternative. The opening year (2010) and design year (2030) base (No Build) traffic forecasts were developed using the methodologies and assuming the baseline transportation improvements described above. Traffic projections were then developed for the Build Alternative.

### **No Build Alternative**

This alternative assumes that the interchange improvement project would not be built. The No Build Alternative includes regional growth and other cumulative projects in the area including development on the Carson Marketplace project site but with only two access locations (to Del Amo Boulevard and Main Street) because Lenardo Drive would not be extended to Avalon

Boulevard, which provides direct access to the Carson Marketplace site in the With Project alternative. Proposed transportation improvements described in the Carson Marketplace Project Environmental Impact Report are assumed to be in place in the No Build Alternative.

Figures 5 and 6 illustrate the morning and evening peak hour traffic projections for the opening year (2010) No Build Alternative at the intersection locations and freeway/ramps, respectively. Figures 7 and 8 similarly illustrate the peak hour traffic projections for the design year (2030) No Build Alternative.

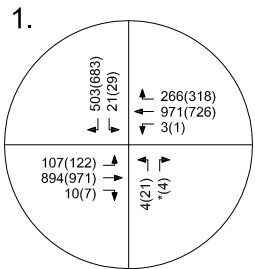
### **Build Alternative**

The traffic forecasts for the Build Alternative were developed by modifying the projected baseline volumes to reflect the shifts in traffic patterns that may be expected due to the addition and improvement of access to/from the I-405 freeway at Avalon Boulevard and addition of a third main access point for the Carson Marketplace project as a result of the improvements at this interchange. Following is a brief summary of the estimated traffic shifts:

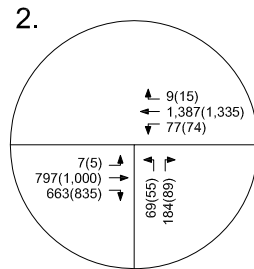
- The proposed project would include the extension of Lenardo Drive to Avalon Boulevard and the I-405 southbound ramps intersecting the Lenardo Drive extension west of Avalon Boulevard. This would provide a third primary access point for the Carson Marketplace project site. A significant amount of vehicular traffic between the Carson Marketplace project and the I-405 southbound freeway that would otherwise be projected to use Del Amo Boulevard and Avalon Boulevard or Main Street and Carson Street to access the freeway under the No Build Alternative would shift to the new access at Lenardo Drive and I-405 southbound ramps as part of the project.
- The improvements at the I-405 freeway interchange at Avalon Boulevard would also include access from the I-405 northbound off-ramp to southbound Avalon Boulevard that does not exist as part of the No Project alternative. This, in combination with the Lenardo Drive extension, will provide a new route for traffic from the northbound I-405 to the Carson Marketplace, shifting such traffic away from the Avalon Boulevard to Del Amo Boulevard route that it would otherwise need to take in the No Build alternative. This would also result in some shift in background traffic that would otherwise access Avalon Boulevard via Carson Street and the I-405 northbound off-ramp at Carson Street.
- The project includes an additional I-405 southbound on-ramp from northbound Avalon Boulevard. This would result in some traffic shifting from the I-405 southbound on-ramp at Carson Street.



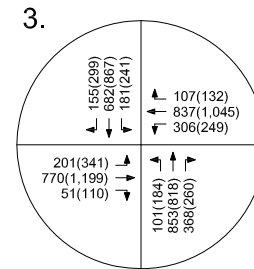
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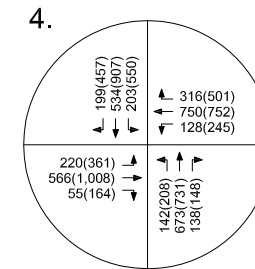
I-405 NB Ramps & Carson St



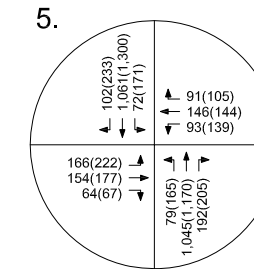
I-405 SB Ramps & Carson St



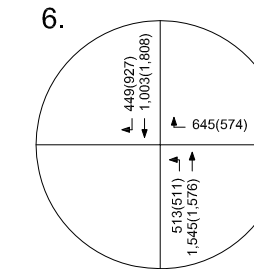
Avalon BI & Carson St



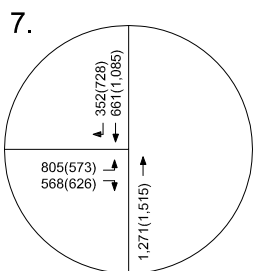
Main St & Carson St



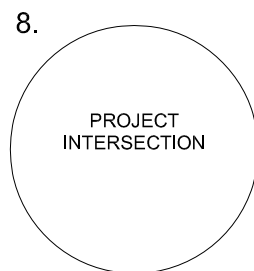
Avalon BI & 213th St



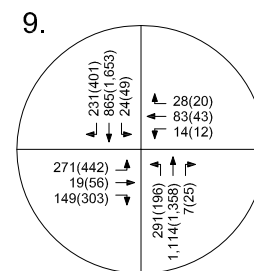
Avalon BI & I-405 NB Ramps



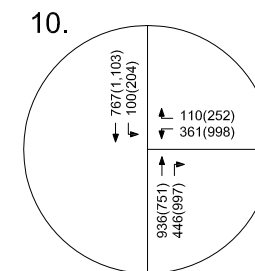
Avalon BI & I-405 SB Ramps



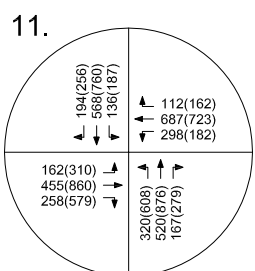
I-405 SB Ramps & Lenardo Dr



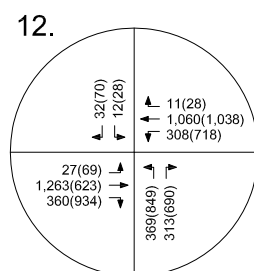
Main St & Torrance BI



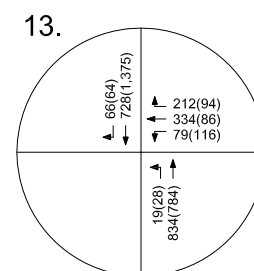
Main St & Lenardo Dr



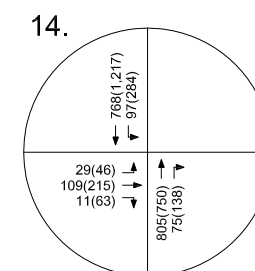
Avalon BI & Del Amo BI



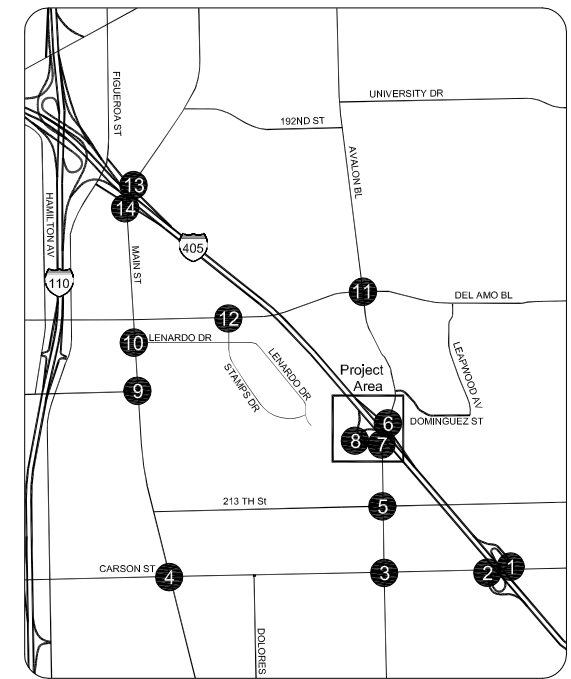
Stamps Dr & Del Amo BI



Main St & I-405 NB Off-Ramp



Main St & I-405 SB On-Ramp



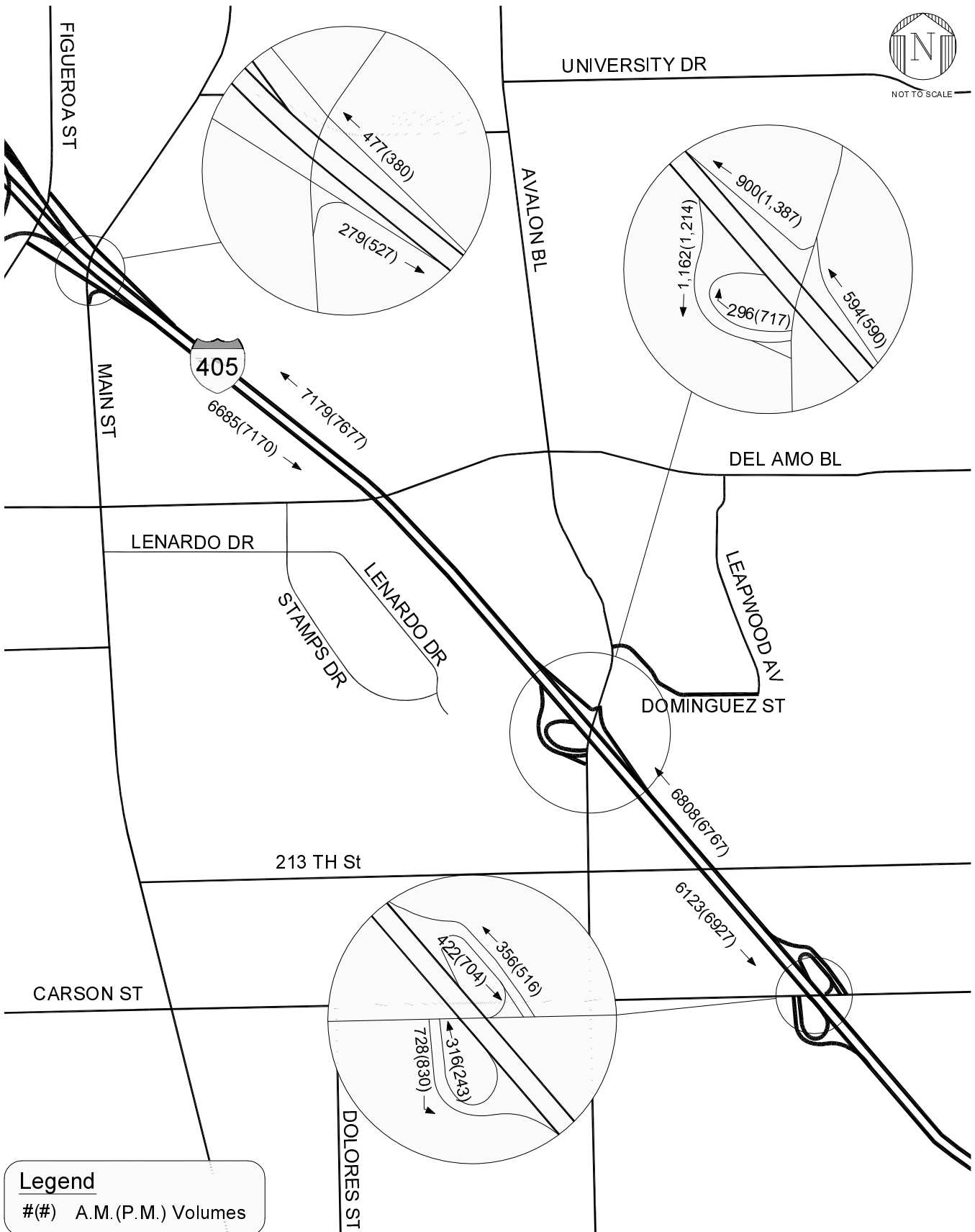
**Legend**  
 ← ##(##) Peak Hour Volumes A.M.(P.M.)

**FEHR & PEERS**  
**KAKU ASSOCIATES**

**FIGURE 5**  
**OPENING YEAR (2010) TRAFFIC PROJECTIONS AT STUDY INTERSECTIONS**  
**NO BUILD ALTERNATIVE**



NOT TO SCALE



**Legend**  
 #(#) A.M.(P.M.) Volumes

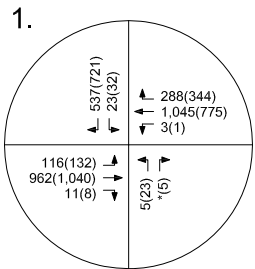
Note: Freeway mainline volumes do not include HOV lanes.

FEHR & PEERS  
KAKU ASSOCIATES

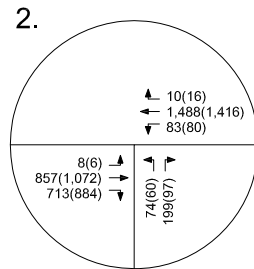
**FIGURE 6**  
**OPENING YEAR (2010) - NO BUILD ALTERNATIVE**  
**TRAFFIC PROJECTIONS ON FREEWAY MAINLINE AND RAMPS**



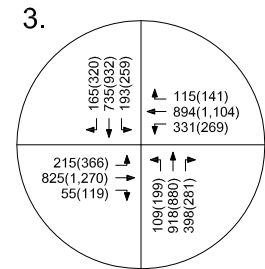
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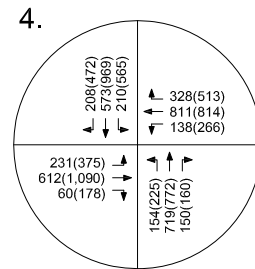
I-405 NB Ramps & Carson St



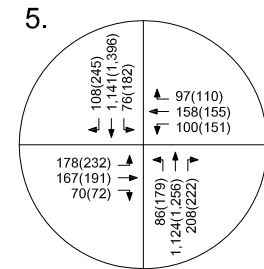
I-405 SB Ramps & Carson St



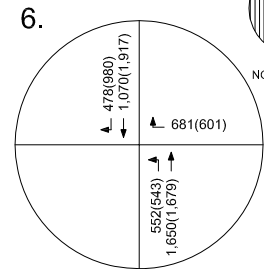
Avalon BI & Carson St



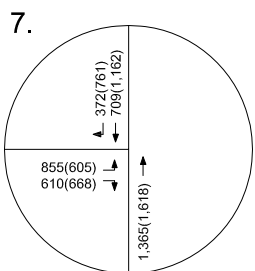
Main St & Carson St



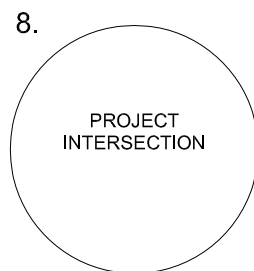
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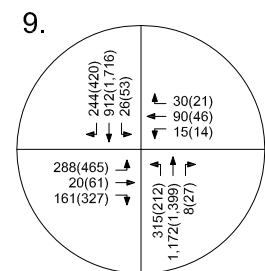
Avalon BI & I-405 NB Ramps



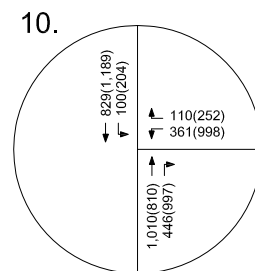
Avalon BI & I-405 SB Ramps



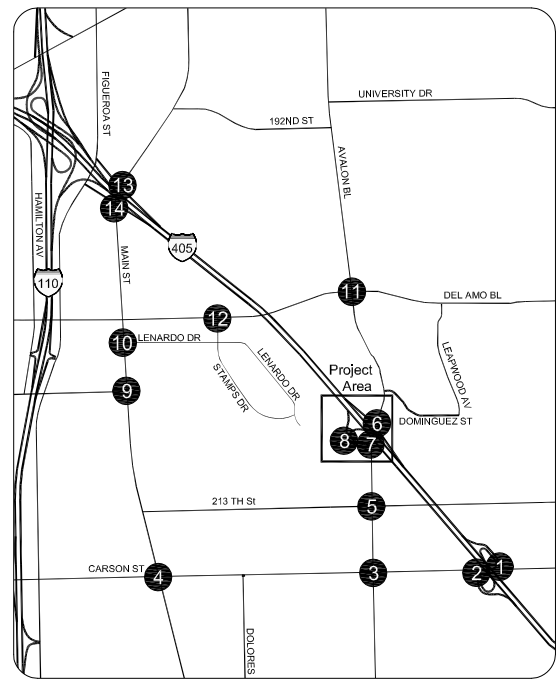
I-405 SB Ramps & Lenardo Dr



Main St & Torrance BI

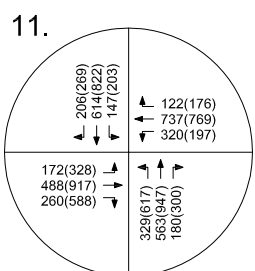


Main St & Lenardo Dr

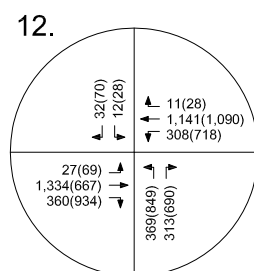


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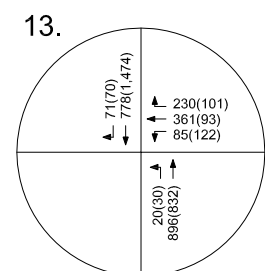
← ##(##) Peak Hour Volumes A.M.(P.M.)



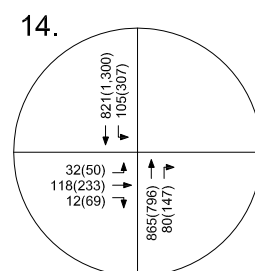
Avalon BI & Del Amo BI



Stamps Dr & Del Amo BI



Main St & I-405 NB Off-Ramp



Main St & I-405 SB On-Ramp

FIGURE 7  
DESIGN YEAR (2030) TRAFFIC PROJECTIONS AT STUDY INTERSECTIONS  
NO BUILD ALTERNATIVE



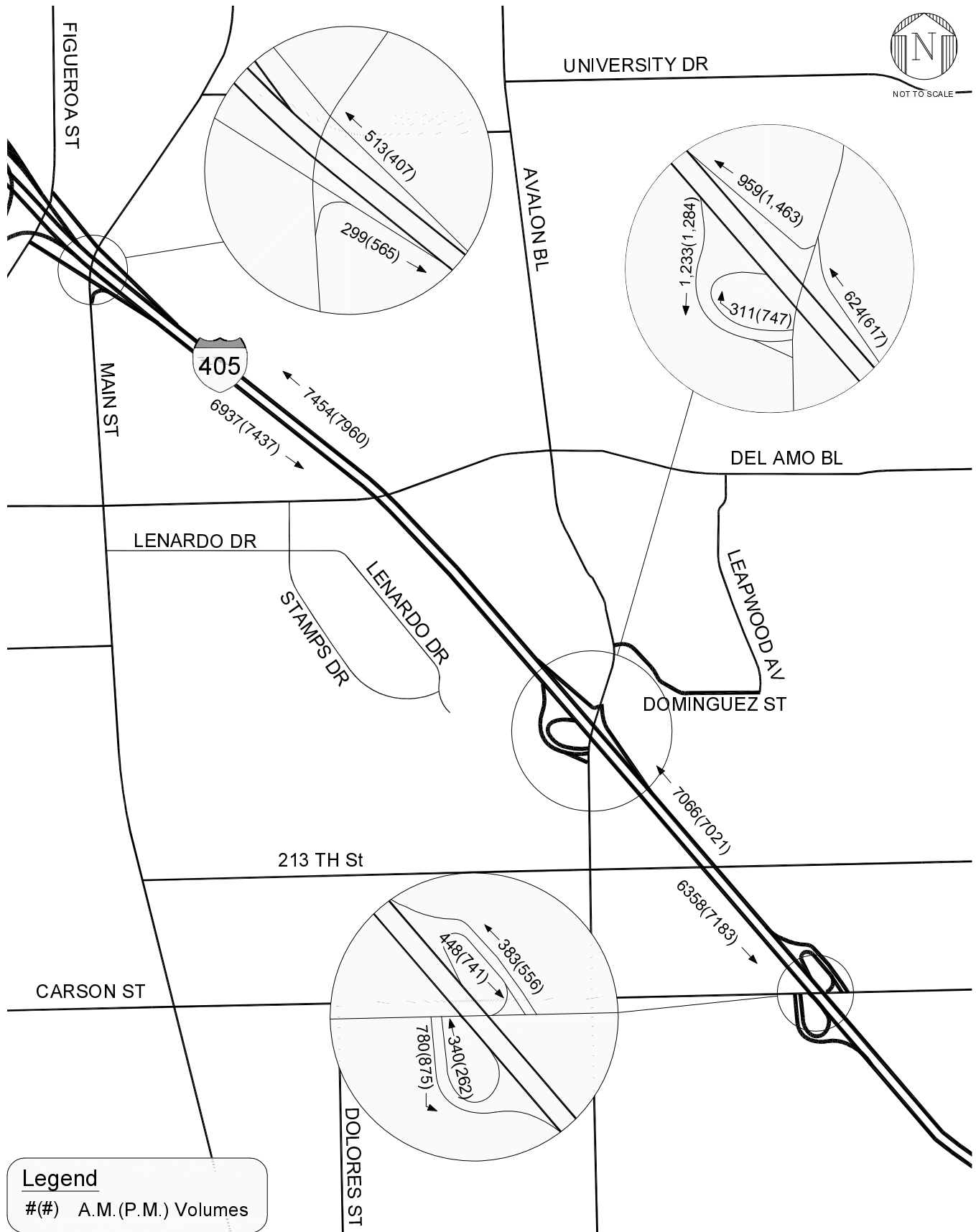


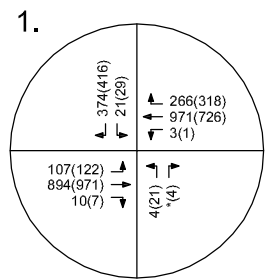
FIGURE 8

DESIGN YEAR (2030) - NO BUILD ALTERNATIVE  
TRAFFIC PROJECTIONS ON FREEWAY MAINLINE AND RAMPS

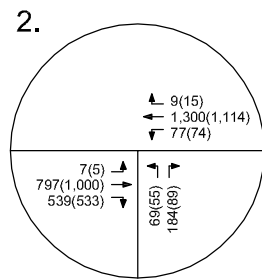
Figures 9 and 10 present the morning and evening peak hour traffic projections for the opening year (2010) Build Alternative, while Figures 11 and 12 present the traffic projections for the design year (2030) Build Alternative.



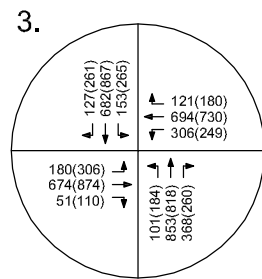
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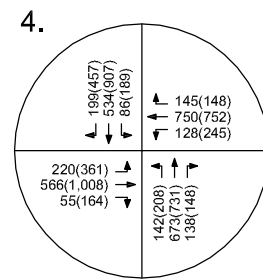
I-405 NB Ramps & Carson St



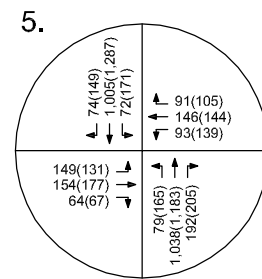
I-405 SB Ramps & Carson St



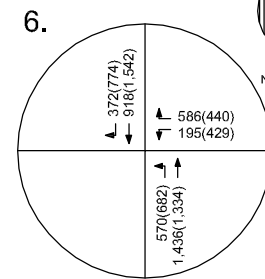
Avalon Bl & Carson St



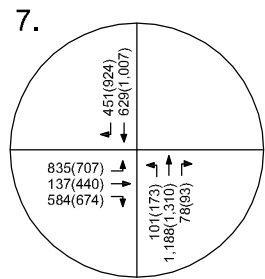
Main St & Carson St



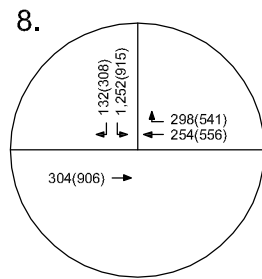
Avalon Bl & 213th St



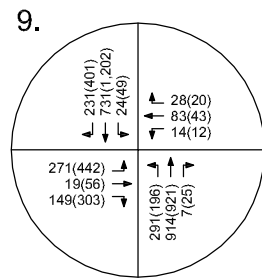
Avalon Bl & I-405 NB Ramps



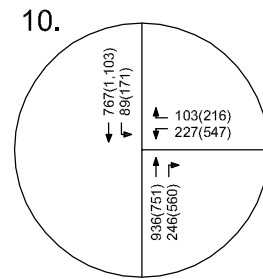
Avalon Bl & Lenardo Dr / I-405 SB Ramps



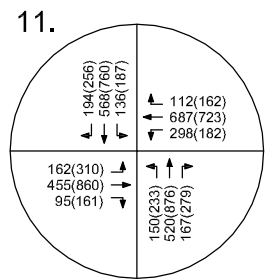
I-405 SB Ramps & Lenardo Dr



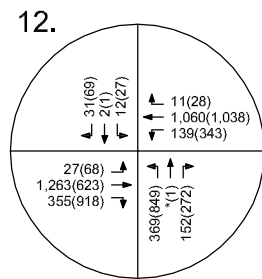
Main St & Torrance Bl



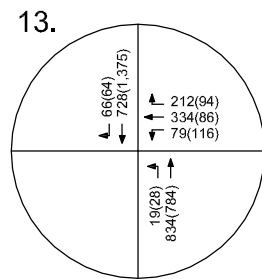
Main St & Lenardo Dr



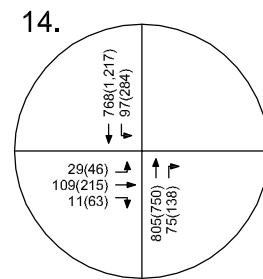
Avalon Bl & Del Amo Bl



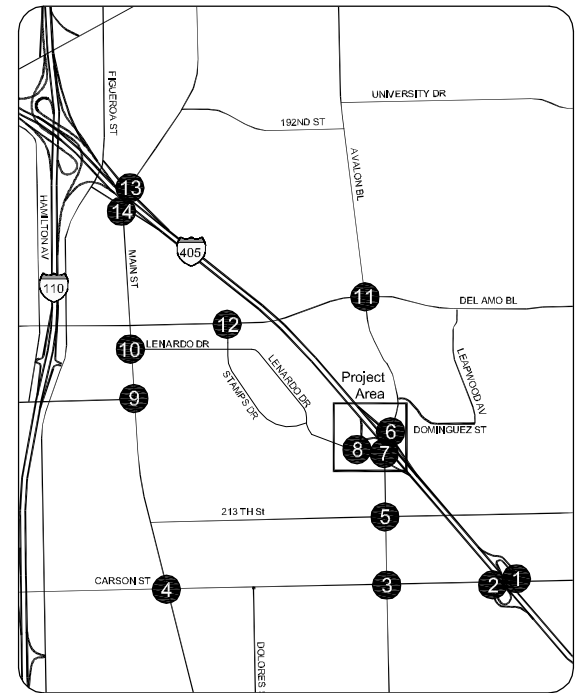
Stamps Dr & Del Amo Bl



Main St & I-405 NB Off-Ramp



Main St & I-405 SB On-Ramp



**Legend**

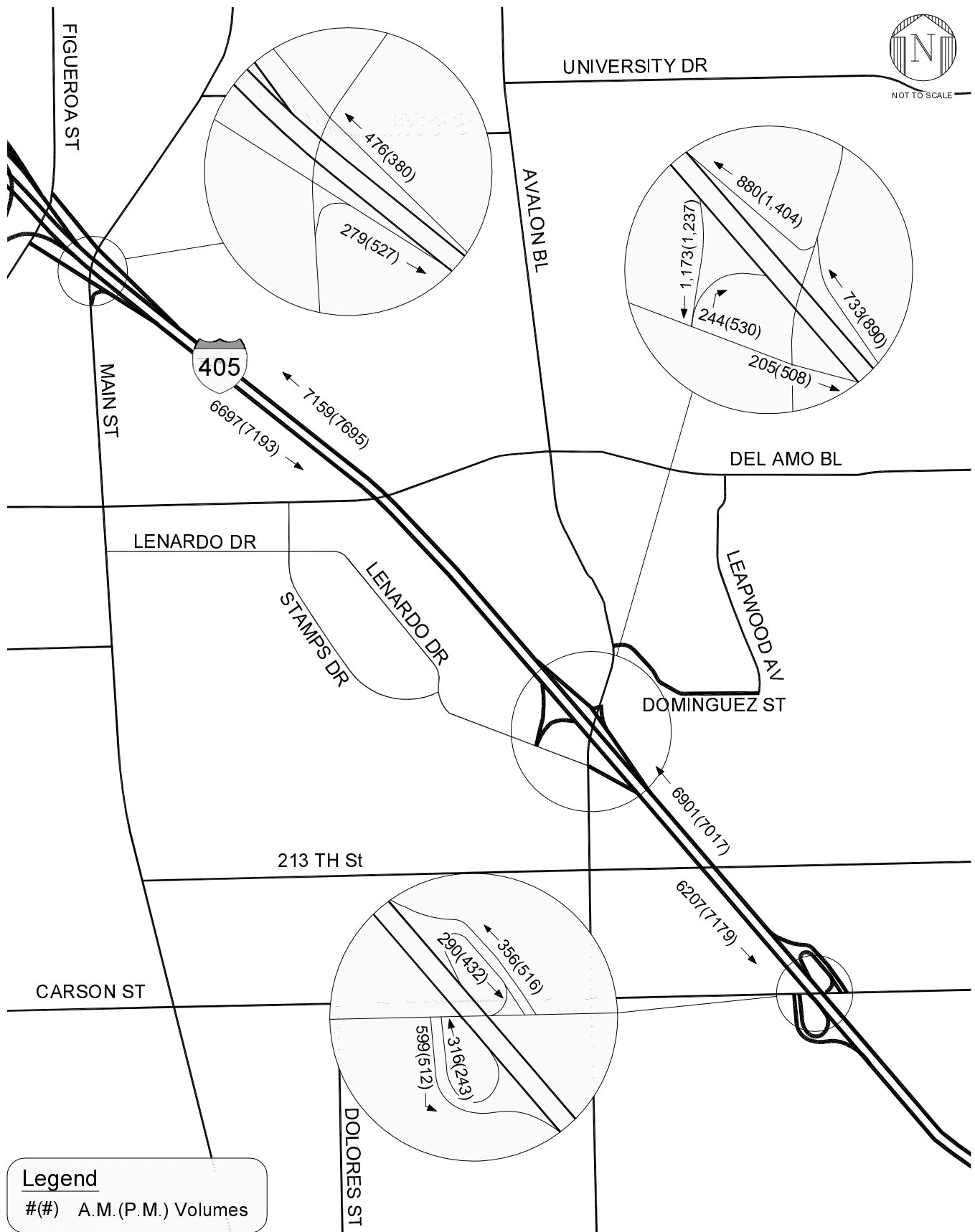
- ← ##(##) Peak Hour Volumes A.M.(P.M.)
- ← \*(\*) Nominal Volumes

**FEHR & PEERS**  
**KAKU ASSOCIATES**

**FIGURE 9**  
**OPENING YEAR (2010) TRAFFIC PROJECTIONS AT STUDY INTERSECTIONS**  
**BUILD ALTERNATIVE**



NOT TO SCALE



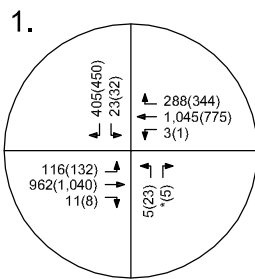
Note: Freeway mainline volumes do not include HOV lanes.

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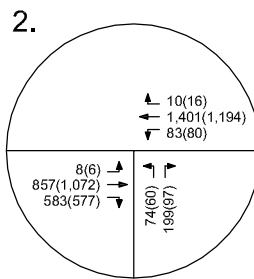
FIGURE 10  
OPENING YEAR (2010) - BUILD ALTERNATIVE  
TRAFFIC PROJECTIONS ON FREEWAY MAINLINE AND RAMPS



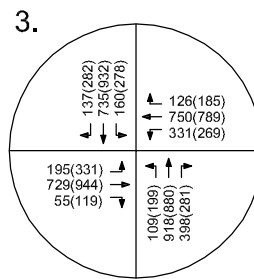
NOT TO SCALE



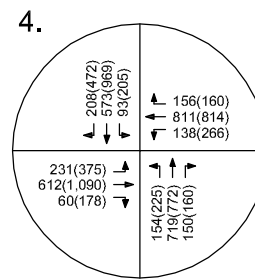
I-405 NB Ramps & Carson St



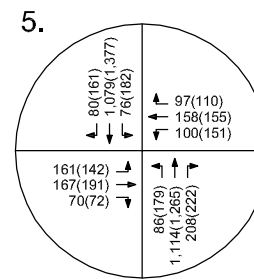
I-405 SB Ramps & Carson St



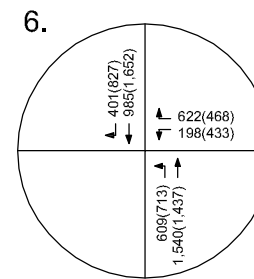
Avalon Bl & Carson St



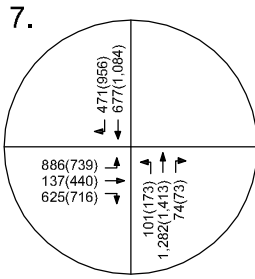
Main St & Carson St



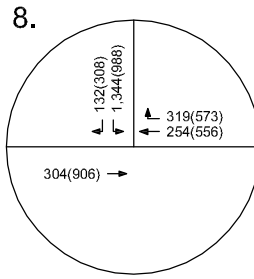
Avalon Bl & 213th St



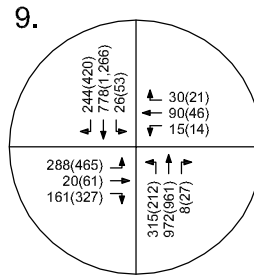
Avalon Bl & I-405 NB Ramps



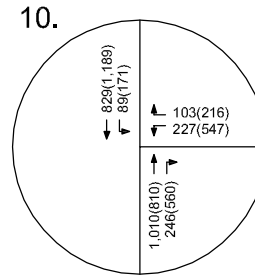
Avalon Bl & Lenardo Dr / I-405 SB Ramps



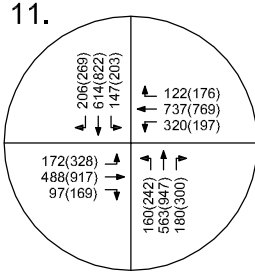
I-405 SB Ramps & Lenardo Dr



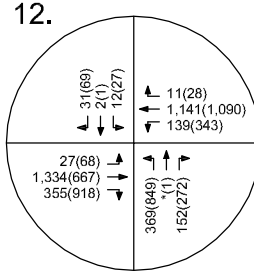
Main St & Torrance Bl



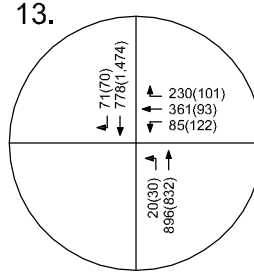
Main St & Lenardo Dr



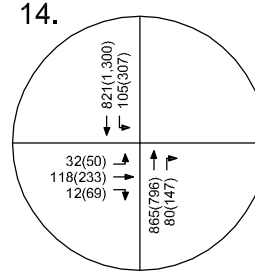
Avalon Bl & Del Amo Bl



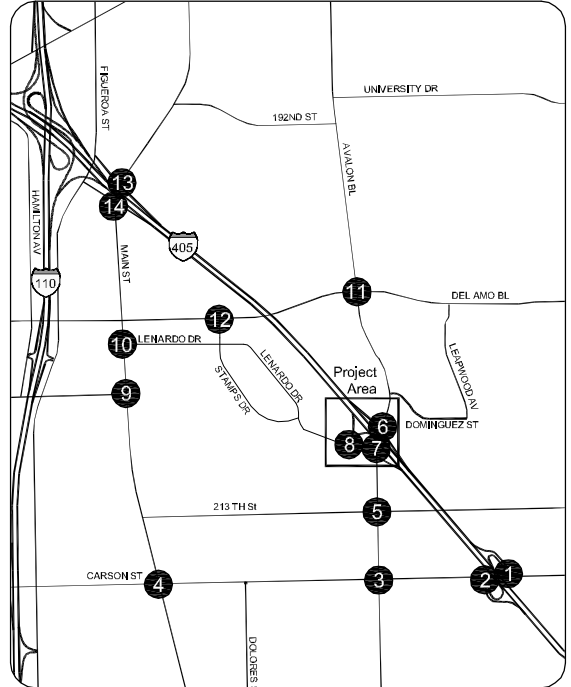
Stamps Dr & Del Amo Bl



Main St & I-405 NB Off-Ramp



Main St & I-405 SB On-Ramp



**Legend**

- ← ##(##) Peak Hour Volumes A.M.(P.M.)
- ← \*(\*) Nominal Volumes

**FEHR & PEERS**  
**KAKU ASSOCIATES**

**FIGURE 11**  
**DESIGN YEAR (2030) TRAFFIC PROJECTIONS AT STUDY INTERSECTIONS**  
**BUILD ALTERNATIVE**

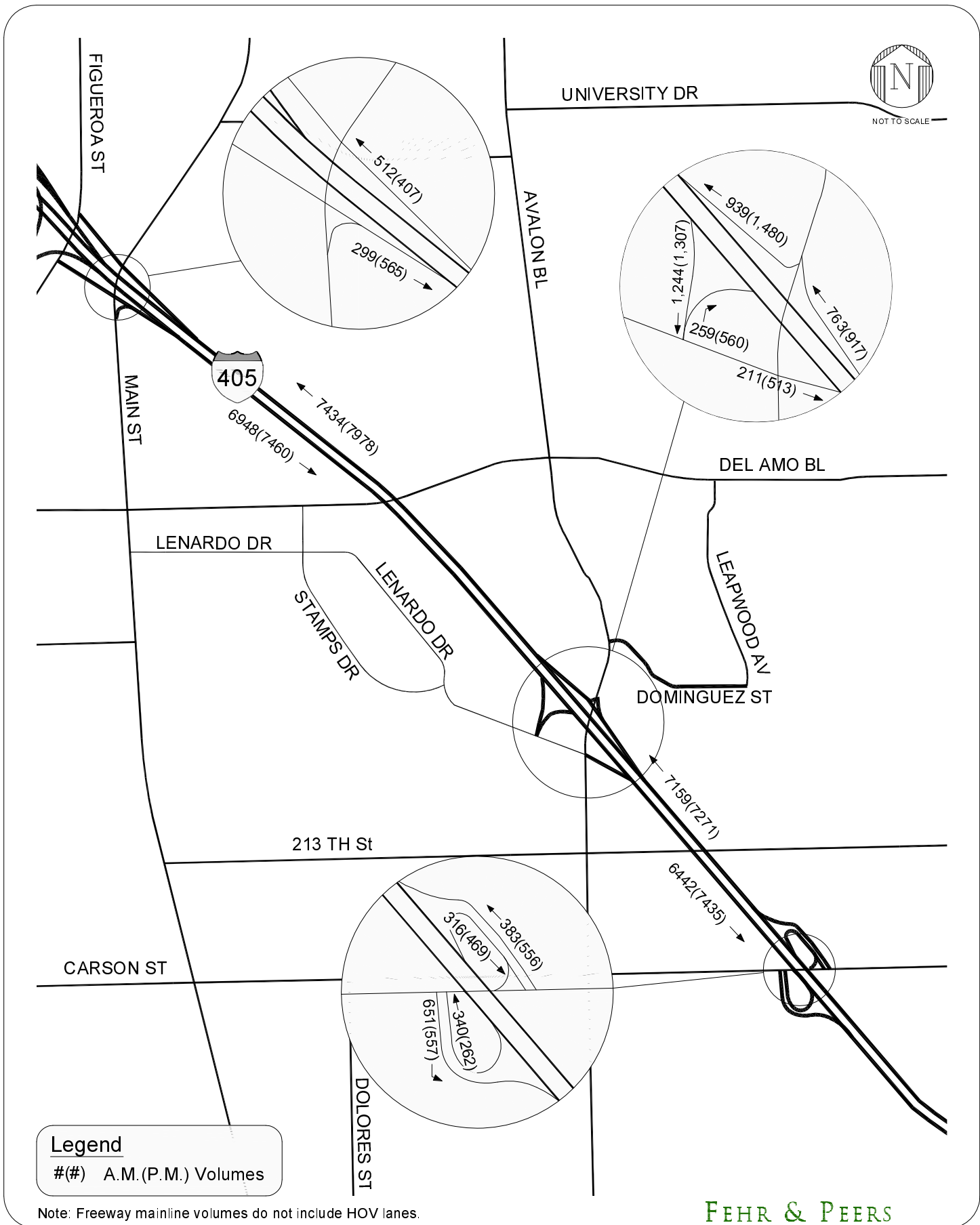


FIGURE 12

DESIGN YEAR (2030) - BUILD ALTERNATIVE  
TRAFFIC PROJECTIONS ON FREEWAY MAINLINE AND RAMPS

## V. FUTURE LEVEL OF SERVICE ANALYSIS

This chapter presents the projected future intersection, freeway mainline segment, freeway/ramp junction and freeway ramp weaving operating conditions for the I-405/Avalon Boulevard project alternatives for both the opening year (2010) and the design year (2030).

Level of service worksheets for the opening year (2010) No Build Alternative and Build Alternative are included in Appendices E and F, respectively. LOS worksheets for the design year (2030) No Build Alternative and Build Alternative are included in Appendices G and H.

### INTERSECTION LEVEL OF SERVICE ANALYSIS

#### **No Build Alternative Level of Service**

Table 7 presents the delay LOS calculations for the No Build Alternative at the opening year (2010) and Table 8 presents similar information for the design year (2030). The tables show that the following five intersections are projected to operate at a LOS E or F under the No Build Alternative during one or both of the AM and PM peak hours at both the opening year (2010) and the design year (2030):

- Avalon Boulevard & Carson Street (LOS E in the AM peak hour)
- Main Street & Carson Street (LOS F in the PM peak hour)
- Main Street & Torrance Boulevard (LOS E in the AM and LOS F in the PM peak hour)
- Avalon Boulevard & Del Amo Boulevard (LOS F in the PM peak hour)
- Stamps Drive & Del Amo Boulevard (LOS E in the PM peak hour)

#### **Build Alternative Level of Service**

Build Alternative delay and level of service calculations are presented in Tables 7 and 8. At the opening year (2010), only one intersection -- Main Street & Carson Street -- is projected to

**TABLE 7  
OPENING YEAR (2010) INTERSECTION LEVEL OF SERVICE ANALYSIS**

Intersection	Peak Hour	No Build Alternative		Build Alternative		Change in Delay	Significant Impact?
		Delay <sup>[1]</sup>	LOS <sup>[2]</sup>	Delay <sup>[1]</sup>	LOS <sup>[2]</sup>		
1 Carson St & I-405 NB Ramps	AM	5.5	A	5.7	A	0.2	No
	PM	4.9	A	5.1	A	0.2	No
2 Carson St & I-405 SB Ramps	AM	6.7	A	6.4	A	-0.3	No
	PM	11.2	B	6.5	A	-4.7	No
3 Avalon Bl & Carson St	AM	33.3	C	27.0	C	-6.3	No
	PM	58.1	E	45.8	D	-12.3	No
4 Main St & Carson St	AM	37.9	D	36.6	D	-1.3	No
	PM	142.9	F	65.6	E	-77.3	No
5 Avalon Bl & 213th St	AM	15.6	B	17.1	B	1.5	No
	PM	22.1	C	27.1	C	5.0	No
6 Avalon Bl & I-405 NB Ramps	AM	6.4	A	11.7	B	5.3	No
	PM	13.7	B	19.5	B	5.8	No
7 Avalon Bl & Lenardo Dr/I-405 SB On-Ramp	AM	11.2	B	17.7	B	6.5	No
	PM	9.8	A	22.2	C	12.4	No
8 Lenardo Dr & I-405 SB Ramps	AM	Future Intersection [3]		11.6	B	Not Applicable	
	PM			13.1	B		
9 Main St & Torrance Bl	AM	68.7	E	42.9	D	-25.8	No
	PM	101.5	F	53.5	D	-48.0	No
10 Main St & Lenardo Dr	AM	10.3	B	7.5	A	-2.8	No
	PM	48.7	D	14.8	B	-33.9	No
11 Avalon Bl & Del Amo Bl	AM	37.3	D	28.0	C	-9.3	No
	PM	82.7	F	53.9	D	-28.8	No
12 Stamps Dr & Del Amo Bl	AM	22.6	C	21.6	C	-1.0	No
	PM	63.1	E	32.4	C	-30.7	No
13 Main St & I-405 NB Ramps	AM	15.0	B	15.0	B	0.0	No
	PM	12.7	B	12.7	B	0.0	No
14 Main St & I-405 SB Ramps	AM	9.6	A	9.6	A	0.0	No
	PM	16.2	B	16.2	B	0.0	No

**Notes:**

[1] Average delay in seconds per vehicle.

[2] Delay and LOS calculated using 2000 Highway Capacity Manual LOS methodology.

[3] Intersection does not exist; to be constructed as part of I-405/Avalon interchange improvement project.



**TABLE 8  
DESIGN YEAR (2030) INTERSECTION LEVEL OF SERVICE ANALYSIS**

Intersection	Peak Hour	No Build Alternative		Build Alternative		Change in Delay	Significant Impact?
		Delay <sup>[1]</sup>	LOS <sup>[2]</sup>	Delay <sup>[1]</sup>	LOS <sup>[2]</sup>		
1 Carson St & I-405 NB Ramps	AM	5.6	A	6.3	A	0.7	No
	PM	5.0	A	5.4	A	0.4	No
2 Carson St & I-405 SB Ramps	AM	9.8	A	6.4	A	-3.4	No
	PM	16.7	B	6.9	A	-9.8	No
3 Avalon Bl & Carson St	AM	49.4	D	29.5	C	-19.9	No
	PM	66.0	E	47.3	D	-18.7	No
4 Main St & Carson St	AM	44.2	D	40.2	D	-4.0	No
	PM	162.0	F	82.9	F	-79.1	No
5 Avalon Bl & 213th St	AM	17.4	B	17.5	B	0.1	No
	PM	25.7	C	33.4	C	7.7	No
6 Avalon Bl & I-405 NB Ramps	AM	7.0	A	12.2	B	5.2	No
	PM	19.7	B	21.8	C	2.1	No
7 Avalon Bl & Lenardo Dr/I-405 SB On-Ramp	AM	13.5	B	18.8	B	5.3	No
	PM	10.9	B	19.4	C	8.5	No
8 Lenardo Dr & I-405 SB Ramps	AM	Future Intersection [3]		11.5	B	Not Applicable	
	PM			13.5	B		
9 Main St & Torrance Bl	AM	85.2	E	56.7	E	-28.5	No
	PM	114.2	F	64.7	E	-49.5	No
10 Main St & Lenardo Dr	AM	10.4	B	7.6	A	-2.8	No
	PM	53.8	D	16.8	B	-37.0	No
11 Avalon Bl & Del Amo Bl	AM	42.1	D	32.6	C	-9.5	No
	PM	98.4	F	71.8	E	-26.6	No
12 Stamps Dr & Del Amo Bl	AM	24.9	C	21.7	C	-3.2	No
	PM	77.4	E	34.1	C	-43.3	No
13 Main St & I-405 NB Ramps	AM	15.7	B	15.7	B	0.0	No
	PM	13.6	B	13.6	B	0.0	No
14 Main St & I-405 SB Ramps	AM	9.9	A	9.9	A	0.0	No
	PM	17.9	B	17.9	B	0.0	No

**Notes:**

[1] Average delay in seconds per vehicle.

[2] Delay and LOS calculated using 2000 Highway Capacity Manual LOS methodology.

[3] Intersection does not exist; to be constructed as part of I-405/Avalon interchange improvement project.

operate at LOS E or worse for the Build Alternative. Three intersections are projected to operate at LOS E or F for this alternative at the design year (2030), as follows:

- Main Street & Carson Street (LOS F in the PM peak hour)
- Main Street & Torrance Boulevard (LOS E in the AM and PM peak hours)
- Avalon Boulevard & Del Amo Boulevard (LOS E in the PM peak hour)

The new I-405 southbound ramps/Lenardo Drive intersection as part of the I-405 improvement project at the Avalon Boulevard interchange is projected to operate at LOS B in the AM and the PM peak hours at both the opening year (2010) and the design year (2030).

## **FREEWAY LEVEL OF SERVICE ANALYSIS**

### **Freeway Mainline Segment Analysis**

Table 9 presents the results of the density calculations and corresponding LOS results for the freeway mainline LOS analysis for the No Build Alternative and the Build Alternative for the opening year (2010). Table 10 presents No Build Alternative and Build Alternative freeway mainline levels of service for the design year (2030).

**No Build Alternative.** As can be seen in Tables 9 and 10, the following segments are projected to operate at LOS E or F under the No Build Alternative at both the opening year (2010) and the design year (2030):

- I-405 northbound between Carson Street and Avalon Boulevard (AM peak hour)
- I-405 northbound between Avalon Boulevard and Main Street (AM and PM peak hours)
- I-405 southbound between Main Street and Avalon Boulevard (PM peak hour)
- I-405 southbound between Avalon Boulevard and Carson Street (PM peak hour)

**Build Alternative.** The same freeway segments are projected to operate at LOS E or F under the Build Alternative as for the No Build Alternative.

**TABLE 9  
OPENING YEAR (2010) FREEWAY MAINLINE AND RAMP LEVEL OF SERVICE ANALYSIS**

**BASIC FREEWAY SEGMENT<sup>1</sup>**

SEGMENT	OPENING YEAR (2010) NO BUILD ALTERNATIVE				OPENING YEAR (2010) BUILD ALTERNATIVE				CHANGE IN DENSITY	
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM	PM
	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS		
Northbound - Carson St to Avalon Bl	36.0	E	30.8	D	36.9	E	32.5	D	0.9	1.7
Northbound - Avalon Bl to Main St	42.6	E	38.1	E	42.3	E	38.2	E	-0.3	0.1
Southbound - Main St to Avalon Bl	30.3	D	n/a	F	30.4	D	n/a	F	0.1	n/a
Southbound - Avalon Bl to Carson St	27.1	D	n/a	F	27.5	D	n/a	F	0.4	n/a

**RAMP-FREEWAY JUNCTION AREAS OF INFLUENCE<sup>2</sup>**

RAMP	OPENING YEAR (2010) NO BUILD ALTERNATIVE				OPENING YEAR (2010) BUILD ALTERNATIVE				CHANGE IN DENSITY	
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM	PM
	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS		
Carson St northbound off-ramp	34.6	D	36.2	E	34.3	D	35.7	E	-0.3	-0.5
Carson St northbound on-ramp	24.8	C	24.5	C	25.1	C	n/a	F <sup>5</sup>	0.3	n/a
Avalon Bl northbound off-ramp	35.7	E	35.5	E	37.0	E	n/a	F <sup>5</sup>	1.3	n/a
Avalon Bl northbound on-ramp	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	n/a
Main St northbound off-ramp	29.9	D	31.2	D	29.9	D	31.3	D	0.0	0.1
Main St southbound on-ramp	19.0	B	20.5	C	19.0	B	20.5	C	0.0	0.0
Avalon Bl southbound off-ramp	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	n/a
Southbound Avalon Bl southbound on-ramp	22.9	C	n/a	F <sup>5</sup>	23.2	C	n/a	F <sup>5</sup>	0.3	n/a
Northbound Avalon Bl southbound on-ramp	Ramp to be constructed as part of the project				23.8	C	n/a	F <sup>5</sup>	n/a	n/a
Carson St southbound off-ramp	30.9	D	34.1	D	31.1	D	35.3	E	0.2	1.2
Carson St southbound on-ramp	22.8	C	n/a	F <sup>5</sup>	23.0	C	n/a	F <sup>5</sup>	0.2	n/a

**FREEWAY WEAVING SEGMENT<sup>3</sup>**

SEGMENT	OPENING YEAR (2010) NO BUILD ALTERNATIVE				OPENING YEAR (2010) BUILD ALTERNATIVE				CHANGE IN DENSITY	
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM	PM
	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS		
Northbound - Carson St to Avalon Bl	89.2	F	93.4	F	92.8	F	102.3	F	3.6	8.8
Southbound - Avalon Bl to Carson St	71.4	F	90.9	F	76.1	F	103.1	F	4.7	12.2

<sup>1</sup> Basic freeway segment LOS criteria per Highway Capacity Manual, 2000, Exhibit 23-2.

<sup>2</sup> Ramp-freeway junction LOS criteria per Highway Capacity Manual, 2000, Exhibit 25-4.

<sup>3</sup> Freeway weaving segment LOS criteria per Highway Capacity Manual, 2000, Exhibit 24-2.

<sup>4</sup> Basic freeway segments, ramp junctions, and weaving areas level of service are measured with density (pc/mi/ln).

<sup>5</sup> LOS F exists when the total flow departing from the merge area exceeds the capacity of the downstream freeway segments. No density will be predicted for such cases - Exhibit 25-4, Highway Capacity Manual 2000.

**TABLE 10  
DESIGN YEAR (2030) FREEWAY MAINLINE AND RAMP LEVEL OF SERVICE ANALYSIS**

**BASIC FREEWAY SEGMENT<sup>1</sup>**

SEGMENT	DESIGN YEAR (2030) NO BUILD ALTERNATIVE				DESIGN YEAR (2030) BUILD ALTERNATIVE				AM	PM
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour			
	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS		
Northbound - Carson St to Avalon Bl	n/a	F	32.5	D	40.1	E	34.4	D	n/a	1.9
Northbound - Avalon Bl to Main St	n/a	F	41.1	E	n/a	F	41.4	E	n/a	0.3
Southbound - Main St to Avalon Bl	31.9	D	n/a	F	32.0	D	n/a	F	0.1	n/a
Southbound - Avalon Bl to Carson St	28.4	D	n/a	F	28.8	D	n/a	F	0.4	n/a

**RAMP-FREEWAY JUNCTION AREAS OF INFLUENCE<sup>2</sup>**

RAMP	DESIGN YEAR (2030) NO BUILD ALTERNATIVE				DESIGN YEAR (2030) BUILD ALTERNATIVE				AM	PM
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour			
	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS		
Carson St northbound off-ramp	36.0	E	n/a	F <sup>5</sup>	35.5	E	37.0	E	-0.5	n/a
Carson St northbound on-ramp	25.5	C	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	n/a
Avalon Bl northbound off-ramp	37.1	E	36.9	E	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	n/a
Avalon Bl northbound on-ramp	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	n/a
Main St northbound off-ramp	31.2	D	32.5	D	31.0	D	32.4	D	-0.2	-0.1
Main St southbound on-ramp	19.5	B	21.1	C	19.6	B	21.2	C	0.1	0.1
Avalon Bl southbound off-ramp	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	F <sup>5</sup>	n/a	n/a
Southbound Avalon Bl southbound on-ramp	25.3	C	n/a	F <sup>5</sup>	23.9	C	n/a	F <sup>5</sup>	-1.4	n/a
Northbound Avalon Bl southbound on-ramp	ramp to be constructed as part of project				24.6	C	n/a	F <sup>5</sup>	n/a	n/a
Carson St southbound off-ramp	32.0	D	35.4	E	32.3	D	n/a	F <sup>5</sup>	0.3	n/a
Carson St southbound on-ramp	23.3	C	n/a	F <sup>5</sup>	23.6	C	n/a	F <sup>5</sup>	0.3	n/a

**FREEWAY WEAVING SEGMENT<sup>3</sup>**

SEGMENT	DESIGN YEAR (2030) NO BUILD ALTERNATIVE				DESIGN YEAR (2030) BUILD ALTERNATIVE				AM	PM
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour			
	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS	DENSITY <sup>4</sup>	LOS		
Northbound - Carson St to Avalon Bl	93.9	F	98.6	F	97.6	F	107.6	F	3.7	9.0
Southbound - Avalon Bl to Carson St	74.9	F	95.2	F	79.8	F	107.7	F	4.9	12.5

<sup>1</sup> Basic freeway segment LOS criteria per Highway Capacity Manual, 2000, Exhibit 23-2.

<sup>2</sup> Ramp-freeway junction LOS criteria per Highway Capacity Manual, 2000, Exhibit 25-4.

<sup>3</sup> Freeway weaving segment LOS criteria per Highway Capacity Manual, 2000, Exhibit 24-2.

<sup>4</sup> Basic freeway segments, ramp junctions, and weaving areas level of service are measured with density (pc/mi/ln).

<sup>5</sup> LOS F exists when the total flow departing from the merge area exceeds the capacity of the downstream freeway segments. No density will be predicted for such cases - Exhibit 25-4, Highway Capacity Manual 2000.

## **Freeway-Ramp Junction Areas of Influence Analysis**

Freeway-ramp junction areas of influence were analyzed for the No Build and Build Alternatives using the future projection of traffic volume data. Following is a brief summary of the analysis results.

**No Build Alternative.** Table 9 presents the results of density calculations and corresponding LOS for the freeway ramp junctions at the opening year (2010). The following six ramp locations are projected to operate at LOS E or F under the No Build Alternative at year 2010:

- Carson Street northbound off-ramp (LOS E in the PM peak hour)
- Avalon Boulevard northbound off-ramp (LOS E in both the AM and PM peak hours)
- Avalon Boulevard northbound on-ramp (LOS F in both AM and PM peak hours)
- Avalon Boulevard southbound off-ramp (LOS F in both the AM and PM peak hours)
- Avalon Boulevard southbound on-ramp (LOS F in the PM peak hour)
- Carson Street southbound on-ramp (LOS F in the PM peak hour)

Table 10 presents the freeway ramp junction analysis for the design year (2030). The following eight ramp locations are projected to operate at LOS E or F under the No Build Alternative at year 2030:

- Carson Street northbound off-ramp (LOS E in the AM and LOS F in the PM peak hour)
- Carson Street northbound on-ramp (LOS F in the PM peak hour)
- Avalon Boulevard northbound off-ramp (LOS E in the AM and PM peak hours)
- Avalon Boulevard northbound on-ramp (LOS F in both AM and PM peak hours)
- Avalon Boulevard southbound off-ramp (LOS F in both AM and PM peak hours)
- Avalon Boulevard southbound on-ramp (LOS F in the PM peak hour)
- Carson Street southbound off-ramp (LOS E in the PM peak hour)
- Carson Street southbound on-ramp (LOS F in the PM peak hour)

**Build Alternative.** With the project, the following ramp locations are projected to operate at LOS E or F at the opening year (2010):

- Carson Street northbound off-ramp (LOS E in the PM peak hour)
- Carson Street northbound on-ramp (LOS F in the PM peak hour)
- Avalon Boulevard northbound off-ramp (LOS E in the AM and LOS F in the PM peak hour)
- Avalon Boulevard northbound on-ramp (LOS F in both AM and PM peak hours)
- Avalon Boulevard southbound off-ramp (LOS F in both the AM and PM peak hours)
- Southbound on-ramp from southbound Avalon Boulevard (LOS F in the PM peak hour)
- Southbound on-ramp from northbound Avalon Boulevard (new ramp constructed as part of project) (LOS F in the PM peak hour)
- Carson Street southbound off-ramp (LOS E in the PM peak hour)
- Carson Street southbound on-ramp (LOS F in the PM peak hour)

The following ramp locations are projected to operate at LOS E or F at the design year (2030) with the project:

- Carson Street northbound off-ramp (LOS E in both the AM and PM peak hours)
- Carson Street northbound on-ramp (LOS F in both the AM and PM peak hours)
- Avalon Boulevard northbound off-ramp (LOS F in both the AM and PM peak hours)
- Avalon Boulevard northbound on-ramp (LOS F in both AM and PM peak hours)
- Avalon Boulevard southbound off-ramp (LOS F in both AM and PM peak hours)
- Southbound on-ramp from southbound Avalon Boulevard (LOS F in the PM peak hour)
- Southbound on-ramp from northbound Avalon Boulevard (new ramp constructed as part of project) (LOS F in the PM peak hour)
- Carson Street southbound off-ramp (LOS F in the PM peak hour)
- Carson Street southbound on-ramp (LOS F in the PM peak hour)

LOS F represents the condition when the total flow departing from the merger area exceeds the capacity of the downstream freeway segment; therefore no density is predicted for such cases in the HCM 2000 methodology.

### **Freeway Weaving Segment Analysis**

Tables 9 and 10 also present the result of density calculations and corresponding LOS for the analyzed freeway weaving segments for the No Build and Build alternatives at the opening year (2010) and the design year (2030). The tables show that both of the analyzed segments along the I-405 freeway (northbound between Carson Street and Avalon Boulevard and southbound between Avalon Boulevard and Carson Street) are projected to operate at LOS F during both the AM and PM peak hours at both the opening year (2010) and the design year (2030).

## VI. TRAFFIC IMPACT ANALYSIS

### INTERSECTION TRAFFIC IMPACT ANALYSIS

#### Threshold Criteria

The City of Carson has threshold criteria that it applies to determine if a project has a significant traffic impact at an intersection. Under the City's criteria, a project impact would be considered significant if the following two conditions are met:

1. The increase in the volume/capacity (V/C) ratio that can be attributed to the project is equal to or exceeds 0.020; *and*
2. Under future base plus project conditions, the intersection is projected to operate at LOS E or F (represented by a V/C ratio of 0.901 or greater).

The City's criteria are based on V/C ratios as estimated using the Intersection Capacity Utilization (ICU) method of intersection capacity analysis. For the purposes of the I-405/Avalon Boulevard interchange project study, however, the HCM operational methodology is being used for intersection capacity analysis, which generates average vehicular delay (not V/C ratio) as the measure of effectiveness. Since the 0.020 change in V/C ratio in the City's criteria is equivalent to two-tenths of the V/C range for a level of service and the delay range for LOS E under the HCM methodology is 25 seconds, the City's criteria were therefore adapted to be delay-based, as follows. Under the modified criteria, a traffic impact at a signalized intersection would be considered significant if the following two conditions are met:

1. The increase in the average vehicular delay that can be attributed to the project is equal to or exceeds 5.0 seconds; *and*
2. Under future base plus project conditions, the intersection is projected to operate at LOS E or F (represented by an average vehicular delay of 55 seconds or greater).



## **Impact Analysis**

The No Build Alternative represents the future base conditions without the interchange improvement project. Thus, to determine significant traffic impact at the intersections with the addition of the project, No Project Alternative delay and LOS were compared with the Build Alternative. Tables 7 and 8 present this comparison for the opening year (2010) and the design year (2030), respectively. No significant project impacts are projected for any of the analyzed intersections at either year 2010 or year 2030. On the contrary, the proposed improvements at the I-405/Avalon Interchange are projected to improve conditions with a reduction in vehicular delay at the following seven intersections:

- Carson Street & I-405 southbound ramps
- Avalon Boulevard & Carson Street
- Main Street & Carson Street
- Main Street & Torrance Boulevard
- Main Street & Lenardo Drive
- Avalon Boulevard & Del Amo Boulevard
- Stamps Drive & Del Amo Boulevard

At five of these locations, poor (LOS E or F) conditions otherwise projected under the No Build Alternative would be either fully or partially alleviated by the project:

- Avalon Boulevard & Carson Street
- Main Street & Carson Street
- Main Street & Torrance Boulevard
- Avalon Boulevard & Del Amo Boulevard
- Stamps Drive & Del Amo Boulevard

The improvements in seconds of delay at the intersections listed above can be attributed to the shift in traffic from other neighboring ramp locations along the I-405 northbound and southbound to the I-405/Avalon Boulevard Interchange as a result of improved access to/from northbound and southbound I-405 freeway to/from northbound and southbound Avalon Boulevard and providing additional access to the Carson Marketplace development via extension of Lenardo Drive up to Avalon Boulevard.

## **FREEWAY IMPACT ANALYSIS**

A comparison study was conducted of projected conditions for the freeway segment, freeway-ramp junction areas of influence and freeway weaving segment locations for the two alternatives. Tables 9 and 10 present a comparison of density results for the two alternatives analyzed in this report for the opening year (2010) and the design year (2030), respectively. Following is a brief summary of this comparison.

### **Freeway Mainline Segments**

Except for a minor reduction in density for the I-405 northbound segment between Avalon Boulevard and Main Street in the AM peak hour, all other analyzed segments are projected to operate with a nominal increase in density in the Build Alternative scenario.

### **Freeway-Ramp Junction Areas of Influence**

The following freeway-ramp junction areas are projected to experience a minor reduction in density for the Build Alternative scenario:

- Carson Street northbound off-ramp (opening year 2010 and design year 2030)
- Main Street northbound off-ramp (design year 2030)
- Southbound Avalon Boulevard southbound on-ramp (design year 2030)

The junction areas above would experience a decrease in density as a result of shift in traffic with the implementation of improvements as part of the Build Alternative. A minor increase in density at the other analyzed locations can be attributed to the increase in level of traffic as a result of improvements to the I-405 freeway interchange at Avalon Boulevard.

### **Freeway Weaving Segments**

Both of the analyzed freeway segments are projected to experience an increase in density with the project at both the opening year (2010) and the design year (2030). This can be attributed

to the increase in level of traffic on the mainline and ramps at the I-405 interchange at Avalon Boulevard.

## VII. INTERSECTION QUEUING ANALYSIS

### SYNCHRO/SIMTRAFFIC QUEUING ANALYSIS

A queuing and LOS analysis of the I-405/Avalon Boulevard interchange was conducted using the Synchro/Simtraffic software program. This program simulates projected traffic flows and considers the effects of upstream and downstream intersection queuing when calculating traffic operations. The use of a simulation software program when analyzing traffic operations at closely spaced intersections that experience congestion during peak hours, such as the three intersections serving the I-405 on- and off-ramps at the Avalon Boulevard interchange, is desirable to ensure that interaction between the intersections is considered.

The Synchro/Simtraffic software program models arterial operations and was used to estimate vehicle queuing at the ramp terminal intersections providing access to Avalon Boulevard and Lenardo Drive. Synchro/Simtraffic does not model freeway operations. Therefore, this analysis does not include the potential effects of congestion on the freeway mainline during peak hours under future conditions.

The Synchro/Simtraffic model contained Avalon Boulevard between 213<sup>th</sup> Street and Dominguez Street and Lenardo Drive between the Carson Marketplace and Avalon Boulevard. The model also included ramp meters on the I-405 northbound on-ramp, the I-405 southbound on-ramp from Lenardo Drive, and the new I-405 southbound on-ramp from Avalon Boulevard. The Avalon Boulevard/213<sup>th</sup> Street and Avalon Boulevard/Dominguez Street intersections were included in the model to reflect forecasted traffic flows entering/exiting the I-405 and Avalon Boulevard interchange. However, queuing and LOS results were not reported at these two intersections. Queuing and LOS results were analyzed for the following three intersections serving the proposed interchange:

- Avalon Boulevard & I-405 northbound ramps
- Avalon Boulevard & Lenardo Drive & I-405 southbound on-ramp
- Lenardo Drive & I-405 southbound ramps

These three intersections were analyzed during the AM and PM peak hours with the projected future (year 2030) traffic forecasts under the Build Alternative. A 90-second cycle length was used for each intersection and the traffic signals were assumed to operate under actuated-coordinated conditions to optimize traffic flows through the interchange (traffic signal timings are provided in Appendix I). To determine the queuing results during peak hours, the Synchro/Simtraffic model was simulated for 20 iterations using different random seed numbers and the results of the 10 average runs were used to report the projected vehicle queues and LOS.

Table 11 shows the simulated 95<sup>th</sup> percentile queues for the critical movements through the I-405 and Avalon Boulevard interchange during the AM and PM peak hours under the Build Alternative (technical calculation worksheets are provided in Appendix I). Vehicle queues for movements not reported were found to be minimal based on observations of the Synchro/Simtraffic model.

As shown in Table 11, the simulated vehicle queues are estimated to extend beyond the storage provided at three locations during the PM peak hour: right turns from southbound Avalon Boulevard to westbound Lenardo Drive; right turns from the northbound I-405 off-ramp to northbound Avalon Boulevard, and left turns from the northbound I-405 off-ramp to southbound Avalon Boulevard. Although the projected queues on the northbound off-ramp would extend back beyond the flared portion of the off-ramp, they are not projected to extend back to the freeway mainline.

Ramp metering rates were determined based on the amount of storage available on the on-ramp and the projected peak hour traffic forecasts under future conditions. The minimum ramp metering rate was applied to eliminate vehicle queues beyond the storage provided on the on-ramp. Table 12 summarizes the ramp metering rates, the storage provided for each on-ramp, and the estimated vehicle queues during the AM and PM peak hours. As shown, ramp metering rates ranged from 250 vehicles per hour per lane to 800 vehicles per hour per lane and the simulated vehicle queues do not exceed the storage provided.

**TABLE 11**  
**I-405/AVALON QUEUING ANALYSIS**  
**DESIGN YEAR (2030) BUILD ALTERNATIVE**

Intersection	Turning Movement	Storage Provided (feet) [1]	95th Percentile Queue [2]			
			AM Peak Hour	Does queue exceed storage?	PM Peak Hour	Does queue exceed storage?
6 Avalon Bl & I-405 N/B Ramps	NB Avalon Left	250 ft.	180 ft.	No	250 ft.	No
	NB Avalon Thru	300 ft.	280 ft.	No	225 ft.	No
	SB Avalon Thru	650 ft.	185 ft.	No	635 ft.	No
	SB Avalon Right	660 ft.	205 ft.	No	625 ft.	No
	NB Off-Ramp Left	660 ft.	90 ft.	No	830 ft.	<b>Yes</b>
	NB Off-Ramp Right	660 ft.	35 ft.	No	845 ft.	<b>Yes</b>
7 Avalon Bl & Lenardo Dr/I-405 S/B On-Ramp	NB Avalon Left	200 ft.	155 ft.	No	125 ft.	No
	SB Avalon Thru	300 ft.	290 ft.	No	120 ft.	No
	SB Avalon Right	300 ft.	215 ft.	No	445 ft.	<b>Yes</b>
	EB Lenardo Left	430 ft.	275 ft.	No	245 ft.	No
	EB Lenardo Thru	430 ft.	180 ft.	No	240 ft.	No
8 Lenardo Dr & I-405 S/B Ramps	SB Off-Ramp Left	300 ft.	250 ft.	No	210 ft.	No
	SB Off-Ramp Right	300 ft.	70 ft.	No	90 ft.	No

Notes:

[1] Storage provided reflects pocket length or distance to upstream intersection.

[2] 95th percentile queue calculated using the Synchro/Simtraffic model.

**TABLE 12**  
**I-405/AVALON RAMP METERING ANALYSIS**  
**DESIGN YEAR (2030) BUILD ALTERNATIVE**

On-Ramp	Ramp Metering Rate [1]		Number of Lanes at Meter	Storage Provided (feet) [2]	95th Percentile Queue [3]			
	AM Peak Hour	PM Peak Hour			AM Peak Hour	Does queue exceed storage?	PM Peak Hour	Does queue exceed storage?
1 NB On-Ramp	600	800	2	300 ft.	245 ft.	No	245 ft.	No
2 SB Loop On-Ramp	500	700	1	200 ft.	95 ft.	No	85 ft.	No
3 SB Diagonal On-Ramp	250	300	2	600 ft.	75 ft.	No	210 ft.	No

Notes:

- [1] Ramp metering rate in vehicles per hour per lane.
- [2] Storage provided reflects distance to upstream intersection.
- [3] 95th percentile queue calculated using the Synchro/Simtraffic model.

## **QUEUING CAUSED BY FREEWAY MAINLINE CONGESTION**

Caltrans has postulated that future congestion on the I-405 freeway mainline may, at some theoretical (but undetermined) point in time, limit the number of vehicles entering I-405 during peak travel hours. This in turn could cause on-ramp vehicle queues to extend into and beyond the upstream ramp termini intersection and onto city streets in both the No Build and Project Build scenarios. This effect is not modeled in the Synchro/Simtraffic simulation, which is appropriate for modeling closely-spaced intersections but does not model the freeway mainline. Although different methodologies could be employed, on-ramp queuing caused by mainline congestion is an effect that could occur in both the No Build and Project Build scenarios whether or not the I-405/Avalon Boulevard interchange project is implemented.



## **VIII. CONSTRUCTION PERIOD TRAFFIC ANALYSIS AND TRANSPORTATION MANAGEMENT PLAN**

This chapter evaluates potential temporary traffic impacts and traffic management procedures during construction of the project. Construction is anticipated to begin in year 2008 and end in year 2010.

### **PROPOSED CONSTRUCTION STAGING**

The project would be implemented in four stages, as illustrated in Figure 13. Following is a brief summary of the proposed construction stages.

#### **Stage One**

Stage One of the project construction involves construction of various elements of the interchange improvements that do not disrupt existing traffic:

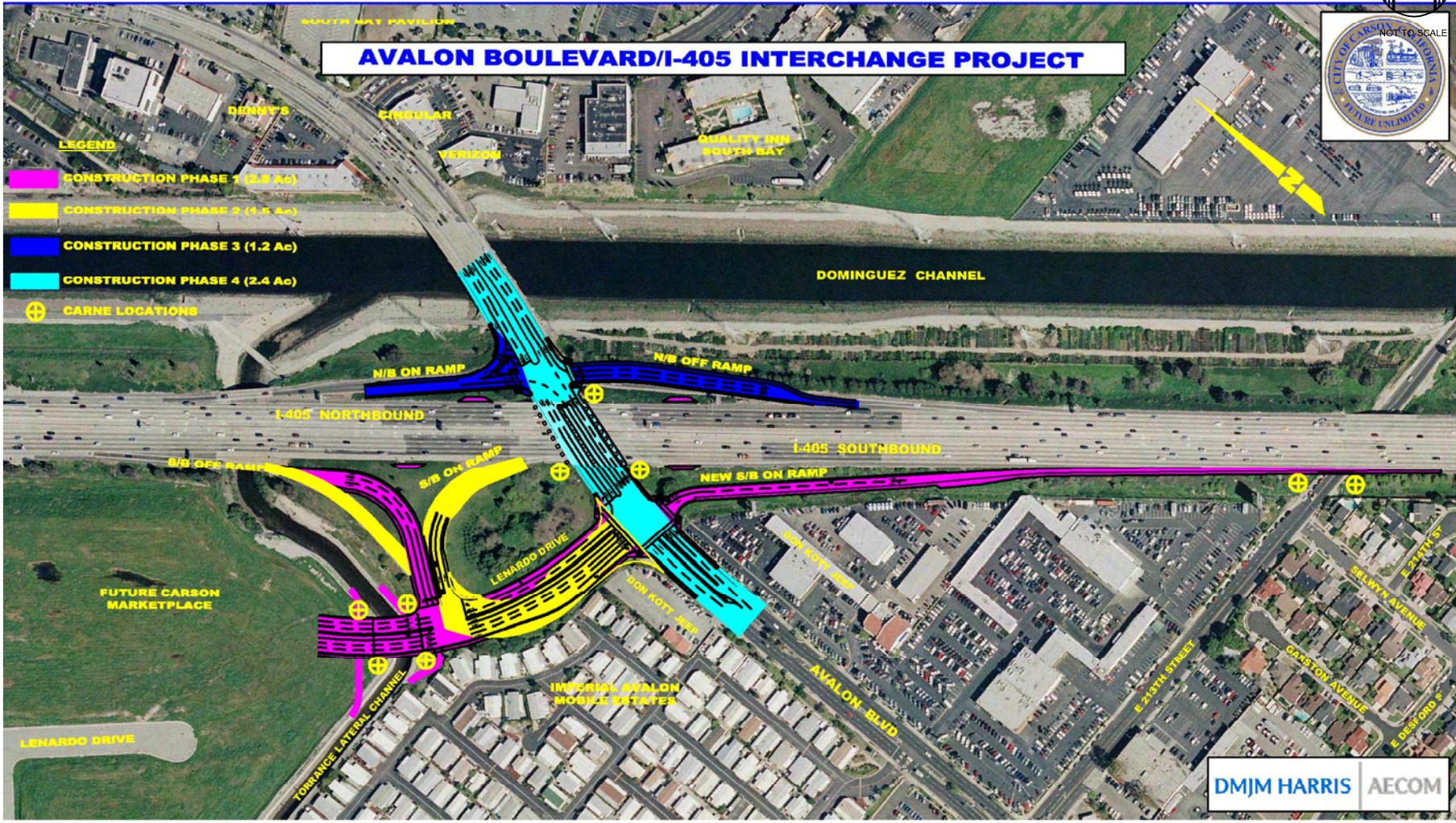
- Construction of the new on-ramp from Avalon Boulevard onto the southbound I-405 freeway
- Construction of Lenardo Drive bridge over the Torrance Lateral Channel
- Construction of portions of Lenardo Drive from Avalon Boulevard to the bridge over Torrance Lateral Channel
- Construction of portions of the new southbound I-405 off-ramp at Avalon Boulevard
- Construction of the four main pullout areas on I-405

During this stage, the existing ramps would remain open and existing traffic patterns would remain in place.



# AVALON BOULEVARD/I-405 INTERCHANGE PROJECT

- LEGEND**
- CONSTRUCTION PHASE 1 (3.8 Ac)
  - CONSTRUCTION PHASE 2 (1.2 Ac)
  - CONSTRUCTION PHASE 3 (1.2 Ac)
  - CONSTRUCTION PHASE 4 (2.4 Ac)
  - CARNE LOCATIONS



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FIGURE 13  
PROPOSED CONSTRUCTION STAGING

## **Stage Two**

Stage Two of the proposed project involves the completion of Lenardo Drive and the modified southbound I-405 on and off ramps at Avalon Boulevard. This stage would occur subsequent to the opening of the new southbound I-405 on-ramp located on the east side of Avalon Boulevard. Stage Two would include the construction of the following:

- Traffic on the southbound off-ramp would be shifted to the north side of Lenardo Drive to rebuild the southern half of the street
- Concurrent with the above construction, modifications would be made to the southbound I-405 on-ramp
- After that, the traffic would be shifted to the south side on Lenardo Drive to rebuild the northern half of the street
- Finally, construction on the modified southbound I-405 off-ramp to Avalon Boulevard would be completed

During this stage, the existing southbound off-ramp and southbound on-ramp could be closed to traffic at certain times. The new southbound on-ramp (constructed in Stage One) would be available to accommodate traffic from northbound Avalon Boulevard turning right to access the southbound freeway, but this ramp is not designed to serve traffic from southbound Avalon Boulevard. Existing traffic patterns at the northbound ramps would not be affected during this stage.

## **Stage Three**

Stage Three would involve the widening of northbound I-405 on- and off-ramps at Avalon Boulevard. This would involve the following:

- Modification/reconstruction of northbound I-405 on ramp at Avalon Boulevard
- Modification/reconstruction of northbound I-405 off-ramp at Avalon Boulevard

During this stage, there may be periods when the existing northbound off-ramp and northbound on-ramp would be closed to traffic. Traffic patterns at the new southbound ramps (constructed in prior stages) would not be affected during this stage.

## **Stage Four**

Stage Four would mainly involve modifications along Avalon Boulevard:

- Shifting Avalon Boulevard traffic to the inside lanes
- Modification of minor concrete structure
- Performing minor roadway demolition
- Modification of traffic signals
- Subsequent to the above steps, shifting traffic to the outside lanes
- Performing minor roadway demolitions again
- Fully opening Avalon Boulevard

## **CONSTRUCTION PERIOD LEVEL OF SERVICE ANALYSIS**

Level of service analysis was conducted for the analyzed intersections for all the above-mentioned stages of construction for the proposed project. The project is expected to be constructed by the year 2010 before the opening of Carson Marketplace project. The analysis was conducted using cumulative base year 2010 AM and PM peak hour traffic volumes from *Traffic Impact Study for the Carson Marketplace* prepared as part of the Carson Marketplace Environmental Impact Report to represent the 2010 base year conditions without the I-405 freeway improvements at the Avalon Interchange and without the Carson Marketplace traffic. Table 13 presents the results of the analysis.

As indicated in the table, with a few exceptions, intersection operating conditions are not expected to be substantially affected at most of the study intersections during the various construction stages. At the existing Avalon Boulevard and I-405 northbound ramps and the Avalon Boulevard/I-405 southbound ramps intersections, this results from the proposal to maintain existing lanes during construction.

A substantial degradation in operating conditions is projected for the intersection of Avalon Boulevard and Carson Street during those portions of construction Stage Two when the I-405 southbound ramps at Avalon Boulevard may be temporarily closed and those portions of construction Stage Three when the I-405 northbound ramps at Avalon Boulevard may be temporarily closed, resulting in traffic shifts to the I-405/Carson Street interchange via Avalon

**TABLE 13  
CONSTRUCTION PERIOD INTERSECTION LEVEL OF SERVICE ANALYSIS**

Intersection	Peak Hour	Cumulative Base		Stage One		Stage Two		Stage Three		Stage Four	
		Delay <sup>[1]</sup>	LOS <sup>[2]</sup>	Delay <sup>[1]</sup>	LOS <sup>[2]</sup>	Delay <sup>[1]</sup>	LOS <sup>[2]</sup>	Delay <sup>[1]</sup>	LOS <sup>[2]</sup>	Delay <sup>[1]</sup>	LOS <sup>[2]</sup>
1 Carson St & I-405 NB Ramps	AM	5.5	A	5.5	A	5.5	A	14.0	B	5.5	A
	PM	6.6	A	6.6	A	4.8	A	23.3	C	6.6	A
2 Carson St & I-405 SB Ramps	AM	8.5	A	8.5	A	14.9	B	7.5	A	7.1	A
	PM	9.1	A	9.1	A	55.3	E	15.2	B	7.1	A
3 Avalon Bl & Carson St	AM	32.9	C	32.9	C	57.5	E	91.3	F	31.3	C
	PM	76.7	E	76.7	E	134.7	F	190.7	F	72.0	E
4 Main St & Carson St	AM	28.8	C	28.8	C	29.7	C	29.7	C	29.7	C
	PM	89.7	F	89.7	F	75.6	E	75.6	E	75.6	E
5 Avalon Bl & 213th St	AM	15.9	B	15.9	B	16.1	B	16.4	B	15.9	B
	PM	19.6	B	19.6	B	25.4	C	29.7	C	19.6	B
6 Avalon Bl & I-405 NB Ramps	AM	7.3	A	7.3	A	7.3	A	Ramps Closed for Construction		12.4	B
	PM	8.1	A	8.1	A	7.9	A		28.7	C	
7 Avalon Bl & Lenardo Dr/I-405 SB On-Ramp	AM	12.4	B	12.4	B	16.9	B	15.7	B	20.7	C
	PM	7.8	A	7.8	A	21.8	B	29.6	C	28.2	C
8 Lenardo Dr & I-405 SB Ramps	AM	Future Intersection [3]		Future Intersection [3]		Ramps Closed for Construction	6.1	A	6.1	A	
	PM	Future Intersection [3]		Future Intersection [3]			11.2	B	11.2	B	
9 Main St & Torrance Bl	AM	24.4	C	24.4	C	25.1	C	25.1	C	25.1	C
	PM	28.3	C	28.3	C	28.2	C	28.2	C	28.2	C
10 Main St & Lenardo Dr	AM	Future Intersection [4]		Future Intersection [4]		Future Intersection [4]		Future Intersection [4]		Future Intersection [4]	
	PM	Future Intersection [4]		Future Intersection [4]		Future Intersection [4]		Future Intersection [4]		Future Intersection [4]	
11 Avalon Bl & Del Amo Bl	AM	26.4	C	26.4	C	38.7	D	38.7	D	38.7	D
	PM	35.9	D	35.9	D	35.9	D	35.9	D	35.9	D
12 Stamps Dr & Del Amo Bl	AM	Future Intersection [4]		Future Intersection [4]		Future Intersection [4]		Future Intersection [4]		Future Intersection [4]	
	PM	Future Intersection [4]		Future Intersection [4]		Future Intersection [4]		Future Intersection [4]		Future Intersection [4]	
13 Main St & I-405 NB Ramps	AM	14.1	B	14.1	B	13.8	B	24.1	C	13.8	B
	PM	11.6	B	11.6	B	10.6	B	20.8	C	10.6	B
14 Main St & I-405 SB Ramps	AM	9.7	A	9.7	A	9.4	A	9.4	A	9.4	A
	PM	16.5	B	16.5	B	15.8	B	15.8	B	15.8	B

**Notes:**

- [1] Average delay in seconds per vehicle.
- [2] Delay and LOS calculated using 2000 Highway Capacity Manual LOS methodology.
- [3] Intersection does not exist; to be constructed as part of I-405/Avalon interchange improvement project.
- [4] Intersection does not exist; to be constructed as part of Carson Marketplace project.

Boulevard and Carson Street. This impact could be mitigated by limiting such closures to off-peak traffic periods.

A possible option that could be investigated to minimize the need for traffic shifts to the Carson Avenue interchange during portions of Stage Two when the existing southbound loop on-ramp is closed would be to temporarily restripe Avalon Boulevard at the southbound ramps and modify the traffic signal to permit left turns from southbound Avalon Boulevard onto the new southbound on-ramp constructed in Stage One.

## **TRANSPORTATION MANAGEMENT PLAN**

The project involves reconstruction of the existing I-405/Avalon Boulevard interchange including construction of new roadways and ramps and modification of existing ramps. The current number of traffic lanes is expected to be maintained at least during the weekday peak hours throughout most of the construction period.

The following measures are recommended to address potential traffic impacts and facilitate traffic flows during project construction:

- Temporary Traffic Controls - Temporary traffic controls, signing, barriers, and flagmen should be employed as necessary and appropriate for the efficient movement of traffic (in accordance with standard traffic engineering practices) to facilitate construction of the project improvements while maintaining traffic flows and minimizing disruption to traffic.
- Street and Ramp Closures (General) - Construction activities should be staged in such a manner to minimize the need for street and/or ramp closures. To the extent possible, such closures (when required) should be made during off-peak and/or overnight periods. In advance of and during closure periods, appropriate temporary signage (in accordance with Caltrans and City guidelines) should be used to warn motorists of the closure and direct them to alternative routes. Details will be developed as needed during lane closures.
- Transportation Management Plan - Notwithstanding the above, any disruption of traffic in this urbanized area would likely result in some degradation of roadway performance. Accordingly, the SPSR called for development of a Transportation Management Plan (TMP) for the project, and included funding in the project cost estimate for development and implementation of the TMP. The TMP would focus on informing the motoring public and affected parties of construction dates, activities, and alternate routes. The TMP could include such elements as the following:

- Public information center
- Additional project signing
- Advertising in local and regional newspapers
- Staff attendance at local neighborhood and business association meetings to inform residents and merchants/landowners of project progress
- Project newsletter and/or articles for the local papers and associations
- Other TMP strategies such as motorist information strategies, incident management, construction strategies, and other appropriate strategies needed for traffic congestion mitigation.

With implementation of the TMP and various measures to manage traffic during the construction period, and given the temporary nature of the construction activities, construction period traffic impacts are anticipated to be less than significant.

## REFERENCES

*Highway Capacity Manual 2000*, Transportation Research Board, 2000.

*Supplemental Project Study Report Project on Route 405 from Carson Street Interchange to Main Street Interchange, EA 07186-23390K*, California Department of Transportation, approved March 2003.

*Traffic Impact Study for the Carson Marketplace*, Kaku Associates, Inc., October 2005.



**APPENDIX A**

**FREEWAY MAINLINE COUNT DATA**

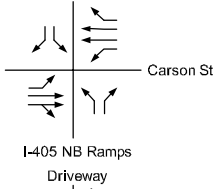
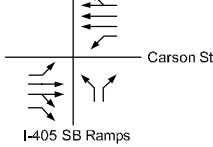
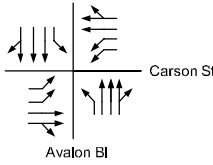
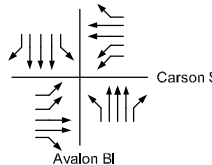
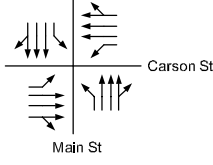
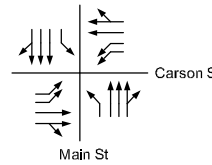
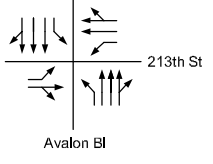
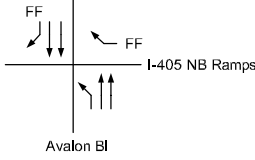
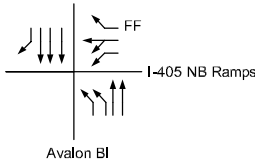
CA PM	Name	Type	# Of Lanes	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total (ADT)
10.66 to 11.32	CARSON to AVALON ML	4 Lanes		1271	896	866	969	1510	4757	6453	6222	6414	5855	5444	5378	5214	5208	5476	5841	6108	6342	5269	4844	3973	3699	3055	1909	103468
	CARSON to AVALON HV			14	6	2	4	39	399	945	1039	899	765	670	542	521	539	672	792	853	877	746	549	344	252	161	58	11685
11.32 to 12.57	AVALON to MAIN ST. ML	4 lanes to 5 lanes		979	657	519	636	1684	4950	6889	6873	6880	6289	5845	5667	5667	5641	5983	6529	6835	7076	5813	5161	4218	3917	3081	1775	109562
	AVALON to MAIN ST. HV			20	6	7	3	21	296	740	824	779	701	678	559	580	578	739	991	1047	952	819	695	408	305	215	80	12039

CA PM	Name	Type	# OF Lanes	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total(ADT)
12.57 to 11.32	MAIN ST. to AVALON	ML	5 lanes to 4 lanes	1429	855	649	591	1115	3462	5866	6295	6157	4800	5084	5413	5581	5897	6450	6671	6494	5103	5722	6092	4939	4263	3708	2555	105188
	MAIN ST. to AVALON	HV		25	7	6	4	23	300	798	898	806	683	692	583	582	605	807	1087	1129	1008	913	731	422	341	231	87	12765
11.32 to 10.49	AVALON to CARSON	ML	4 lanes	1401	824	633	564	1038	3267	5494	5829	5876	4570	4924	5270	5336	5670	6022	6407	6212	4887	5629	5934	4769	4209	3633	2467	100864
	AVALON to CARSON	HV		36	10	8	3	7	127	485	606	579	439	564	572	619	682	1001	1510	1531	1304	1252	1027	506	370	288	118	13640

## **APPENDIX B**

### **INTERSECTION LANE CONFIGURATIONS**

# INTERSECTION LANE CONFIGURATIONS

	<u>EXISTING CONDITIONS</u>	<u>NO BUILD ALTERNATIVE CONDITIONS</u>	<u>BUILD ALTERNATIVE CONDITIONS</u>
1. I-405 NB Ramps Carson St	 <p style="text-align: center;">I-405 NB Ramps Driveway</p>	Same As Existing	Same As Existing
2. I-405 SB Ramps & Carson St	 <p style="text-align: center;">I-405 SB Ramps</p>	Same As Existing	Same As Existing
3. Avalon Bl & Carson St	 <p style="text-align: center;">Avalon Bl</p>	 <p style="text-align: center;">Avalon Bl</p>	Same As No Build
4. Main St & Carson St	 <p style="text-align: center;">Main St</p>	 <p style="text-align: center;">Main St</p>	Same As No Build
5. Avalon Bl & 213th St	 <p style="text-align: center;">Avalon Bl</p>	Same As Existing	Same As Existing
6. Avalon Bl & I-405 NB Ramps	 <p style="text-align: center;">Avalon Bl</p>	Same As Existing	 <p style="text-align: center;">Avalon Bl</p>

**LEGEND**

- ☐ = Stop Sign Controlled Approach
- FF = Free Flow Right Turn

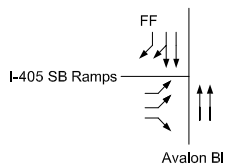
# INTERSECTION LANE CONFIGURATIONS

## EXISTING CONDITIONS

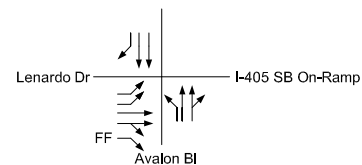
## NO BUILD ALTERNATIVE CONDITIONS

## BUILD ALTERNATIVE CONDITIONS

7. Avalon Bl & Lenardo Dr / I-405 SB Ramps



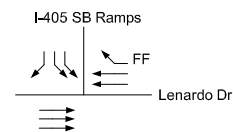
Same As Existing



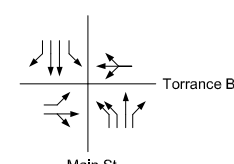
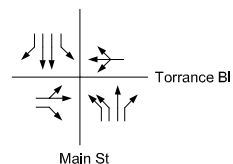
8. Lenardo Dr & I-405 SB Ramps

## FUTURE INTERSECTION

Intersection Does Not Exist



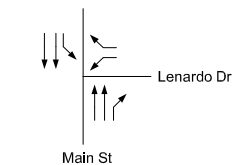
9. Main St & Torrance Bl



Same As No Build

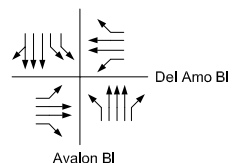
10. Main St & Lenardo Dr

## FUTURE INTERSECTION



Same As No Build

11. Avalon Bl & Del Amo Bl

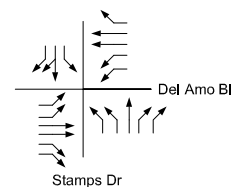


Same As Existing

Same As Existing

12. Stamps Dr & Del Amo Bl

## FUTURE INTERSECTION

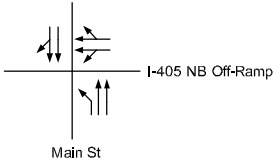
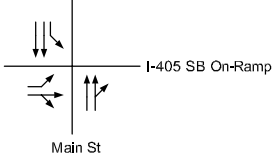


Same As No Build

### LEGEND

- ☐ = Stop Sign Controlled Approach
- FF = Free Flow Right Turn

# INTERSECTION LANE CONFIGURATIONS

	<u>EXISTING CONDITIONS</u>	<u>NO BUILD ALTERNATIVE CONDITIONS</u>	<u>BUILD ALTERNATIVE CONDITIONS</u>
13. Main St & I-405 NB Off-Ramp	 <p style="text-align: center;">Main St</p>	Same As Existing	Same As Existing
14. Main St & I-405 SB On-Ramp	 <p style="text-align: center;">Main St</p>	Same As Existing	Same As Existing

**LEGEND**

- ☐ = Stop Sign Controlled Approach
- FF = Free Flow Right Turn

**APPENDIX C**

**EXISTING LEVEL OF SERVICE WORKSHEETS**



## INTERSECTIONS

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	1	1	0	1	1	0	1
Lane group	L	TR		L	T	R	L		R	L		R
Volume (vph)	103	798	10	3	871	256	4		0	20		400
% Heavy veh	0	0	0	0	0	0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90		0.90
Actuated (P/A)	P	P	A	P	P	A	P		P	P		P
Startup lost time	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Ext. eff. green	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Arrival type	3	3		3	3	3	3		3	3		3
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0		12.0	12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0	0	0		0	0		0
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Phasing	EW Perm	EW Perm	03	04	NS Perm	06	07	08				
Timing	G = 11.5	G = 32.3	G =	G =	G = 7.2	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	114	898		3	968	284	4		0	22		444
Lane group cap.	346	2817		325	1948	1615	217		1615	217		1615
v/c ratio	0.33	0.32		0.01	0.50	0.18	0.02		0.00	0.10		0.27
Green ratio	0.19	0.78		0.54	0.54	1.00	0.12		1.00	0.12		1.00
Unif. delay d1	20.9	1.9		6.4	8.7	0.0	23.3		0.0	23.5		0.0
Delay factor k	0.50	0.50		0.50	0.50	0.11	0.50		0.11	0.50		0.50
Increm. delay d2	2.5	0.3		0.1	0.9	0.1	0.2		0.0	0.9		0.4
PF factor	1.000	1.000		1.000	1.000	0.950	1.000		0.950	1.000		0.950
Control delay	23.5	2.2		6.5	9.6	0.1	23.4		0.0	24.5		0.4
Lane group LOS	C	A		A	A	A	C		A	C		A
Apprch. delay	4.6			7.5			23.4			1.6		
Approach LOS	A			A			C			A		
Intersec. delay	5.4			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	1	1	0	1	1	0	1
Lane group	L	TR		L	T	R	L		R	L		R
Volume (vph)	117	819	7	1	576	306	20		4	28		444
% Heavy veh	0	0	0	0	0	0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90		0.90
Actuated (P/A)	P	P	A	P	P	A	P		P	P		P
Startup lost time	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Ext. eff. green	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Arrival type	3	3		3	3	3	3		3	3		3
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0		12.0	12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0	0	0		0	0		0
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Phasing	EW Perm	EW Perm	03	04	NS Perm	06	07	08				
Timing	G = 11.5	G = 31.7	G =	G =	G = 7.8	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	130	918		1	640	340	22		4	31		493
Lane group cap.	346	2782		313	1912	1615	235		1615	235		1615
v/c ratio	0.38	0.33		0.00	0.33	0.21	0.09		0.00	0.13		0.31
Green ratio	0.19	0.77		0.53	0.53	1.00	0.13		1.00	0.13		1.00
Unif. delay d1	21.1	2.1		6.7	8.1	0.0	23.0		0.0	23.1		0.0
Delay factor k	0.50	0.50		0.50	0.50	0.11	0.50		0.11	0.50		0.50
Increm. delay d2	3.1	0.3		0.0	0.5	0.1	0.8		0.0	1.2		0.5
PF factor	1.000	1.000		1.000	1.000	0.950	1.000		0.950	1.000		0.950
Control delay	24.2	2.4		6.7	8.6	0.1	23.8		0.0	24.3		0.5
Lane group LOS	C	A		A	A	A	C		A	C		A
Apprch. delay	5.1			5.6			20.1			1.9		
Approach LOS	A			A			C			A		
Intersec. delay	4.8			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	1	1	3	0	1	0	1	0	0	0
Lane group	L	TR	R	L	TR		L		R			
Volume (vph)	7	705	584	74	1187	9	66		177			
% Heavy veh	0	0	0	0	0	0	0		0			
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90			
Actuated (P/A)	P	P	P	P	P	P	P		P			
Startup lost time	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Ext. eff. green	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Arrival type	3	3	3	3	3		3		3			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N		N
Parking/hr												
Bus stops/hr	0	0	0	0	0		0		0			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Phasing	WB Only	EW Perm	03		04		NB Only	06		07		08
Timing	G = 7.8	G = 54.0	G =		G =		G = 9.2	G =		G =		G =
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y =		Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	8	783	649	82	1329		73		197			
Lane group cap.	248	2442	1090	176	4188		208		1615			
v/c ratio	0.03	0.32	0.60	0.47	0.32		0.35		0.12			
Green ratio	0.68	0.68	0.68	0.10	0.81		0.11		1.00			
Unif. delay d1	4.3	5.4	7.1	34.1	1.9		32.6		0.0			
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50		0.11			
Increm. delay d2	0.2	0.3	2.4	8.6	0.2		4.6		0.0			
PF factor	1.000	1.000	1.000	1.000	1.000		1.000		0.950			
Control delay	4.6	5.7	9.5	42.7	2.1		37.3		0.0			
Lane group LOS	A	A	A	D	A		D		A			
Apprch. delay	7.4			4.5			10.1					
Approach LOS	A			A			B					
Intersec. delay	6.3			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	1	1	3	0	1	0	1	0	0	0
Lane group	L	TR	R	L	TR		L		R			
Volume (vph)	5	847	578	71	949	14	53		86			
% Heavy veh	0	0	0	0	0	0	0		0			
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90			
Actuated (P/A)	P	P	P	P	P	P	P		P			
Startup lost time	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Ext. eff. green	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Arrival type	3	3	3	3	3		3		3			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N		N
Parking/hr												
Bus stops/hr	0	0	0	0	0		0		0			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Phasing	WB Only	EW Perm	03		04		NB Only	06		07		08
Timing	G = 7.8	G = 54.0	G =		G =		G = 9.2	G =		G =		G =
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y =		Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	6	941	642	79	1070		59		96			
Lane group cap.	326	2442	1090	176	4183		208		1615			
v/c ratio	0.02	0.39	0.59	0.45	0.26		0.28		0.06			
Green ratio	0.68	0.68	0.68	0.10	0.81		0.11		1.00			
Unif. delay d1	4.3	5.7	7.0	34.1	1.8		32.4		0.0			
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50		0.11			
Increm. delay d2	0.1	0.5	2.3	8.1	0.1		3.4		0.0			
PF factor	1.000	1.000	1.000	1.000	1.000		1.000		0.950			
Control delay	4.4	6.2	9.4	42.1	2.0		35.8		0.0			
Lane group LOS	A	A	A	D	A		D		A			
Apprch. delay	7.4			4.7			13.6					
Approach LOS	A			A			B					
Intersec. delay	6.7			Intersection LOS						A		

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2006						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	0	2	2	0	1	3	0	1	3	0	
Lane group	L	TR		L	TR		L	TR		L	TR		
Volume (vph)	173	647	49	294	665	96	97	772	354	152	628	122	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Arrival type	3	3		3	3		3	3		3	3		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0		0	0		0	0		0	0		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.1	G = 20.6	G =			G =			G = 8.1	G = 22.2	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 70.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	192	773		327	846		108	1251		169	834		
Lane group cap.	356	1054		356	1044		209	1564		209	1601		
v/c ratio	0.54	0.73		0.92	0.81		0.52	0.80		0.81	0.52		
Green ratio	0.10	0.29		0.10	0.29		0.12	0.32		0.12	0.32		
Unif. delay d1	29.9	22.2		31.2	22.9		29.1	21.9		30.2	19.6		
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50		
Increm. delay d2	5.8	4.5		30.9	6.8		8.8	4.4		27.6	1.2		
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000		
Control delay	35.7	26.8		62.1	29.7		38.0	26.3		57.8	20.8		
Lane group LOS	D	C		E	C		D	C		E	C		
Apprch. delay	28.5			38.7			27.2			27.0			
Approach LOS	C			D			C			C			
Intersec. delay	30.4			Intersection LOS						C			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2006						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	0	2	2	0	1	3	0	1	3	0	
Lane group	L	TR		L	TR		L	TR		L	TR		
Volume (vph)	294	834	106	239	696	101	177	733	250	212	764	251	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Arrival type	3	3		3	3		3	3		3	3		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0		0	0		0	0		0	0		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.1	G = 25.0	G =			G =			G = 9.9	G = 26.0	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	327	1045		266	885		197	1092		236	1128		
Lane group cap.	311	1111		311	1109		223	1618		223	1620		
v/c ratio	1.05	0.94		0.86	0.80		0.88	0.67		1.06	0.70		
Green ratio	0.09	0.31		0.09	0.31		0.12	0.32		0.12	0.32		
Unif. delay d1	36.5	26.8		35.9	25.2		34.5	23.3		35.0	23.6		
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50		
Increm. delay d2	65.2	16.0		24.8	6.0		36.2	2.3		76.5	2.5		
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000		
Control delay	101.6	42.8		60.7	31.2		70.7	25.6		111.5	26.1		
Lane group LOS	F	D		E	C		E	C		F	C		
Apprch. delay	56.8			38.0			32.5			40.8			
Approach LOS	E			D			C			D			
Intersec. delay	42.4			Intersection LOS						D			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Main St & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2006						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	3	0	1	3	0	1	3	0	1	3	0	
Lane group	L	TR		L	TR		L	TR		L	TR		
Volume (vph)	129	543	53	123	719	139	137	532	133	83	458	98	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Arrival type	3	3		3	3		3	3		3	3		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0		0	0		0	0		0	0		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.0	G = 14.2	G =			G =			G = 13.4	G = 13.4	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	143	662		137	953		152	739		92	618		
Lane group cap.	211	1208		211	1195		403	1121		403	1125		
v/c ratio	0.68	0.55		0.65	0.80		0.38	0.66		0.23	0.55		
Green ratio	0.12	0.24		0.12	0.24		0.22	0.22		0.22	0.22		
Unif. delay d1	25.4	20.1		25.3	21.5		19.8	21.2		19.1	20.6		
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50		
Increm. delay d2	16.1	1.8		14.5	5.6		2.7	3.0		1.3	1.9		
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000		
Control delay	41.6	21.9		39.8	27.1		22.4	24.3		20.4	22.6		
Lane group LOS	D	C		D	C		C	C		C	C		
Apprch. delay	25.4			28.7			24.0			22.3			
Approach LOS	C			C			C			C			
Intersec. delay	25.4			Intersection LOS						C			



SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Carson St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	3	0	1	3	0	1	3	0	1	3	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	166	963	158	236	718	142	200	479	142	182	728	178
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	Excl. Left	Thru & RT	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 8.9	G = 17.3	G =	G =	G = 15.9	G = 15.9	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 70.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	184	1246		262	956		222	690		202	1007	
Lane group cap.	229	1252		229	1247		410	1135		410	1141	
v/c ratio	0.80	1.00		1.14	0.77		0.54	0.61		0.49	0.88	
Green ratio	0.13	0.25		0.13	0.25		0.23	0.23		0.23	0.23	
Unif. delay d1	29.7	26.3		30.6	24.5		23.8	24.3		23.5	26.1	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	25.0	24.3		103.8	4.5		5.1	2.4		4.2	10.0	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	54.7	50.6		134.4	29.0		28.9	26.7		27.7	36.1	
Lane group LOS	D	D		F	C		C	C		C	D	
Apprch. delay	51.2			51.7			27.2			34.7		
Approach LOS	D			D			C			C		
Intersec. delay	42.5			Intersection LOS						D		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & 213th St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	1	2	0	1	3	0	1	3	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	143	148	62	89	140	64	76	930	185	49	944	71
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 15.4	G =	G =	G =	G = 7.1	G = 28.5	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	159	233		99	227		84	1239		54	1128	
Lane group cap.	294	466		229	885		214	2397		214	2432	
v/c ratio	0.54	0.50		0.43	0.26		0.39	0.52		0.25	0.46	
Green ratio	0.26	0.26		0.26	0.26		0.12	0.47		0.12	0.47	
Unif. delay d1	19.2	19.0		18.6	17.7		24.5	11.0		24.0	10.6	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	7.0	3.8		5.9	0.7		5.3	0.8		2.8	0.6	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	26.2	22.8		24.5	18.4		29.8	11.8		26.9	11.2	
Lane group LOS	C	C		C	B		C	B		C	B	
Apprch. delay	24.2			20.3			12.9			12.0		
Approach LOS	C			C			B			B		
Intersec. delay	14.7			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & 213th St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	1	2	0	1	3	0	1	3	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	126	170	64	134	138	57	159	1012	197	122	1125	143
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 15.4	G =	G =	G =	G = 7.0	G = 28.6	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	140	260		149	216		177	1343		136	1409	
Lane group cap.	301	468		206	888		211	2407		211	2425	
v/c ratio	0.47	0.56		0.72	0.24		0.84	0.56		0.64	0.58	
Green ratio	0.26	0.26		0.26	0.26		0.12	0.48		0.12	0.48	
Unif. delay d1	18.8	19.3		20.4	17.7		25.9	11.2		25.3	11.4	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	5.1	4.7		19.7	0.7		31.1	0.9		14.2	1.0	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	23.9	24.0		40.1	18.3		57.0	12.1		39.5	12.4	
Lane group LOS	C	C		D	B		E	B		D	B	
Apprch. delay	24.0			27.2			17.4			14.8		
Approach LOS	C			C			B			B		
Intersec. delay	17.9			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 NB					
Agency or Co.	Kaku Associates						Ramps					
Date Performed	8/7/2006					Area Type	All other areas					
Time Period	AM					Jurisdiction						
						Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	0	1	1	2	0	0	3	0
Lane group						R	L	T			TR	
Volume (vph)						422	457	1230			795	341
% Heavy veh						0	0	0			0	0
PHF						0.90	0.90	0.90			0.90	0.90
Actuated (P/A)							P	P			P	P
Startup lost time						2.0	2.0	2.0			2.0	
Ext. eff. green						2.0	2.0	2.0			2.0	
Arrival type						3	3	3			3	
Unit Extension						3.0	3.0	3.0			3.0	
Ped/Bike/RTOR Volume				0		0				0		0
Lane Width						12.0	12.0	12.0			12.0	
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr						0	0	0			0	
Unit Extension						3.0	3.0	3.0			3.0	
Phasing	01	02	03	04	Thru & RT	NB Only	07	08				
Timing	G =	G =	G =	G =	G = 28.6	G = 25.4	G =	G =				
	Y =	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate						469	508	1367			1262	
Lane group cap.						1562	764	3437			2356	
v/c ratio						0.30	0.66	0.40			0.54	
Green ratio						0.95	0.42	0.95			0.48	
Unif. delay d1						0.1	13.9	0.1			11.0	
Delay factor k						0.50	0.50	0.50			0.50	
Increm. delay d2						0.5	4.5	0.3			0.9	
PF factor						1.000	1.000	1.000			1.000	
Control delay						0.6	18.4	0.5			11.9	
Lane group LOS						A	B	A			B	
Apprch. delay				0.6			5.3			11.9		
Approach LOS				A			A			B		
Intersec. delay	7.0			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 NB					
Agency or Co.	Kaku Associates						Ramps					
Date Performed	8/7/2006					Area Type	All other areas					
Time Period	PM					Jurisdiction						
						Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	0	1	1	2	0	0	3	0
Lane group						R	L	T			TR	
Volume (vph)						324	371	1215			1288	629
% Heavy veh						0	0	0			0	0
PHF						0.90	0.90	0.90			0.90	0.90
Actuated (P/A)							P	P			P	P
Startup lost time						2.0	2.0	2.0			2.0	
Ext. eff. green						2.0	2.0	2.0			2.0	
Arrival type						3	3	3			3	
Unit Extension						3.0	3.0	3.0			3.0	
Ped/Bike/RTOR Volume				0		0				0		0
Lane Width						12.0	12.0	12.0			12.0	
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr						0	0	0			0	
Unit Extension						3.0	3.0	3.0			3.0	
Phasing	01	02	03	04	Thru & RT	NB Only	07	08				
Timing	G =	G =	G =	G =	G = 36.7	G = 17.3	G =	G =				
	Y =	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate						360	412	1350			2130	
Lane group cap.						1562	520	3437			3010	
v/c ratio						0.23	0.79	0.39			0.71	
Green ratio						0.95	0.29	0.95			0.61	
Unif. delay d1						0.1	19.7	0.1			8.0	
Delay factor k						0.50	0.50	0.50			0.50	
Increm. delay d2						0.3	11.7	0.3			1.4	
PF factor						1.000	1.000	1.000			1.000	
Control delay						0.4	31.4	0.5			9.4	
Lane group LOS						A	C	A			A	
Apprch. delay				0.4			7.7			9.4		
Approach LOS				A			A			A		
Intersec. delay	7.9			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 SB					
Agency or Co.	Kaku Associates						Ramps					
Date Performed	8/7/2006					Area Type	All other areas					
Time Period	AM					Jurisdiction						
						Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	0	1	0	0	0	0	2	0	0	2	1
Lane group	L		R					T			TR	R
Volume (vph)	596		492					1107			566	238
% Heavy veh	0		0					0			0	0
PHF	0.90		0.90					0.90			0.90	0.90
Actuated (P/A)	P		P					P			P	P
Startup lost time	2.0		2.0					2.0			2.0	2.0
Ext. eff. green	2.0		2.0					2.0			2.0	2.0
Arrival type	3		3					3			3	3
Unit Extension	3.0		3.0					3.0			3.0	3.0
Ped/Bike/RTOR Volume	0		0	0						0		0
Lane Width	12.0		12.0					12.0			12.0	12.0
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0		0					0			0	0
Unit Extension	3.0		3.0					3.0			3.0	3.0
Phasing	EB Only	02	03	04	Thru & RT	06	07	08				
Timing	G = 17.0	G =	G =	G =	G = 37.0	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	662		547					1230			629	264
Lane group cap.	993		1615					2231			2231	996
v/c ratio	0.67		0.34					0.55			0.28	0.27
Green ratio	0.28		1.00					0.62			0.62	0.62
Unif. delay d1	19.0		0.0					6.7			5.3	5.3
Delay factor k	0.50		0.50					0.50			0.50	0.50
Increm. delay d2	3.5		0.6					1.0			0.3	0.7
PF factor	1.000		0.950					1.000			1.000	1.000
Control delay	22.5		0.6					7.7			5.7	5.9
Lane group LOS	C		A					A			A	A
Apprch. delay	12.6						7.7			5.7		
Approach LOS	B						A			A		
Intersec. delay	8.9			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	0	1	0	0	0	0	2	0	0	2	1
Lane group	L		R					T			TR	R
Volume (vph)	375		485					1212			911	382
% Heavy veh	0		0					0			0	0
PHF	0.90		0.90					0.90			0.90	0.90
Actuated (P/A)	P		P					P			P	P
Startup lost time	2.0		2.0					2.0			2.0	2.0
Ext. eff. green	2.0		2.0					2.0			2.0	2.0
Arrival type	3		3					3			3	3
Unit Extension	3.0		3.0					3.0			3.0	3.0
Ped/Bike/RTOR Volume	0		0	0						0		0
Lane Width	12.0		12.0					12.0			12.0	12.0
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0		0					0			0	0
Unit Extension	3.0		3.0					3.0			3.0	3.0
Phasing	EB Only	02	03	04	Thru & RT	06	07	08				
Timing	G = 10.1	G =	G =	G =	G = 43.9	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	417		539					1347			1012	424
Lane group cap.	590		1615					2647			2647	1182
v/c ratio	0.71		0.33					0.51			0.38	0.36
Green ratio	0.17		1.00					0.73			0.73	0.73
Unif. delay d1	23.6		0.0					3.4			3.0	2.9
Delay factor k	0.50		0.50					0.50			0.50	0.50
Increm. delay d2	7.0		0.6					0.7			0.4	0.8
PF factor	1.000		0.950					1.000			1.000	1.000
Control delay	30.5		0.6					4.1			3.4	3.8
Lane group LOS	C		A					A			A	A
Apprch. delay	13.6						4.1			3.5		
Approach LOS	B						A			A		
Intersec. delay	6.3			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Torrance Bl					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	1	1	0	1	0	2	2	0	1	2	1
Lane group		LT	R		LTR		L	TR		L	T	R
Volume (vph)	190	18	143	13	80	27	280	681	7	23	554	142
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time		2.0	2.0		2.0		2.0	2.0		2.0	2.0	2.0
Ext. eff. green		2.0	2.0		2.0		2.0	2.0		2.0	2.0	2.0
Arrival type		3	3		3		3	3		3	3	3
Unit Extension		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width		12.0	12.0		12.0		12.0	12.0		12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr		0	0		0		0	0		0	0	0
Unit Extension		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Phasing	WB Only	EB Only	03		04		Excl. Left	Thru & RT	07		08	
Timing	G = 8.6	G = 10.7	G =		G =		G = 7.4	G = 21.3	G =		G =	
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y = 3	Y =		Y =	
Duration of Analysis (hrs) = 0.25							Cycle Length C = 60.0					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate		231	159		133		311	765		26	616	158
Lane group cap.		324	288		263		432	1282		223	1284	573
v/c ratio		0.71	0.55		0.51		0.72	0.60		0.12	0.48	0.28
Green ratio		0.18	0.18		0.14		0.12	0.35		0.12	0.35	0.35
Unif. delay d1		23.2	22.5		23.7		25.3	15.8		23.4	15.0	13.8
Delay factor k		0.50	0.50		0.50		0.50	0.50		0.50	0.50	0.50
Increm. delay d2		12.6	7.4		6.8		9.9	2.1		1.1	1.3	1.2
PF factor		1.000	1.000		1.000		1.000	1.000		1.000	1.000	1.000
Control delay		35.8	29.9		30.5		35.2	17.9		24.5	16.3	15.0
Lane group LOS		D	C		C		D	B		C	B	B
Apprch. delay	33.4			30.5			22.9			16.3		
Approach LOS	C			C			C			B		
Intersec. delay	22.8			Intersection LOS						C		



SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Torrance Bl					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	1	1	0	1	0	2	2	0	1	2	1
Lane group		LT	R		LTR		L	TR		L	T	R
Volume (vph)	269	54	291	12	41	19	188	480	24	47	750	223
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time		2.0	2.0		2.0		2.0	2.0		2.0	2.0	2.0
Ext. eff. green		2.0	2.0		2.0		2.0	2.0		2.0	2.0	2.0
Arrival type		3	3		3		3	3		3	3	3
Unit Extension		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width		12.0	12.0		12.0		12.0	12.0		12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr		0	0		0		0	0		0	0	0
Unit Extension		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Phasing	WB Only	EB Only	03		04		Excl. Left	Thru & RT		07		08
Timing	G = 7.0	G = 18.1	G =		G =		G = 9.4	G = 23.5		G =		G =
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y = 3		Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 70.0					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate		359	323		80		209	560		52	833	248
Lane group cap.		472	418		182		471	1206		242	1215	542
v/c ratio		0.76	0.77		0.44		0.44	0.46		0.21	0.69	0.46
Green ratio		0.26	0.26		0.10		0.13	0.34		0.13	0.34	0.34
Unif. delay d1		24.0	24.0		29.7		27.9	18.3		27.0	20.1	18.2
Delay factor k		0.50	0.50		0.50		0.50	0.50		0.50	0.50	0.50
Increm. delay d2		11.0	13.0		7.5		3.0	1.3		2.0	3.2	2.8
PF factor		1.000	1.000		1.000		1.000	1.000		1.000	1.000	1.000
Control delay		34.9	37.0		37.2		30.9	19.6		29.0	23.2	21.0
Lane group LOS		C	D		D		C	B		C	C	C
Apprch. delay	35.9			37.2			22.7			23.0		
Approach LOS	D			D			C			C		
Intersec. delay	26.6			Intersection LOS						C		

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2006						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	2	1	1	2	1	1	3	1	2	3	0	
Lane group	L	T	R	L	T	R	L	T	R	L	TR		
Volume (vph)	120	382	24	263	593	108	107	500	157	131	546	144	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Arrival type	3	3	3	3	3	3	3	3	3	3	3		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 14.0	G = 12.7	G =			G =			G = 7.3	G = 14.0	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	133	424	27	292	659	120	119	556	174	146	767		
Lane group cap.	421	766	619	421	766	619	220	1208	834	426	1170		
v/c ratio	0.32	0.55	0.04	0.69	0.86	0.19	0.54	0.46	0.21	0.34	0.66		
Green ratio	0.23	0.21	0.38	0.23	0.21	0.38	0.12	0.23	0.52	0.12	0.23		
Unif. delay d1	19.0	21.1	11.6	21.0	22.8	12.3	24.8	19.8	7.9	24.2	20.8		
Delay factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50		
Increm. delay d2	2.0	2.9	0.0	9.1	12.1	0.2	9.2	1.3	0.1	2.2	2.9		
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Control delay	21.0	24.0	11.6	30.1	34.9	12.5	34.0	21.0	8.0	26.3	23.7		
Lane group LOS	C	C	B	C	C	B	C	C	A	C	C		
Apprch. delay	22.7			31.1			20.2			24.1			
Approach LOS	C			C			C			C			
Intersec. delay	25.1			Intersection LOS						C			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	PM					Analysis Year	2006						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	2	1	1	2	1	1	3	1	2	3	0	
Lane group	L	T	R	L	T	R	L	T	R	L	TR		
Volume (vph)	208	677	98	171	545	156	101	842	245	180	731	155	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Arrival type	3	3	3	3	3	3	3	3	3	3	3		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 15.5	G = 14.8	G =			G =			G = 7.0	G = 20.7	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 70.0						
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	231	752	109	190	606	173	112	936	272	200	984		
Lane group cap.	400	765	572	400	765	572	181	1531	904	351	1490		
v/c ratio	0.58	0.98	0.19	0.47	0.79	0.30	0.62	0.61	0.30	0.57	0.66		
Green ratio	0.22	0.21	0.35	0.22	0.21	0.35	0.10	0.30	0.56	0.10	0.30		
Unif. delay d1	24.3	27.5	15.6	23.7	26.1	16.3	30.2	21.2	8.1	30.1	21.6		
Delay factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50		
Increm. delay d2	6.0	28.7	0.2	4.0	8.2	0.3	14.9	1.8	0.2	6.6	2.3		
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Control delay	30.3	56.1	15.8	27.7	34.4	16.6	45.1	23.0	8.3	36.6	23.9		
Lane group LOS	C	E	B	C	C	B	D	C	A	D	C		
Apprch. delay	46.6			29.9			21.9			26.0			
Approach LOS	D			C			C			C			
Intersec. delay	30.6			Intersection LOS						C			

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 NB Off Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	2	0	1	2	0	0	2	0
Lane group					LTR		L	T			TR	
Volume (vph)				67	321	204	18	729			592	63
% Heavy veh				0	0	0	0	0			0	0
PHF				0.90	0.90	0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P	P	P	P	P			P	P
Startup lost time					2.0		2.0	2.0			2.0	
Ext. eff. green					2.0		2.0	2.0			2.0	
Arrival type					3		3	3			3	
Unit Extension					3.0		3.0	3.0			3.0	
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width					12.0		12.0	12.0			12.0	
Parking/Grade/Parking	N			N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr					0		0	0			0	
Unit Extension					3.0		3.0	3.0			3.0	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 19.0	G =	G =	G =	G = 24.8	G = 7.2	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				658			20	810			728	
Lane group cap.				1080			217	2110			1474	
v/c ratio				0.61			0.09	0.38			0.49	
Green ratio				0.32			0.12	0.58			0.41	
Unif. delay d1				17.4			23.5	6.7			13.0	
Delay factor k				0.50			0.50	0.50			0.50	
Increm. delay d2				2.6			0.8	0.5			1.2	
PF factor				1.000			1.000	1.000			1.000	
Control delay				19.9			24.3	7.2			14.2	
Lane group LOS				B			C	A			B	
Apprch. delay				19.9			7.7			14.2		
Approach LOS				B			A			B		
Intersec. delay	13.4			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 NB Off Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	2	0	1	2	0	0	2	0
Lane group					LTR		L	T			TR	
Volume (vph)				80	83	90	27	573			1167	62
% Heavy veh				0	0	0	0	0			0	0
PHF				0.90	0.90	0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P	P	P	P	P			P	P
Startup lost time					2.0		2.0	2.0			2.0	
Ext. eff. green					2.0		2.0	2.0			2.0	
Arrival type					3		3	3			3	
Unit Extension					3.0		3.0	3.0			3.0	
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width					12.0		12.0	12.0			12.0	
Parking/Grade/Parking	N			N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr					0		0	0			0	
Unit Extension					3.0		3.0	3.0			3.0	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 13.3	G =	G =	G =	G = 49.2	G = 8.5	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				281			30	637			1366	
Lane group cap.				560			192	2745			2208	
v/c ratio				0.50			0.16	0.23			0.62	
Green ratio				0.17			0.11	0.76			0.62	
Unif. delay d1				30.3			32.5	2.8			9.6	
Delay factor k				0.50			0.50	0.50			0.50	
Increm. delay d2				3.2			1.7	0.2			1.3	
PF factor				1.000			1.000	1.000			1.000	
Control delay				33.5			34.2	3.0			10.9	
Lane group LOS				C			C	A			B	
Apprch. delay				33.5			4.4			10.9		
Approach LOS				C			A			B		
Intersec. delay	11.8			Intersection LOS						B		

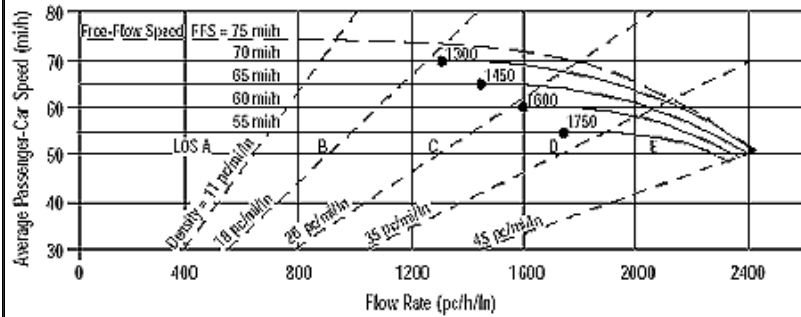
SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 SB On Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	0	0	0	2	0	1	2	0
Lane group	L	TR						TR		L	T	
Volume (vph)	28	105	11					702	56	93	621	
% Heavy veh	0	0	0					0	0	0	0	
PHF	0.90	0.90	0.90					0.90	0.90	0.90	0.90	
Actuated (P/A)	P	P	P					P	P	P	P	
Startup lost time	2.0	2.0						2.0		2.0	2.0	
Ext. eff. green	2.0	2.0						2.0		2.0	2.0	
Arrival type	3	3						3		3	3	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0		0			
Lane Width	12.0	12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0						0		0	0	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Phasing	EB Only	02	03	04	Thru & RT	SB Only	07	08				
Timing	G = 11.2	G =	G =	G =	G = 31.7	G = 8.1	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	31	129						842		103	690	
Lane group cap.	337	350						1890		244	2581	
v/c ratio	0.09	0.37						0.45		0.42	0.27	
Green ratio	0.19	0.19						0.53		0.13	0.71	
Unif. delay d1	20.2	21.3						8.7		23.8	3.0	
Delay factor k	0.50	0.50						0.50		0.50	0.50	
Increm. delay d2	0.5	3.0						0.8		5.3	0.3	
PF factor	1.000	1.000						1.000		1.000	1.000	
Control delay	20.7	24.3						9.5		29.1	3.3	
Lane group LOS	C	C						A		C	A	
Apprch. delay	23.6						9.5			6.6		
Approach LOS	C						A			A		
Intersec. delay	9.5			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 SB On Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	0	0	0	2	0	1	2	0
Lane group	L	TR						TR		L	T	
Volume (vph)	44	207	61					541	104	273	984	
% Heavy veh	0	0	0					0	0	0	0	
PHF	0.90	0.90	0.90					0.90	0.90	0.90	0.90	
Actuated (P/A)	P	P	P					P	P	P	P	
Startup lost time	2.0	2.0						2.0		2.0	2.0	
Ext. eff. green	2.0	2.0						2.0		2.0	2.0	
Arrival type	3	3						3		3	3	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0		0			
Lane Width	12.0	12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0						0		0	0	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Phasing	EB Only	02	03	04	Thru & RT	SB Only	07	08				
Timing	G = 16.6	G =	G =	G =	G = 20.5	G = 13.9	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	49	298						717		303	1093	
Lane group cap.	499	508						1206		418	2255	
v/c ratio	0.10	0.59						0.59		0.72	0.48	
Green ratio	0.28	0.28						0.34		0.23	0.62	
Unif. delay d1	16.1	18.7						16.3		21.3	6.1	
Delay factor k	0.50	0.50						0.50		0.50	0.50	
Increm. delay d2	0.4	4.9						2.2		10.5	0.7	
PF factor	1.000	1.000						1.000		1.000	1.000	
Control delay	16.5	23.6						18.5		31.7	6.8	
Lane group LOS	B	C						B		C	A	
Apprch. delay	22.6						18.5			12.3		
Approach LOS	C						B			B		
Intersec. delay	15.5			Intersection LOS						B		

**FREEWAY**



## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 NB
Agency or Company	Kaku Associates	From/To	Carson St to Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2006
Project Description EXISTING			

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

Flow Inputs			
Volume, V	6453 veh/h	Peak-Hour Factor, PHF	0.80
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade %	Length mi
Driver type adjustment	1.00	Up/Down %	

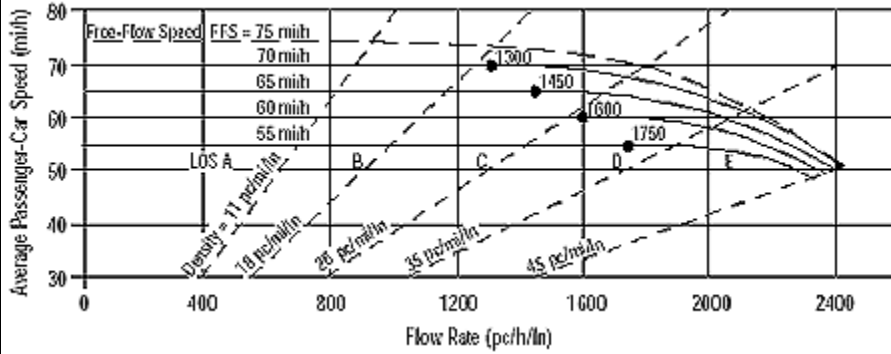
Calculate Flow Adjustments			
$f_p$	1.00	$E_R$	1.2
$E_T$	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.976

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 I/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	70.0 mi/h	FFS	70.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2067 pc/h/ln	Design LOS	
S	63.5 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	32.6 pc/mi/ln	S	mi/h
LOS	D	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, $v_p$
Design (N)	FFS, LOS, $v_p$
Design ( $v_p$ )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning ( $v_p$ )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: PM

**Site Information**

Highway/Direction of Travel: I-405 NB  
 From/To: Carson St to Avalon  
 Jurisdiction:  
 Analysis Year: 2006

Project Description: EXISTING

Oper.(LOS)       Des.(N)       Planning Dat

**Flow Inputs**

Volume, V	6342 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

**Calculate Flow Adjustments**

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

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

$f_{LW}$	
$f_{LC}$	
$f_{ID}$	
$f_N$	
FFS	65.0

**LOS and Performance Measures**

Operational (LOS)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1806 pc/h/ln
S	63.9 mi/h
$D = v_p / S$	28.3 pc/mi/ln
LOS	D

**Design (N)**

Design (N)	
Design LOS	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	
S	
$D = v_p / S$	
Required Number of Lanes, N	

**Glossary**

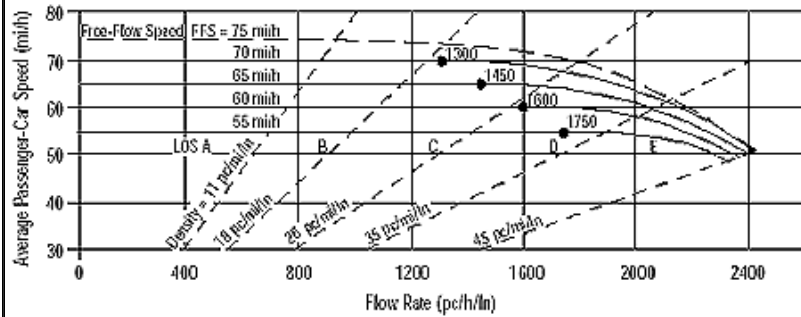
N - Number of lanes      S - Speed

**Factor Location**

$E_R$  - Exhibits 23-8, 23-10       $f_{LW}$  - Ex

V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 NB
Agency or Company	Kaku Associates	From/To	Avalon Bl to Main St
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2006
Project Description EXISTING			

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

Flow Inputs			
Volume, V	6889 veh/h	Peak-Hour Factor, PHF	0.80
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade %	Length mi
Driver type adjustment	1.00		Up/Down %

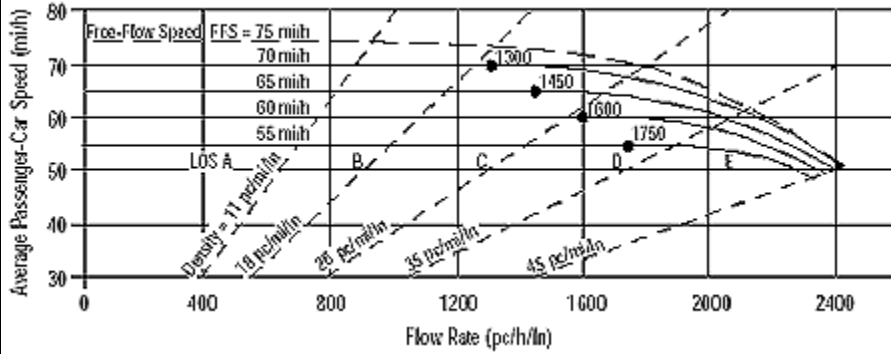
Calculate Flow Adjustments			
$f_p$	1.00	$E_R$	1.2
$E_T$	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.976

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 I/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	65.0 mi/h	FFS	65.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2207 pc/h/ln	Design LOS	
S	56.9 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	38.8 pc/mi/ln	S	mi/h
LOS	E	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, $v_p$
Design (N)	FFS, LOS, $v_p$
Design ( $v_p$ )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning ( $v_p$ )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: PM

**Site Information**

Highway/Direction of Travel: I-405 NB  
 From/To: Avalon Bl to Main S  
 Jurisdiction:  
 Analysis Year: 2006

Project Description: EXISTING

Oper.(LOS)       Des.(N)       Planning Dat

**Flow Inputs**

Volume, V	7076 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

**Calculate Flow Adjustments**

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

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

$f_{LW}$	
$f_{LC}$	
$f_{ID}$	
$f_N$	
FFS	65.0

**LOS and Performance Measures**

Operational (LOS)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2015 pc/h/ln
S	61.2 mi/h
$D = v_p / S$	32.9 pc/mi/ln
LOS	D

**Design (N)**

Design (N)	
Design LOS	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	
S	
$D = v_p / S$	
Required Number of Lanes, N	

**Glossary**

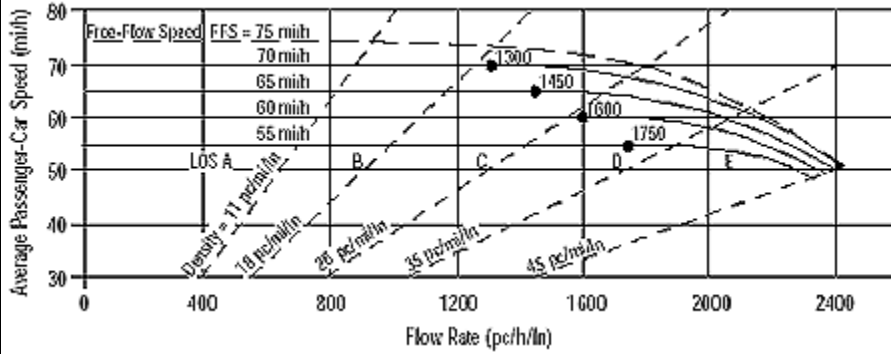
N - Number of lanes      S - Speed

**Factor Location**

$E_R$  - Exhibits 23-8, 23-10       $f_{LW}$  - Ex

V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, v <sub>p</sub>
Design (N)	FFS, LOS, v <sub>p</sub>
Design (v <sub>p</sub> )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v <sub>p</sub> )	FFS, LOS, N

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 SB
Agency or Company	Kaku Associates	From/To	Main St to Avalon E
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2006

Project Description EXISTING

Oper.(LOS)       Des.(N)       Planning Dat

Flow Inputs			
Volume, V	6295 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P <sub>T</sub>	5
Peak-Hr Prop. of AADT, K		%RVs, P <sub>R</sub>	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

Calculate Flow Adjustments			
f <sub>p</sub>	1.00	E <sub>R</sub>	1.2
E <sub>T</sub>	1.5	f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)]	0.976

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	f <sub>LW</sub>	
Rt-Shoulder Lat. Clearance	6.0 ft	f <sub>LC</sub>	
Interchange Density	0.50 I/mi	f <sub>ID</sub>	
Number of Lanes, N	4	f <sub>N</sub>	
FFS (measured)	65.0 mi/h	FFS	65.0
Base free-flow Speed, BFFS	mi/h		

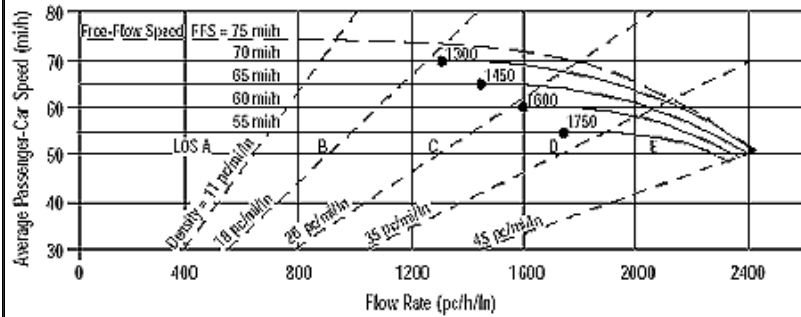
LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )	1792 pc/h/ln	Design LOS	
S	64.0 mi/h	v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )	
D = v <sub>p</sub> / S	28.0 pc/mi/ln	S	
LOS	D	D = v <sub>p</sub> / S	
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E <sub>R</sub> - Exhibits23-8, 23-10	f <sub>LW</sub> - Ex

V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						



## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 SB
Agency or Company	Kaku Associates	From/To	Main St to Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2006
Project Description EXISTING			

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

Flow Inputs			
Volume, V	6671 veh/h	Peak-Hour Factor, PHF	0.75
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

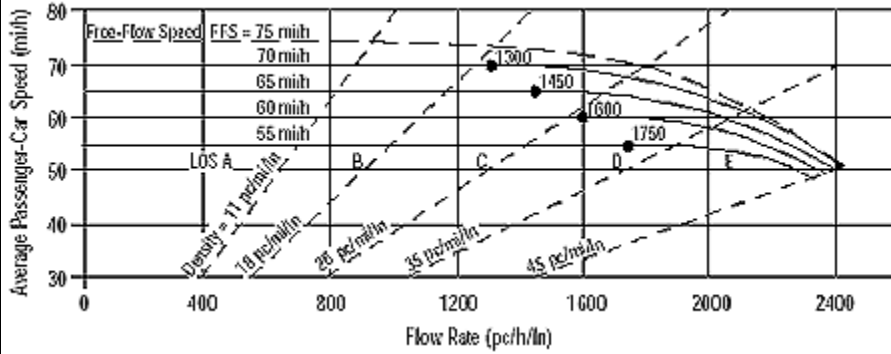
Calculate Flow Adjustments			
$f_p$	1.00	$E_R$	1.2
$E_T$	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.976

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 I/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	65.0 mi/h	FFS	65.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2279 pc/h/ln	Design LOS	
S	54.7 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	41.7 pc/mi/ln	S	mi/h
LOS	E	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, $v_p$
Design (N)	FFS, LOS, $v_p$
Design ( $v_p$ )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning ( $v_p$ )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: AM

**Site Information**

Highway/Direction of Travel: I-405 SB  
 From/To: Avalon BI to Corsor  
 Jurisdiction:  
 Analysis Year: 2006

Project Description: EXISTING

Oper.(LOS)       Des.(N)       Planning Dat

**Flow Inputs**

Volume, V	5878 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

**Calculate Flow Adjustments**

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

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

$f_{LW}$	
$f_{LC}$	
$f_{ID}$	
$f_N$	
FFS	65.0

**LOS and Performance Measures**

Operational (LOS)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1674 pc/h/ln
S	64.7 mi/h
$D = v_p / S$	25.9 pc/mi/ln
LOS	C

**Design (N)**

Design (N)	
Design LOS	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	
S	
$D = v_p / S$	
Required Number of Lanes, N	

**Glossary**

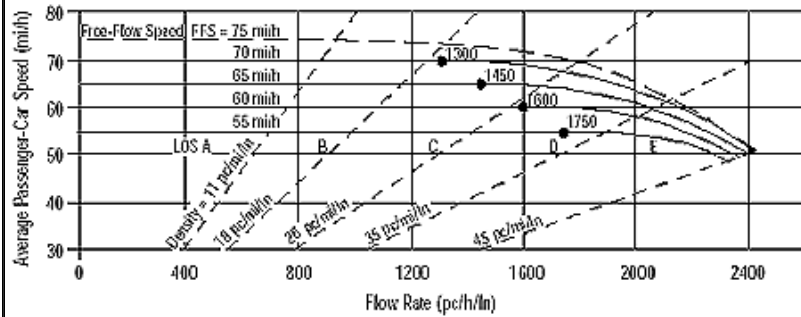
N - Number of lanes      S - Speed

**Factor Location**

$E_R$  - Exhibits 23-8, 23-10       $f_{LW}$  - Ex

V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 SB
Agency or Company	Kaku Associates	From/To	Avalon Bl to Carson St
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2006
Project Description EXISTING			

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

Flow Inputs			
Volume, V	6407 veh/h	Peak-Hour Factor, PHF	0.75
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

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

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 I/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	65.0 mi/h	FFS	65.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2189 pc/h/ln	Design LOS	
S	57.3 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	38.2 pc/mi/ln	S	mi/h
LOS	E	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	I-405 NB			
Agency or Company	Kaku Associates			Junction	Carson St			
Date Performed	9/13/2006			Jurisdiction				
Analysis Time Period	AM			Analysis Year	2006			
Project Description EXISTING								
Inputs								
Upstream Adj Ramp		Terrain				Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off		
L <sub>up</sub> =        ft		S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph				L <sub>down</sub> =        ft		
Vu =            veh/h		Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )				VD =            veh/h		
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6453	0.90	Level	5	0	0.976	0.90	8166
Ramp	322	0.90	Level	5	0	0.976	0.90	407
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of v <sub>12</sub>				Estimation of v <sub>12</sub>				
V <sub>12</sub> = V <sub>F</sub> ( P <sub>FM</sub> )				V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub>				
L <sub>EQ</sub> = (Equation 25-2 or 25-3)				L <sub>EQ</sub> = (Equation 25-8 or 25-9)				
P <sub>FM</sub> = using Equation				P <sub>FD</sub> =0.436 using Equation 8				
V <sub>12</sub> = pc/h				V <sub>12</sub> = 3790 pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8166	9400	No	
				V <sub>12</sub>	3790	4400:All	No	
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> -	7759	9400	No	
				V <sub>R</sub>	407	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>				D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> =        (pc/ mi /ln)				D <sub>R</sub> =    32.3 (pc/ mi /ln)				
LOS =        (Exhibit 25-4)				LOS=    D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
M <sub>S</sub> =        (Exhibit 25-19)				D <sub>s</sub> =    0.335 (Exhibit 25-19)				
S <sub>R</sub> =        mph (Exhibit 25-19)				S <sub>R</sub> =    57.3 mph (Exhibit 25-19)				
S <sub>0</sub> =        mph (Exhibit 25-19)				S <sub>0</sub> =    66.7 mph (Exhibit 25-19)				
S=         mph (Exhibit 25-14)				S =     62.0 mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	I-405 NB			
Agency or Company	Kaku Associates			Junction	Carson St			
Date Performed	9/13/2006			Jurisdiction				
Analysis Time Period	PM			Analysis Year	2006			
Project Description EXISTING								
Inputs								
Upstream Adj Ramp		Terrain				Downstream Adj Ramp		
<input type="checkbox"/> Yes	<input type="checkbox"/> On					<input type="checkbox"/> Yes	<input type="checkbox"/> On	
<input type="checkbox"/> No	<input type="checkbox"/> Off	<input type="checkbox"/> No	<input type="checkbox"/> Off					
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
VD = veh/h								
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF$ $f_{HV} f_p$
Freeway	6342	0.90	Level	5	0	0.976	0.90	8025
Ramp	463	0.90	Level	5	0	0.976	0.90	586
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 3829$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	8025	9400	No	
				$V_{12}$	3829	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F -$	7439	9400	No	
				$V_R$	586	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 32.7$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS= D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.351$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 56.9$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 67.0$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 61.8$ mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	I-405 NB						
Agency or Company	Kak Associates	Junction	Carson St						
Date Performed	9/13/2006	Jurisdiction							
Analysis Time Period	AM	Analysis Year	2006						
Project Description EXISTING									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   $S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h							
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	6453	0.90	Level	5	0	0.976	0.90	8166	
Ramp	342	0.90	Level	5	0	0.976	0.90	433	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.288 using Equation 4 V <sub>12</sub> = 2348 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	8599	See Exhibit 25-7	No	V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14			
				V <sub>12</sub>		4400:All			
V <sub>R12</sub>	2781	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14			
				V <sub>R</sub>		See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        23.8 (pc/ m/ln) LOS =        C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        (pc/ m/ln) LOS =        (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> =        0.339 (Exhibit 25-19) S <sub>R</sub> =        57.2 mph (Exhibit 25-19) S <sub>0</sub> =        54.8 mph (Exhibit 25-19) S =        55.6 mph (Exhibit 25-14)					D <sub>s</sub> =        (Exhibit 25-19) S <sub>R</sub> =        mph (Exhibit 25-19) S <sub>0</sub> =        mph (Exhibit 25-19) S =        mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	I-405 NB						
Agency or Company	Kaku Associates	Junction	Carson St						
Date Performed	9/13/2006	Jurisdiction							
Analysis Time Period	PM	Analysis Year	2006						
Project Description EXISTING									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h							
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	6342	0.90	Level	5	0	0.976	0.90	8025	
Ramp	496	0.90	Level	5	0	0.976	0.90	628	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.263 using Equation 4 V <sub>12</sub> = 2112 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	8653	See Exhibit 25-7	No	V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14			
				V <sub>12</sub>		4400:All			
V <sub>R12</sub>	2740	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14			
				V <sub>R</sub>		See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 23.4 (pc/ m/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/ m/ln) LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> = 0.336 (Exhibit 25-19) S <sub>R</sub> = 57.3 mph (Exhibit 25-19) S <sub>0</sub> = 54.5 mph (Exhibit 25-19) S = 55.4 mph (Exhibit 25-14)					D <sub>s</sub> = (Exhibit 25-19) S <sub>R</sub> = mph (Exhibit 25-19) S <sub>0</sub> = mph (Exhibit 25-19) S = mph (Exhibit 25-15)				



## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency or Company	Kaku Associates	Junction	Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2006

Project Description EXISTING

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6453	0.90	Level	5	0	0.976	0.90	8166
Ramp	373	0.90	Level	5	0	0.976	0.90	472
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 3827 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		$V_{FI} = V_F$	8166	9400	No
				V <sub>12</sub>	3827	4400:All	No
V <sub>R12</sub>		4600:All		$V_{FO} = V_F - V_R$	7694	9400	No
				V <sub>R</sub>	472	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        32.7 (pc/ mi /ln)  
 LOS =        D (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.340 (Exhibit 25-19)  
 S<sub>R</sub> =        57.2 mph (Exhibit 25-19)  
 S<sub>0</sub> =        66.7 mph (Exhibit 25-19)  
 S =        61.9 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency or Company	Kaku Associates	Junction	Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2006

Project Description EXISTING

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain   S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6432	0.90	Level	5	0	0.976	0.90	8139
Ramp	339	0.90	Level	5	0	0.976	0.90	429
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 3791 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7	
V <sub>R12</sub>		4600:All	

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>	8139	9400	No
V <sub>12</sub>	3791	4400:All	No
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7710	9400	No
V <sub>R</sub>	429	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        32.4 (pc/ mi /ln)  
 LOS =        D (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.337 (Exhibit 25-19)  
 S<sub>R</sub> =        57.3 mph (Exhibit 25-19)  
 S<sub>0</sub> =        66.7 mph (Exhibit 25-19)  
 S =        62.0 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2  
Agency or Company  
Date Performed  
Analysis Time Period

Anjum  
Kaku Associates  
9/13/2006  
AM

### Site Information

Freeway/Dir of Travel  
Junction  
Jurisdiction  
Analysis Year

I-405 NB  
Avalon Bl  
  
2006

Project Description EXISTING

### Inputs

Upstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft  V <sub>u</sub> =        veh/h	Terrain Level          <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft  V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6889	0.90	Level	5	0	0.976	0.90	8718
Ramp	738	0.90	Level	5	0	0.976	0.90	934
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.225 using Equation 4  
 V<sub>12</sub> = 1961 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	9652	See Exhibit 25-7	Yes
V <sub>R12</sub>	2895	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.5 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.347 (Exhibit 25-19)  
 S<sub>R</sub> = 57.0 mph (Exhibit 25-19)  
 S<sub>0</sub> = 52.0 mph (Exhibit 25-19)  
 S = 53.4 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	I-405 NB
Agency or Company	Kaku Associates	Junction	Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2006

Project Description EXISTING

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level    S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7076	0.90	Level	5	0	0.976	0.90	8954
Ramp	951	0.90	Level	5	0	0.976	0.90	1203
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.191 using Equation 4  
 V<sub>12</sub> = 1713 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	10157	See Exhibit 25-7	Yes
V <sub>R12</sub>	2916	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.5 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.348 (Exhibit 25-19)  
 S<sub>R</sub> = 57.0 mph (Exhibit 25-19)  
 S<sub>0</sub> = 50.5 mph (Exhibit 25-19)  
 S = 52.2 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	I-405 NB			
Agency or Company	Kaku Associates			Junction	Main St			
Date Performed	9/13/2006			Jurisdiction				
Analysis Time Period	AM			Analysis Year	2006			
Project Description EXISTING								
Inputs								
Upstream Adj Ramp		Terrain					Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
<b>Conversion to pc/h Under Base Conditions</b>								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF$ $f_{HV} f_p$
Freeway	6889	0.90	Level	5	0	0.976	0.90	8718
Ramp	449	0.90	Level	5	0	0.976	0.90	568
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 3361$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	6975	9400	No	
				$V_{12}$	3361	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F -$	6407	9400	No	
				$V_R$	568	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 28.7$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS= D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.349$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 57.0$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 68.2$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 62.3$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	I-405 NB			
Agency or Company	Kaku Associates			Junction	Main St			
Date Performed	9/13/2006			Jurisdiction				
Analysis Time Period	PM			Analysis Year	2006			
Project Description EXISTING								
Inputs								
Upstream Adj Ramp		Terrain				Downstream Adj Ramp		
<input type="checkbox"/> Yes	<input type="checkbox"/> On					<input type="checkbox"/> Yes	<input type="checkbox"/> On	
<input type="checkbox"/> No	<input type="checkbox"/> Off	<input type="checkbox"/> No	<input type="checkbox"/> Off					
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
VD = veh/h								
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v = V/PHF$ $f_{HV} f_p$
Freeway	7076	0.90	Level	5	0	0.976	0.90	8954
Ramp	335	0.90	Level	5	0	0.976	0.90	424
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 3363$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	7164	9400	No	
				$V_{12}$	3363	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F -$	6740	9400	No	
				$V_R$	424	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 28.7$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS= D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.336$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 57.3$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 67.8$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 62.4$ mph (Exhibit 25-15)				

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2  
Agency or Company  
Date Performed  
Analysis Time Period

Anjum  
Kaku Associates  
9/13/2006  
AM

### Site Information

Freeway/Dir of Travel  
Junction  
Jurisdiction  
Analysis Year

I-405 SB  
Main St  
  
2006

Project Description EXISTING

### Inputs

Upstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft  V <sub>u</sub> =        veh/h	Terrain Level          <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft  V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6295	0.90	Level	5	0	0.976	0.90	7966
Ramp	252	0.90	Level	5	0	0.976	0.90	319
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.302 using Equation 4  
 V<sub>12</sub> = 1719 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	6015	See Exhibit 25-7	No
V <sub>R12</sub>	2038	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 18.1 (pc/ m/ln)  
 LOS = B (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.306 (Exhibit 25-19)  
 S<sub>R</sub> = 58.0 mph (Exhibit 25-19)  
 S<sub>0</sub> = 59.6 mph (Exhibit 25-19)  
 S = 59.1 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	I-405 SB
Agency or Company	Kaku Associates	Junction	Main St
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2006

Project Description EXISTING

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level     S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6671	0.90	Level	5	0	0.976	0.90	8442
Ramp	478	0.90	Level	5	0	0.976	0.90	605
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.266 using Equation 4  
 V<sub>12</sub> = 1606 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	6642	See Exhibit 25-7	No
V <sub>R12</sub>	2211	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 19.3 (pc/ m/ln)  
 LOS = B (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.312 (Exhibit 25-19)  
 S<sub>R</sub> = 57.8 mph (Exhibit 25-19)  
 S<sub>0</sub> = 58.8 mph (Exhibit 25-19)  
 S = 58.5 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)



## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency or Company	Kaku Associates	Junction	Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2006

Project Description EXISTING

Inputs		
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6295	0.90	Level	5	0	0.976	0.90	7966
Ramp	886	0.90	Level	5	0	0.976	0.90	1121
UpStream								
DownStream								

Merge Areas				Diverge Areas			
<b>Estimation of v<sub>12</sub></b> $V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h				<b>Estimation of v<sub>12</sub></b> $V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 4105 pc/h			

Capacity Checks				Capacity Checks			
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	7966	9400	No
			V <sub>12</sub>	4105	4400:All	No	
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	6845	9400	No
			V <sub>R</sub>	1121	2100	No	

Level of Service Determination (if not F)		Level of Service Determination (if not F)	
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>		D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>	
D <sub>R</sub> =        (pc/ mi /ln)		D <sub>R</sub> =    35.1 (pc/ mi /ln)	
LOS =        (Exhibit 25-4)		LOS=    E (Exhibit 25-4)	

Speed Estimation		Speed Estimation	
M <sub>S</sub> = (Exhibit 25-19)		D <sub>s</sub> = 0.399 (Exhibit 25-19)	
S <sub>R</sub> =    mph (Exhibit 25-19)		S <sub>R</sub> =    55.8 mph (Exhibit 25-19)	
S <sub>0</sub> =    mph (Exhibit 25-19)		S <sub>0</sub> =    67.7 mph (Exhibit 25-19)	
S =        mph (Exhibit 25-14)		S =        61.0 mph (Exhibit 25-15)	

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency or Company	Kaku Associates	Junction	Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2006

Project Description EXISTING

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain   S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6671	0.90	Level	5	0	0.976	0.90	8442
Ramp	873	0.90	Level	5	0	0.976	0.90	1105
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4304 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8442	9400	No
				V <sub>12</sub>	4304	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7337	9400	No
				V <sub>R</sub>	1105	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        36.8 (pc/ mi /ln)  
 LOS =        E (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.397 (Exhibit 25-19)  
 S<sub>R</sub> =        55.9 mph (Exhibit 25-19)  
 S<sub>0</sub> =        67.1 mph (Exhibit 25-19)  
 S =        60.9 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2  
Agency or Company  
Date Performed  
Analysis Time Period

Anjum  
Kaku Associates  
9/13/2006  
AM

### Site Information

Freeway/Dir of Travel  
Junction  
Jurisdiction  
Analysis Year

I-405 SB  
Avalon Bl  
  
2006

Project Description EXISTING

### Inputs

Upstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft  V <sub>u</sub> =        veh/h	Terrain Level          <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft  V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	5878	0.90	Level	5	0	0.976	0.90	7438
Ramp	187	0.90	Level	5	0	0.976	0.90	237
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.312 using Equation 4  
 V<sub>12</sub> = 2321 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	7675	See Exhibit 25-7	No
V <sub>R12</sub>	2558	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 22.2 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.326 (Exhibit 25-19)  
 S<sub>R</sub> = 57.5 mph (Exhibit 25-19)  
 S<sub>0</sub> = 56.9 mph (Exhibit 25-19)  
 S = 57.1 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	I-405 SB
Agency or Company	Kaku Associates	Junction	Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2006

Project Description EXISTING

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level    S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6407	0.90	Level	5	0	0.976	0.90	8108
Ramp	371	0.90	Level	5	0	0.976	0.90	469
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.283 using Equation 4  
 V<sub>12</sub> = 2295 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	8577	See Exhibit 25-7	No
V <sub>R12</sub>	2764	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 23.7 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.338 (Exhibit 25-19)  
 S<sub>R</sub> = 57.2 mph (Exhibit 25-19)  
 S<sub>0</sub> = 54.8 mph (Exhibit 25-19)  
 S = 55.6 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	I-405 SB			
Agency or Company	Kaku Associates			Junction	Carson St			
Date Performed	9/13/2006			Jurisdiction				
Analysis Time Period	AM			Analysis Year	2006			
Project Description EXISTING								
Inputs								
Upstream Adj Ramp		Terrain					Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
<b>Conversion to pc/h Under Base Conditions</b>								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF$ $f_{HV} f_p$
Freeway	5578	0.90	Level	5	0	0.976	0.90	7059
Ramp	304	0.90	Level	5	0	0.976	0.90	385
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 3295$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	7059	9400	No	
			$V_{12}$	3295	4400:All	No		
$V_{R12}$		4600:All		$V_{FO} = V_F - V_R$	6674	9400	No	
			$V_R$	385	2100	No		
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 28.1$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS = D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.333$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 57.3$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 67.9$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 62.5$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	I-405 SB			
Agency or Company	Kaku Associates			Junction	Carson St			
Date Performed	9/13/2006			Jurisdiction				
Analysis Time Period	PM			Analysis Year	2006			
Project Description EXISTING								
Inputs								
Upstream Adj Ramp		Terrain					Downstream Adj Ramp	
<input type="checkbox"/> Yes	<input type="checkbox"/> On						<input type="checkbox"/> Yes	<input type="checkbox"/> On
<input type="checkbox"/> No	<input type="checkbox"/> Off	<input type="checkbox"/> No	<input type="checkbox"/> Off					
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
VD = veh/h								
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v = V/PHF$ $f_{HV} f_p$
Freeway	6407	0.90	Level	5	0	0.976	0.90	8108
Ramp	234	0.90	Level	5	0	0.976	0.90	296
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 3702$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	8108	9400	No	
				$V_{12}$	3702	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F -$	7812	9400	No	
				$V_R$	296	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 31.6$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS= D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.325$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 57.5$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 66.6$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 62.1$ mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	I-405 SB						
Agency or Company	Kaku Associates	Junction	Carson St						
Date Performed	9/13/2006	Jurisdiction							
Analysis Time Period	AM	Analysis Year	2006						
Project Description EXISTING									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =    ft V <sub>u</sub> =    veh/h		Terrain Level   $S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )					Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =    ft V <sub>D</sub> =    veh/h		
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	5878	0.90	Level	5	0	0.976	0.90	7438	
Ramp	646	0.90	Level	5	0	0.976	0.90	817	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.240 using Equation 4 V <sub>12</sub> = 1782 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	8255	See Exhibit 25-7	No		V <sub>F1</sub> =V <sub>F</sub>	See Exhibit 25-14			
					V <sub>12</sub>	4400:All			
V <sub>R12</sub>	2599	4600:All	No		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	See Exhibit 25-14			
					V <sub>R</sub>	See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 22.2 (pc/ m/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/ m/ln) LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> = 0.328 (Exhibit 25-19) S <sub>R</sub> = 57.4 mph (Exhibit 25-19) S <sub>0</sub> = 55.3 mph (Exhibit 25-19) S = 56.0 mph (Exhibit 25-14)					D <sub>s</sub> = (Exhibit 25-19) S <sub>R</sub> = mph (Exhibit 25-19) S <sub>0</sub> = mph (Exhibit 25-19) S = mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	I-405 SB						
Agency or Company	Kaku Associates	Junction	Carson St						
Date Performed	9/13/2006	Jurisdiction							
Analysis Time Period	PM	Analysis Year	2006						
Project Description EXISTING									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =    ft V <sub>u</sub> =    veh/h		Terrain Level   $S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )					Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =    ft V <sub>D</sub> =    veh/h		
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	6407	0.90	Level	5	0	0.976	0.90	8108	
Ramp	563	0.90	Level	5	0	0.976	0.90	712	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.253 using Equation 4 V <sub>12</sub> = 2049 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	8820	See Exhibit 25-7	No		$V_{FI} = V_F$	See Exhibit 25-14			
					V <sub>12</sub>	4400:All			
V <sub>R12</sub>	2761	4600:All	No		$V_{FO} = V_F - V_R$	See Exhibit 25-14			
					V <sub>R</sub>	See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 23.5 (pc/ m/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/ m/ln) LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> = 0.338 (Exhibit 25-19) S <sub>R</sub> = 57.2 mph (Exhibit 25-19) S <sub>0</sub> = 54.1 mph (Exhibit 25-19) S = 55.0 mph (Exhibit 25-14)					D <sub>s</sub> = (Exhibit 25-19) S <sub>R</sub> = mph (Exhibit 25-19) S <sub>0</sub> = mph (Exhibit 25-19) S = mph (Exhibit 25-15)				



## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency/Company	Kaku Associates	Weaving Seg Location	Carson St to Avalon Bl
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	EXISTING AM	Analysis Year	2006

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.11
Weaving seg length, L (ft)	1600	Weaving ratio, R	0.48
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6080	0.90	5	0	1.5	1.2	0.976	0.90	7693
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	373	0.90	5	0	1.5	1.2	0.976	0.90	472
Vw2	342	0.90	5	0	1.5	1.2	0.976	0.90	432
Vw				904	Vnw				7693
V									8597

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.87	0.39		
Weaving and non-weaving speeds, Si (mi/h)	44.40	54.52		
Number of lanes required for unconstrained operation, Nw			0.25	
Maximum number of lanes, Nw (max)			3.50	
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 200px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>				

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	53.25
Weaving segment density, D (pc/mi/ln)	80.73
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency/Company	Kaku Associates	Weaving Seg Location	Carson St to Avalon Bl
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	EXISTING PM	Analysis Year	2006

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.12
Weaving seg length, L (ft)	1600	Weaving ratio, R	0.41
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6003	0.90	5	0	1.5	1.2	0.976	0.90	7596
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	339	0.90	5	0	1.5	1.2	0.976	0.90	428
Vw2	496	0.90	5	0	1.5	1.2	0.976	0.90	627
Vw				1055	Vnw				7596
V									8651

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.90	0.43		
Weaving and non-weaving speeds, Si (mi/h)	43.89	53.42		

Number of lanes required for unconstrained operation, Nw	0.29
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 100px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	52.05
Weaving segment density, D (pc/mi/ln)	83.11
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency/Company	Kaku Associates	Weaving Seg Location	Avalon Bl to Carson St
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	EXISTING AM	Analysis Year	2006

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.08
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.38
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	5574	0.90	5	0	1.5	1.2	0.976	0.90	7053
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	304	0.90	5	0	1.5	1.2	0.976	0.90	384
Vw2	187	0.90	5	0	1.5	1.2	0.976	0.90	236
Vw				620	Vnw				7053
V									7673

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.61	0.24		
Weaving and non-weaving speeds, Si (mi/h)	49.11	59.19		

Number of lanes required for unconstrained operation, Nw	0.11
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 100px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	58.22
Weaving segment density, D (pc/mi/ln)	65.89
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency/Company	Kaku Associates	Weaving Seg Location	Avalon Bl to Carson St
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	EXISTING PM	Analysis Year	2006

### Inputs

Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.09
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.39
Terrain	Level		

### Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6173	0.90	5	0	1.5	1.2	0.976	0.90	7811
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	234	0.90	5	0	1.5	1.2	0.976	0.90	296
Vw2	371	0.90	5	0	1.5	1.2	0.976	0.90	469
Vw				765	Vnw				7811
V									8576

### Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.67	0.29		
Weaving and non-weaving speeds, Si (mi/h)	47.87	57.76		

Number of lanes required for unconstrained operation, Nw	0.13
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 200px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

### Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment speed, S (mi/h)	56.71
Weaving segment density, D (pc/mi/ln)	75.61
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

### Notes

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

**APPENDIX D**

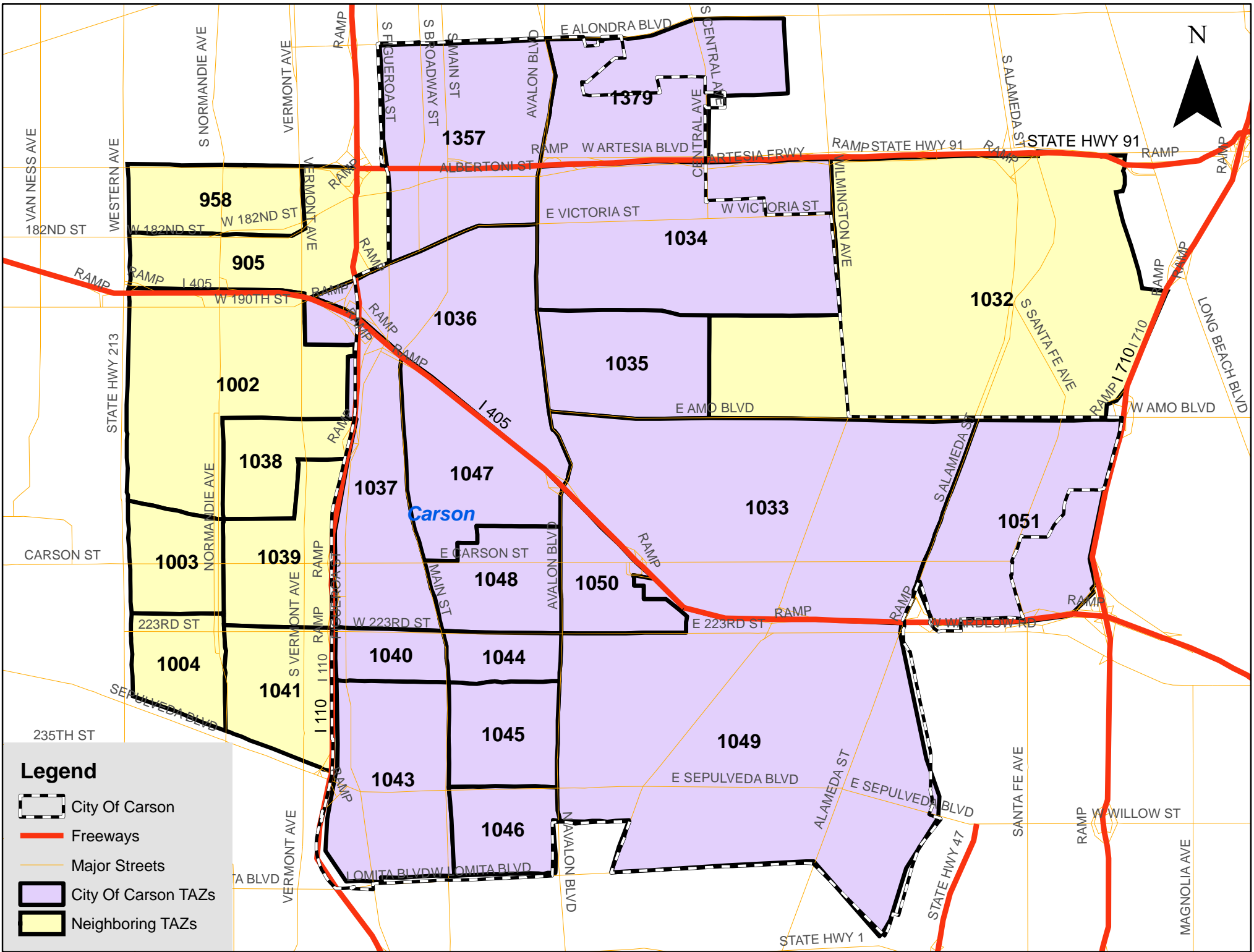
**COMPARISON OF SCAG SOCIOECONOMIC DATA  
TO MAJOR DEVELOPMENT PROJECTS**

**TABLE 1  
ANALYSIS OF SCAG SOCIOECONOMIC DATA FOR CITY OF CARSON AND NEIGHBORING AREAS**

YEAR 2000 DATA		SCAG Data										Estimated Data [a]			
TAZ	Major Project in TAZ	Population	SF DU	MF DU	Total Households	Retail Emp.	Service Emp.	Other Emp.	Total Emp.	K-12 Enrollment	University Enrollment	Retail KSF	KSF	Other KSF	Total KSF
<b>CITY OF CARSON</b>															
1033	South Bay Pavilion; Dominguez Tech. Ctr.	7,201	1,303	769	2,072	1,753	859	6,933	9,545	634	0	877	215	3,467	4,558
1034	CSUDH; Home Depot Center Ph II	3,973	600	663	1,263	1,402	2,255	1,303	4,960	647	14,871	701	564	652	1,916
1035		7,095	2,039	87	2,126	162	255	66	483	2,396	0	81	64	33	178
1036		4,424	930	60	990	519	600	4,147	5,266	630	0	260	150	2,074	2,483
1037		6,551	756	1,295	2,051	590	536	1,581	2,707	2,461	0	295	134	791	1,220
1040		4,007	581	447	1,028	12	170	40	222	4,870	0	6	43	20	69
1043		5,202	1,245	34	1,279	243	107	1,708	2,058	521	0	122	27	854	1,002
1044		3,096	632	29	661	36	256	21	313	933	0	18	64	11	93
1045		6,405	959	744	1,703	170	178	30	378	963	0	85	45	15	145
1046		3,648	838	133	971	148	169	387	704	137	0	74	42	194	310
1047	Carson Marketplace	5,012	888	546	1,434	60	88	111	259	0	0	30	22	56	108
1048		7,282	1,235	712	1,947	529	651	351	1,531	1,128	0	265	163	176	603
1049		4,709	372	643	1,015	326	881	9,388	10,595	0	0	163	220	4,694	5,077
1050		3,573	779	145	924	661	454	1,465	2,580	2,487	0	331	114	733	1,177
1051		7,765	1,701	341	2,042	329	6,518	4,572	11,419	0	0	165	1,630	2,286	4,080
1357	Prime Wheel Expansion	3,358	497	589	1,086	499	1,457	7,070	9,026	690	0	250	364	3,535	4,149
1379		6,783	1,518	188	1,706	378	495	3,722	4,595	2,111	0	189	124	1,861	2,174
Subtotal		90,084	16,873	7,425	24,298	7,817	15,929	42,895	66,641	20,608	14,871	3,909	3,962	21,448	29,338
<b>CLOSE PROXIMITY (neighboring area)</b>															
905		2,728	825	143	968	453	558	1,183	2,194	1,373	2,479	227	140	592	958
958		2,324	499	451	950	494	727	1,065	2,286	3,619	0	247	182	533	961
1002	19503 Normandie Av Shopping Center	6,652	681	1,155	1,836	977	2,088	7,294	10,359	0	0	489	522	3,647	4,658
1003		6,571	945	1,216	2,161	266	165	105	536	748	0	133	41	53	227
1004		6,653	439	1,264	1,703	236	213	925	1,374	0	0	118	53	463	634
1032		9,000	1,962	981	2,943	2,693	2,904	15,883	21,480	1,572	0	1,347	726	7,942	10,014
1038		4,230	831	457	1,288	146	170	489	805	0	0	73	43	245	360
1039		5,762	1,004	825	1,829	483	5,329	489	6,301	582	0	242	1,332	245	1,818
1041		7,382	1,140	1,325	2,465	370	498	773	1,641	1,282	0	185	125	387	696
Subtotal		51,302	8,326	7,817	16,143	6,118	12,652	28,206	46,976	9,176	2,479	3,059	3,163	14,103	20,325

YEAR 2030 DATA		SCAG Data										Estimated Data [a]			
TAZ	Major Project in TAZ	Population	SF DU	MF DU	Total Households	Retail Emp.	Service Emp.	Other Emp.	Total Emp.	K-12 Enrollment	University Enrollment	Retail KSF	KSF	Other KSF	Total KSF
<b>CITY OF CARSON</b>															
1033	South Bay Pavilion; Dominguez Tech. Ctr.	8,670	1,577	962	2,539	2,233	1,376	8,121	11,730	699	0	1,117	344	4,061	5,521
1034	CSUDH; Home Depot Center Ph II	4,937	633	971	1,604	1,855	3,501	1,611	6,967	1,060	18,591	928	875	806	2,608
1035		8,508	2,502	117	2,619	264	585	117	966	2,428	0	132	146	59	337
1036		5,354	1,072	168	1,240	755	1,175	4,778	6,708	741	0	378	294	2,389	3,066
1037		7,866	909	1,602	2,511	867	1,027	1,930	3,824	2,493	0	434	257	965	1,655
1040		4,786	706	547	1,253	24	484	85	593	4,920	0	12	121	43	176
1043		6,390	1,363	268	1,631	305	166	2,174	2,645	780	0	153	42	1,087	1,281
1044		3,713	778	36	814	78	637	59	774	1,082	0	39	159	30	228
1045		7,716	1,168	918	2,086	273	385	125	783	1,102	0	137	96	63	295
1046		4,392	1,031	164	1,195	213	321	539	1,073	228	0	107	80	270	456
1047	Carson Marketplace	6,344	1,080	788	1,868	113	239	246	598	167	0	57	60	123	239
1048		8,768	1,510	873	2,383	749	1,186	593	2,528	1,269	0	375	297	297	968
1049		5,715	404	854	1,258	464	1,457	10,595	12,516	211	0	232	364	5,298	5,894
1050		4,307	958	175	1,133	805	757	1,831	3,393	2,520	0	403	189	916	1,507
1051		9,345	1,978	549	2,527	412	9,228	4,646	14,286	329	0	206	2,307	2,323	4,836
1357	Prime Wheel Expansion	4,026	600	710	1,310	598	2,344	7,475	10,417	769	0	299	586	3,738	4,623
1379		7,779	1,746	216	1,962	478	750	4,248	5,476	2,261	0	239	188	2,124	2,551
Subtotal		108,616	20,015	9,918	29,933	10,486	25,618	49,173	85,277	23,059	18,591	5,243	6,405	24,587	36,234
<b>CLOSE PROXIMITY (neighboring area)</b>															
905		3,172	922	267	1,189	504	848	1,175	2,527	1,566	3,099	252	212	588	1,052
958		3,222	640	633	1,273	705	1,342	1,198	3,245	4,073	0	353	336	599	1,287
1002	19503 Normandie Av Shopping Center	7,979	810	1,552	2,362	1,084	3,459	7,728	12,271	0	0	542	865	3,864	5,271
1003		7,574	1,163	1,556	2,719	289	319	128	736	844	0	145	80	64	288
1004		7,669	526	1,637	2,163	270	388	939	1,597	0	0	135	97	470	702
1032		10,828	2,405	1,228	3,633	3,211	5,106	17,246	25,563	1,852	0	1,606	1,277	8,623	11,505
1038		4,754	915	563	1,478	175	274	519	968	0	0	88	69	260	416
1039		6,601	1,074	1,065	2,139	516	6,315	441	7,272	718	0	258	1,579	221	2,057
1041		8,396	1,226	1,724	2,950	426	791	782	1,999	1,615	0	213	198	391	802
Subtotal		60,195	9,681	10,225	19,906	7,180	18,842	30,156	56,178	10,668	3,099	3,590	4,711	15,078	23,379

2000 TO 2030 CHANGE		SCAG Data										Estimated Data [a]			
TAZ	Major Project in TAZ	Population	SF DU	MF DU	Total Households	Retail Emp.	Service Emp.	Other Emp.	Total Emp.	K-12 Enrollment	University Enrollment	Retail KSF	KSF	Other KSF	Total KSF
<b>CITY OF CARSON</b>															
1033	South Bay Pavilion; Dominguez Tech. Ctr.	1,469	274	193	467	480	517	1,188	2,185	65	0	240	129	594	963
1034	CSUDH; Home Depot Center Ph II	964	33	308	341	453	1,246	308	2,007	413	3,720	227	312	154	692
1035		1,413	463	30	493	102	330	51	483	32	0	51	83	26	159
1036		930	142	108	250	236	575	631	1,442	111	0	118	144	316	577
1037		1,315	153	307	460	277	491	349	1,117	32	0	139	123	175	436
1040		779	125	100	225	12	314	45	371	50	0	6	79	23	107
1043		1,188	118	234	352	62	59	466	587	259	0	31	15	233	279
1044		617	146	7	153	42	381	38	461	149	0	21	95	19	135
1045		1,311	209	174	383	103	207	95	405	139	0	52	52	48	151
1046		744	193	31	224	65	152	152	369	91	0	33	38	76	147
1047	Carson Marketplace	1,332	192	242	434	53	151	135	339	167	0	27	38	68	132
1048		1,486	275	161	436	220	535	242	997	141	0	110	134	121	365
1049		1,006	32	211	243	138	576	1,207	1,921	211	0	69	144	604	817
1050		734	179	30	209	144	303	366	813	33	0	72	76	183	331
1051		1,580	277	208	485	83	2,710	74	2,867	329	0	42	678	37	756
1357	Prime Wheel Expansion	668	103	121	224	99	887	405	1,391	79	0	50	222	203	474
1379		996	228	28	256	100	255								



**TABLE 2  
KNOWN MAJOR DEVELOPMENT PROJECTS**

PROJECT LOCATION	LAND-USE	SIZE	TRIP GENERATION						
			DAILY	A.M. PEAK HOUR			P.M. PEAK HOUR		
				IN	OUT	TOTAL	IN	OUT	TOTAL
19503 Normandie Avenue	Shopping Center	160.000 KSF	6,870	101	64	165	288	312	600
Dominguez Technology Center	Technology	840.997 KSF	5,862	681	93	774	99	725	824
	Industrial	693.822 KSF	2,317	280	46	326	64	255	319
	Office	567.673 KSF	1,885	239	33	272	44	217	261
<i>Subtotal</i>			<u>10,064</u>	<u>1,200</u>	<u>172</u>	<u>1,372</u>	<u>207</u>	<u>1,197</u>	<u>1,404</u>
CSUDH - Campus	Univ. Student Growth @ 3.9 p.a.	1479 Students	3,520	249	62	311	93	218	311
CSUDH - University Housing	Single Family Residential	125 DU	1,196	24	70	94	79	47	126
	Townhouses	125 DU	<u>733</u>	<u>9</u>	<u>46</u>	<u>55</u>	<u>44</u>	<u>21</u>	<u>65</u>
<i>Subtotal</i>			<u>1,929</u>	<u>33</u>	<u>116</u>	<u>149</u>	<u>123</u>	<u>68</u>	<u>191</u>
CSUDH/ Home Depot Center Phase II	Hotel	200 Rooms	1,784	78	56	134	69	71	140
	Administrative Offices	30.000 KSF	100	12	2	14	2	12	14
	Athletic Performance Ctr,	30.000 KSF	1,290	53	39	92	109	64	173
	Training Facilities	50.000 KSF	2,150	89	64	153	181	107	288
	Dormitories	240 Beds	<u>571</u>	<u>40</u>	<u>10</u>	<u>50</u>	<u>15</u>	<u>35</u>	<u>50</u>
<i>Subtotal</i>			<u>5,895</u>	<u>272</u>	<u>171</u>	<u>443</u>	<u>376</u>	<u>289</u>	<u>665</u>
Prime Wheel Expansion	Warehouse And Office	165.000 KSF	1,292	140	27	167	44	150	194
South Bay Pavilion	Future Development	1009.207 KSF	30,516	382	245	627	1,382	1,497	2,879
	Less: Existing after demolition	<u>783.753 KSF</u>	<u>25,891</u>	<u>328</u>	<u>210</u>	<u>538</u>	<u>1,169</u>	<u>1,267</u>	<u>2,436</u>
	Incremental Development	225.454 KSF	4,625	54	35	89	213	230	443
	Less: 10% Pass by trips		<u>463</u>	<u>5</u>	<u>4</u>	<u>9</u>	<u>21</u>	<u>23</u>	<u>44</u>
<i>Subtotal</i>	<i>Total Incremental Project Trips</i>		<u>4,162</u>	<u>49</u>	<u>31</u>	<u>80</u>	<u>192</u>	<u>207</u>	<u>399</u>
Carson Marketplace	Regional Retail Center	1370.00 KSF	36,129	466	280	746	1,576	1,710	3,286
	Neighborhood Retail Center	130.00 KSF	5,285	100	64	164	228	240	468
	Residential	1550 DU	7,671	102	462	564	453	230	683
	Hotel	300 Rooms	3,058	98	62	160	94	83	177
	Restaurants	81.125 KSF	11,127	418	328	746	383	273	656
<i>Subtotal</i>	Commercial Recreation/Entertainment	214.000 KSF	5,681	82	48	130	221	270	491
<b>Total</b>			<b>101,391</b>	<b>3,170</b>	<b>1,860</b>	<b>5,030</b>	<b>4,234</b>	<b>5,097</b>	<b>9,331</b>

Source: Kaku Associates, "Traffic Impact Study for the Carson Marketplace," October 2005.



**APPENDIX E**

**OPENING YEAR (2010) NO BUILD ALTERNATIVE  
LEVEL OF SERVICE WORKSHEETS**

## INTERSECTIONS

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	1	1	0	1	1	0	1
Lane group	L	TR		L	T	R	L		R	L		R
Volume (vph)	103	798	10	3	871	256	4		0	20		400
% Heavy veh	0	0	0	0	0	0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90		0.90
Actuated (P/A)	P	P	A	P	P	A	P		P	P		P
Startup lost time	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Ext. eff. green	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Arrival type	3	3		3	3	3	3		3	3		3
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0		12.0	12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0	0	0		0	0		0
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Phasing	EW Perm	EW Perm	03	04	NS Perm	06	07	08				
Timing	G = 11.5	G = 32.3	G =	G =	G = 7.2	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	114	898		3	968	284	4		0	22		444
Lane group cap.	346	2817		325	1948	1615	217		1615	217		1615
v/c ratio	0.33	0.32		0.01	0.50	0.18	0.02		0.00	0.10		0.27
Green ratio	0.19	0.78		0.54	0.54	1.00	0.12		1.00	0.12		1.00
Unif. delay d1	20.9	1.9		6.4	8.7	0.0	23.3		0.0	23.5		0.0
Delay factor k	0.50	0.50		0.50	0.50	0.11	0.50		0.11	0.50		0.50
Increm. delay d2	2.5	0.3		0.1	0.9	0.1	0.2		0.0	0.9		0.4
PF factor	1.000	1.000		1.000	1.000	0.950	1.000		0.950	1.000		0.950
Control delay	23.5	2.2		6.5	9.6	0.1	23.4		0.0	24.5		0.4
Lane group LOS	C	A		A	A	A	C		A	C		A
Apprch. delay	4.6			7.5			23.4			1.6		
Approach LOS	A			A			C			A		
Intersec. delay	5.4			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	1	1	0	1	1	0	1
Lane group	L	TR		L	T	R	L		R	L		R
Volume (vph)	117	819	7	1	576	306	20		4	28		444
% Heavy veh	0	0	0	0	0	0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90		0.90
Actuated (P/A)	P	P	A	P	P	A	P		P	P		P
Startup lost time	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Ext. eff. green	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Arrival type	3	3		3	3	3	3		3	3		3
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0		12.0	12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0	0	0		0	0		0
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Phasing	EW Perm	EW Perm	03	04	NS Perm	06	07	08				
Timing	G = 11.5	G = 31.7	G =	G =	G = 7.8	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	130	918		1	640	340	22		4	31		493
Lane group cap.	346	2782		313	1912	1615	235		1615	235		1615
v/c ratio	0.38	0.33		0.00	0.33	0.21	0.09		0.00	0.13		0.31
Green ratio	0.19	0.77		0.53	0.53	1.00	0.13		1.00	0.13		1.00
Unif. delay d1	21.1	2.1		6.7	8.1	0.0	23.0		0.0	23.1		0.0
Delay factor k	0.50	0.50		0.50	0.50	0.11	0.50		0.11	0.50		0.50
Increm. delay d2	3.1	0.3		0.0	0.5	0.1	0.8		0.0	1.2		0.5
PF factor	1.000	1.000		1.000	1.000	0.950	1.000		0.950	1.000		0.950
Control delay	24.2	2.4		6.7	8.6	0.1	23.8		0.0	24.3		0.5
Lane group LOS	C	A		A	A	A	C		A	C		A
Apprch. delay	5.1			5.6			20.1			1.9		
Approach LOS	A			A			C			A		
Intersec. delay	4.8			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	1	1	3	0	1	0	1	0	0	0
Lane group	L	TR	R	L	TR		L		R			
Volume (vph)	7	705	584	74	1187	9	66		177			
% Heavy veh	0	0	0	0	0	0	0		0			
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90			
Actuated (P/A)	P	P	P	P	P	P	P		P			
Startup lost time	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Ext. eff. green	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Arrival type	3	3	3	3	3		3		3			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N		N
Parking/hr												
Bus stops/hr	0	0	0	0	0		0		0			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Phasing	WB Only	EW Perm	03		04		NB Only	06		07		08
Timing	G = 7.8	G = 54.0	G =		G =		G = 9.2	G =		G =		G =
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y =		Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 80.0					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	8	783	649	82	1329		73		197			
Lane group cap.	248	2442	1090	176	4188		208		1615			
v/c ratio	0.03	0.32	0.60	0.47	0.32		0.35		0.12			
Green ratio	0.68	0.68	0.68	0.10	0.81		0.11		1.00			
Unif. delay d1	4.3	5.4	7.1	34.1	1.9		32.6		0.0			
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50		0.11			
Increm. delay d2	0.2	0.3	2.4	8.6	0.2		4.6		0.0			
PF factor	1.000	1.000	1.000	1.000	1.000		1.000		0.950			
Control delay	4.6	5.7	9.5	42.7	2.1		37.3		0.0			
Lane group LOS	A	A	A	D	A		D		A			
Apprch. delay	7.4			4.5			10.1					
Approach LOS	A			A			B					
Intersec. delay	6.3			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	1	1	3	0	1	0	1	0	0	0
Lane group	L	TR	R	L	TR		L		R			
Volume (vph)	5	847	578	71	949	14	53		86			
% Heavy veh	0	0	0	0	0	0	0		0			
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90			
Actuated (P/A)	P	P	P	P	P	P	P		P			
Startup lost time	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Ext. eff. green	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Arrival type	3	3	3	3	3		3		3			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N		N
Parking/hr												
Bus stops/hr	0	0	0	0	0		0		0			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Phasing	WB Only	EW Perm	03		04		NB Only	06		07		08
Timing	G = 7.8	G = 54.0	G =		G =		G = 9.2	G =		G =		G =
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y =		Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 80.0					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	6	941	642	79	1070		59		96			
Lane group cap.	326	2442	1090	176	4183		208		1615			
v/c ratio	0.02	0.39	0.59	0.45	0.26		0.28		0.06			
Green ratio	0.68	0.68	0.68	0.10	0.81		0.11		1.00			
Unif. delay d1	4.3	5.7	7.0	34.1	1.8		32.4		0.0			
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50		0.11			
Increm. delay d2	0.1	0.5	2.3	8.1	0.1		3.4		0.0			
PF factor	1.000	1.000	1.000	1.000	1.000		1.000		0.950			
Control delay	4.4	6.2	9.4	42.1	2.0		35.8		0.0			
Lane group LOS	A	A	A	D	A		D		A			
Apprch. delay	7.4			4.7			13.6					
Approach LOS	A			A			B					
Intersec. delay	6.7			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & Carson St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	2	0	2	2	0	1	3	0	1	3	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	173	647	49	294	665	96	97	772	354	152	628	122
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	Excl. Left	Thru & RT	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 7.1	G = 20.6	G =	G =	G = 8.1	G = 22.2	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 70.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	192	773		327	846		108	1251		169	834	
Lane group cap.	356	1054		356	1044		209	1564		209	1601	
v/c ratio	0.54	0.73		0.92	0.81		0.52	0.80		0.81	0.52	
Green ratio	0.10	0.29		0.10	0.29		0.12	0.32		0.12	0.32	
Unif. delay d1	29.9	22.2		31.2	22.9		29.1	21.9		30.2	19.6	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	5.8	4.5		30.9	6.8		8.8	4.4		27.6	1.2	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	35.7	26.8		62.1	29.7		38.0	26.3		57.8	20.8	
Lane group LOS	D	C		E	C		D	C		E	C	
Apprch. delay	28.5			38.7			27.2			27.0		
Approach LOS	C			D			C			C		
Intersec. delay	30.4			Intersection LOS						C		

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2006						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	0	2	2	0	1	3	0	1	3	0	
Lane group	L	TR		L	TR		L	TR		L	TR		
Volume (vph)	294	834	106	239	696	101	177	733	250	212	764	251	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Arrival type	3	3		3	3		3	3		3	3		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0		0	0		0	0		0	0		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.1	G = 25.0	G =			G =			G = 9.9	G = 26.0	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	327	1045		266	885		197	1092		236	1128		
Lane group cap.	311	1111		311	1109		223	1618		223	1620		
v/c ratio	1.05	0.94		0.86	0.80		0.88	0.67		1.06	0.70		
Green ratio	0.09	0.31		0.09	0.31		0.12	0.32		0.12	0.32		
Unif. delay d1	36.5	26.8		35.9	25.2		34.5	23.3		35.0	23.6		
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50		
Increm. delay d2	65.2	16.0		24.8	6.0		36.2	2.3		76.5	2.5		
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000		
Control delay	101.6	42.8		60.7	31.2		70.7	25.6		111.5	26.1		
Lane group LOS	F	D		E	C		E	C		F	C		
Apprch. delay	56.8			38.0			32.5			40.8			
Approach LOS	E			D			C			D			
Intersec. delay	42.4			Intersection LOS						D			



SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Main St & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2006						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	3	0	1	3	0	1	3	0	1	3	0	
Lane group	L	TR		L	TR		L	TR		L	TR		
Volume (vph)	129	543	53	123	719	139	137	532	133	83	458	98	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Arrival type	3	3		3	3		3	3		3	3		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0		0	0		0	0		0	0		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.0	G = 14.2	G =			G =			G = 13.4	G = 13.4	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	143	662		137	953		152	739		92	618		
Lane group cap.	211	1208		211	1195		403	1121		403	1125		
v/c ratio	0.68	0.55		0.65	0.80		0.38	0.66		0.23	0.55		
Green ratio	0.12	0.24		0.12	0.24		0.22	0.22		0.22	0.22		
Unif. delay d1	25.4	20.1		25.3	21.5		19.8	21.2		19.1	20.6		
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50		
Increm. delay d2	16.1	1.8		14.5	5.6		2.7	3.0		1.3	1.9		
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000		
Control delay	41.6	21.9		39.8	27.1		22.4	24.3		20.4	22.6		
Lane group LOS	D	C		D	C		C	C		C	C		
Apprch. delay	25.4			28.7			24.0			22.3			
Approach LOS	C			C			C			C			
Intersec. delay	25.4			Intersection LOS						C			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Main St & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	PM					Analysis Year	2006						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	3	0	1	3	0	1	3	0	1	3	0	
Lane group	L	TR		L	TR		L	TR		L	TR		
Volume (vph)	166	963	158	236	718	142	200	479	142	182	728	178	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Arrival type	3	3		3	3		3	3		3	3		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0		0	0		0	0		0	0		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 8.9	G = 17.3	G =			G =			G = 15.9	G = 15.9	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 70.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	184	1246		262	956		222	690		202	1007		
Lane group cap.	229	1252		229	1247		410	1135		410	1141		
v/c ratio	0.80	1.00		1.14	0.77		0.54	0.61		0.49	0.88		
Green ratio	0.13	0.25		0.13	0.25		0.23	0.23		0.23	0.23		
Unif. delay d1	29.7	26.3		30.6	24.5		23.8	24.3		23.5	26.1		
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50		
Increm. delay d2	25.0	24.3		103.8	4.5		5.1	2.4		4.2	10.0		
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000		
Control delay	54.7	50.6		134.4	29.0		28.9	26.7		27.7	36.1		
Lane group LOS	D	D		F	C		C	C		C	D		
Apprch. delay	51.2			51.7			27.2			34.7			
Approach LOS	D			D			C			C			
Intersec. delay	42.5			Intersection LOS						D			

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & 213th St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	1	2	0	1	3	0	1	3	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	143	148	62	89	140	64	76	930	185	49	944	71
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 15.4	G =	G =	G =	G = 7.1	G = 28.5	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	159	233		99	227		84	1239		54	1128	
Lane group cap.	294	466		229	885		214	2397		214	2432	
v/c ratio	0.54	0.50		0.43	0.26		0.39	0.52		0.25	0.46	
Green ratio	0.26	0.26		0.26	0.26		0.12	0.47		0.12	0.47	
Unif. delay d1	19.2	19.0		18.6	17.7		24.5	11.0		24.0	10.6	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	7.0	3.8		5.9	0.7		5.3	0.8		2.8	0.6	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	26.2	22.8		24.5	18.4		29.8	11.8		26.9	11.2	
Lane group LOS	C	C		C	B		C	B		C	B	
Apprch. delay	24.2			20.3			12.9			12.0		
Approach LOS	C			C			B			B		
Intersec. delay	14.7			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & 213th St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	1	2	0	1	3	0	1	3	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	126	170	64	134	138	57	159	1012	197	122	1125	143
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 15.4	G =	G =	G =	G = 7.0	G = 28.6	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	140	260		149	216		177	1343		136	1409	
Lane group cap.	301	468		206	888		211	2407		211	2425	
v/c ratio	0.47	0.56		0.72	0.24		0.84	0.56		0.64	0.58	
Green ratio	0.26	0.26		0.26	0.26		0.12	0.48		0.12	0.48	
Unif. delay d1	18.8	19.3		20.4	17.7		25.9	11.2		25.3	11.4	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	5.1	4.7		19.7	0.7		31.1	0.9		14.2	1.0	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	23.9	24.0		40.1	18.3		57.0	12.1		39.5	12.4	
Lane group LOS	C	C		D	B		E	B		D	B	
Apprch. delay	24.0			27.2			17.4			14.8		
Approach LOS	C			C			B			B		
Intersec. delay	17.9			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 NB					
Agency or Co.	Kaku Associates						Ramps					
Date Performed	8/7/2006					Area Type	All other areas					
Time Period	AM					Jurisdiction						
						Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	0	1	1	2	0	0	3	0
Lane group						R	L	T			TR	
Volume (vph)						422	457	1230			795	341
% Heavy veh						0	0	0			0	0
PHF						0.90	0.90	0.90			0.90	0.90
Actuated (P/A)							P	P			P	P
Startup lost time						2.0	2.0	2.0			2.0	
Ext. eff. green						2.0	2.0	2.0			2.0	
Arrival type						3	3	3			3	
Unit Extension						3.0	3.0	3.0			3.0	
Ped/Bike/RTOR Volume				0		0				0		0
Lane Width						12.0	12.0	12.0			12.0	
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr						0	0	0			0	
Unit Extension						3.0	3.0	3.0			3.0	
Phasing	01	02	03	04	Thru & RT	NB Only	07	08				
Timing	G =	G =	G =	G =	G = 28.6	G = 25.4	G =	G =				
	Y =	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate						469	508	1367			1262	
Lane group cap.						1562	764	3437			2356	
v/c ratio						0.30	0.66	0.40			0.54	
Green ratio						0.95	0.42	0.95			0.48	
Unif. delay d1						0.1	13.9	0.1			11.0	
Delay factor k						0.50	0.50	0.50			0.50	
Increm. delay d2						0.5	4.5	0.3			0.9	
PF factor						1.000	1.000	1.000			1.000	
Control delay						0.6	18.4	0.5			11.9	
Lane group LOS						A	B	A			B	
Apprch. delay				0.6			5.3			11.9		
Approach LOS				A			A			B		
Intersec. delay	7.0			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	0	1	1	2	0	0	3	0
Lane group						R	L	T			TR	
Volume (vph)						324	371	1215			1288	629
% Heavy veh						0	0	0			0	0
PHF						0.90	0.90	0.90			0.90	0.90
Actuated (P/A)							P	P			P	P
Startup lost time						2.0	2.0	2.0			2.0	
Ext. eff. green						2.0	2.0	2.0			2.0	
Arrival type						3	3	3			3	
Unit Extension						3.0	3.0	3.0			3.0	
Ped/Bike/RTOR Volume				0		0				0		0
Lane Width						12.0	12.0	12.0			12.0	
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr						0	0	0			0	
Unit Extension						3.0	3.0	3.0			3.0	
Phasing	01	02	03	04	Thru & RT	NB Only	07	08				
Timing	G =	G =	G =	G =	G = 36.7	G = 17.3	G =	G =				
	Y =	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate						360	412	1350			2130	
Lane group cap.						1562	520	3437			3010	
v/c ratio						0.23	0.79	0.39			0.71	
Green ratio						0.95	0.29	0.95			0.61	
Unif. delay d1						0.1	19.7	0.1			8.0	
Delay factor k						0.50	0.50	0.50			0.50	
Increm. delay d2						0.3	11.7	0.3			1.4	
PF factor						1.000	1.000	1.000			1.000	
Control delay						0.4	31.4	0.5			9.4	
Lane group LOS						A	C	A			A	
Apprch. delay				0.4			7.7			9.4		
Approach LOS				A			A			A		
Intersec. delay	7.9			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	0	1	0	0	0	0	2	0	0	2	1
Lane group	L		R					T			TR	R
Volume (vph)	596		492					1107			566	238
% Heavy veh	0		0					0			0	0
PHF	0.90		0.90					0.90			0.90	0.90
Actuated (P/A)	P		P					P			P	P
Startup lost time	2.0		2.0					2.0			2.0	2.0
Ext. eff. green	2.0		2.0					2.0			2.0	2.0
Arrival type	3		3					3			3	3
Unit Extension	3.0		3.0					3.0			3.0	3.0
Ped/Bike/RTOR Volume	0		0	0						0		0
Lane Width	12.0		12.0					12.0			12.0	12.0
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0		0					0			0	0
Unit Extension	3.0		3.0					3.0			3.0	3.0
Phasing	EB Only	02	03	04	Thru & RT	06	07	08				
Timing	G = 17.0	G =	G =	G =	G = 37.0	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	662		547					1230			629	264
Lane group cap.	993		1615					2231			2231	996
v/c ratio	0.67		0.34					0.55			0.28	0.27
Green ratio	0.28		1.00					0.62			0.62	0.62
Unif. delay d1	19.0		0.0					6.7			5.3	5.3
Delay factor k	0.50		0.50					0.50			0.50	0.50
Increm. delay d2	3.5		0.6					1.0			0.3	0.7
PF factor	1.000		0.950					1.000			1.000	1.000
Control delay	22.5		0.6					7.7			5.7	5.9
Lane group LOS	C		A					A			A	A
Apprch. delay	12.6						7.7			5.7		
Approach LOS	B						A			A		
Intersec. delay	8.9			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	0	1	0	0	0	0	2	0	0	2	1
Lane group	L		R					T			TR	R
Volume (vph)	375		485					1212			911	382
% Heavy veh	0		0					0			0	0
PHF	0.90		0.90					0.90			0.90	0.90
Actuated (P/A)	P		P					P			P	P
Startup lost time	2.0		2.0					2.0			2.0	2.0
Ext. eff. green	2.0		2.0					2.0			2.0	2.0
Arrival type	3		3					3			3	3
Unit Extension	3.0		3.0					3.0			3.0	3.0
Ped/Bike/RTOR Volume	0		0	0						0		0
Lane Width	12.0		12.0					12.0			12.0	12.0
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0		0					0			0	0
Unit Extension	3.0		3.0					3.0			3.0	3.0
Phasing	EB Only	02	03	04	Thru & RT	06	07	08				
Timing	G = 10.1	G =	G =	G =	G = 43.9	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	417		539					1347			1012	424
Lane group cap.	590		1615					2647			2647	1182
v/c ratio	0.71		0.33					0.51			0.38	0.36
Green ratio	0.17		1.00					0.73			0.73	0.73
Unif. delay d1	23.6		0.0					3.4			3.0	2.9
Delay factor k	0.50		0.50					0.50			0.50	0.50
Increm. delay d2	7.0		0.6					0.7			0.4	0.8
PF factor	1.000		0.950					1.000			1.000	1.000
Control delay	30.5		0.6					4.1			3.4	3.8
Lane group LOS	C		A					A			A	A
Apprch. delay	13.6						4.1			3.5		
Approach LOS	B						A			A		
Intersec. delay	6.3			Intersection LOS						A		



SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Torrance Bl					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	1	1	0	1	0	2	2	0	1	2	1
Lane group		LT	R		LTR		L	TR		L	T	R
Volume (vph)	190	18	143	13	80	27	280	681	7	23	554	142
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time		2.0	2.0		2.0		2.0	2.0		2.0	2.0	2.0
Ext. eff. green		2.0	2.0		2.0		2.0	2.0		2.0	2.0	2.0
Arrival type		3	3		3		3	3		3	3	3
Unit Extension		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width		12.0	12.0		12.0		12.0	12.0		12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr		0	0		0		0	0		0	0	0
Unit Extension		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Phasing	WB Only	EB Only	03		04		Excl. Left	Thru & RT	07		08	
Timing	G = 8.6	G = 10.7	G =		G =		G = 7.4	G = 21.3	G =		G =	
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y = 3	Y =		Y =	
Duration of Analysis (hrs) = 0.25							Cycle Length C = 60.0					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate		231	159		133		311	765		26	616	158
Lane group cap.		324	288		263		432	1282		223	1284	573
v/c ratio		0.71	0.55		0.51		0.72	0.60		0.12	0.48	0.28
Green ratio		0.18	0.18		0.14		0.12	0.35		0.12	0.35	0.35
Unif. delay d1		23.2	22.5		23.7		25.3	15.8		23.4	15.0	13.8
Delay factor k		0.50	0.50		0.50		0.50	0.50		0.50	0.50	0.50
Increm. delay d2		12.6	7.4		6.8		9.9	2.1		1.1	1.3	1.2
PF factor		1.000	1.000		1.000		1.000	1.000		1.000	1.000	1.000
Control delay		35.8	29.9		30.5		35.2	17.9		24.5	16.3	15.0
Lane group LOS		D	C		C		D	B		C	B	B
Apprch. delay	33.4			30.5			22.9			16.3		
Approach LOS	C			C			C			B		
Intersec. delay	22.8			Intersection LOS						C		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Torrance Bl					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	1	1	0	1	0	2	2	0	1	2	1
Lane group		LT	R		LTR		L	TR		L	T	R
Volume (vph)	269	54	291	12	41	19	188	480	24	47	750	223
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time		2.0	2.0		2.0		2.0	2.0		2.0	2.0	2.0
Ext. eff. green		2.0	2.0		2.0		2.0	2.0		2.0	2.0	2.0
Arrival type		3	3		3		3	3		3	3	3
Unit Extension		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width		12.0	12.0		12.0		12.0	12.0		12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr		0	0		0		0	0		0	0	0
Unit Extension		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Phasing	WB Only	EB Only	03		04		Excl. Left	Thru & RT		07		08
Timing	G = 7.0	G = 18.1	G =		G =		G = 9.4	G = 23.5		G =		G =
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y = 3		Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 70.0					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate		359	323		80		209	560		52	833	248
Lane group cap.		472	418		182		471	1206		242	1215	542
v/c ratio		0.76	0.77		0.44		0.44	0.46		0.21	0.69	0.46
Green ratio		0.26	0.26		0.10		0.13	0.34		0.13	0.34	0.34
Unif. delay d1		24.0	24.0		29.7		27.9	18.3		27.0	20.1	18.2
Delay factor k		0.50	0.50		0.50		0.50	0.50		0.50	0.50	0.50
Increm. delay d2		11.0	13.0		7.5		3.0	1.3		2.0	3.2	2.8
PF factor		1.000	1.000		1.000		1.000	1.000		1.000	1.000	1.000
Control delay		34.9	37.0		37.2		30.9	19.6		29.0	23.2	21.0
Lane group LOS		C	D		D		C	B		C	C	C
Apprch. delay	35.9			37.2			22.7			23.0		
Approach LOS	D			D			C			C		
Intersec. delay	26.6			Intersection LOS						C		

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2006						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	2	1	1	2	1	1	3	1	2	3	0	
Lane group	L	T	R	L	T	R	L	T	R	L	TR		
Volume (vph)	120	382	24	263	593	108	107	500	157	131	546	144	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Arrival type	3	3	3	3	3	3	3	3	3	3	3		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 14.0	G = 12.7	G =			G =			G = 7.3	G = 14.0	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	133	424	27	292	659	120	119	556	174	146	767		
Lane group cap.	421	766	619	421	766	619	220	1208	834	426	1170		
v/c ratio	0.32	0.55	0.04	0.69	0.86	0.19	0.54	0.46	0.21	0.34	0.66		
Green ratio	0.23	0.21	0.38	0.23	0.21	0.38	0.12	0.23	0.52	0.12	0.23		
Unif. delay d1	19.0	21.1	11.6	21.0	22.8	12.3	24.8	19.8	7.9	24.2	20.8		
Delay factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50		
Increm. delay d2	2.0	2.9	0.0	9.1	12.1	0.2	9.2	1.3	0.1	2.2	2.9		
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Control delay	21.0	24.0	11.6	30.1	34.9	12.5	34.0	21.0	8.0	26.3	23.7		
Lane group LOS	C	C	B	C	C	B	C	C	A	C	C		
Apprch. delay	22.7			31.1			20.2			24.1			
Approach LOS	C			C			C			C			
Intersec. delay	25.1			Intersection LOS						C			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	PM					Analysis Year	2006						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	2	1	1	2	1	1	3	1	2	3	0	
Lane group	L	T	R	L	T	R	L	T	R	L	TR		
Volume (vph)	208	677	98	171	545	156	101	842	245	180	731	155	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Arrival type	3	3	3	3	3	3	3	3	3	3	3		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 15.5	G = 14.8	G =			G =			G = 7.0	G = 20.7	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 70.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	231	752	109	190	606	173	112	936	272	200	984		
Lane group cap.	400	765	572	400	765	572	181	1531	904	351	1490		
v/c ratio	0.58	0.98	0.19	0.47	0.79	0.30	0.62	0.61	0.30	0.57	0.66		
Green ratio	0.22	0.21	0.35	0.22	0.21	0.35	0.10	0.30	0.56	0.10	0.30		
Unif. delay d1	24.3	27.5	15.6	23.7	26.1	16.3	30.2	21.2	8.1	30.1	21.6		
Delay factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50		
Increm. delay d2	6.0	28.7	0.2	4.0	8.2	0.3	14.9	1.8	0.2	6.6	2.3		
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Control delay	30.3	56.1	15.8	27.7	34.4	16.6	45.1	23.0	8.3	36.6	23.9		
Lane group LOS	C	E	B	C	C	B	D	C	A	D	C		
Apprch. delay	46.6			29.9			21.9			26.0			
Approach LOS	D			C			C			C			
Intersec. delay	30.6			Intersection LOS						C			

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 NB Off Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	2	0	1	2	0	0	2	0
Lane group					LTR		L	T			TR	
Volume (vph)				67	321	204	18	729			592	63
% Heavy veh				0	0	0	0	0			0	0
PHF				0.90	0.90	0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P	P	P	P	P			P	P
Startup lost time					2.0		2.0	2.0			2.0	
Ext. eff. green					2.0		2.0	2.0			2.0	
Arrival type					3		3	3			3	
Unit Extension					3.0		3.0	3.0			3.0	
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width					12.0		12.0	12.0			12.0	
Parking/Grade/Parking	N			N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr					0		0	0			0	
Unit Extension					3.0		3.0	3.0			3.0	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 19.0	G =	G =	G =	G = 24.8	G = 7.2	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				658			20	810			728	
Lane group cap.				1080			217	2110			1474	
v/c ratio				0.61			0.09	0.38			0.49	
Green ratio				0.32			0.12	0.58			0.41	
Unif. delay d1				17.4			23.5	6.7			13.0	
Delay factor k				0.50			0.50	0.50			0.50	
Increm. delay d2				2.6			0.8	0.5			1.2	
PF factor				1.000			1.000	1.000			1.000	
Control delay				19.9			24.3	7.2			14.2	
Lane group LOS				B			C	A			B	
Apprch. delay				19.9			7.7			14.2		
Approach LOS				B			A			B		
Intersec. delay	13.4			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 NB Off Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	2	0	1	2	0	0	2	0
Lane group					LTR		L	T			TR	
Volume (vph)				80	83	90	27	573			1167	62
% Heavy veh				0	0	0	0	0			0	0
PHF				0.90	0.90	0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P	P	P	P	P			P	P
Startup lost time					2.0		2.0	2.0			2.0	
Ext. eff. green					2.0		2.0	2.0			2.0	
Arrival type					3		3	3			3	
Unit Extension					3.0		3.0	3.0			3.0	
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width					12.0		12.0	12.0			12.0	
Parking/Grade/Parking	N			N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr					0		0	0			0	
Unit Extension					3.0		3.0	3.0			3.0	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 13.3	G =	G =	G =	G = 49.2	G = 8.5	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				281			30	637			1366	
Lane group cap.				560			192	2745			2208	
v/c ratio				0.50			0.16	0.23			0.62	
Green ratio				0.17			0.11	0.76			0.62	
Unif. delay d1				30.3			32.5	2.8			9.6	
Delay factor k				0.50			0.50	0.50			0.50	
Increm. delay d2				3.2			1.7	0.2			1.3	
PF factor				1.000			1.000	1.000			1.000	
Control delay				33.5			34.2	3.0			10.9	
Lane group LOS				C			C	A			B	
Apprch. delay				33.5			4.4			10.9		
Approach LOS				C			A			B		
Intersec. delay	11.8			Intersection LOS						B		

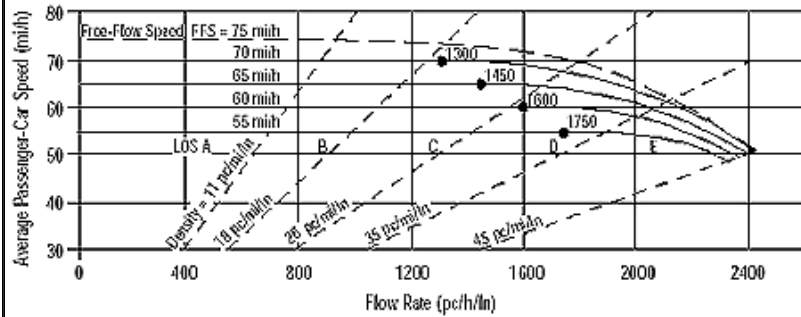
SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 SB On Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	0	0	0	2	0	1	2	0
Lane group	L	TR						TR		L	T	
Volume (vph)	28	105	11					702	56	93	621	
% Heavy veh	0	0	0					0	0	0	0	
PHF	0.90	0.90	0.90					0.90	0.90	0.90	0.90	
Actuated (P/A)	P	P	P					P	P	P	P	
Startup lost time	2.0	2.0						2.0		2.0	2.0	
Ext. eff. green	2.0	2.0						2.0		2.0	2.0	
Arrival type	3	3						3		3	3	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0		0			
Lane Width	12.0	12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0						0		0	0	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Phasing	EB Only	02	03	04	Thru & RT	SB Only	07	08				
Timing	G = 11.2	G =	G =	G =	G = 31.7	G = 8.1	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	31	129						842		103	690	
Lane group cap.	337	350						1890		244	2581	
v/c ratio	0.09	0.37						0.45		0.42	0.27	
Green ratio	0.19	0.19						0.53		0.13	0.71	
Unif. delay d1	20.2	21.3						8.7		23.8	3.0	
Delay factor k	0.50	0.50						0.50		0.50	0.50	
Increm. delay d2	0.5	3.0						0.8		5.3	0.3	
PF factor	1.000	1.000						1.000		1.000	1.000	
Control delay	20.7	24.3						9.5		29.1	3.3	
Lane group LOS	C	C						A		C	A	
Apprch. delay	23.6						9.5			6.6		
Approach LOS	C						A			A		
Intersec. delay	9.5			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 SB On Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2006					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	0	0	0	2	0	1	2	0
Lane group	L	TR						TR		L	T	
Volume (vph)	44	207	61					541	104	273	984	
% Heavy veh	0	0	0					0	0	0	0	
PHF	0.90	0.90	0.90					0.90	0.90	0.90	0.90	
Actuated (P/A)	P	P	P					P	P	P	P	
Startup lost time	2.0	2.0						2.0		2.0	2.0	
Ext. eff. green	2.0	2.0						2.0		2.0	2.0	
Arrival type	3	3						3		3	3	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0		0			
Lane Width	12.0	12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0						0		0	0	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Phasing	EB Only	02	03	04	Thru & RT	SB Only	07	08				
Timing	G = 16.6	G =	G =	G =	G = 20.5	G = 13.9	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	49	298						717		303	1093	
Lane group cap.	499	508						1206		418	2255	
v/c ratio	0.10	0.59						0.59		0.72	0.48	
Green ratio	0.28	0.28						0.34		0.23	0.62	
Unif. delay d1	16.1	18.7						16.3		21.3	6.1	
Delay factor k	0.50	0.50						0.50		0.50	0.50	
Increm. delay d2	0.4	4.9						2.2		10.5	0.7	
PF factor	1.000	1.000						1.000		1.000	1.000	
Control delay	16.5	23.6						18.5		31.7	6.8	
Lane group LOS	B	C						B		C	A	
Apprch. delay	22.6						18.5			12.3		
Approach LOS	C						B			B		
Intersec. delay	15.5			Intersection LOS						B		



**FREEWAY**

## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 NB
Agency or Company	Kaku Associates	From/To	Carson St to Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)
Project Description NO BUILD			

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

Flow Inputs			
Volume, V	6808 veh/h	Peak-Hour Factor, PHF	0.80
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

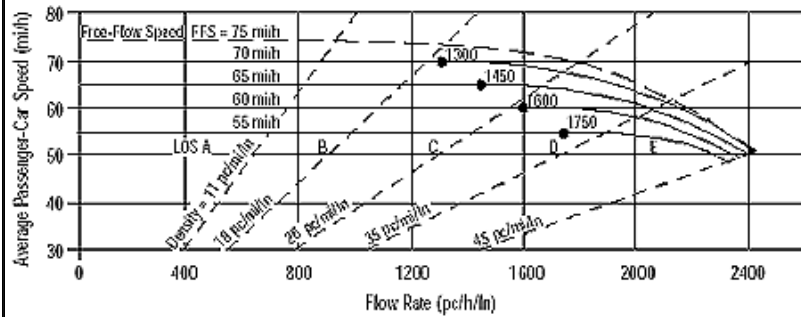
Calculate Flow Adjustments			
$f_p$	1.00	$E_R$	1.2
$E_T$	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.976

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 I/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	70.0 mi/h	FFS	70.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2181 pc/h/ln	Design LOS	
S	60.6 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	36.0 pc/mi/ln	S	mi/h
LOS	E	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 NB
Agency or Company	Kaku Associates	From/To	Carson St to Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)
Project Description NO BUILD			

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

Flow Inputs			
Volume, V	6767	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, $P_T$ 5
Peak-Hr Prop. of AADT, K			%RVs, $P_R$ 0
Peak-Hr Direction Prop, D			General Terrain: Level
DDHV = AADT x K x D		veh/h	Grade % Length mi
Driver type adjustment	1.00		Up/Down %

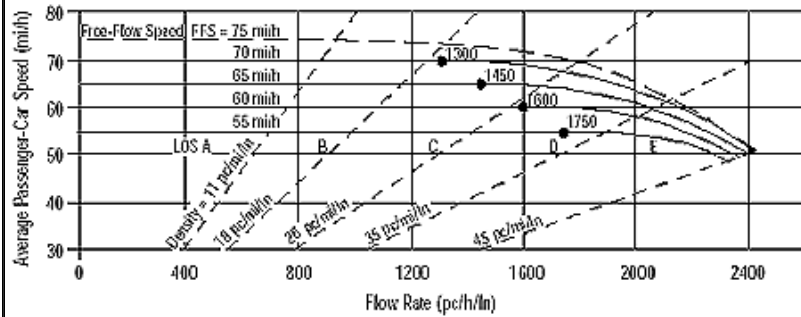
Calculate Flow Adjustments			
$f_p$	1.00	$E_R$	1.2
$E_T$	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.976

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 l/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	65.0 mi/h	FFS	65.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1927 pc/h/ln	Design LOS	
S	62.5 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	30.8 pc/mi/ln	S	mi/h
LOS	D	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 NB
Agency or Company	Kaku Associates	From/To	Avalon Bl to Main St
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)
Project Description NO BUILD			

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

Flow Inputs			
Volume, V	7179 veh/h	Peak-Hour Factor, PHF	0.80
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

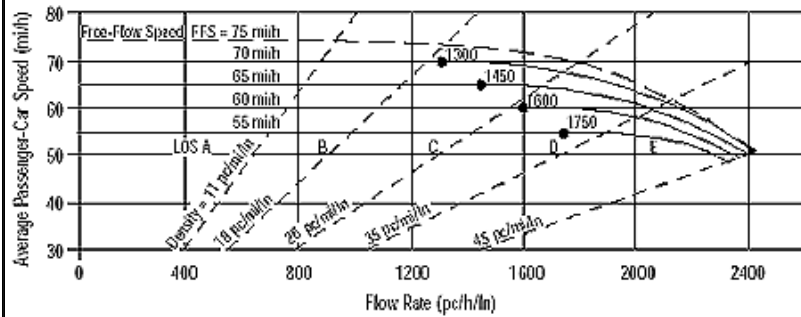
Calculate Flow Adjustments			
$f_p$	1.00	$E_R$	1.2
$E_T$	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.976

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 I/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	65.0 mi/h	FFS	65.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2300 pc/h/ln	Design LOS	
S	54.0 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	42.6 pc/mi/ln	S	mi/h
LOS	E	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 NB
Agency or Company	Kaku Associates	From/To	Avalon Bl to Main St
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)
Project Description NO BUILD			

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

Flow Inputs				
Volume, V	7677	veh/h	Peak-Hour Factor, PHF	0.90
AADT		veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K			%RVs, $P_R$	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade % Length	mi
Driver type adjustment	1.00		Up/Down %	

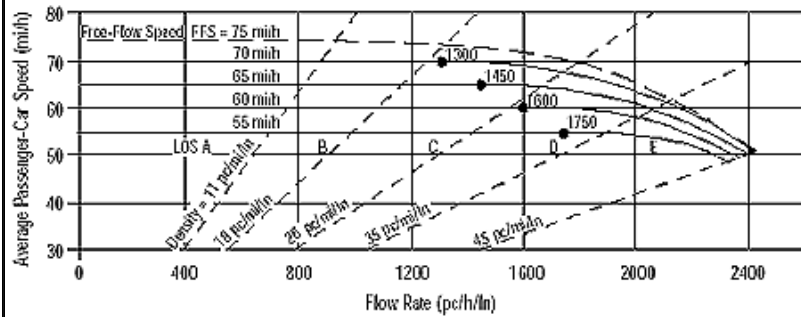
Calculate Flow Adjustments				
$f_p$	1.00		$E_R$	1.2
$E_T$	1.5		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.976

Speed Inputs		Calc Speed Adj and FFS		
Lane Width	12.0	ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0	ft	$f_{LC}$	mi/h
Interchange Density	0.50	l/mi	$f_{ID}$	mi/h
Number of Lanes, N	4		$f_N$	mi/h
FFS (measured)	65.0	mi/h	FFS	65.0
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures		Design (N)		
Operational (LOS)		Design (N)		
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2186	pc/h/ln	Design LOS	
S	57.4	mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	38.1	pc/mi/ln	S	mi/h
LOS	E		$D = v_p / S$	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 SB
Agency or Company	Kaku Associates	From/To	Main St to Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)
Project Description NO BUILD			

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

Flow Inputs			
Volume, V	6685	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	%Trucks and Buses, $P_T$
Peak-Hr Prop. of AADT, K			%RVs, $P_R$
Peak-Hr Direction Prop, D			General Terrain:
DDHV = AADT x K x D		veh/h	Grade % Length
Driver type adjustment	1.00		Up/Down %

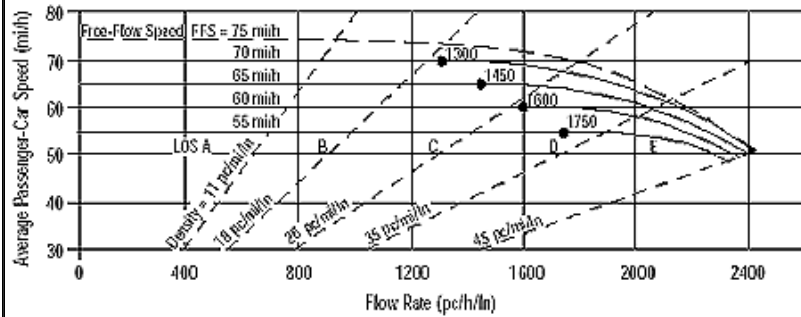
Calculate Flow Adjustments			
$f_p$	1.00	$E_R$	1.2
$E_T$	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.976

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 l/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	65.0 mi/h	FFS	65.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1903 pc/h/ln	Design LOS	
S	62.9 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	30.3 pc/mi/ln	S	mi/h
LOS	D	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 SB
Agency or Company	Kaku Associates	From/To	Main St to Avalon Bl
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)
Project Description NO BUILD			

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

Flow Inputs			
Volume, V	7170 veh/h	Peak-Hour Factor, PHF	0.75
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade %	Length mi
Driver type adjustment	1.00	Up/Down %	

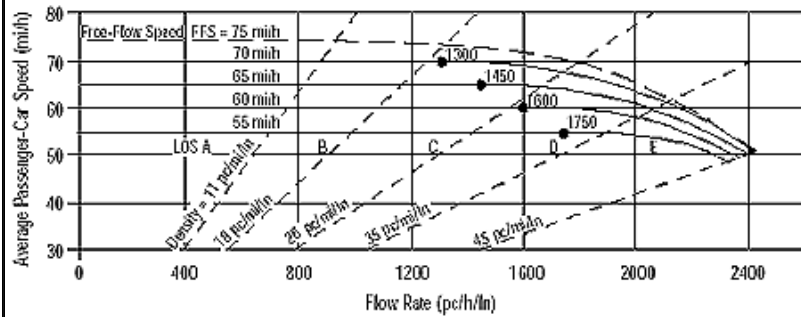
Calculate Flow Adjustments			
$f_p$	1.00	$E_R$	1.2
$E_T$	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.976

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 I/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	65.0 mi/h	FFS	65.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2450 pc/h/ln	Design LOS	
S	mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	pc/mi/ln	S	mi/h
LOS	F	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 SB
Agency or Company	Kaku Associates	From/To	Avalon Bl to Carson St
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description BUILD

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

Flow Inputs			
Volume, V	6123	veh/h	Peak-Hour Factor, PHF 0.90
AADT		veh/day	%Trucks and Buses, $P_T$ 5
Peak-Hr Prop. of AADT, K			%RVs, $P_R$ 0
Peak-Hr Direction Prop, D			General Terrain: Level
DDHV = AADT x K x D		veh/h	Grade % Length mi
Driver type adjustment	1.00		Up/Down %

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

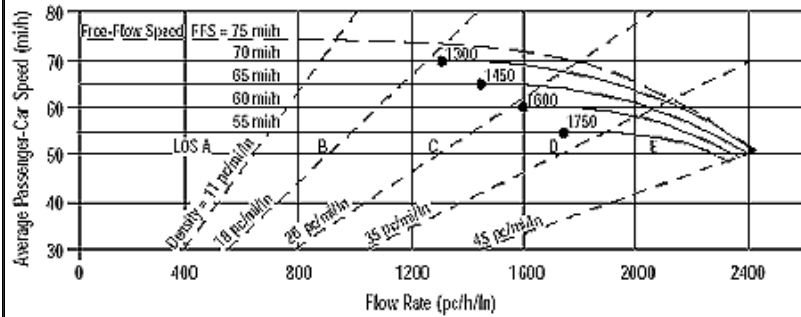
Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 l/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	65.0 mi/h	FFS	65.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1743 pc/h/ln	Design LOS	
S	64.3 mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	27.1 pc/mi/ln	S	mi/h
LOS	D	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			



## BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input	Output
Operational (LOS)	FFS, N, $v_p$	LOS, S, D
Design (N)	FFS, LOS, $v_p$	N, S, D
Design ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning ( $v_p$ )	FFS, LOS, N	$v_p$ , S, D

General Information		Site Information	
Analyst	Anjum	Highway/Direction of Travel	I-405 SB
Agency or Company	Kaku Associates	From/To	Avalon Bl to Carson St
Date Performed	9/13/2006	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)
Project Description NO BUILD			

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

Flow Inputs			
Volume, V	6927 veh/h	Peak-Hour Factor, PHF	0.75
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade %	Length mi
Driver type adjustment	1.00	Up/Down %	

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

Speed Inputs		Calc Speed Adj and FFS	
Lane Width	12.0 ft	$f_{LW}$	mi/h
Rt-Shoulder Lat. Clearance	6.0 ft	$f_{LC}$	mi/h
Interchange Density	0.50 I/mi	$f_{ID}$	mi/h
Number of Lanes, N	4	$f_N$	mi/h
FFS (measured)	65.0 mi/h	FFS	65.0 mi/h
Base free-flow Speed, BFFS	mi/h		

LOS and Performance Measures		Design (N)	
Operational (LOS)		Design (N)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2367 pc/h/ln	Design LOS	
S	mi/h	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	pc/h
$D = v_p / S$	pc/mi/ln	S	mi/h
LOS	F	$D = v_p / S$	pc/mi/ln
		Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	$E_R$ - Exhibits 23-8, 23-10	$f_{LW}$ - Exhibit 23-4
V - Hourly volume	D - Density	$E_T$ - Exhibits 23-8, 23-10, 23-11	$f_{LC}$ - Exhibit 23-5
$v_p$ - Flow rate	FFS - Free-flow speed	$f_p$ - Page 23-12	$f_N$ - Exhibit 23-6
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3	$f_{ID}$ - Exhibit 23-7
DDHV - Directional design hour volume			

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Northbound			
Agency or Company	Kaku Associates			Junction	Carson Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	AM			Analysis Year	2010 (Opening Year)			
Project Description No Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain				Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off		
$L_{up} =$	ft	$S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph				$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )				$V_D =$	veh/h	
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF$ $f_{HV} f_p$
Freeway	6808	0.90	Level	5	0	0.976	0.90	8615
Ramp	422	0.90	Level	5	0	0.976	0.90	534
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation $V_{12} =$ pc/h				$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} = 0.436$ using Equation 8 $V_{12} = 4057$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	8615	9400	No	
				$V_{12}$	4057	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F - V_R$	8081	9400	No	
				$V_R$	534	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/ mi /ln) LOS = (Exhibit 25-4)				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ $D_R =$ 34.6 (pc/ mi /ln) LOS = D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)				$D_s =$ 0.346 (Exhibit 25-19) $S_R =$ 57.0 mph (Exhibit 25-19) $S_0 =$ 66.3 mph (Exhibit 25-19) $S =$ 61.6 mph (Exhibit 25-15)				

**RAMPS AND RAMP JUNCTIONS WORKSHEET**

**General Information** **Site Information**

Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Carson Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

**Inputs**

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft Vu =        veh/h	Terrain  <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =        veh/h
---	--	---

**Conversion to pc/h Under Base Conditions**

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6767	0.90	Level	5	0	0.976	0.90	8563
Ramp	704	0.90	Level	5	0	0.976	0.90	891
UpStream								
DownStream								

Merge Areas Diverge Areas

**Estimation of v<sub>12</sub>** **Estimation of v<sub>12</sub>**

$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h	$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 4236 pc/h
---	---

**Capacity Checks** **Capacity Checks**

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8563	9400	No
				V <sub>12</sub>	4236	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7672	9400	No
				V <sub>R</sub>	891	2100	No

**Level of Service Determination (if not F)** **Level of Service Determination (if not F)**

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/ mi /ln) LOS =        (Exhibit 25-4)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        36.2 (pc/ mi /ln) LOS =        E (Exhibit 25-4)
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**Speed Estimation** **Speed Estimation**

M <sub>S</sub> =        (Exibit 25-19) S <sub>R</sub> =        mph (Exhibit 25-19) S <sub>0</sub> =        mph (Exhibit 25-19) S =        mph (Exhibit 25-14)	D <sub>s</sub> =        0.378 (Exhibit 25-19) S <sub>R</sub> =        56.3 mph (Exhibit 25-19) S <sub>0</sub> =        66.8 mph (Exhibit 25-19) S =        61.1 mph (Exhibit 25-15)
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## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2 Anjum  
 Agency or Company Kaku Associates  
 Date Performed 9/13/2006  
 Analysis Time Period AM

### Site Information

Freeway/Dir of Travel Northbound  
 Junction Carson On Ramp  
 Jurisdiction Caltrans  
 Analysis Year 2010 (Opening Year)

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6808	0.90	Level	5	0	0.976	0.90	8615
Ramp	356	0.90	Level	5	0	0.976	0.90	450
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.285 using Equation 4  
 V<sub>12</sub> = 2459 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	9065	See Exhibit 25-7	No
V <sub>R12</sub>	2909	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.8 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.348 (Exhibit 25-19)  
 S<sub>R</sub> = 57.0 mph (Exhibit 25-19)  
 S<sub>0</sub> = 53.8 mph (Exhibit 25-19)  
 S = 54.8 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Carson On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level  <hr/> S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6767	0.90	Level	5	0	0.976	0.90	8563
Ramp	516	0.90	Level	5	0	0.976	0.90	653
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.260 using Equation 4  
 V<sub>12</sub> = 2227 pc/h

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>	9216	See Exhibit 25-7	No	V <sub>FI</sub> =V <sub>F</sub>		4400:All	
				V <sub>12</sub>			
V <sub>R12</sub>	2880	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> -		See Exhibit 25-14	
				V <sub>R</sub>			
				V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.5 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

### Speed Estimation

M<sub>S</sub> = 0.345 (Exhibit 25-19)  
 S<sub>R</sub> = 57.1 mph (Exhibit 25-19)  
 S<sub>0</sub> = 53.3 mph (Exhibit 25-19)  
 S = 54.4 mph (Exhibit 25-14)

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

**RAMPS AND RAMP JUNCTIONS WORKSHEET**

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

**Inputs**

Upstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =          ft  Vu =          veh/h	Terrain      S <sub>FF</sub> = 65.0 mph                  S <sub>FR</sub> = 45.0 mph  Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =          ft  VD =          veh/h

**Conversion to pc/h Under Base Conditions**

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6808	0.90	Level	5	0	0.976	0.90	8615
Ramp	594	0.90	Level	5	0	0.976	0.90	752
UpStream								
DownStream								

Merge Areas

Diverge Areas

**Estimation of v<sub>12</sub>**

$V_{12} = V_F (P_{FM})$   
 L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

**Estimation of v<sub>12</sub>**

$V_{12} = V_R + (V_F - V_R)P_{FD}$   
 L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4180 pc/h

**Capacity Checks**

**Capacity Checks**

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8615	9400	No
				V <sub>12</sub>	4180	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7863	9400	No
				V <sub>R</sub>	752	2100	No

**Level of Service Determination (if not F)**

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$   
 D<sub>R</sub> =          (pc/ mi /ln)  
 LOS =          (Exhibit 25-4)

**Level of Service Determination (if not F)**

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$   
 D<sub>R</sub> =          35.7 (pc/ mi /ln)  
 LOS =          E (Exhibit 25-4)

**Speed Estimation**

M<sub>S</sub> =          (Exhibit 25-19)  
 S<sub>R</sub> =          mph (Exhibit 25-19)  
 S<sub>0</sub> =          mph (Exhibit 25-19)  
 S =          mph (Exhibit 25-14)

**Speed Estimation**

D<sub>s</sub> =          0.366 (Exhibit 25-19)  
 S<sub>R</sub> =          56.6 mph (Exhibit 25-19)  
 S<sub>0</sub> =          66.6 mph (Exhibit 25-19)  
 S =          61.3 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6767	0.90	Level	5	0	0.976	0.90	8563
Ramp	590	0.90	Level	5	0	0.976	0.90	747
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4155 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8563	9400	No
				V <sub>12</sub>	4155	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7816	9400	No
				V <sub>R</sub>	747	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        35.5 (pc/ mi /ln)  
 LOS =        E (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.365 (Exhibit 25-19)  
 S<sub>R</sub> =        56.6 mph (Exhibit 25-19)  
 S<sub>0</sub> =        66.6 mph (Exhibit 25-19)  
 S =        61.3 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)
Project Description No Build Scenario			

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level    S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7179	0.90	Level	5	0	0.976	0.90	9085
Ramp	883	0.90	Level	5	0	0.976	0.90	1117
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.202 using Equation 4  
 V<sub>12</sub> = 1836 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	10202	See Exhibit 25-7	Yes
V <sub>R12</sub>	2953	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.9 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.351 (Exhibit 25-19)  
 S<sub>R</sub> = 56.9 mph (Exhibit 25-19)  
 S<sub>0</sub> = 50.5 mph (Exhibit 25-19)  
 S = 52.2 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)



## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst: Analyst2  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: PM

### Site Information

Freeway/Dir of Travel: Northbound  
 Junction: Avalon On Ramp  
 Jurisdiction: Caltrans  
 Analysis Year: 2010 (Opening Year)

Project Description: No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level    <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7677	0.90	Level	5	0	0.976	0.90	9715
Ramp	1297	0.90	Level	5	0	0.976	0.90	1641
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.137 using Equation 4  
 V<sub>12</sub> = 1327 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	11356	See Exhibit 25-7	Yes
V <sub>R12</sub>	2968	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.7 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.352 (Exhibit 25-19)  
 S<sub>R</sub> = 56.9 mph (Exhibit 25-19)  
 S<sub>0</sub> = 47.1 mph (Exhibit 25-19)  
 S = 49.3 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

**RAMPS AND RAMP JUNCTIONS WORKSHEET**

<b>General Information</b>	<b>Site Information</b>
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Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Main Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

**Inputs**

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft Vu =          veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =       ft VD =          veh/h
---	---	--

**Conversion to pc/h Under Base Conditions**

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7179	0.90	Level	5	0	0.976	0.90	9085
Ramp	477	0.90	Level	5	0	0.976	0.90	604
UpStream								
DownStream								

Merge Areas	Diverge Areas
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<b>Estimation of v<sub>12</sub></b>	<b>Estimation of v<sub>12</sub></b>
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$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h	$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 3510 pc/h
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<b>Capacity Checks</b>	<b>Capacity Checks</b>
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	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	7268	9400	No
			V <sub>12</sub>	3510	4400:All	No	
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	6664	9400	No
			V <sub>R</sub>	604	2100	No	

<b>Level of Service Determination (if not F)</b>	<b>Level of Service Determination (if not F)</b>
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$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = (pc/ mi /ln) LOS = (Exhibit 25-4)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = 29.9 (pc/ mi /ln) LOS= D (Exhibit 25-4)
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<b>Speed Estimation</b>	<b>Speed Estimation</b>
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M <sub>S</sub> = (Exhibit 25-19) S <sub>R</sub> = mph (Exhibit 25-19) S <sub>0</sub> = mph (Exhibit 25-19) S = mph (Exhibit 25-14)	D <sub>s</sub> = 0.352 (Exhibit 25-19) S <sub>R</sub> = 56.9 mph (Exhibit 25-19) S <sub>0</sub> = 67.9 mph (Exhibit 25-19) S = 62.1 mph (Exhibit 25-15)
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## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Main Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft Vu =         veh/h	Terrain  <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =         veh/h
--	--	--

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7677	0.90	Level	5	0	0.976	0.90	9715
Ramp	380	0.90	Level	5	0	0.976	0.90	481
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 3660 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	7772	9400	No
				V <sub>12</sub>	3660	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7291	9400	No
				V <sub>R</sub>	481	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        31.2 (pc/ mi /ln)  
 LOS =        D (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =         mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.341 (Exhibit 25-19)  
 S<sub>R</sub> =        57.2 mph (Exhibit 25-19)  
 S<sub>0</sub> =        67.2 mph (Exhibit 25-19)  
 S =         62.1 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: AM

### Site Information

Freeway/Dir of Travel: Southbound  
 Junction: Main On Ramp  
 Jurisdiction: Caltrans  
 Analysis Year: 2010 (Opening Year)

Project Description: No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6685	0.90	Level	5	0	0.976	0.90	8459
Ramp	279	0.90	Level	5	0	0.976	0.90	353
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.298 using Equation 4  
 V<sub>12</sub> = 1800 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	6402	See Exhibit 25-7	No
V <sub>R12</sub>	2153	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 19.0 (pc/ m/ln)  
 LOS = B (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.310 (Exhibit 25-19)  
 S<sub>R</sub> = 57.9 mph (Exhibit 25-19)  
 S<sub>0</sub> = 59.2 mph (Exhibit 25-19)  
 S = 58.7 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Main On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level     S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7170	0.90	Level	5	0	0.976	0.90	9073
Ramp	527	0.90	Level	5	0	0.976	0.90	667
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.258 using Equation 4  
 V<sub>12</sub> = 1698 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	7240	See Exhibit 25-7	No
V <sub>R12</sub>	2365	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 20.5 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.318 (Exhibit 25-19)  
 S<sub>R</sub> = 57.7 mph (Exhibit 25-19)  
 S<sub>0</sub> = 57.6 mph (Exhibit 25-19)  
 S = 57.7 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6685	0.90	Level	5	0	0.976	0.90	8459
Ramp	1134	0.90	Level	5	0	0.976	0.90	1435
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4497 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8459	9400	No
			V <sub>12</sub>	4497	4400:All	Yes	
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7024	9400	No
			V <sub>R</sub>	1435	2100	No	

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        38.4 (pc/ mi /ln)  
 LOS =        F (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.427 (Exhibit 25-19)  
 S<sub>R</sub> =        55.2 mph (Exhibit 25-19)  
 S<sub>0</sub> =        67.5 mph (Exhibit 25-19)  
 S =        60.3 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7170	0.90	Level	5	0	0.976	0.90	9073
Ramp	1129	0.90	Level	5	0	0.976	0.90	1429
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4762 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	9073	9400	No
				V <sub>12</sub>	4762	4400:All	Yes
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7644	9400	No
				V <sub>R</sub>	1429	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        40.7 (pc/ mi /ln)  
 LOS =        F (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.427 (Exhibit 25-19)  
 S<sub>R</sub> =        55.2 mph (Exhibit 25-19)  
 S<sub>0</sub> =        66.8 mph (Exhibit 25-19)  
 S =        60.2 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst: Analyst2  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: AM

### Site Information

Freeway/Dir of Travel: Southbound  
 Junction: Avalon On Ramp  
 Jurisdiction: Caltrans  
 Analysis Year: 2010 (Opening Year)

Project Description: No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   <div style="text-align: center;"> <math>S_{FF} = 65.0 \text{ mph}</math>                      <math>S_{FR} = 45.0 \text{ mph}</math> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	V=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6123	0.90	Level	5	0	0.976	0.90	7748
Ramp	296	0.90	Level	5	0	0.976	0.90	375
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.295 using Equation 4  
 V<sub>12</sub> = 2284 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	8123	See Exhibit 25-7	No
V <sub>R12</sub>	2659	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 22.9 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.332 (Exhibit 25-19)  
 S<sub>R</sub> = 57.4 mph (Exhibit 25-19)  
 S<sub>0</sub> = 55.9 mph (Exhibit 25-19)  
 S = 56.4 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)



## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)
Project Description No Build Scenario			

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level     S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6927	0.90	Level	5	0	0.976	0.90	8766
Ramp	717	0.90	Level	5	0	0.976	0.90	907
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.228 using Equation 4  
 V<sub>12</sub> = 2001 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	9673	See Exhibit 25-7	Yes
V <sub>R12</sub>	2908	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.6 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.347 (Exhibit 25-19)  
 S<sub>R</sub> = 57.0 mph (Exhibit 25-19)  
 S<sub>0</sub> = 52.0 mph (Exhibit 25-19)  
 S = 53.4 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Carson Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft Vu =        veh/h	Terrain  <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6123	0.90	Level	5	0	0.976	0.90	7748
Ramp	340	0.90	Level	5	0	0.976	0.90	430
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 3621 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	7748	9400	No
				V <sub>12</sub>	3621	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7318	9400	No
				V <sub>R</sub>	430	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        30.9 (pc/ mi /ln)  
 LOS =        D (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.337 (Exhibit 25-19)  
 S<sub>R</sub> =        57.3 mph (Exhibit 25-19)  
 S<sub>0</sub> =        67.2 mph (Exhibit 25-19)  
 S =        62.1 mph (Exhibit 25-15)

**RAMPS AND RAMP JUNCTIONS WORKSHEET**

**General Information** **Site Information**

Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

**Inputs**

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft Vu =        veh/h	Terrain  <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =        veh/h
---	--	---

**Conversion to pc/h Under Base Conditions**

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6927	0.90	Level	5	0	0.976	0.90	8766
Ramp	243	0.90	Level	5	0	0.976	0.90	308
UpStream								
DownStream								

Merge Areas Diverge Areas

**Estimation of v<sub>12</sub>** **Estimation of v<sub>12</sub>**

$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h	$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 3996 pc/h
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**Capacity Checks** **Capacity Checks**

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8766	9400	No
				V <sub>12</sub>	3996	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	8458	9400	No
				V <sub>R</sub>	308	2100	No

**Level of Service Determination (if not F)** **Level of Service Determination (if not F)**

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/ mi /ln) LOS =        (Exhibit 25-4)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        34.1 (pc/ mi /ln) LOS =        D (Exhibit 25-4)
---	--

**Speed Estimation** **Speed Estimation**

M <sub>S</sub> =        (Exibit 25-19) S <sub>R</sub> =        mph (Exhibit 25-19) S <sub>0</sub> =        mph (Exhibit 25-19) S =        mph (Exhibit 25-14)	D <sub>s</sub> =        0.326 (Exhibit 25-19) S <sub>R</sub> =        57.5 mph (Exhibit 25-19) S <sub>0</sub> =        65.9 mph (Exhibit 25-19) S =        61.8 mph (Exhibit 25-15)
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## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Carson On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level  <hr/> S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6123	0.90	Level	5	0	0.976	0.90	7748
Ramp	728	0.90	Level	5	0	0.976	0.90	921
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.227 using Equation 4  
 V<sub>12</sub> = 1755 pc/h

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>	8669	See Exhibit 25-7	No	V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
				V <sub>12</sub>		4400:All	
V <sub>R12</sub>	2676	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> -		See Exhibit 25-14	
				V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 22.8 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

### Speed Estimation

M<sub>S</sub> = 0.333 (Exhibit 25-19)  
 S<sub>R</sub> = 57.3 mph (Exhibit 25-19)  
 S<sub>0</sub> = 54.3 mph (Exhibit 25-19)  
 S = 55.2 mph (Exhibit 25-14)

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2 Anjum  
 Agency or Company Kaku Associates  
 Date Performed 9/13/2006  
 Analysis Time Period PM

### Site Information

Freeway/Dir of Travel Southbound  
 Junction Carson On Ramp  
 Jurisdiction Caltrans  
 Analysis Year 2010 (Opening Year)

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level  <hr/> S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6927	0.90	Level	5	0	0.976	0.90	8766
Ramp	830	0.90	Level	5	0	0.976	0.90	1050
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.210 using Equation 4  
 V<sub>12</sub> = 1845 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	9816	See Exhibit 25-7	Yes
V <sub>R12</sub>	2895	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.4 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.347 (Exhibit 25-19)  
 S<sub>R</sub> = 57.0 mph (Exhibit 25-19)  
 S<sub>0</sub> = 51.5 mph (Exhibit 25-19)  
 S = 53.0 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## FREEWAY WEAVING WORKSHEET

General Information				Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB		
Agency/Company	Kaku Associates	Weaving Seg Location	Carson St to Avalon Bl		
Date Performed	9/14/2006	Jurisdiction	Caltrans		
Analysis Time Period	AM No Build Scenario	Analysis Year	2010 (Opening Year)		

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.13
Weaving seg length, L (ft)	1600	Weaving ratio, R	0.37
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	f <sub>HV</sub>	f <sub>p</sub>	v
Vo1	6214	0.90	5	0	1.5	1.2	0.976	0.90	7863
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	594	0.90	5	0	1.5	1.2	0.976	0.90	751
Vw2	356	0.90	5	0	1.5	1.2	0.976	0.90	450
Vw				1201	Vnw				7863
V									9064

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.95	0.48		
Weaving and non-weaving speeds, Si (mi/h)	43.15	52.21		

Number of lanes required for unconstrained operation, Nw	0.32
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 100px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	50.80
Weaving segment density, D (pc/mi/ln)	89.22
Level of service, LOS	F
Capacity of base condition, c <sub>b</sub> (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, c <sub>h</sub> (veh/h)	

- Notes**
- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
  - b. Capacity constrained by basic freeway capacity.
  - c. Capacity occurs under constrained operating conditions.
  - d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
  - e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
  - f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
  - g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
  - h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
  - i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency/Company	Kaku Associates	Weaving Seg Location	Carson St to Avalon Bl
Date Performed	9/14/2006	Jurisdiction	Caltrans
Analysis Time Period	PM No Build Scenario	Analysis Year	2010 (Opening Year)

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.15
Weaving seg length, L (ft)	1600	Weaving ratio, R	0.47
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	f <sub>HV</sub>	f <sub>p</sub>	v
Vo1	6177	0.90	5	0	1.5	1.2	0.976	0.90	7816
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	590	0.90	5	0	1.5	1.2	0.976	0.90	746
Vw2	516	0.90	5	0	1.5	1.2	0.976	0.90	652
Vw				1398	Vnw				7816
V									9214

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.00	0.54		
Weaving and non-weaving speeds, Si (mi/h)	42.49	50.77		
Number of lanes required for unconstrained operation, Nw			0.38	
Maximum number of lanes, Nw (max)			3.50	
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 150px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>				

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	49.31
Weaving segment density, D (pc/mi/ln)	93.43
Level of service, LOS	F
Capacity of base condition, c <sub>b</sub> (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, c <sub>h</sub> (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency/Company	Kaku Associates	Weaving Seg Location	Avalon Bl to Carson St
Date Performed	9/14/2006	Jurisdiction	Caltrans
Analysis Time Period	AM No Build Scenario	Analysis Year	2010 (Opening Year)

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.10
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.48
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	5807	0.90	5	0	1.5	1.2	0.976	0.90	7348
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	316	0.90	5	0	1.5	1.2	0.976	0.90	399
Vw2	296	0.90	5	0	1.5	1.2	0.976	0.90	374
Vw				773	Vnw				7348
V									8121

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.66	0.28		
Weaving and non-weaving speeds, Si (mi/h)	48.21	57.96		

Number of lanes required for unconstrained operation, Nw	0.14
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 100px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	56.87
Weaving segment density, D (pc/mi/ln)	71.41
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.



## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency/Company	Kaku Associates	Weaving Seg Location	Avalon Bl to Carson St
Date Performed	9/14/2006	Jurisdiction	Caltrans
Analysis Time Period	PM No Build Scenario	Analysis Year	2010 (Opening Year)

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.13
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.25
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6684	0.90	5	0	1.5	1.2	0.976	0.90	8458
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	243	0.90	5	0	1.5	1.2	0.976	0.90	307
Vw2	717	0.90	5	0	1.5	1.2	0.976	0.90	907
Vw				1214	Vnw				8458
V									9672

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.79	0.39		
Weaving and non-weaving speeds, Si (mi/h)	45.77	54.48		
Number of lanes required for unconstrained operation, Nw			0.22	
Maximum number of lanes, Nw (max)			3.50	
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 150px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>				

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	53.21
Weaving segment density, D (pc/mi/ln)	90.89
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

**APPENDIX F**

**OPENING YEAR (2010) BUILD ALTERNATIVE  
LEVEL OF SERVICE WORKSHEETS**

## INTERSECTIONS

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>AM</i>	Intersection <i>Carson St &amp; I-405 NB</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2030</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	2	0	1	2	1	1		1	1		1
Lane Group	L	TR		L	T	R	L		R	L		R
Volume (vph)	107	894	10	3	971	266	4		0	21		503
% Heavy Vehicles	0	0	0	0	0	0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90		0.90
Pretimed/Actuated (P/A)	P	P	A	P	P	A	P		P	P		P
Startup Lost Time	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Extension of Effective Green	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Arrival Type	3	3		3	3	3	3		3	3		3
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0		12.0	12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0	0	0		0	0		0
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	
Phasing	EW Perm	EW Perm	03	04	NS Perm	06	07	08				
Timing	G = 14.0	G = 48.5	G =	G =	G = 8.5	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0						

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	Adjusted Flow Rate	119	1004		3	1079	296	4		0	23	
Lane Group Capacity	316	2957		330	2193	1615	192		1615	192		1615
v/c Ratio	0.38	0.34		0.01	0.49	0.18	0.02		0.00	0.12		0.35
Green Ratio	0.17	0.82		0.61	0.61	1.00	0.11		1.00	0.11		1.00
Uniform Delay d <sub>1</sub>	29.1	1.8		6.2	8.8	0.0	32.0		0.0	32.4		0.0
Delay Factor k	0.50	0.50		0.50	0.50	0.11	0.50		0.11	0.50		0.50
Incremental Delay d <sub>2</sub>	3.4	0.3		0.1	0.8	0.1	0.2		0.0	1.3		0.6
PF Factor	1.000	1.000		1.000	1.000	0.950	1.000		0.950	1.000		0.950
Control Delay	32.5	2.1		6.3	9.6	0.1	32.2		0.0	33.6		0.6
Lane Group LOS	C	A		A	A	A	C		A	C		A
Approach Delay	5.4			7.6			32.2			1.9		
Approach LOS	A			A			C			A		
Intersection Delay	5.7			Intersection LOS						A		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>PM</i>	Intersection <i>Carson St &amp; I-405 NB</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	2	0	1	2	1	1		1	1		1
Lane Group	L	TR		L	T	R	L		R	L		R
Volume (vph)	122	971	7	1	726	318	21		4	29		416
% Heavy Vehicles	0	0	0	0	0	0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90		0.90
Pretimed/Actuated (P/A)	P	P	A	P	P	A	P		P	P		P
Startup Lost Time	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Extension of Effective Green	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Arrival Type	3	3		3	3	3	3		3	3		3
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0		12.0	12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0	0	0		0	0		0
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	
Phasing	EW Perm	EW Perm	03	04	NS Perm	06	07	08				
Timing	G = 12.4	G = 39.6	G =	G =	G = 7.3	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 68.3					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	Adjusted Flow Rate	136	1087		1	807	353	23		4	32	
Lane Group Capacity	328	2910		290	2098	1615	193		1615	193		1615
v/c Ratio	0.41	0.37		0.00	0.38	0.22	0.12		0.00	0.17		0.29
Green Ratio	0.18	0.81		0.58	0.58	1.00	0.11		1.00	0.11		1.00
Uniform Delay d <sub>1</sub>	24.7	1.9		6.0	7.8	0.0	27.6		0.0	27.7		0.0
Delay Factor k	0.50	0.50		0.50	0.50	0.11	0.50		0.11	0.50		0.50
Incremental Delay d <sub>2</sub>	3.8	0.4		0.0	0.5	0.1	1.3		0.0	1.8		0.4
PF Factor	1.000	1.000		1.000	1.000	0.950	1.000		0.950	1.000		0.950
Control Delay	28.6	2.2		6.1	8.3	0.1	28.8		0.0	29.6		0.4
Lane Group LOS	C	A		A	A	A	C		A	C		A
Approach Delay	5.2			5.8			24.6			2.3		
Approach LOS	A			A			C			A		
Intersection Delay	5.1			Intersection LOS						A		

## SHORT REPORT

General Information				Site Information			
Analyst	Anjum			Intersection	Carson St & I-405 SB		
Agency or Co.	Kaku Associates			Ramps			
Date Performed	8/7/2006			Area Type	All other areas		
Time Period	AM			Jurisdiction			
				Analysis Year	2010 (Opening)		

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	2	1	1	3	0	1		1			
Lane Group	L	TR	R	L	TR		L		R			
Volume (vph)	7	797	539	77	1300	9	69		184			
% Heavy Vehicles	0	0	0	0	0	0	0		0			
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90			
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P		P			
Startup Lost Time	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Extension of Effective Green	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Arrival Type	3	3	3	3	3		3		3			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0			
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N			
Parking/Hour												
Bus Stops/Hour	0	0	0	0	0		0		0			
Minimum Pedestrian Time		3.2			3.2			3.2				
Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08				
Timing	G = 7.8	G = 38.3	G =	G =	G = 8.3	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 63.4					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	Adjusted Flow Rate	8	886	599	86	1454		77		204		
Lane Group Capacity	195	2186	976	222	4004		236		1615			
v/c Ratio	0.04	0.41	0.61	0.39	0.36		0.33		0.13			
Green Ratio	0.60	0.60	0.60	0.12	0.77		0.13		1.00			
Uniform Delay d <sub>1</sub>	5.1	6.6	7.9	25.6	2.2		25.0		0.0			
Delay Factor k	0.50	0.50	0.50	0.50	0.50		0.50		0.11			
Incremental Delay d <sub>2</sub>	0.4	0.6	2.9	5.0	0.3		3.6		0.0			
PF Factor	1.000	1.000	1.000	1.000	1.000		1.000		0.950			
Control Delay	5.5	7.1	10.8	30.6	2.5		28.7		0.0			
Lane Group LOS	A	A	B	C	A		C		A			
Approach Delay	8.6			4.1			7.9					
Approach LOS	A			A			A					
Intersection Delay	6.4			Intersection LOS						A		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>PM</i>	Intersection <i>Carson St &amp; I-405 SB Ramps</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	2	1	1	3	0	1		1			
Lane Group	L	TR	R	L	TR		L		R			
Volume (vph)	5	1000	533	74	1114	15	55		89			
% Heavy Vehicles	0	0	0	0	0	0	0		0			
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90			
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P		P			
Startup Lost Time	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Extension of Effective Green	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Arrival Type	3	3	3	3	3		3		3			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0			
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N			
Parking/Hour												
Bus Stops/Hour	0	0	0	0	0		0		0			
Minimum Pedestrian Time		3.2			3.2			3.2				
Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08				
Timing	G = 7.8	G = 54.0	G =	G =	G = 9.2	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 80.0					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	Adjusted Flow Rate	6	1111	592	82	1255		61		99		
Lane Group Capacity	269	2442	1090	176	4184		208		1615			
v/c Ratio	0.02	0.45	0.54	0.47	0.30		0.29		0.06			
Green Ratio	0.68	0.68	0.68	0.10	0.81		0.11		1.00			
Uniform Delay d <sub>1</sub>	4.3	6.1	6.7	34.1	1.9		32.4		0.0			
Delay Factor k	0.50	0.50	0.50	0.50	0.50		0.50		0.11			
Incremental Delay d <sub>2</sub>	0.2	0.6	1.9	8.6	0.2		3.6		0.0			
PF Factor	1.000	1.000	1.000	1.000	1.000		1.000		0.950			
Control Delay	4.4	6.7	8.6	42.7	2.1		36.0		0.0			
Lane Group LOS	A	A	A	D	A		D		A			
Approach Delay	7.4			4.6			13.7					
Approach LOS	A			A			B					
Intersection Delay	6.5			Intersection LOS						A		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>AM</i>	Intersection <i>Avalon Bl &amp; Carson St</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	2	2	1	2	2	1	1	3	1	1	3	1
Lane Group	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>T</i>	<i>R</i>
Volume (vph)	180	674	51	306	694	121	101	853	368	153	682	127
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
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
Pretimed/Actuated (P/A)	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>
Startup Lost Time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Parking/Grade/Parking	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>
Parking/Hour												
Bus Stops/Hour	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	
Phasing	Excl. Left	Thru & RT	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 7.2	G = 16.9	G =	G =	G = 7.1	G = 18.8	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 62.0					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	Adjusted Flow Rate	200	749	57	340	771	134	112	948	409	170	758
Lane Group Capacity	407	986	440	407	986	440	207	1569	490	207	1569	490
v/c Ratio	0.49	0.76	0.13	0.84	0.78	0.30	0.54	0.60	0.83	0.82	0.48	0.29
Green Ratio	0.12	0.27	0.27	0.12	0.27	0.27	0.11	0.30	0.30	0.11	0.30	0.30
Uniform Delay d <sub>1</sub>	25.7	20.7	17.0	26.8	20.8	17.9	25.9	18.4	20.2	26.8	17.6	16.5
Delay Factor k	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Incremental Delay d <sub>2</sub>	4.2	5.5	0.6	18.0	6.2	1.8	9.8	1.7	15.4	29.3	1.1	1.5
PF Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Control Delay	29.9	26.2	17.6	44.9	27.0	19.7	35.7	20.2	35.5	56.1	18.7	18.0
Lane Group LOS	<i>C</i>	<i>C</i>	<i>B</i>	<i>D</i>	<i>C</i>	<i>B</i>	<i>D</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>B</i>	<i>B</i>
Approach Delay	26.4			31.1			25.6			24.6		
Approach LOS	<i>C</i>			<i>C</i>			<i>C</i>			<i>C</i>		
Intersection Delay	27.0						Intersection LOS				<i>C</i>	



## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>PM</i>	Intersection <i>Avalon Bl &amp; Carson St</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	2	2	1	2	2	1	1	3	1	1	3	1
Lane Group	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>T</i>	<i>R</i>
Volume (vph)	306	874	110	249	730	180	184	818	260	265	867	261
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
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
Pretimed/Actuated (P/A)	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>
Startup Lost Time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Parking/Grade/Parking	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>
Parking/Hour												
Bus Stops/Hour	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	
Phasing	Excl. Left	Thru & RT	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 7.0	G = 21.4	G =	G =	G = 12.8	G = 11.5	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 64.7					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	Adjusted Flow Rate	340	971	122	277	811	200	204	909	289	294	963
Lane Group Capacity	379	1197	534	379	1197	534	357	920	287	357	920	287
v/c Ratio	0.90	0.81	0.23	0.73	0.68	0.37	0.57	0.99	1.01	0.82	1.05	1.01
Green Ratio	0.11	0.33	0.33	0.11	0.33	0.33	0.20	0.18	0.18	0.20	0.18	0.18
Uniform Delay d <sub>1</sub>	28.5	19.8	15.7	27.9	18.7	16.5	23.5	26.5	26.6	24.9	26.6	26.6
Delay Factor k	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Incremental Delay d <sub>2</sub>	26.4	6.0	1.0	11.8	3.1	2.0	6.5	26.9	54.9	19.0	42.6	55.8
PF Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Control Delay	54.9	25.8	16.7	39.7	21.8	18.5	30.0	53.5	81.5	43.9	69.2	82.4
Lane Group LOS	<i>D</i>	<i>C</i>	<i>B</i>	<i>D</i>	<i>C</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>F</i>	<i>D</i>	<i>E</i>	<i>F</i>
Approach Delay	31.9			25.1			55.8			66.9		
Approach LOS	<i>C</i>			<i>C</i>			<i>E</i>			<i>E</i>		
Intersection Delay	45.8						Intersection LOS				<i>D</i>	

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>AM</i>	Intersection <i>Main St &amp; Carson St</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	2	2	0	2	2	0	1	3	0	1	3	0
Lane Group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	220	566	55	128	750	145	142	673	138	86	534	199
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
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
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival Type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0		0	0		0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	
Phasing	Excl. Left	Thru & RT	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 7.0	G = 21.4	G =	G =	G = 12.8	G = 11.5	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 64.7					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	Adjusted Flow Rate	244	690		142	994		158	901		96	814
Lane Group Capacity	379	1181		379	1168		357	897		357	882	
v/c Ratio	0.64	0.58		0.37	0.85		0.44	1.00		0.27	0.92	
Green Ratio	0.11	0.33		0.11	0.33		0.20	0.18		0.20	0.18	
Uniform Delay d <sub>1</sub>	27.7	18.0		26.8	20.2		22.8	26.6		22.0	26.2	
Delay Factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Incremental Delay d <sub>2</sub>	8.2	2.1		2.8	7.9		3.9	31.1		1.8	16.5	
PF Factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control Delay	35.8	20.1		29.6	28.0		26.8	57.7		23.8	42.7	
Lane Group LOS	D	C		C	C		C	E		C	D	
Approach Delay	24.2			28.2			53.1			40.7		
Approach LOS	C			C			D			D		
Intersection Delay	36.6						Intersection LOS			D		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>PM</i>	Intersection <i>Main St &amp; Carson St</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	2	2	0	2	2	0	1	3	0	1	3	0
Lane Group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	361	1008	164	245	752	148	208	731	148	189	907	457
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
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
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival Type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0		0	0		0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	
Phasing	Excl. Left	Thru & RT	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 8.5	G = 29.1	G =	G =	G = 7.6	G = 22.8	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 80.0					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate	401	1302		272	1000		231	976		210	1516	
Lane Group Capacity	372	1288		372	1284		171	1438		171	1401	
v/c Ratio	1.08	1.01		0.73	0.78		1.35	0.68		1.23	1.08	
Green Ratio	0.11	0.36		0.11	0.36		0.10	0.28		0.10	0.28	
Uniform Delay d <sub>1</sub>	35.8	25.4		34.6	22.6		36.2	25.4		36.2	28.6	
Delay Factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Incremental Delay d <sub>2</sub>	69.1	27.8		12.0	4.7		191.3	2.6		143.2	49.6	
PF Factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control Delay	104.8	53.2		46.6	27.3		227.5	28.0		179.4	78.2	
Lane Group LOS	F	D		D	C		F	C		F	E	
Approach Delay	65.4			31.4			66.1			90.5		
Approach LOS	E			C			E			F		
Intersection Delay	65.6			Intersection LOS						E		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>AM</i>	Intersection <i>Avalon Bl &amp; 213th St</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	2	0	1	3	0	1	2	0
Lane Group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	149	154	64	93	146	91	79	1038	192	72	1005	74
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
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
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival Type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0		0	0		0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 17.0	G =	G =	G =	G = 7.2	G = 34.3	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 67.5					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate	166	242		103	263		88	1366		80	1199	
Lane Group Capacity	262	457		208	859		193	2569		193	1819	
v/c Ratio	0.63	0.53		0.50	0.31		0.46	0.53		0.41	0.66	
Green Ratio	0.25	0.25		0.25	0.25		0.11	0.51		0.11	0.51	
Uniform Delay d <sub>1</sub>	22.5	21.8		21.6	20.5		28.3	11.2		28.2	12.3	
Delay Factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Incremental Delay d <sub>2</sub>	11.1	4.3		8.2	0.9		7.6	0.8		6.4	1.9	
PF Factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control Delay	33.6	26.1		29.8	21.4		35.9	12.0		34.6	14.2	
Lane Group LOS	C	C		C	C		D	B		C	B	
Approach Delay	29.2			23.8			13.4			15.4		
Approach LOS	C			C			B			B		
Intersection Delay	17.1			Intersection LOS						B		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>PM</i>	Intersection <i>Avalon Bl &amp; 213th St</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	2	0	1	3	0	1	2	0
Lane Group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	131	177	67	139	144	105	165	1183	205	171	1287	149
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
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
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival Type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0		0	0		0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 18.6	G =	G =	G =	G = 11.6	G = 39.8	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 79.0					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate	146	271		154	277		183	1542		190	1596	
Lane Group Capacity	228	429		155	798		265	2550		265	1794	
v/c Ratio	0.64	0.63		0.99	0.35		0.69	0.60		0.72	0.89	
Green Ratio	0.24	0.24		0.24	0.24		0.15	0.50		0.15	0.50	
Uniform Delay d <sub>1</sub>	27.2	27.1		30.1	25.1		32.0	14.0		32.1	17.6	
Delay Factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Incremental Delay d <sub>2</sub>	13.0	6.9		70.6	1.2		13.8	1.1		15.4	7.1	
PF Factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control Delay	40.2	34.0		100.8	26.3		45.8	15.1		47.5	24.7	
Lane Group LOS	D	C		F	C		D	B		D	C	
Approach Delay	36.2			52.9			18.3			27.1		
Approach LOS	D			D			B			C		
Intersection Delay	27.1			Intersection LOS						C		

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & I-405 NB						
Agency or Co.	Kaku Associates					Area Type	Ramps						
Date Performed	8/7/2006					Jurisdiction	All other areas						
Time Period	AM					Analysis Year	2010 (Opening)						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	0	0	0	2	0	1	2	2	0	0	3	1	
Lane group				L		R	L	T			T	R	
Volume (vph)				195		586	570	1436			918	372	
% Heavy veh				0		0	0	0			0	0	
PHF				0.90		0.90	0.90	0.90			0.90	0.90	
Actuated (P/A)				P		P	P	P			P	P	
Startup lost time				2.0		2.0	2.0	2.0			2.0	2.0	
Ext. eff. green				2.0		2.0	2.0	2.0			2.0	2.0	
Arrival type				3		3	3	3			3	3	
Unit Extension				3.0		3.0	3.0	3.0			3.0	3.0	
Ped/Bike/RTOR Volume	0			0		0				0		0	
Lane Width				12.0		12.0	12.0	12.0			12.0	12.0	
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr				0		0	0	0			0	0	
Unit Extension				3.0		3.0	3.0	3.0			3.0	3.0	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08					
Timing	G = 7.2	G =	G =	G =	G = 46.6	G = 27.2	G =	G =					
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =					
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate				217		651	633	1596			1020	413	
Lane group cap.				280		1615	1059	3087			2680	1019	
v/c ratio				0.77		0.40	0.60	0.52			0.38	0.41	
Green ratio				0.08		1.00	0.30	0.85			0.52	0.63	
Unif. delay d1				40.6		0.0	26.7	1.7			13.0	8.2	
Delay factor k				0.50		0.50	0.50	0.50			0.50	0.50	
Increm. delay d2				18.7		0.8	2.5	0.6			0.4	1.2	
PF factor				1.000		0.950	1.000	1.000			1.000	1.000	
Control delay				59.3		0.8	29.2	2.4			13.4	9.4	
Lane group LOS				E		A	C	A			B	A	
Apprch. delay				15.4			10.0			12.3			
Approach LOS				B			A			B			
Intersec. delay	11.7			Intersection LOS							B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2010 (Opening)					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	2	0	1	2	2	0	0	3	1
Lane group				L		R	L	T			T	R
Volume (vph)				429		440	682	1334			1542	774
% Heavy veh				0		0	0	0			0	0
PHF				0.90		0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P		P	P	P			P	P
Startup lost time				2.0		2.0	2.0	2.0			2.0	2.0
Ext. eff. green				2.0		2.0	2.0	2.0			2.0	2.0
Arrival type				3		3	3	3			3	3
Unit Extension				3.0		3.0	3.0	3.0			3.0	3.0
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width				12.0		12.0	12.0	12.0			12.0	12.0
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr				0		0	0	0			0	0
Unit Extension				3.0		3.0	3.0	3.0			3.0	3.0
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 18.0	G =	G =	G =	G = 40.8	G = 22.2	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				477		489	758	1482			1713	860
Lane group cap.				701		1615	865	2653			2346	1109
v/c ratio				0.68		0.30	0.88	0.56			0.73	0.78
Green ratio				0.20		1.00	0.25	0.73			0.45	0.69
Unif. delay d1				33.3		0.0	32.6	5.4			20.1	9.5
Delay factor k				0.50		0.50	0.50	0.50			0.50	0.50
Increm. delay d2				5.3		0.5	12.1	0.9			2.0	5.3
PF factor				1.000		0.950	1.000	1.000			1.000	1.000
Control delay				38.6		0.5	44.7	6.3			22.1	14.8
Lane group LOS				D		A	D	A			C	B
Apprch. delay				19.3			19.3			19.7		
Approach LOS				B			B			B		
Intersec. delay	19.5			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon/Leandro & I-405 SB					
Agency or Co.	Kaku Associates						Ramp					
Date Performed	8/7/2006					Area Type	All other areas					
Time Period	AM					Jurisdiction						
						Analysis Year	2010 (Opening)					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	2	1	0	0	0	1	2	0	0	2	1
Lane group	L	TR	R				L	TR			T	R
Volume (vph)	835	137	584				101	1188	78		629	451
% Heavy veh	0	0	0				0	0	0		0	0
PHF	0.90	0.90	0.90				0.90	0.90	0.90		0.90	0.90
Actuated (P/A)	P	P	P				P	P	P		P	A
Startup lost time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext. eff. green	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Arrival type	3	3	3				3	3			3	3
Unit Extension	3.0	3.0	3.0				3.0	3.0			3.0	3.0
Ped/Bike/RTOR Volume	0		0	0			0		0	0		0
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0	0				0	0			0	0
Unit Extension	3.0	3.0	3.0				3.0	3.0			3.0	3.0
Phasing	EB Only	02	03	04	Thru & RT	NS Perm	07	08				
Timing	G = 40.3	G =	G =	G =	G = 30.5	G = 10.2	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	928	152	649				112	1407			699	501
Lane group cap.	1569	1620	1615				205	1740			1226	1615
v/c ratio	0.59	0.09	0.40				0.55	0.81			0.57	0.31
Green ratio	0.45	0.45	1.00				0.11	0.49			0.34	1.00
Unif. delay d1	18.7	14.3	0.0				37.7	19.6			24.4	0.0
Delay factor k	0.50	0.50	0.50				0.50	0.50			0.50	0.11
Increm. delay d2	1.6	0.1	0.7				10.1	4.2			1.9	0.1
PF factor	1.000	1.000	0.950				1.000	1.000			1.000	0.950
Control delay	20.3	14.4	0.7				47.8	23.8			26.3	0.1
Lane group LOS	C	B	A				D	C			C	A
Apprch. delay	12.5						25.5			15.4		
Approach LOS	B						C			B		
Intersec. delay	17.7			Intersection LOS						B		



SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon/Leandro & I-405 SB					
Agency or Co.	Kaku Associates						Ramp					
Date Performed	8/7/2006					Area Type	All other areas					
Time Period	PM					Jurisdiction						
						Analysis Year	2010 (Opening)					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	2	1	0	0	0	1	2	0	0	2	1
Lane group	L	TR	R				L	TR			T	R
Volume (vph)	707	440	674				173	1310	93		1007	924
% Heavy veh	0	0	0				0	0	0		0	0
PHF	0.90	0.90	0.90				0.90	0.90	0.90		0.90	0.90
Actuated (P/A)	P	P	P				P	P	P		P	A
Startup lost time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext. eff. green	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Arrival type	3	3	3				3	3			3	3
Unit Extension	3.0	3.0	3.0				3.0	3.0			3.0	3.0
Ped/Bike/RTOR Volume	0		0	0			0		0	0		0
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0	0				0	0			0	0
Unit Extension	3.0	3.0	3.0				3.0	3.0			3.0	3.0
Phasing	EB Only	02	03	04	Thru & RT	NS Perm	07	08				
Timing	G = 40.3	G =	G =	G =	G = 30.5	G = 10.2	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	786	489	749				192	1559			1119	1027
Lane group cap.	1569	1620	1615				205	1739			1226	1615
v/c ratio	0.50	0.30	0.46				0.94	0.90			0.91	0.64
Green ratio	0.45	0.45	1.00				0.11	0.49			0.34	1.00
Unif. delay d1	17.7	15.9	0.0				39.6	21.1			28.5	0.0
Delay factor k	0.50	0.50	0.50				0.50	0.50			0.50	0.22
Increm. delay d2	1.1	0.5	1.0				48.2	7.7			11.8	0.8
PF factor	1.000	1.000	0.950				1.000	1.000			1.000	0.950
Control delay	18.8	16.3	1.0				87.8	28.8			40.3	0.8
Lane group LOS	B	B	A				F	C			D	A
Apprch. delay	11.6						35.3			21.4		
Approach LOS	B						D			C		
Intersec. delay	22.2			Intersection LOS						C		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Lenardo Dr & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	9/8/2006					Jurisdiction	All other areas					
Time Period	AM					Analysis Year	2010 (Opening)					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	3	0	0	2	1	0	0	0	2	0	1
Lane group		T			T	R				L		R
Volume (vph)		304			254	298				1252		132
% Heavy veh		0			0	0				0		0
PHF		0.90			0.90	0.90				0.90		0.90
Actuated (P/A)		P			P	P				P		P
Startup lost time		2.0			2.0	2.0				2.0		2.0
Ext. eff. green		2.0			2.0	2.0				2.0		2.0
Arrival type		3			3	3				3		3
Unit Extension		3.0			3.0	3.0				3.0		3.0
Ped/Bike/RTOR Volume				0		0	0			0		0
Lane Width		12.0			12.0	12.0				12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr		0			0	0				0		0
Unit Extension		3.0			3.0	3.0				3.0		3.0
Phasing	Thru & RT	02	03	04	SB Only	06	07	08				
Timing	G = 21.3	G =	G =	G =	G = 62.7	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y =	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate		338			282	331				1391		147
Lane group cap.		1225			856	1615				2442		1615
v/c ratio		0.28			0.33	0.20				0.57		0.09
Green ratio		0.24			0.24	1.00				0.70		1.00
Unif. delay d1		28.1			28.4	0.0				6.9		0.0
Delay factor k		0.50			0.50	0.50				0.50		0.50
Increm. delay d2		0.6			1.0	0.3				1.0		0.1
PF factor		1.000			1.000	0.950				1.000		0.950
Control delay		28.6			29.5	0.3				7.8		0.1
Lane group LOS		C			C	A				A		A
Apprch. delay	28.6			13.7						7.1		
Approach LOS	C			B						A		
Intersec. delay	11.6			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Lenardo Dr & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	9/8/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2010 (Opening)					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	3	0	0	2	1	0	0	0	2	0	1
Lane group		T			T	R				L		R
Volume (vph)		906			556	541				915		308
% Heavy veh		0			0	0				0		0
PHF		0.90			0.90	0.90				0.90		0.90
Actuated (P/A)		P			P	P				P		P
Startup lost time		2.0			2.0	2.0				2.0		2.0
Ext. eff. green		2.0			2.0	2.0				2.0		2.0
Arrival type		3			3	3				3		3
Unit Extension		3.0			3.0	3.0				3.0		3.0
Ped/Bike/RTOR Volume				0		0	0			0		0
Lane Width		12.0			12.0	12.0				12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr		0			0	0				0		0
Unit Extension		3.0			3.0	3.0				3.0		3.0
Phasing	Thru & RT	02	03	04	SB Only	06	07	08				
Timing	G = 42.1	G =	G =	G =	G = 41.9	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y =	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate		1007			618	601				1017		342
Lane group cap.		2421			1692	1615				1632		1615
v/c ratio		0.42			0.37	0.37				0.62		0.21
Green ratio		0.47			0.47	1.00				0.47		1.00
Unif. delay d1		15.8			15.4	0.0				18.1		0.0
Delay factor k		0.50			0.50	0.50				0.50		0.50
Increm. delay d2		0.5			0.6	0.7				1.8		0.3
PF factor		1.000			1.000	0.950				1.000		0.950
Control delay		16.4			16.0	0.7				19.9		0.3
Lane group LOS		B			B	A				B		A
Apprch. delay	16.4			8.4						15.0		
Approach LOS	B			A						B		
Intersec. delay	13.1			Intersection LOS						B		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>AM</i>	Intersection <i>Main St &amp; Torrance Bl</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	0	1	0	2	1	1	1	2	1
Lane Group	L	TR			LTR		L	T	R	L	T	R
Volume (vph)	271	19	149	14	83	28	291	914	7	24	731	231
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
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
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival Type	3	3			3		3	3	3	3	3	3
Unit Extension	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0			0		0	0	0	0	0	0
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 23.1	G =	G =	G =	G = 11.5	G = 50.7	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 94.3					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate	301	187			139		323	1016	8	27	812	257
Lane Group Capacity	266	403			435		427	1022	868	220	1945	868
v/c Ratio	1.13	0.46			0.32		0.76	0.99	0.01	0.12	0.42	0.30
Green Ratio	0.24	0.24			0.24		0.12	0.54	0.54	0.12	0.54	0.54
Uniform Delay d <sub>1</sub>	35.6	30.3			29.2		40.0	21.7	10.1	36.9	13.0	12.0
Delay Factor k	0.50	0.50			0.50		0.50	0.50	0.50	0.50	0.50	0.50
Incremental Delay d <sub>2</sub>	95.3	3.8			1.9		11.8	26.8	0.0	1.1	0.7	0.9
PF Factor	1.000	1.000			1.000		1.000	1.000	1.000	1.000	1.000	1.000
Control Delay	130.9	34.1			31.1		51.9	48.4	10.1	38.0	13.7	12.9
Lane Group LOS	F	C			C		D	D	B	D	B	B
Approach Delay	93.8			31.1			49.0			14.1		
Approach LOS	F			C			D			B		
Intersection Delay	42.9			Intersection LOS						D		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>PM</i>	Intersection <i>Main St &amp; Torrance Bl</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	0	1	0	2	1	1	1	2	1
Lane Group	L	TR			LTR		L	T	R	L	T	R
Volume (vph)	442	56	303	12	43	20	196	921	25	49	1202	401
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
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
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival Type	3	3			3		3	3	3	3	3	3
Unit Extension	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0			0		0	0	0	0	0	0
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 38.7	G =	G =	G =	G = 9.8	G = 62.1	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 119.6					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	Adjusted Flow Rate	491	399			83		218	1023	28	54	1336
Lane Group Capacity	421	537			553		287	987	839	148	1879	839
v/c Ratio	1.17	0.74			0.15		0.76	1.04	0.03	0.36	0.71	0.53
Green Ratio	0.32	0.32			0.32		0.08	0.52	0.52	0.08	0.52	0.52
Uniform Delay d <sub>1</sub>	40.4	36.0			28.8		53.7	28.8	14.1	52.0	21.9	19.1
Delay Factor k	0.50	0.50			0.50		0.50	0.50	0.50	0.50	0.50	0.50
Incremental Delay d <sub>2</sub>	97.8	9.0			0.6		17.1	38.5	0.1	6.8	2.3	2.4
PF Factor	1.000	1.000			1.000		1.000	1.000	1.000	1.000	1.000	1.000
Control Delay	138.2	45.0			29.3		70.9	67.3	14.1	58.8	24.2	21.5
Lane Group LOS	F	D			C		E	E	B	E	C	C
Approach Delay	96.4			29.3			66.7			24.6		
Approach LOS	F			C			E			C		
Intersection Delay	53.5			Intersection LOS						D		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>AM</i>	Intersection <i>Main St &amp; Lenardo Dr</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes				1		1		2	1	1	2	
Lane Group				L		R		T	R	L	T	
Volume (vph)				227		103		936	246	89	767	
% Heavy Vehicles				0		0		0	0	0	0	
PHF				0.90		0.90		0.90	0.90	0.90	0.90	
Pretimed/Actuated (P/A)				P		P		P	P	P	P	
Startup Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of Effective Green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival Type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume				0	0	0	0	0	0	0	0	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking				N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour				0		0		0	0	0	0	
Minimum Pedestrian Time					3.2			3.2			3.2	
Phasing	WB Only	02	03	04	NS Perm	06	07	08				
Timing	G = 14.6	G =	G =	G =	G = 39.4	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 60.0					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate				252		114		1040	273	99	852	
Lane Group Capacity				439		393		2376	1615	292	2376	
v/c Ratio				0.57		0.29		0.44	0.17	0.34	0.36	
Green Ratio				0.24		0.24		0.66	1.00	0.66	0.66	
Uniform Delay d <sub>1</sub>				20.0		18.5		5.0	0.0	4.5	4.6	
Delay Factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Incremental Delay d <sub>2</sub>				5.4		1.9		0.6	0.2	3.1	0.4	
PF Factor				1.000		1.000		1.000	0.950	1.000	1.000	
Control Delay				25.3		20.3		5.6	0.2	7.7	5.0	
Lane Group LOS				C		C		A	A	A	A	
Approach Delay				23.8			4.4			5.3		
Approach LOS				C			A			A		
Intersection Delay	7.5			Intersection LOS						A		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>PM</i>	Intersection <i>Main St &amp; Lenardo Dr</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes				1		1		2	1	1	2	
Lane Group				L		R		T	R	L	T	
Volume (vph)				547		216		751	560	171	1103	
% Heavy Vehicles				0		0		0	0	0	0	
PHF				0.90		0.90		0.90	0.90	0.90	0.90	
Pretimed/Actuated (P/A)				P		P		P	P	P	P	
Startup Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of Effective Green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival Type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume				0	0	0	0	0	0	0	0	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking				N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour				0		0		0	0	0	0	
Minimum Pedestrian Time					3.2			3.2			3.2	
Phasing	WB Only	02	03	04	NS Perm	06	07	08				
Timing	G = 26.8	G =	G =	G =	G = 35.4	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 68.2					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	Adjusted Flow Rate				608		240		834	622	190	1226
Lane Group Capacity				709		635		1878	1615	263	1878	
v/c Ratio				0.86		0.38		0.44	0.39	0.72	0.65	
Green Ratio				0.39		0.39		0.52	1.00	0.52	0.52	
Uniform Delay d <sub>1</sub>				19.0		14.8		10.3	0.0	12.6	11.9	
Delay Factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Incremental Delay d <sub>2</sub>				12.7		1.7		0.8	0.7	15.8	1.8	
PF Factor				1.000		1.000		1.000	0.950	1.000	1.000	
Control Delay				31.7		16.5		11.0	0.7	28.4	13.7	
Lane Group LOS				C		B		B	A	C	B	
Approach Delay				27.4			6.6			15.7		
Approach LOS				C			A			B		
Intersection Delay	14.8			Intersection LOS						B		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>AM</i>	Intersection <i>Avalon Bl &amp; Del Amo Bl</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Number of Lanes	1	2	1	1	2	1	1	3	1	2	3	0	
Lane Group	L	T	R	L	T	R	L	T	R	L	TR		
Volume (vph)	162	455	95	298	687	112	150	520	167	136	568	194	
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup Lost Time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Extension of Effective Green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Arrival Type	3	3	3	3	3	3	3	3	3	3	3		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/Hour													
Bus Stops/Hour	0	0	0	0	0	0	0	0	0	0	0		
Minimum Pedestrian Time		3.2			3.2			3.2			3.2		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 13.5	G = 14.0	G =	G =	G = 7.0	G = 14.0	G =	G =					
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y = 3	Y =	Y =					
Duration of Analysis (hrs) = 0.25							Cycle Length C = 60.5						

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	Adjusted Flow Rate	180	506	106	331	763	124	167	578	186	151	847
Lane Group Capacity	403	837	641	403	837	641	209	1198	814	406	1152	
v/c Ratio	0.45	0.60	0.17	0.82	0.91	0.19	0.80	0.48	0.23	0.37	0.74	
Green Ratio	0.22	0.23	0.40	0.22	0.23	0.40	0.12	0.23	0.50	0.12	0.23	
Uniform Delay d <sub>1</sub>	20.3	20.8	11.8	22.4	22.6	11.9	26.1	20.1	8.4	24.7	21.5	
Delay Factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	
Incremental Delay d <sub>2</sub>	3.6	3.2	0.1	17.0	15.9	0.1	26.5	1.4	0.1	2.6	4.2	
PF Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Control Delay	23.8	24.0	11.9	39.3	38.5	12.1	52.6	21.5	8.6	27.3	25.7	
Lane Group LOS	C	C	B	D	D	B	D	C	A	C	C	
Approach Delay	22.3			36.0			24.5			26.0		
Approach LOS	C			D			C			C		
Intersection Delay	28.0						Intersection LOS				C	



## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>PM</i>	Intersection <i>Avalon Bl &amp; Del Amo Bl</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Number of Lanes	1	2	1	1	2	1	1	3	1	2	3	0	
Lane Group	L	T	R	L	T	R	L	T	R	L	TR		
Volume (vph)	310	860	161	182	723	162	233	876	279	187	760	256	
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup Lost Time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Extension of Effective Green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Arrival Type	3	3	3	3	3	3	3	3	3	3	3		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/Hour													
Bus Stops/Hour	0	0	0	0	0	0	0	0	0	0	0		
Minimum Pedestrian Time		3.2			3.2			3.2			3.2		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 13.8	G = 23.4	G =			G =			G = 19.3	G = 19.2	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 87.7						

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate	344	956	179	202	803	180	259	973	310	208	1128	
Lane Group Capacity	284	965	842	284	965	842	397	1133	663	771	1090	
v/c Ratio	1.21	0.99	0.21	0.71	0.83	0.21	0.65	0.86	0.47	0.27	1.03	
Green Ratio	0.16	0.27	0.52	0.16	0.27	0.52	0.22	0.22	0.41	0.22	0.22	
Uniform Delay d <sub>1</sub>	36.9	32.0	11.3	35.1	30.3	11.3	31.1	32.9	18.9	28.4	34.3	
Delay Factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	
Incremental Delay d <sub>2</sub>	123.1	26.8	0.1	14.1	8.3	0.1	8.1	8.5	0.5	0.9	36.7	
PF Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Control Delay	160.1	58.9	11.4	49.1	38.6	11.4	39.2	41.5	19.4	29.2	70.9	
Lane Group LOS	F	E	B	D	D	B	D	D	B	C	E	
Approach Delay	76.7			36.3			36.7			64.4		
Approach LOS	E			D			D			E		
Intersection Delay	53.9			Intersection LOS						D		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>AM</i>	Intersection <i>Stamps Dr &amp; Del Amo Bl</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Number of Lanes	2	2	2	2	2	1	2	1	2	1	1	1	
Lane Group	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>TR</i>	<i>R</i>	
Volume (vph)	27	1263	355	139	1060	11	369	0	152	12	2	31	
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Pretimed/Actuated (P/A)	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	
Startup Lost Time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Extension of Effective Green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Parking/Grade/Parking	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>	
Parking/Hour													
Bus Stops/Hour	0	0	0	0	0	0	0	0	0	0	0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.1	G = 28.9	G =	G =	G = 8.1	G = 7.2	G =	G =					
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y = 3	Y =	Y =					
Duration of Analysis (hrs) = 0.25							Cycle Length C = 63.3						

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate	30	1403	394	154	1178	12	410	0	169	13	2	34
Lane Group Capacity	393	1652	1807	393	1652	1021	449	216	781	231	216	184
v/c Ratio	0.08	0.85	0.22	0.39	0.71	0.01	0.91	0.00	0.22	0.06	0.01	0.18
Green Ratio	0.11	0.46	0.63	0.11	0.46	0.63	0.13	0.11	0.27	0.13	0.11	0.11
Uniform Delay d <sub>1</sub>	25.2	15.3	5.0	26.1	13.9	4.3	27.3	24.9	17.8	24.2	24.9	25.4
Delay Factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.50
Incremental Delay d <sub>2</sub>	0.4	5.7	0.1	2.9	2.7	0.0	25.5	0.0	0.1	0.5	0.1	2.2
PF Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Control Delay	25.5	20.9	5.0	29.0	16.5	4.3	52.8	24.9	17.9	24.7	25.0	27.6
Lane Group LOS	<i>C</i>	<i>C</i>	<i>A</i>	<i>C</i>	<i>B</i>	<i>A</i>	<i>D</i>	<i>C</i>	<i>B</i>	<i>C</i>	<i>C</i>	<i>C</i>
Approach Delay	17.6			17.8			42.6			26.7		
Approach LOS	<i>B</i>			<i>B</i>			<i>D</i>			<i>C</i>		
Intersection Delay	21.6			Intersection LOS						<i>C</i>		

## SHORT REPORT

General Information	Site Information
Analyst <i>Anjum</i> Agency or Co. <i>Kaku Associates</i> Date Performed <i>8/7/2006</i> Time Period <i>PM</i>	Intersection <i>Stamps Dr &amp; Del Amo Bl</i> Area Type <i>All other areas</i> Jurisdiction Analysis Year <i>2010 (Opening)</i>

Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Number of Lanes	2	2	2	2	2	1	2	1	2	1	1	1	
Lane Group	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>T</i>	<i>R</i>	<i>L</i>	<i>TR</i>	<i>R</i>	
Volume (vph)	68	623	918	343	1038	28	849	1	272	27	1	69	
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Pretimed/Actuated (P/A)	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	
Startup Lost Time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Extension of Effective Green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Parking/Grade/Parking	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>	<i>N</i>	0	<i>N</i>	
Parking/Hour													
Bus Stops/Hour	0	0	0	0	0	0	0	0	0	0	0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 8.1	G = 22.4	G =	G =	G = 20.3	G = 7.2	G =	G =					
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y = 3	Y =	Y =					
Duration of Analysis (hrs) = 0.25							Cycle Length C = 70.0						

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate	76	692	1020	381	1153	31	943	1	302	30	1	77
Lane Group Capacity	406	1158	1867	406	1158	1054	1016	195	747	523	195	166
v/c Ratio	0.19	0.60	0.55	0.94	1.00	0.03	0.93	0.01	0.40	0.06	0.01	0.46
Green Ratio	0.12	0.32	0.65	0.12	0.32	0.65	0.29	0.10	0.26	0.29	0.10	0.10
Uniform Delay d <sub>1</sub>	28.0	20.0	6.6	30.7	23.8	4.3	24.1	28.2	21.3	17.9	28.2	29.6
Delay Factor k	0.50	0.50	0.15	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.50
Incremental Delay d <sub>2</sub>	1.0	2.3	0.3	31.6	25.4	0.0	15.5	0.0	0.4	0.2	0.0	9.0
PF Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Control Delay	29.0	22.3	6.9	62.3	49.2	4.3	39.6	28.2	21.7	18.2	28.2	38.6
Lane Group LOS	<i>C</i>	<i>C</i>	<i>A</i>	<i>E</i>	<i>D</i>	<i>A</i>	<i>D</i>	<i>C</i>	<i>C</i>	<i>B</i>	<i>C</i>	<i>D</i>
Approach Delay	13.8			51.5			35.3			32.8		
Approach LOS	<i>B</i>			<i>D</i>			<i>D</i>			<i>C</i>		
Intersection Delay	32.4			Intersection LOS						<i>C</i>		

SHORT REPORT												
General Information						Site Information						
Analyst	<i>Anjum</i>					Intersection	<i>Main St &amp; I-405 NB Off Ramp</i>					
Agency or Co.	<i>Kaku Associates</i>					Area Type	<i>All other areas</i>					
Date Performed	<i>8/7/2006</i>					Jurisdiction						
Time Period	<i>AM</i>					Analysis Year	<i>2030</i>					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	2	0	1	2	0	0	2	0
Lane group					<i>LTR</i>		<i>L</i>	<i>T</i>			<i>TR</i>	
Volume (vph)				<i>79</i>	<i>334</i>	<i>212</i>	<i>19</i>	<i>834</i>			<i>728</i>	<i>66</i>
% Heavy veh				<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>			<i>0</i>	<i>0</i>
PHF				<i>0.90</i>	<i>0.90</i>	<i>0.90</i>	<i>0.90</i>	<i>0.90</i>			<i>0.90</i>	<i>0.90</i>
Actuated (P/A)				<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>			<i>P</i>	<i>P</i>
Startup lost time					<i>2.0</i>		<i>2.0</i>	<i>2.0</i>			<i>2.0</i>	
Ext. eff. green					<i>2.0</i>		<i>2.0</i>	<i>2.0</i>			<i>2.0</i>	
Arrival type					<i>3</i>		<i>3</i>	<i>3</i>			<i>3</i>	
Unit Extension					<i>3.0</i>		<i>3.0</i>	<i>3.0</i>			<i>3.0</i>	
Ped/Bike/RTOR Volume	<i>0</i>			<i>0</i>		<i>0</i>				<i>0</i>		<i>0</i>
Lane Width					<i>12.0</i>		<i>12.0</i>	<i>12.0</i>			<i>12.0</i>	
Parking/Grade/Parking	<i>N</i>			<i>N</i>	<i>N</i>	<i>0</i>	<i>N</i>	<i>0</i>	<i>N</i>	<i>N</i>	<i>0</i>	<i>N</i>
Parking/hr												
Bus stops/hr					<i>0</i>		<i>0</i>	<i>0</i>			<i>0</i>	
Unit Extension					<i>3.0</i>		<i>3.0</i>	<i>3.0</i>			<i>3.0</i>	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = <i>19.0</i>	G =	G =	G =	G = <i>22.5</i>	G = <i>9.5</i>	G =	G =				
	Y = <i>3</i>	Y =	Y =	Y =	Y = <i>3</i>	Y =	Y =	Y =				
Duration of Analysis (hrs) = <i>0.25</i>						Cycle Length C = <i>60.0</i>						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				<i>695</i>			<i>21</i>	<i>927</i>			<i>882</i>	
Lane group cap.				<i>1080</i>			<i>286</i>	<i>2110</i>			<i>1340</i>	
v/c ratio				<i>0.64</i>			<i>0.07</i>	<i>0.44</i>			<i>0.66</i>	
Green ratio				<i>0.32</i>			<i>0.16</i>	<i>0.58</i>			<i>0.38</i>	
Unif. delay d1				<i>17.6</i>			<i>21.5</i>	<i>7.0</i>			<i>15.6</i>	
Delay factor k				<i>0.50</i>			<i>0.50</i>	<i>0.50</i>			<i>0.50</i>	
Increm. delay d2				<i>3.0</i>			<i>0.5</i>	<i>0.7</i>			<i>2.5</i>	
PF factor				<i>1.000</i>			<i>1.000</i>	<i>1.000</i>			<i>1.000</i>	
Control delay				<i>20.5</i>			<i>22.0</i>	<i>7.7</i>			<i>18.1</i>	
Lane group LOS				<i>C</i>			<i>C</i>	<i>A</i>			<i>B</i>	
Approch. delay				<i>20.5</i>			<i>8.0</i>			<i>18.1</i>		
Approach LOS				<i>C</i>			<i>A</i>			<i>B</i>		
Intersec. delay	<i>15.0</i>			Intersection LOS						<i>B</i>		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 NB Off Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2010 (Opening)					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	2	0	1	2	0	0	2	0
Lane group					LTR		L	T			TR	
Volume (vph)				116	86	94	28	784			1375	64
% Heavy veh				0	0	0	0	0			0	0
PHF				0.90	0.90	0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P	P	P	P	P			P	P
Startup lost time					2.0		2.0	2.0			2.0	
Ext. eff. green					2.0		2.0	2.0			2.0	
Arrival type					3		3	3			3	
Unit Extension					3.0		3.0	3.0			3.0	
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width					12.0		12.0	12.0			12.0	
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr					0		0	0			0	
Unit Extension					3.0		3.0	3.0			3.0	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 13.3	G =	G =	G =	G = 49.2	G = 8.5	G =	G =				
	Y =	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				329			31	871			1599	
Lane group cap.				562			192	2745			2210	
v/c ratio				0.59			0.16	0.32			0.72	
Green ratio				0.17			0.11	0.76			0.62	
Unif. delay d1				30.8			32.5	3.1			10.7	
Delay factor k				0.50			0.50	0.50			0.50	
Increm. delay d2				4.4			1.8	0.3			2.1	
PF factor				1.000			1.000	1.000			1.000	
Control delay				35.2			34.3	3.4			12.8	
Lane group LOS				D			C	A			B	
Apprch. delay				35.2			4.4			12.8		
Approach LOS				D			A			B		
Intersec. delay	12.7			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 SB On Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2010 (Opening)					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	0	0	0	2	0	1	2	0
Lane group	L	TR						TR		L	T	
Volume (vph)	29	109	11					805	75	97	768	
% Heavy veh	0	0	0					0	0	0	0	
PHF	0.90	0.90	0.90					0.90	0.90	0.90	0.90	
Actuated (P/A)	P	P	P					P	P	P	P	
Startup lost time	2.0	2.0						2.0		2.0	2.0	
Ext. eff. green	2.0	2.0						2.0		2.0	2.0	
Arrival type	3	3						3		3	3	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0		0			
Lane Width	12.0	12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0						0		0	0	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Phasing	EB Only	02	03	04	Thru & RT	SB Only	07	08				
Timing	G = 11.2	G =	G =	G =	G = 31.7	G = 8.1	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	32	133						977		108	853	
Lane group cap.	337	350						1887		244	2581	
v/c ratio	0.09	0.38						0.52		0.44	0.33	
Green ratio	0.19	0.19						0.53		0.13	0.71	
Unif. delay d1	20.2	21.4						9.2		23.9	3.2	
Delay factor k	0.50	0.50						0.50		0.50	0.50	
Increm. delay d2	0.6	3.1						1.0		5.7	0.3	
PF factor	1.000	1.000						1.000		1.000	1.000	
Control delay	20.8	24.5						10.2		29.6	3.6	
Lane group LOS	C	C						B		C	A	
Approch. delay	23.8						10.2			6.5		
Approach LOS	C						B			A		
Intersec. delay	9.6			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	<i>Anjum</i>					Intersection	<i>Main St &amp; I-405 SB On Ramp</i>					
Agency or Co.	<i>Kaku Associates</i>					Area Type	<i>All other areas</i>					
Date Performed	<i>8/7/2006</i>					Jurisdiction						
Time Period	<i>PM</i>					Analysis Year	<i>2010 (Opening)</i>					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	0	0	0	2	0	1	2	0
Lane group	L	TR						TR		L	T	
Volume (vph)	46	215	63					750	138	284	1217	
% Heavy veh	0	0	0					0	0	0	0	
PHF	0.90	0.90	0.90					0.90	0.90	0.90	0.90	
Actuated (P/A)	P	P	P					P	P	P	P	
Startup lost time	2.0	2.0						2.0		2.0	2.0	
Ext. eff. green	2.0	2.0						2.0		2.0	2.0	
Arrival type	3	3						3		3	3	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0		0			
Lane Width	12.0	12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0						0		0	0	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Phasing	EB Only	02	03	04	Thru & RT	SB Only	07	08				
Timing	G = 11.8	G =	G =	G =	G = 25.9	G = 13.3	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	51	309						986		316	1352	
Lane group cap.	355	361						1525		400	2545	
v/c ratio	0.14	0.86						0.65		0.79	0.53	
Green ratio	0.20	0.20						0.43		0.22	0.70	
Unif. delay d1	19.9	23.3						13.4		22.0	4.2	
Delay factor k	0.50	0.50						0.50		0.50	0.50	
Increm. delay d2	0.8	22.1						2.1		14.7	0.8	
PF factor	1.000	1.000						1.000		1.000	1.000	
Control delay	20.8	45.4						15.6		36.7	5.0	
Lane group LOS	C	D						B		D	A	
Apprch. delay	41.9						15.6			11.0		
Approach LOS	D						B			B		
Intersec. delay	16.2			Intersection LOS						B		

**FREEWAY**



### RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Carson Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description Build Scenario

Inputs		
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft Vu =        veh/h	Terrain  $S_{FF} = 65.0 \text{ mph}$ $S_{FR} = 45.0 \text{ mph}$ Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =        veh/h

#### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6901	0.90	Level	5	0	0.976	0.90	8733
Ramp	290	0.90	Level	5	0	0.976	0.90	367
UpStream								
DownStream								

Merge Areas Diverge Areas

Estimation of v <sub>12</sub>	Estimation of v <sub>12</sub>
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h	$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 4015 pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8733	9400	No
			V <sub>12</sub>	4015	4400:All	No	
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	8366	9400	No
			V <sub>R</sub>	367	2100	No	

#### Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/ mi /ln) LOS =        (Exhibit 25-4)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        34.3 (pc/ mi /ln) LOS =        D (Exhibit 25-4)
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#### Speed Estimation

M <sub>S</sub> =        (Exhibit 25-19) S <sub>R</sub> =        mph (Exhibit 25-19) S <sub>0</sub> =        mph (Exhibit 25-19) S =        mph (Exhibit 25-14)	D <sub>S</sub> =        0.331 (Exhibit 25-19) S <sub>R</sub> =        57.4 mph (Exhibit 25-19) S <sub>0</sub> =        66.0 mph (Exhibit 25-19) S =        61.7 mph (Exhibit 25-15)
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### RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Carson Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)
Project Description Build Scenario			

Inputs		
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft Vu =         veh/h	Terrain  $S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =            veh/h

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7017	0.90	Level	5	0	0.976	0.90	8880
Ramp	432	0.90	Level	5	0	0.976	0.90	547
UpStream								
DownStream								

Merge Areas	Diverge Areas
<b>Estimation of v<sub>12</sub></b> $V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h	<b>Estimation of v<sub>12</sub></b> $V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 4180 pc/h

Capacity Checks				Capacity Checks			
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8880	9400	No
			V <sub>12</sub>	4180	4400:All	No	
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	8333	9400	No
			V <sub>R</sub>	547	2100	No	

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/ mi /ln) LOS =        (Exhibit 25-4)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        35.7 (pc/ mi /ln) LOS =        E (Exhibit 25-4)

Speed Estimation	Speed Estimation
M <sub>S</sub> =        (Exhibit 25-19)	D <sub>s</sub> =        0.347 (Exhibit 25-19)
S <sub>R</sub> =        mph (Exhibit 25-19)	S <sub>R</sub> =        57.0 mph (Exhibit 25-19)
S <sub>0</sub> =        mph (Exhibit 25-19)	S <sub>0</sub> =        66.0 mph (Exhibit 25-19)
S =         mph (Exhibit 25-14)	S =         61.5 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Carson On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level  <hr/> S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6901	0.90	Level	5	0	0.976	0.90	8733
Ramp	356	0.90	Level	5	0	0.976	0.90	450
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.285 using Equation 4  
 V<sub>12</sub> = 2493 pc/h

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>	9183	See Exhibit 25-7	No	V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14	
				V <sub>12</sub>		4400:All	
V <sub>R12</sub>	2943	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> -		See Exhibit 25-14	
				V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 25.1 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

### Speed Estimation

M<sub>S</sub> = 0.350 (Exhibit 25-19)  
 S<sub>R</sub> = 57.0 mph (Exhibit 25-19)  
 S<sub>0</sub> = 53.5 mph (Exhibit 25-19)  
 S = 54.6 mph (Exhibit 25-14)

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Carson On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7017	0.90	Level	5	0	0.976	0.90	8880
Ramp	516	0.90	Level	5	0	0.976	0.90	653
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.260 using Equation 4  
 V<sub>12</sub> = 2309 pc/h

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>	9533	See Exhibit 25-7	Yes	V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14	
				V <sub>12</sub>		4400:All	
V <sub>R12</sub>	2962	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> -		See Exhibit 25-14	
				V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 25.1 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

### Speed Estimation

M<sub>S</sub> = 0.351 (Exhibit 25-19)  
 S<sub>R</sub> = 56.9 mph (Exhibit 25-19)  
 S<sub>0</sub> = 52.6 mph (Exhibit 25-19)  
 S = 53.8 mph (Exhibit 25-14)

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)
Project Description Build Scenario			

Inputs		
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6901	0.90	Level	5	0	0.976	0.90	8733
Ramp	733	0.90	Level	5	0	0.976	0.90	928
UpStream								
DownStream								

Merge Areas				Diverge Areas			
Estimation of v <sub>12</sub>				Estimation of v <sub>12</sub>			
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h				$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 4331 pc/h			

Capacity Checks				Capacity Checks			
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8733	9400	No
				V <sub>12</sub>	4331	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7805	9400	No
				V <sub>R</sub>	928	2100	No

Level of Service Determination (if not F)		Level of Service Determination (if not F)	
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/ mi /ln) LOS =        (Exhibit 25-4)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        37.0 (pc/ mi /ln) LOS =        E (Exhibit 25-4)		

Speed Estimation		Speed Estimation	
M <sub>S</sub> = (Exhibit 25-19)	D <sub>s</sub> = 0.382 (Exhibit 25-19)	S <sub>R</sub> = mph (Exhibit 25-19)	S <sub>R</sub> = 56.2 mph (Exhibit 25-19)
S <sub>R</sub> = mph (Exhibit 25-19)	S <sub>0</sub> = 66.6 mph (Exhibit 25-19)	S <sub>0</sub> = mph (Exhibit 25-19)	S = 61.0 mph (Exhibit 25-15)
S = mph (Exhibit 25-14)			

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =            veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7017	0.90	Level	5	0	0.976	0.90	8880
Ramp	890	0.90	Level	5	0	0.976	0.90	1126
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4507 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8880	9400	No
				V <sub>12</sub>	4507	4400:All	Yes
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7754	9400	No
				V <sub>R</sub>	1126	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        38.5 (pc/ mi /ln)  
 LOS =        F (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.399 (Exhibit 25-19)  
 S<sub>R</sub> =        55.8 mph (Exhibit 25-19)  
 S<sub>0</sub> =        66.7 mph (Exhibit 25-19)  
 S =        60.7 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)
Project Description Build Scenario			

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7159	0.90	Level	5	0	0.976	0.90	9059
Ramp	880	0.90	Level	5	0	0.976	0.90	1114
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.202 using Equation 4  
 V<sub>12</sub> = 1834 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	10173	See Exhibit 25-7	Yes
V <sub>R12</sub>	2948	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.8 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.350 (Exhibit 25-19)  
 S<sub>R</sub> = 56.9 mph (Exhibit 25-19)  
 S<sub>0</sub> = 50.6 mph (Exhibit 25-19)  
 S = 52.3 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2  
Agency or Company  
Date Performed  
Analysis Time Period

Anjum  
Kaku Associates  
9/13/2006  
PM

### Site Information

Freeway/Dir of Travel  
Junction  
Jurisdiction  
Analysis Year

Northbound  
Avalon On Ramp  
Caltrans  
2010 (Opening Year)

Project Description Build Scenario

### Inputs

Upstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft  V <sub>u</sub> =        veh/h	Terrain Level          S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft  V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7695	0.90	Level	5	0	0.976	0.90	9738
Ramp	1404	0.90	Level	5	0	0.976	0.90	1777
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.120 using Equation 4  
 V<sub>12</sub> = 1164 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	11515	See Exhibit 25-7	Yes
V <sub>R12</sub>	2941	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.5 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.350 (Exhibit 25-19)  
 S<sub>R</sub> = 57.0 mph (Exhibit 25-19)  
 S<sub>0</sub> = 46.5 mph (Exhibit 25-19)  
 S = 48.8 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)



### RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Main Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description Build Scenario

Inputs		
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft Vu =        veh/h	Terrain  $S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =        veh/h

#### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7159	0.90	Level	5	0	0.976	0.90	9059
Ramp	476	0.90	Level	5	0	0.976	0.90	602
UpStream								
DownStream								

Merge Areas	Diverge Areas
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Estimation of v <sub>12</sub>	Estimation of v <sub>12</sub>
$V_{12} = V_F ( P_{FM} )$	$V_{12} = V_R + (V_F - V_R)P_{FD}$
L <sub>EQ</sub> = (Equation 25-2 or 25-3)	L <sub>EQ</sub> = (Equation 25-8 or 25-9)
P <sub>FM</sub> = using Equation	P <sub>FD</sub> = 0.436 using Equation 8
V <sub>12</sub> = pc/h	V <sub>12</sub> = 3500 pc/h

#### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		$V_{FI} = V_F$	7248	9400	No
			V <sub>12</sub>	3500	4400:All	No	
V <sub>R12</sub>		4600:All		$V_{FO} = V_F - V_R$	6646	9400	No
			V <sub>R</sub>	602	2100	No	

#### Level of Service Determination (if not F)

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D <sub>R</sub> = (pc/ mi /ln)	D <sub>R</sub> = 29.9 (pc/ mi /ln)
LOS = (Exhibit 25-4)	LOS = D (Exhibit 25-4)

#### Speed Estimation

Speed Estimation	Speed Estimation
M <sub>S</sub> = (Exhibit 25-19)	D <sub>s</sub> = 0.352 (Exhibit 25-19)
S <sub>R</sub> = mph (Exhibit 25-19)	S <sub>R</sub> = 56.9 mph (Exhibit 25-19)
S <sub>0</sub> = mph (Exhibit 25-19)	S <sub>0</sub> = 67.9 mph (Exhibit 25-19)
S = mph (Exhibit 25-14)	S = 62.1 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Main Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description Build Scenario

Inputs		
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft Vu =         veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =         veh/h

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7695	0.90	Level	5	0	0.976	0.90	9738
Ramp	380	0.90	Level	5	0	0.976	0.90	481
UpStream								
DownStream								

Merge Areas Diverge Areas

Estimation of v <sub>12</sub>	Estimation of v <sub>12</sub>
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h	$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 3668 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	7791	9400	No
			V <sub>12</sub>	3668	4400:All	No	
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7310	9400	No
			V <sub>R</sub>	481	2100	No	

### Level of Service Determination (if not F)

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/ mi /ln) LOS =        (Exhibit 25-4)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        31.3 (pc/ mi /ln) LOS =        D (Exhibit 25-4)

### Speed Estimation

Speed Estimation	Speed Estimation
M <sub>S</sub> =        (Exhibit 25-19) S <sub>R</sub> =        mph (Exhibit 25-19) S <sub>0</sub> =        mph (Exhibit 25-19) S =         mph (Exhibit 25-14)	D <sub>s</sub> =        0.341 (Exhibit 25-19) S <sub>R</sub> =        57.2 mph (Exhibit 25-19) S <sub>0</sub> =        67.2 mph (Exhibit 25-19) S =         62.0 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst: Analyst2  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: AM

Anjum  
 Kaku Associates  
 9/13/2006  
 AM

### Site Information

Freeway/Dir of Travel: Southbound  
 Junction: Main On Ramp  
 Jurisdiction: Caltrans  
 Analysis Year: 2010 (Opening Year)

Project Description: Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level     $S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6697	0.90	Level	5	0	0.976	0.90	8475
Ramp	279	0.90	Level	5	0	0.976	0.90	353
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.298 using Equation 4  
 V<sub>12</sub> = 1803 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	6413	See Exhibit 25-7	No
V <sub>R12</sub>	2156	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 19.0 (pc/ m/ln)  
 LOS = B (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.310 (Exhibit 25-19)  
 S<sub>R</sub> = 57.9 mph (Exhibit 25-19)  
 S<sub>0</sub> = 59.1 mph (Exhibit 25-19)  
 S = 58.7 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Main On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level     S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7193	0.90	Level	5	0	0.976	0.90	9102
Ramp	527	0.90	Level	5	0	0.976	0.90	667
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.258 using Equation 4  
 V<sub>12</sub> = 1705 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	7269	See Exhibit 25-7	No
V <sub>R12</sub>	2372	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 20.5 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.318 (Exhibit 25-19)  
 S<sub>R</sub> = 57.7 mph (Exhibit 25-19)  
 S<sub>0</sub> = 57.6 mph (Exhibit 25-19)  
 S = 57.6 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)
Project Description Build Scenario			

Inputs		
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6697	0.90	Level	5	0	0.976	0.90	8475
Ramp	1173	0.90	Level	5	0	0.976	0.90	1484
UpStream								
DownStream								

Merge Areas				Diverge Areas			
<b>Estimation of v<sub>12</sub></b>				<b>Estimation of v<sub>12</sub></b>			
$V_{12} = V_F (P_{FM})$				$V_{12} = V_R + (V_F - V_R)P_{FD}$			
L <sub>EQ</sub> = (Equation 25-2 or 25-3)				L <sub>EQ</sub> = (Equation 25-8 or 25-9)			
P <sub>FM</sub> = using Equation				P <sub>FD</sub> = 0.436 using Equation 8			
V <sub>12</sub> = pc/h				V <sub>12</sub> = 4532 pc/h			

Capacity Checks				Capacity Checks			
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8475	9400	No
				V <sub>12</sub>	4532	4400:All	Yes
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> -	6991	9400	No
				V <sub>R</sub>	1484	2100	No

Level of Service Determination (if not F)		Level of Service Determination (if not F)	
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$		$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$	
D <sub>R</sub> =        (pc/ mi /ln)		D <sub>R</sub> =    38.7 (pc/ mi /ln)	
LOS =        (Exhibit 25-4)		LOS=    F (Exhibit 25-4)	

Speed Estimation		Speed Estimation	
M <sub>S</sub> =        (Exhibit 25-19)		D <sub>s</sub> =    0.432 (Exhibit 25-19)	
S <sub>R</sub> =        mph (Exhibit 25-19)		S <sub>R</sub> =    55.1 mph (Exhibit 25-19)	
S <sub>0</sub> =        mph (Exhibit 25-19)		S <sub>0</sub> =    67.5 mph (Exhibit 25-19)	
S =        mph (Exhibit 25-14)		S =     60.2 mph (Exhibit 25-15)	

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)
Project Description Build Scenario			

Inputs		
Upstream Adj Ramp	Terrain	Downstream Adj Ramp
<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off		<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off
$L_{up} =$ ft	$S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph	$L_{down} =$ ft
$V_u =$ veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )	$V_D =$ veh/h

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v = V / (PHF \cdot f_{HV} \cdot f_p)$
Freeway	7193	0.90	Level	5	0	0.976	0.90	9102
Ramp	1237	0.90	Level	5	0	0.976	0.90	1565
UpStream								
DownStream								

Merge Areas				Diverge Areas			
<b>Estimation of <math>v_{12}</math></b>				<b>Estimation of <math>v_{12}</math></b>			
$V_{12} = V_F (P_{FM})$				$V_{12} = V_R + (V_F - V_R)P_{FD}$			
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)			
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8			
$V_{12} =$ pc/h				$V_{12} = 4851$ pc/h			

Capacity Checks				Capacity Checks			
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	9102	9400	No
				$V_{12}$	4851	4400:All	Yes
$V_{R12}$		4600:All		$V_{FO} = V_F - V_R$	7537	9400	No
				$V_R$	1565	2100	No

Level of Service Determination (if not F)		Level of Service Determination (if not F)	
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$		$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$	
$D_R =$ (pc/ mi /ln)		$D_R = 41.5$ (pc/ mi /ln)	
LOS = (Exhibit 25-4)		LOS = F (Exhibit 25-4)	

Speed Estimation		Speed Estimation	
$M_S =$ (Exhibit 25-19)		$D_s = 0.439$ (Exhibit 25-19)	
$S_R =$ mph (Exhibit 25-19)		$S_R = 54.9$ mph (Exhibit 25-19)	
$S_0 =$ mph (Exhibit 25-19)		$S_0 = 66.9$ mph (Exhibit 25-19)	
$S =$ mph (Exhibit 25-14)		$S = 59.9$ mph (Exhibit 25-15)	

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2  
Agency or Company  
Date Performed  
Analysis Time Period

Anjum  
Kaku Associates  
9/13/2006  
AM

### Site Information

Freeway/Dir of Travel  
Junction  
Jurisdiction  
Analysis Year

Southbound  
Avalon On Ramp  
Caltrans  
2010 (Opening Year)

Project Description Build Scenario

### Inputs

Upstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft  V <sub>u</sub> =        veh/h	Terrain Level          <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft  V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6207	0.90	Level	5	0	0.976	0.90	7855
Ramp	244	0.90	Level	5	0	0.976	0.90	309
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.303 using Equation 4  
 V<sub>12</sub> = 2381 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	8164	See Exhibit 25-7	No
V <sub>R12</sub>	2690	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 23.2 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.333 (Exhibit 25-19)  
 S<sub>R</sub> = 57.3 mph (Exhibit 25-19)  
 S<sub>0</sub> = 55.8 mph (Exhibit 25-19)  
 S = 56.3 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2  
Agency or Company  
Date Performed  
Analysis Time Period

Anjum  
Kaku Associates  
9/13/2006  
PM

### Site Information

Freeway/Dir of Travel  
Junction  
Jurisdiction  
Analysis Year

Southbound  
Avalon On Ramp  
Caltrans  
2010 (Opening Year)

Project Description Build Scenario

### Inputs

Upstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft  V <sub>u</sub> =        veh/h	Terrain Level          <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft  V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7179	0.90	Level	5	0	0.976	0.90	9085
Ramp	530	0.90	Level	5	0	0.976	0.90	671
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.258 using Equation 4  
 V<sub>12</sub> = 2342 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	9756	See Exhibit 25-7	Yes
V <sub>R12</sub>	3013	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 25.5 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.355 (Exhibit 25-19)  
 S<sub>R</sub> = 56.8 mph (Exhibit 25-19)  
 S<sub>0</sub> = 52.0 mph (Exhibit 25-19)  
 S = 53.4 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)



<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	Southbound						
Agency or Company	Kaku Associates	Junction	Avalon On Ramp						
Date Performed	9/13/2006	Jurisdiction	Caltrans						
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)						
Project Description Build Scenario									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h		Terrain Level   <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )					Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h		
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	6415	0.90	Level	5	0	0.976	0.90	8118	
Ramp	205	0.90	Level	5	0	0.976	0.90	259	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.309 using Equation 4 V <sub>12</sub> = 2511 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	8377	See Exhibit 25-7	No		V <sub>FI</sub> =V <sub>F</sub>	See Exhibit 25-14			
					V <sub>12</sub>	4400:All			
V <sub>R12</sub>	2770	4600:All	No		V <sub>FO</sub> = V <sub>F</sub> -	See Exhibit 25-14			
					V <sub>R</sub>	See Exhibit 25-3			
					V <sub>R</sub>	See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 23.8 (pc/ m/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/ m/ln) LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> = 0.338 (Exhibit 25-19) S <sub>R</sub> = 57.2 mph (Exhibit 25-19) S <sub>0</sub> = 55.5 mph (Exhibit 25-19) S = 56.0 mph (Exhibit 25-14)					D <sub>s</sub> = (Exhibit 25-19) S <sub>R</sub> = mph (Exhibit 25-19) S <sub>0</sub> = mph (Exhibit 25-19) S = mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>								
<b>General Information</b>				<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	Southbound					
Agency or Company	Kaku Associates	Junction	Avalon On Ramp					
Date Performed	9/13/2006	Jurisdiction	Caltrans					
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)					
Project Description Build Scenario								
<b>Inputs</b>								
Upstream Adj Ramp		Terrain Level				Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off		
L <sub>up</sub> =    ft		S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )				L <sub>down</sub> =    ft		
V <sub>u</sub> =    veh/h						V <sub>D</sub> =    veh/h		
<b>Conversion to pc/h Under Base Conditions</b>								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7624	0.90	Level	5	0	0.976	0.90	9648
Ramp	508	0.90	Level	5	0	0.976	0.90	643
UpStream								
DownStream								
Merge Areas				Diverge Areas				
<b>Estimation of v<sub>12</sub></b>				<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.261 using Equation 4 V <sub>12</sub> = 2521 pc/h				$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>				<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
V <sub>FO</sub>	10291	See Exhibit 25-7	Yes	V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14		
				V <sub>12</sub>		4400:All		
V <sub>R12</sub>	3164	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> -		See Exhibit 25-14		
				V <sub>R</sub>		See Exhibit 25-3		
				V <sub>R</sub>				
<b>Level of Service Determination (if not F)</b>				<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 26.7 (pc/ m/ln) LOS = F (Exhibit 25-4)				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/ m/ln) LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>				<b>Speed Estimation</b>				
M <sub>S</sub> =	0.368 (Exhibit 25-19)			D <sub>s</sub> =	(Exhibit 25-19)			
S <sub>R</sub> =	56.5 mph (Exhibit 25-19)			S <sub>R</sub> =	mph (Exhibit 25-19)			
S <sub>0</sub> =	50.9 mph (Exhibit 25-19)			S <sub>0</sub> =	mph (Exhibit 25-19)			
S =	52.5 mph (Exhibit 25-14)			S =	mph (Exhibit 25-15)			

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Carson Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft Vu =        veh/h	Terrain  <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft VD =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6207	0.90	Level	5	0	0.976	0.90	7855
Ramp	316	0.90	Level	5	0	0.976	0.90	400
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 3650 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	7855	9400	No
				V <sub>12</sub>	3650	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> -	7455	9400	No
				V <sub>R</sub>	400	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        31.1 (pc/ mi /ln)  
 LOS =        D (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.334 (Exhibit 25-19)  
 S<sub>R</sub> =        57.3 mph (Exhibit 25-19)  
 S<sub>0</sub> =        67.0 mph (Exhibit 25-19)  
 S =        62.1 mph (Exhibit 25-15)

**RAMPS AND RAMP JUNCTIONS WORKSHEET**

<b>General Information</b>	<b>Site Information</b>
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Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2010 (Opening Year)

Project Description Build Scenario

**Inputs**

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =          ft Vu =          veh/h	Terrain  <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph          S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =          ft VD =          veh/h
---	--	---

**Conversion to pc/h Under Base Conditions**

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7179	0.90	Level	5	0	0.976	0.90	9085
Ramp	243	0.90	Level	5	0	0.976	0.90	308
UpStream								
DownStream								

Merge Areas	Diverge Areas
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<b>Estimation of v<sub>12</sub></b>	<b>Estimation of v<sub>12</sub></b>
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$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h	$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 4135 pc/h
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<b>Capacity Checks</b>	<b>Capacity Checks</b>
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	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	9085	9400	No
				V <sub>12</sub>	4135	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	8777	9400	No
				V <sub>R</sub>	308	2100	No

<b>Level of Service Determination (if not F)</b>	<b>Level of Service Determination (if not F)</b>
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$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =          (pc/ mi /ln) LOS =          (Exhibit 25-4)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =          35.3 (pc/ mi /ln) LOS =          E (Exhibit 25-4)
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<b>Speed Estimation</b>	<b>Speed Estimation</b>
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M <sub>S</sub> =          (Exhibit 25-19) S <sub>R</sub> =          mph (Exhibit 25-19) S <sub>0</sub> =          mph (Exhibit 25-19) S =          mph (Exhibit 25-14)	D <sub>s</sub> =          0.326 (Exhibit 25-19) S <sub>R</sub> =          57.5 mph (Exhibit 25-19) S <sub>0</sub> =          65.6 mph (Exhibit 25-19) S =          61.6 mph (Exhibit 25-15)
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## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Carson On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2010 (Opening Year)

Project Description Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6207	0.90	Level	5	0	0.976	0.90	7855
Ramp	599	0.90	Level	5	0	0.976	0.90	758
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.247 using Equation 4  
 V<sub>12</sub> = 1940 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	8613	See Exhibit 25-7	No
V <sub>R12</sub>	2698	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> -		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 23.0 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.334 (Exhibit 25-19)  
 S<sub>R</sub> = 57.3 mph (Exhibit 25-19)  
 S<sub>0</sub> = 54.5 mph (Exhibit 25-19)  
 S = 55.4 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2 Anjum  
 Agency or Company Kaku Associates  
 Date Performed 9/13/2006  
 Analysis Time Period PM

### Site Information

Freeway/Dir of Travel Southbound  
 Junction Carson On Ramp  
 Jurisdiction Caltrans  
 Analysis Year 2010 (Opening Year)

Project Description Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7179	0.90	Level	5	0	0.976	0.90	9085
Ramp	512	0.90	Level	5	0	0.976	0.90	648
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.261 using Equation 4  
 V<sub>12</sub> = 2368 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	9733	See Exhibit 25-7	Yes
V <sub>R12</sub>	3016	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 25.6 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.356 (Exhibit 25-19)  
 S<sub>R</sub> = 56.8 mph (Exhibit 25-19)  
 S<sub>0</sub> = 52.1 mph (Exhibit 25-19)  
 S = 53.5 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency/Company	Kaku Associates	Weaving Seg Location	Carson St to Avalon Bl
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	BUILD AM	Analysis Year	2010 (Opening Year)

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.15
Weaving seg length, L (ft)	1600	Weaving ratio, R	0.33
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6168	0.90	5	0	1.5	1.2	0.976	0.90	7805
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	733	0.90	5	0	1.5	1.2	0.976	0.90	927
Vw2	356	0.90	5	0	1.5	1.2	0.976	0.90	450
Vw				1377	Vnw				7805
V									9182

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.00	0.53		
Weaving and non-weaving speeds, Si (mi/h)	42.57	50.93		
Number of lanes required for unconstrained operation, Nw			0.37	
Maximum number of lanes, Nw (max)			3.50	
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 200px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>				

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	49.47
Weaving segment density, D (pc/mi/ln)	92.80
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency/Company	Kaku Associates	Weaving Seg Location	Carson St to Avalon Bl
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	BUILD PM	Analysis Year	2010 (Opening Year)

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.19
Weaving seg length, L (ft)	1600	Weaving ratio, R	0.37
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6127	0.90	5	0	1.5	1.2	0.976	0.90	7753
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	890	0.90	5	0	1.5	1.2	0.976	0.90	1126
Vw2	516	0.90	5	0	1.5	1.2	0.976	0.90	652
Vw				1778	Vnw				7753
V									9531

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.09	0.66		
Weaving and non-weaving speeds, Si (mi/h)	41.26	48.03		
Number of lanes required for unconstrained operation, Nw			0.48	
Maximum number of lanes, Nw (max)			3.50	
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 150px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>				

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	46.61
Weaving segment density, D (pc/mi/ln)	102.25
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.



## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency/Company	Kaku Associates	Weaving Seg Location	Avalon Bl to Carson St
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	BUILD AM	Analysis Year	2010 (Opening Year)

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.11
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.41
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	5891	0.90	5	0	1.5	1.2	0.976	0.90	7454
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	316	0.90	5	0	1.5	1.2	0.976	0.90	399
Vw2	449	0.90	5	0	1.5	1.2	0.976	0.90	568
Vw				967	Vnw				7454
V									8421

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.70	0.32		
Weaving and non-weaving speeds, Si (mi/h)	47.36	56.56		
Number of lanes required for unconstrained operation, Nw			0.19	
Maximum number of lanes, Nw (max)			3.50	
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 200px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>				

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	55.33
Weaving segment density, D (pc/mi/ln)	76.10
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency/Company	Kaku Associates	Weaving Seg Location	Avalon Bl to Carson St
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	BUILD PM	Analysis Year	2010 (Opening Year)

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.16
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.19
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6936	0.90	5	0	1.5	1.2	0.976	0.90	8777
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	243	0.90	5	0	1.5	1.2	0.976	0.90	307
Vw2	1038	0.90	5	0	1.5	1.2	0.976	0.90	1313
Vw				1620	Vnw				8777
V									10397

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.88	0.50		
Weaving and non-weaving speeds, Si (mi/h)	44.28	51.77		

Number of lanes required for unconstrained operation, Nw	0.31
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 200px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	50.44
Weaving segment density, D (pc/mi/ln)	103.06
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

**APPENDIX G**

**DESIGN YEAR (2030) NO BUILD ALTERNATIVE  
LEVEL OF SERVICE WORKSHEETS**

## INTERSECTIONS

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	1	1	0	1	1	0	1
Lane group	L	TR		L	T	R	L		R	L		R
Volume (vph)	116	962	11	3	1045	288	5		0	23		537
% Heavy veh	0	0	0	0	0	0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90		0.90
Actuated (P/A)	P	P	A	P	P	A	P		P	P		P
Startup lost time	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Ext. eff. green	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Arrival type	3	3		3	3	3	3		3	3		3
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0		12.0	12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0	0	0		0	0		0
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Phasing	EW Perm	EW Perm	03	04	NS Perm	06	07	08				
Timing	G = 7.8	G = 37.5	G =	G =	G = 8.2	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 62.5						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	129	1081		3	1161	320	6		0	26		597
Lane group cap.	225	2785		301	2166	1615	237		1615	237		1615
v/c ratio	0.57	0.39		0.01	0.54	0.20	0.03		0.00	0.11		0.37
Green ratio	0.12	0.77		0.60	0.60	1.00	0.13		1.00	0.13		1.00
Unif. delay d1	25.8	2.3		5.0	7.4	0.0	23.7		0.0	23.9		0.0
Delay factor k	0.50	0.50		0.50	0.50	0.11	0.50		0.11	0.50		0.50
Increm. delay d2	10.2	0.4		0.1	1.0	0.1	0.2		0.0	0.9		0.7
PF factor	1.000	1.000		1.000	1.000	0.950	1.000		0.950	1.000		0.950
Control delay	36.0	2.7		5.1	8.3	0.1	23.9		0.0	24.9		0.7
Lane group LOS	D	A		A	A	A	C		A	C		A
Apprch. delay	6.3			6.5			23.9			1.7		
Approach LOS	A			A			C			A		
Intersec. delay	5.6			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	1	1	0	1	1	0	1
Lane group	L	TR		L	T	R	L		R	L		R
Volume (vph)	132	1040	8	1	775	344	23		5	32		721
% Heavy veh	0	0	0	0	0	0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90		0.90
Actuated (P/A)	P	P	A	P	P	A	P		P	P		P
Startup lost time	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Ext. eff. green	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Arrival type	3	3		3	3	3	3		3	3		3
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0		12.0	12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0	0	0		0	0		0
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Phasing	EW Perm	EW Perm	03	04	NS Perm	06	07	08				
Timing	G = 12.4	G = 39.6	G =	G =	G = 7.3	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 68.3						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	147	1165		1	861	382	26		6	36		801
Lane group cap.	328	2904		268	2093	1615	193		1615	193		1615
v/c ratio	0.45	0.40		0.00	0.41	0.24	0.13		0.00	0.19		0.50
Green ratio	0.18	0.81		0.58	0.58	1.00	0.11		1.00	0.11		1.00
Unif. delay d1	24.9	1.9		6.0	7.9	0.0	27.6		0.0	27.8		0.0
Delay factor k	0.50	0.50		0.50	0.50	0.11	0.50		0.11	0.50		0.50
Increm. delay d2	4.4	0.4		0.0	0.6	0.1	1.4		0.0	2.1		1.1
PF factor	1.000	1.000		1.000	1.000	0.950	1.000		0.950	1.000		0.950
Control delay	29.3	2.3		6.1	8.5	0.1	29.1		0.0+	29.9		1.1
Lane group LOS	C	A		A	A	A	C		A	C		A
Apprch. delay	5.3			5.9			23.6			2.3		
Approach LOS	A			A			C			A		
Intersec. delay	5.0			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	1	1	3	0	1	0	1	0	0	0
Lane group	L	TR	R	L	TR		L		R			
Volume (vph)	8	857	713	83	1488	10	74		199			
% Heavy veh	0	0	0	0	0	0	0		0			
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90			
Actuated (P/A)	P	P	P	P	P	P	P		P			
Startup lost time	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Ext. eff. green	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Arrival type	3	3	3	3	3		3		3			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N		N
Parking/hr												
Bus stops/hr	0	0	0	0	0		0		0			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Phasing	WB Only	EW Perm	03		04		NB Only	06		07		08
Timing	G = 12.0	G = 35.1	G =		G =		G = 7.3	G =		G =		G =
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y =		Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 63.4					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	9	952	792	92	1664		82		221			
Lane group cap.	143	1999	894	342	4095		208		1615			
v/c ratio	0.06	0.48	0.89	0.27	0.41		0.39		0.14			
Green ratio	0.55	0.55	0.55	0.19	0.79		0.12		1.00			
Unif. delay d1	6.5	8.6	12.4	22.0	2.1		26.0		0.0			
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50		0.11			
Increm. delay d2	0.8	0.8	12.6	1.9	0.3		5.5		0.0			
PF factor	1.000	1.000	1.000	1.000	1.000		1.000		0.950			
Control delay	7.4	9.4	25.0	23.9	2.4		31.5		0.0+			
Lane group LOS	A	A	C	C	A		C		A			
Apprch. delay	16.4			3.5			8.6					
Approach LOS	B			A			A					
Intersec. delay	9.8			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	1	1	3	0	1	0	1	0	0	0
Lane group	L	TR	R	L	TR		L		R			
Volume (vph)	6	1072	884	80	1416	16	60		97			
% Heavy veh	0	0	0	0	0	0	0		0			
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90			
Actuated (P/A)	P	P	P	P	P	P	P		P			
Startup lost time	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Ext. eff. green	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Arrival type	3	3	3	3	3		3		3			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N		N
Parking/hr												
Bus stops/hr	0	0	0	0	0		0		0			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08				
Timing	G = 12.4	G = 42.3	G =	G =	G = 7.3	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 71.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	7	1191	982	89	1591		67		108			
Lane group cap.	167	2151	962	315	4208		186		1615			
v/c ratio	0.04	0.55	1.02	0.28	0.38		0.36		0.07			
Green ratio	0.60	0.60	0.60	0.17	0.81		0.10		1.00			
Unif. delay d1	5.9	8.7	14.4	25.4	1.8		29.7		0.0			
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50		0.11			
Increm. delay d2	0.5	1.0	34.4	2.2	0.3		5.3		0.0			
PF factor	1.000	1.000	1.000	1.000	1.000		1.000		0.950			
Control delay	6.4	9.7	48.7	27.7	2.1		35.0+		0.0+			
Lane group LOS	A	A	D	C	A		D		A			
Apprch. delay	27.3			3.4			13.4					
Approach LOS	C			A			B					
Intersec. delay	16.7			Intersection LOS						B		



SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	1	2	2	1	1	3	1	1	3	1	
Lane group	L	T	R	L	T	R	L	T	R	L	T	R	
Volume (vph)	215	825	55	331	894	115	109	918	398	193	735	165	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Arrival type	3	3	3	3	3	3	3	3	3	3	3	3	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.0	G = 18.9	G =			G =			G = 14.3	G = 14.1	G =		
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		
Duration of Analysis (hrs) = 0.25						Cycle Length C = 66.3							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	239	917	61	368	993	128	121	1020	442	214	817	183	
Lane group cap.	370	1029	460	370	1029	460	389	1103	343	389	1103	343	
v/c ratio	0.65	0.89	0.13	0.99	0.97	0.28	0.31	0.92	1.29	0.55	0.74	0.53	
Green ratio	0.11	0.29	0.29	0.11	0.29	0.29	0.22	0.21	0.21	0.22	0.21	0.21	
Unif. delay d1	28.5	22.7	17.6	29.6	23.4	18.4	21.9	25.6	26.1	23.1	24.4	23.2	
Delay factor k	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
Increm. delay d2	8.4	11.6	0.6	45.5	20.8	1.5	2.1	14.1	150.2	5.5	4.5	5.8	
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Control delay	36.9	34.3	18.2	75.1	44.2	19.9	23.9	39.7	176.3	28.6	28.9	29.0	
Lane group LOS	D	C	B	E	D	B	C	D	F	C	C	C	
Apprch. delay	34.0			49.7			76.6			28.9			
Approach LOS	C			D			E			C			
Intersec. delay	49.4			Intersection LOS						D			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	PM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	1	2	2	1	1	3	1	1	3	1	
Lane group	L	T	R	L	T	R	L	T	R	L	T	R	
Volume (vph)	336	1270	119	269	1104	141	199	880	281	259	932	320	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Arrival type	3	3	3	3	3	3	3	3	3	3	3	3	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.0	G = 27.9	G =			G =			G = 16.4	G = 16.2	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 79.5							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	373	1411	132	299	1227	157	221	978	312	288	1036	356	
Lane group cap.	308	1267	567	308	1267	567	372	1057	329	372	1057	329	
v/c ratio	1.21	1.11	0.23	0.97	0.97	0.28	0.59	0.93	0.95	0.77	0.98	1.08	
Green ratio	0.09	0.35	0.35	0.09	0.35	0.35	0.21	0.20	0.20	0.21	0.20	0.20	
Unif. delay d1	36.3	25.8	18.2	36.1	25.4	18.5	28.5	31.1	31.2	29.8	31.5	31.6	
Delay factor k	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
Increm. delay d2	121.2	62.5	1.0	44.4	18.8	1.2	6.8	14.7	38.1	14.5	23.3	73.3	
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Control delay	157.5	88.3	19.2	80.5	44.1	19.8	35.4	45.7	69.3	44.3	54.8	104.9	
Lane group LOS	F	F	B	F	D	B	D	D	E	D	D	F	
Apprch. delay	97.0			48.3			49.1			63.6			
Approach LOS	F			D			D			E			
Intersec. delay	66.0			Intersection LOS						E			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Main St & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	0	2	2	0	1	3	0	1	3	0	
Lane group	L	TR		L	TR		L	TR		L	TR		
Volume (vph)	231	612	60	138	811	328	154	719	150	210	573	208	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Arrival type	3	3		3	3		3	3		3	3		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0		0	0		0	0		0	0		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.0	G = 30.2	G =			G =			G = 15.5	G = 15.3	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	257	747		153	1265		171	966		233	868		
Lane group cap.	307	1347		307	1307		350	964		350	950		
v/c ratio	0.84	0.55		0.50	0.97		0.49	1.00		0.67	0.91		
Green ratio	0.09	0.38		0.09	0.38		0.19	0.19		0.19	0.19		
Unif. delay d1	35.9	19.6		34.8	24.4		28.7	32.3		29.9	31.7		
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50		
Increm. delay d2	23.0	1.7		5.7	18.3		4.8	29.5		9.6	14.6		
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000		
Control delay	58.9	21.3		40.5	42.7		33.5	61.8		39.5	46.3		
Lane group LOS	E	C		D	D		C	E		D	D		
Apprch. delay	30.9			42.5			57.6			44.8			
Approach LOS	C			D			E			D			
Intersec. delay	44.2			Intersection LOS						D			

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Carson St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	2	0	2	2	0	1	3	0	1	3	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	375	1090	178	266	814	513	225	772	160	565	969	472
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	Excl. Left	Thru & RT	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 10.1	G = 47.2	G =	G =	G = 25.6	G = 25.1	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 120.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	417	1409		296	1474		250	1036		628	1601	
Lane group cap.	295	1393		295	1340		385	1055		385	1030	
v/c ratio	1.41	1.01		1.00	1.10		0.65	0.98		1.63	1.55	
Green ratio	0.08	0.39		0.08	0.39		0.21	0.21		0.21	0.21	
Unif. delay d1	55.0	36.4		55.0	36.4		43.1	47.2		47.2	47.5	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	205.0	27.0		53.3	56.7		8.2	23.7		295.6	254.3	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	260.0	63.4		108.2	93.1		51.3	70.9		342.8	301.7	
Lane group LOS	F	E		F	F		D	E		F	F	
Apprch. delay	108.3			95.6			67.1			313.3		
Approach LOS	F			F			E			F		
Intersec. delay	162.0			Intersection LOS						F		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & 213th St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	1	2	0	1	3	0	1	3	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	178	167	70	100	158	97	86	1124	208	76	1141	108
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 17.0	G =	G =	G =	G = 7.2	G = 34.3	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 67.5						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	198	264		111	284		96	1480		84	1388	
Lane group cap.	251	457		190	857		193	2574		193	2602	
v/c ratio	0.79	0.58		0.58	0.33		0.50	0.57		0.44	0.53	
Green ratio	0.25	0.25		0.25	0.25		0.11	0.51		0.11	0.51	
Unif. delay d1	23.6	22.1		22.1	20.6		28.4	11.5		28.2	11.2	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	21.8	5.2		12.5	1.0		8.9	0.9		7.0	0.8	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	45.4	27.4		34.6	21.6		37.3	12.5		35.2	12.0	
Lane group LOS	D	C		C	C		D	B		D	B	
Apprch. delay	35.1			25.3			14.0			13.3		
Approach LOS	D			C			B			B		
Intersec. delay	17.4			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & 213th St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	1	2	0	1	3	0	1	3	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	232	191	72	151	155	110	179	1256	222	182	1396	245
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 21.4	G =	G =	G =	G = 10.6	G = 30.7	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 71.7						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	258	292		168	294		199	1643		202	1823	
Lane group cap.	298	544		226	1010		267	2171		267	2171	
v/c ratio	0.87	0.54		0.74	0.29		0.75	0.76		0.76	0.84	
Green ratio	0.30	0.30		0.30	0.30		0.15	0.43		0.15	0.43	
Unif. delay d1	23.8	21.0		22.7	19.3		29.3	17.3		29.3	18.3	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	26.9	3.8		19.7	0.7		17.2	2.5		18.0	4.1	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	50.7	24.8		42.4	20.1		46.4	19.9		47.3	22.4	
Lane group LOS	D	C		D	C		D	B		D	C	
Apprch. delay	37.0			28.2			22.7			24.9		
Approach LOS	D			C			C			C		
Intersec. delay	25.7			Intersection LOS						C		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	0	1	1	2	0	0	2	1
Lane group						R	L	T			T	R
Volume (vph)						681	552	1650			1070	478
% Heavy veh						0	0	0			0	0
PHF						0.90	0.90	0.90			0.90	0.90
Actuated (P/A)							P	P			P	P
Startup lost time						2.0	2.0	2.0			2.0	2.0
Ext. eff. green						2.0	2.0	2.0			2.0	2.0
Arrival type						3	3	3			3	3
Unit Extension						3.0	3.0	3.0			3.0	3.0
Ped/Bike/RTOR Volume				0		0				0		0
Lane Width						12.0	12.0	12.0			12.0	12.0
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr						0	0	0			0	0
Unit Extension						3.0	3.0	3.0			3.0	3.0
Phasing	01	02	03	04	Thru & RT	NS Perm	07	08				
Timing	G =	G =	G =	G =	G = 27.0	G = 27.0	G =	G =				
	Y =	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate						757	613	1833			1189	531
Lane group cap.						1562	812	3429			1624	1534
v/c ratio						0.48	0.75	0.53			0.73	0.35
Green ratio						0.95	0.45	0.95			0.45	0.95
Unif. delay d1						0.1	13.7	0.2			13.5	0.1
Delay factor k						0.50	0.50	0.50			0.50	0.50
Increm. delay d2						1.1	6.5	0.6			3.0	0.6
PF factor						1.000	1.000	1.000			1.000	1.000
Control delay						1.2	20.2	0.8			16.5	0.7
Lane group LOS						A	C	A			B	A
Apprch. delay				1.2			5.6			11.6		
Approach LOS				A			A			B		
Intersec. delay	7.0			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	0	1	1	2	0	0	2	1
Lane group						R	L	T			T	R
Volume (vph)						601	543	1679			1917	980
% Heavy veh						0	0	0			0	0
PHF						0.90	0.90	0.90			0.90	0.90
Actuated (P/A)							P	P			P	P
Startup lost time						2.0	2.0	2.0			2.0	2.0
Ext. eff. green						2.0	2.0	2.0			2.0	2.0
Arrival type						3	3	3			3	3
Unit Extension						3.0	3.0	3.0			3.0	3.0
Ped/Bike/RTOR Volume				0		0				0		0
Lane Width						12.0	12.0	12.0			12.0	12.0
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr						0	0	0			0	0
Unit Extension						3.0	3.0	3.0			3.0	3.0
Phasing	01	02	03	04	Thru & RT	NS Perm	07	08				
Timing	G =	G =	G =	G =	G = 33.2	G = 16.8	G =	G =				
	Y =	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 56.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate						668	603	1866			2130	1089
Lane group cap.						1556	541	3417			2140	1528
v/c ratio						0.43	1.11	0.55			1.00	0.71
Green ratio						0.95	0.30	0.95			0.59	0.95
Unif. delay d1						0.1	19.6	0.2			11.3	0.2
Delay factor k						0.50	0.50	0.50			0.50	0.50
Increm. delay d2						0.9	74.1	0.6			18.4	2.9
PF factor						1.000	1.000	1.000			1.000	1.000
Control delay						1.0	93.7	0.8			29.7	3.1
Lane group LOS						A	F	A			C	A
Apprch. delay				1.0			23.5			20.7		
Approach LOS				A			C			C		
Intersec. delay	19.7			Intersection LOS						B		



SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & Lenardo/SB					
Agency or Co.	Kaku Associates					Area Type	OnRamp					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	0	1	0	0	0	0	2	0	0	2	1
Lane group	L		R					T			TR	R
Volume (vph)	855		610					1365			709	372
% Heavy veh	0		0					0			0	0
PHF	0.90		0.90					0.90			0.90	0.90
Actuated (P/A)	P		P					P			P	P
Startup lost time	2.0		2.0					2.0			2.0	2.0
Ext. eff. green	2.0		2.0					2.0			2.0	2.0
Arrival type	3		3					3			3	3
Unit Extension	3.0		3.0					3.0			3.0	3.0
Ped/Bike/RTOR Volume	0		0	0						0		0
Lane Width	12.0		12.0					12.0			12.0	12.0
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0		0					0			0	0
Unit Extension	3.0		3.0					3.0			3.0	3.0
Phasing	EB Only	02	03	04	Thru & RT	06	07	08				
Timing	G = 26.0	G =	G =	G =	G = 41.2	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 73.2						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	950		678					1517			788	413
Lane group cap.	1244		1615					2032			2032	909
v/c ratio	0.76		0.42					0.75			0.39	0.45
Green ratio	0.36		1.00					0.56			0.56	0.56
Unif. delay d1	20.9		0.0					12.1			8.9	9.4
Delay factor k	0.50		0.50					0.50			0.50	0.50
Increm. delay d2	4.5		0.8					2.6			0.6	1.6
PF factor	1.000		0.950					1.000			1.000	1.000
Control delay	25.4		0.8					14.6			9.5	11.0
Lane group LOS	C		A					B			A	B
Apprch. delay	15.1						14.6			10.0+		
Approach LOS	B						B			B		
Intersec. delay	13.5			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & Lenardo/SB On-Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	0	1	0	0	0	0	2	0	0	2	1
Lane group	L		R					T			TR	R
Volume (vph)	605		668					1618			1162	761
% Heavy veh	0		0					0			0	0
PHF	0.90		0.90					0.90			0.90	0.90
Actuated (P/A)	P		P					P			P	P
Startup lost time	2.0		2.0					2.0			2.0	2.0
Ext. eff. green	2.0		2.0					2.0			2.0	2.0
Arrival type	3		3					3			3	3
Unit Extension	3.0		3.0					3.0			3.0	3.0
Ped/Bike/RTOR Volume	0		0	0						0		0
Lane Width	12.0		12.0					12.0			12.0	12.0
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0		0					0			0	0
Unit Extension	3.0		3.0					3.0			3.0	3.0
Phasing	EB Only	02	03	04	Thru & RT	06	07	08				
Timing	G = 15.7	G =	G =	G =	G = 45.8	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 67.5						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	672		742					1798			1291	846
Lane group cap.	815		1615					2449			2449	1096
v/c ratio	0.82		0.46					0.73			0.53	0.77
Green ratio	0.23		1.00					0.68			0.68	0.68
Unif. delay d1	24.6		0.0					7.0			5.4	7.3
Delay factor k	0.50		0.50					0.50			0.50	0.50
Increm. delay d2	9.3		0.9					2.0			0.8	5.3
PF factor	1.000		0.950					1.000			1.000	1.000
Control delay	33.9		0.9					8.9			6.2	12.6
Lane group LOS	C		A					A			A	B
Apprch. delay	16.6						8.9			8.8		
Approach LOS	B						A			A		
Intersec. delay	10.9			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Torrance Bl					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	1	0	2	1	1	1	2	1
Lane group	L	TR			LTR		L	T	R	L	T	R
Volume (vph)	288	20	161	15	90	30	315	1172	8	26	912	244
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Ext. eff. green	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival type	3	3			3		3	3	3	3	3	3
Unit Extension	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0			0		0	0	0	0	0	0
Unit Extension	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 25.6	G =	G =	G =	G = 7.0	G = 58.4	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 100.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	320	201		150			350	1302	9	29	1013	271
Lane group cap.	270	421		454			245	1110	943	126	2113	943
v/c ratio	1.19	0.48		0.33			1.43	1.17	0.01	0.23	0.48	0.29
Green ratio	0.26	0.26		0.26			0.07	0.58	0.58	0.07	0.58	0.58
Unif. delay d1	37.2	31.5		30.2			46.5	20.8	8.7	44.0	12.0	10.4
Delay factor k	0.50	0.50		0.50			0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	114.4	3.8		1.9			214.8	87.6	0.0	4.2	0.8	0.8
PF factor	1.000	1.000		1.000			1.000	1.000	1.000	1.000	1.000	1.000
Control delay	151.6	35.4		32.2			261.3	108.4	8.7	48.2	12.8	11.2
Lane group LOS	F	D		C			F	F	A	D	B	B
Apprch. delay	106.8			32.2			140.1			13.2		
Approach LOS	F			C			F			B		
Intersec. delay	85.2			Intersection LOS						F		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Torrance Bl					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	1	0	2	1	1	1	2	1
Lane group	L	TR			LTR		L	T	R	L	T	R
Volume (vph)	465	61	327	14	46	21	212	1399	27	53	1716	420
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Ext. eff. green	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival type	3	3			3		3	3	3	3	3	3
Unit Extension	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0			0		0	0	0	0	0	0
Unit Extension	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 25.6	G =	G =	G =	G = 7.0	G = 58.4	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 100.0					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	517	431		90			236	1554	30	59	1907	467
Lane group cap.	325	425		303			245	1110	943	126	2113	943
v/c ratio	1.59	1.01		0.30			0.96	1.40	0.03	0.47	0.90	0.50
Green ratio	0.26	0.26		0.26			0.07	0.58	0.58	0.07	0.58	0.58
Unif. delay d1	37.2	37.2		30.0			46.4	20.8	8.8	44.7	18.3	12.2
Delay factor k	0.50	0.50		0.50			0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	280.0	47.3		2.5			48.8	185.5	0.1	12.0	6.8	1.9
PF factor	1.000	1.000		1.000			1.000	1.000	1.000	1.000	1.000	1.000
Control delay	317.2	84.5		32.4			95.1	206.3	8.9	56.7	25.1	14.0
Lane group LOS	F	F		C			F	F	A	E	C	B
Apprch. delay	211.4			32.4			188.6			23.8		
Approach LOS	F			C			F			C		
Intersec. delay	114.2			Intersection LOS						F		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Lenardo Dr					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	1	0	1	0	2	1	1	2	0
Lane group				L		R		T	R	L	T	
Volume (vph)				361		110		1010	446	100	829	
% Heavy veh				0		0		0	0	0	0	
PHF				0.90		0.90		0.90	0.90	0.90	0.90	
Actuated (P/A)				P		P		P	P	P	P	
Startup lost time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext. eff. green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0			0		0	0		0			
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr				0		0		0	0	0	0	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Phasing	WB Only	02	03	04	NS Perm	06	07	08				
Timing	G = 20.4	G =	G =	G =	G = 43.6	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 70.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				401		122		1122	496	111	921	
Lane group cap.				526		471		2253	1615	233	2253	
v/c ratio				0.76		0.26		0.50	0.31	0.48	0.41	
Green ratio				0.29		0.29		0.62	1.00	0.62	0.62	
Unif. delay d1				22.6		19.0		7.2	0.0	7.1	6.7	
Delay factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Increm. delay d2				10.0		1.3		0.8	0.5	6.8	0.6	
PF factor				1.000		1.000		1.000	0.950	1.000	1.000	
Control delay				32.6		20.3		8.0	0.5	13.9	7.2	
Lane group LOS				C		C		A	A	B	A	
Apprch. delay				29.8			5.7			7.9		
Approach LOS				C			A			A		
Intersec. delay	10.4			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Lenardo Dr					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	1	0	1	0	2	1	1	2	0
Lane group				L		R		T	R	L	T	
Volume (vph)				998		252		810	997	204	1189	
% Heavy veh				0		0		0	0	0	0	
PHF				0.90		0.90		0.90	0.90	0.90	0.90	
Actuated (P/A)				P		P		P	P	P	P	
Startup lost time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext. eff. green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0			0		0	0		0			
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr				0		0		0	0	0	0	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Phasing	WB Only	02	03	04	NS Perm	06	07	08				
Timing	G = 35.4	G =	G =	G =	G = 28.6	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 70.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				1109		280		900	1108	227	1321	
Lane group cap.				913		817		1478	1615	145	1478	
v/c ratio				1.21		0.34		0.61	0.69	1.57	0.89	
Green ratio				0.51		0.51		0.41	1.00	0.41	0.41	
Unif. delay d1				17.3		10.3		16.3	0.0	20.7	19.3	
Delay factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Increm. delay d2				106.7		1.1		1.9	2.4	285.2	8.7	
PF factor				1.000		1.000		1.000	0.950	1.000	1.000	
Control delay				124.0		11.5		18.2	2.4	305.9	28.0	
Lane group LOS				F		B		B	A	F	C	
Apprch. delay				101.3			9.5			68.7		
Approach LOS				F			A			E		
Intersec. delay	53.8			Intersection LOS						D		

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	2	1	1	2	1	1	3	1	2	3	0	
Lane group	L	T	R	L	T	R	L	T	R	L	TR		
Volume (vph)	172	488	260	320	737	122	329	563	180	147	614	206	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Arrival type	3	3	3	3	3	3	3	3	3	3	3		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 15.7	G = 18.1	G =			G =			G = 17.0	G = 16.3	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 79.1						
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	191	542	289	356	819	136	366	626	200	163	911		
Lane group cap.	358	826	778	358	826	778	388	1069	715	753	1028		
v/c ratio	0.53	0.66	0.37	0.99	0.99	0.17	0.94	0.59	0.28	0.22	0.89		
Green ratio	0.20	0.23	0.48	0.20	0.23	0.48	0.21	0.21	0.44	0.21	0.21		
Unif. delay d1	28.4	27.7	12.9	31.7	30.4	11.6	30.6	28.4	14.0	25.6	30.5		
Delay factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50		
Increm. delay d2	5.6	4.1	0.3	46.2	29.3	0.1	33.4	2.3	0.2	0.7	11.2		
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Control delay	34.0	31.7	13.2	77.8	59.8	11.7	64.0	30.7	14.2	26.2	41.7		
Lane group LOS	C	C	B	E	E	B	E	C	B	C	D		
Apprch. delay	26.9			59.7			38.2			39.3			
Approach LOS	C			E			D			D			
Intersec. delay	42.1			Intersection LOS						D			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	PM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	2	1	1	2	1	1	3	1	2	3	0	
Lane group	L	T	R	L	T	R	L	T	R	L	TR		
Volume (vph)	328	917	588	197	769	176	617	947	300	203	822	269	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Arrival type	3	3	3	3	3	3	3	3	3	3	3		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 11.8	G = 18.1	G =			G =			G = 20.6	G = 18.3	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 80.8						
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	364	1019	653	219	854	196	686	1052	333	226	1212		
Lane group cap.	264	809	833	264	809	833	460	1175	662	893	1131		
v/c ratio	1.38	1.26	0.78	0.83	1.06	0.24	1.49	0.90	0.50	0.25	1.07		
Green ratio	0.15	0.22	0.52	0.15	0.22	0.52	0.25	0.23	0.41	0.25	0.23		
Unif. delay d1	34.5	31.4	15.9	33.5	31.4	10.8	30.1	30.3	17.7	24.0	31.3		
Delay factor k	0.50	0.50	0.33	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50		
Increm. delay d2	192.4	126.8	4.9	25.0	47.4	0.1	232.4	10.7	0.6	0.7	48.2		
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Control delay	226.9	158.1	20.8	58.5	78.7	10.9	262.5	41.0	18.4	24.7	79.4		
Lane group LOS	F	F	C	E	E	B	F	D	B	C	E		
Apprch. delay	126.4			64.8			110.7			70.8			
Approach LOS	F			E			F			E			
Intersec. delay	98.4			Intersection LOS						F			



SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Stamps Dr & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	2	2	2	1	2	1	2	1	1	1	
Lane group	L	T	R	L	T	R	L	T	R	L	TR	R	
Volume (vph)	27	1334	360	308	1141	11	369	0	313	12	0	32	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Arrival type	3	3	3	3	3	3	3	3	3	3	3	3	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.1	G = 28.9	G =			G =			G = 8.1	G = 7.2	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 63.3							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	30	1482	400	342	1268	12	410	0	348	13	0	36	
Lane group cap.	393	1648	1796	393	1648	1021	448	216	777	231	216	184	
v/c ratio	0.08	0.90	0.22	0.87	0.77	0.01	0.92	0.00	0.45	0.06	0.00	0.20	
Green ratio	0.11	0.46	0.63	0.11	0.46	0.63	0.13	0.11	0.27	0.13	0.11	0.11	
Unif. delay d1	25.2	15.9	5.0	27.6	14.4	4.3	27.3	24.9	19.0	24.2	24.9	25.4	
Delay factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.50	
Increm. delay d2	0.4	8.2	0.1	22.2	3.5	0.0	25.8	0.0	0.4	0.5	0.0	2.4	
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Control delay	25.5	24.1	5.1	49.9	17.9	4.3	53.1	24.9	19.5	24.7	24.9	27.8	
Lane group LOS	C	C	A	D	B	A	D	C	B	C	C	C	
Apprch. delay	20.1			24.6			37.7			27.0			
Approach LOS	C			C			D			C			
Intersec. delay	24.9			Intersection LOS						C			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Stamps Dr & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	PM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	2	2	2	1	2	1	2	1	1	1	
Lane group	L	T	R	L	T	R	L	T	R	L	TR	R	
Volume (vph)	69	667	934	718	1090	28	849	0	690	28	0	70	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Arrival type	3	3	3	3	3	3	3	3	3	3	3	3	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Phasing	Excl. Left	Thru & RT	03			04		Excl. Left	Thru & RT	07		08	
Timing	G = 14.9	G = 23.7	G =		G =		G = 12.1	G = 7.3	G =		G =		
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y = 3	Y =		Y =		
Duration of Analysis (hrs) = 0.25						Cycle Length C = 70.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	77	741	1038	798	1211	31	943	0	767	31	0	78	
Lane group cap.	746	1225	1585	746	1225	895	606	198	1029	312	198	168	
v/c ratio	0.10	0.60	0.65	1.07	0.99	0.03	1.56	0.00	0.75	0.10	0.00	0.46	
Green ratio	0.21	0.34	0.55	0.21	0.34	0.55	0.17	0.10	0.36	0.17	0.10	0.10	
Unif. delay d1	22.2	19.3	10.9	27.5	23.0	7.1	28.9	28.1	19.6	24.4	28.1	29.5	
Delay factor k	0.50	0.50	0.23	0.50	0.50	0.11	0.50	0.50	0.30	0.50	0.50	0.50	
Increm. delay d2	0.3	2.2	1.0	53.2	23.1	0.0	258.3	0.0	3.0	0.6	0.0	9.0	
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Control delay	22.5	21.5	11.9	80.7	46.1	7.1	287.2	28.1	22.6	25.0	28.1	38.5	
Lane group LOS	C	C	B	F	D	A	F	C	C	C	C	D	
Apprch. delay	16.2			59.1			168.5			34.6			
Approach LOS	B			E			F			C			
Intersec. delay	77.4			Intersection LOS						E			

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 NB Off Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	2	0	1	2	0	0	2	0
Lane group					LTR		L	T			TR	
Volume (vph)				85	361	230	20	896			778	71
% Heavy veh				0	0	0	0	0			0	0
PHF				0.90	0.90	0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P	P	P	P	P			P	P
Startup lost time					2.0		2.0	2.0			2.0	
Ext. eff. green					2.0		2.0	2.0			2.0	
Arrival type					3		3	3			3	
Unit Extension					3.0		3.0	3.0			3.0	
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width					12.0		12.0	12.0			12.0	
Parking/Grade/Parking	N			N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr					0		0	0			0	
Unit Extension					3.0		3.0	3.0			3.0	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 19.0	G =	G =	G =	G = 22.5	G = 9.5	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				751			22	996			943	
Lane group cap.				1080			286	2110			1340	
v/c ratio				0.70			0.08	0.47			0.70	
Green ratio				0.32			0.16	0.58			0.38	
Unif. delay d1				18.0			21.5	7.2			15.9	
Delay factor k				0.50			0.50	0.50			0.50	
Increm. delay d2				3.7			0.5	0.8			3.1	
PF factor				1.000			1.000	1.000			1.000	
Control delay				21.7			22.0	7.9			19.0	
Lane group LOS				C			C	A			B	
Apprch. delay				21.7			8.3			19.0		
Approach LOS				C			A			B		
Intersec. delay	15.7			Intersection LOS						B		

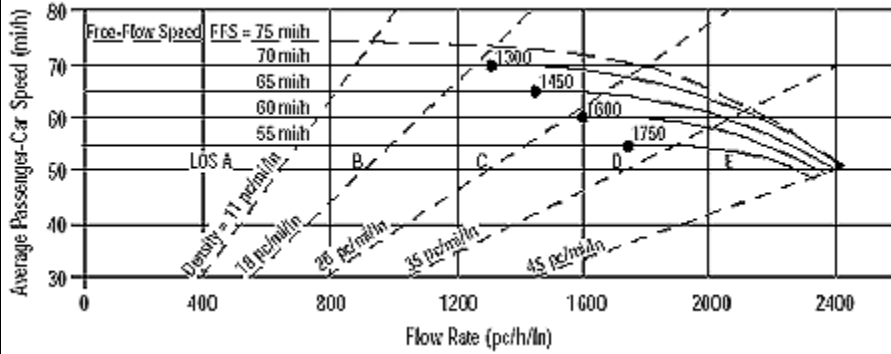
SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 NB Off Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	2	0	1	2	0	0	2	0
Lane group					LTR		L	T			TR	
Volume (vph)				122	93	101	30	832			1474	70
% Heavy veh				0	0	0	0	0			0	0
PHF				0.90	0.90	0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P	P	P	P	P			P	P
Startup lost time					2.0		2.0	2.0			2.0	
Ext. eff. green					2.0		2.0	2.0			2.0	
Arrival type					3		3	3			3	
Unit Extension					3.0		3.0	3.0			3.0	
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width					12.0		12.0	12.0			12.0	
Parking/Grade/Parking	N			N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr					0		0	0			0	
Unit Extension					3.0		3.0	3.0			3.0	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 13.3	G =	G =	G =	G = 49.2	G = 8.5	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				351			33	924			1716	
Lane group cap.				562			192	2745			2210	
v/c ratio				0.62			0.17	0.34			0.78	
Green ratio				0.17			0.11	0.76			0.62	
Unif. delay d1				31.0			32.5	3.1			11.3	
Delay factor k				0.50			0.50	0.50			0.50	
Increm. delay d2				5.2			1.9	0.3			2.8	
PF factor				1.000			1.000	1.000			1.000	
Control delay				36.2			34.5	3.5			14.1	
Lane group LOS				D			C	A			B	
Apprch. delay				36.2			4.5			14.1		
Approach LOS				D			A			B		
Intersec. delay	13.6			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 SB On Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	0	0	0	2	0	1	2	0
Lane group	L	TR						TR		L	T	
Volume (vph)	32	118	12					865	80	105	821	
% Heavy veh	0	0	0					0	0	0	0	
PHF	0.90	0.90	0.90					0.90	0.90	0.90	0.90	
Actuated (P/A)	P	P	P					P	P	P	P	
Startup lost time	2.0	2.0						2.0		2.0	2.0	
Ext. eff. green	2.0	2.0						2.0		2.0	2.0	
Arrival type	3	3						3		3	3	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0		0			
Lane Width	12.0	12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0						0		0	0	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Phasing	EB Only	02	03	04	Thru & RT	SB Only	07	08				
Timing	G = 11.2	G =	G =	G =	G = 31.7	G = 8.1	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	36	144						1050		117	912	
Lane group cap.	337	350						1887		244	2581	
v/c ratio	0.11	0.41						0.56		0.48	0.35	
Green ratio	0.19	0.19						0.53		0.13	0.71	
Unif. delay d1	20.2	21.5						9.5		24.0	3.3	
Delay factor k	0.50	0.50						0.50		0.50	0.50	
Increm. delay d2	0.6	3.5						1.2		6.6	0.4	
PF factor	1.000	1.000						1.000		1.000	1.000	
Control delay	20.9	25.0						10.6		30.6	3.7	
Lane group LOS	C	C						B		C	A	
Apprch. delay	24.2						10.6			6.7		
Approach LOS	C						B			A		
Intersec. delay	9.9			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 SB On Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	0	0	0	2	0	1	2	0
Lane group	L	TR						TR		L	T	
Volume (vph)	50	233	69					796	147	307	1300	
% Heavy veh	0	0	0					0	0	0	0	
PHF	0.90	0.90	0.90					0.90	0.90	0.90	0.90	
Actuated (P/A)	P	P	P					P	P	P	P	
Startup lost time	2.0	2.0						2.0		2.0	2.0	
Ext. eff. green	2.0	2.0						2.0		2.0	2.0	
Arrival type	3	3						3		3	3	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0		0			
Lane Width	12.0	12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0						0		0	0	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Phasing	EB Only	02	03	04	Thru & RT	SB Only	07	08				
Timing	G = 13.2	G =	G =	G =	G = 24.9	G = 12.9	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	56	336						1047		341	1444	
Lane group cap.	397	404						1466		388	2460	
v/c ratio	0.14	0.83						0.71		0.88	0.59	
Green ratio	0.22	0.22						0.41		0.21	0.68	
Unif. delay d1	18.8	22.3						14.6		22.8	5.1	
Delay factor k	0.50	0.50						0.50		0.50	0.50	
Increm. delay d2	0.7	17.8						3.0		23.5	1.0	
PF factor	1.000	1.000						1.000		1.000	1.000	
Control delay	19.6	40.2						17.6		46.3	6.1	
Lane group LOS	B	D						B		D	A	
Apprch. delay	37.2						17.6			13.8		
Approach LOS	D						B			B		
Intersec. delay	17.9			Intersection LOS						B		

**FREWAY**

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, $v_p$
Design (N)	FFS, LOS, $v_p$
Design ( $v_p$ )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning ( $v_p$ )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: AM

**Site Information**

Highway/Direction of Travel: I-405 NB  
 From/To: Carson St to Avalon  
 Jurisdiction:  
 Analysis Year: 2030

Project Description: NO BUILD

Oper.(LOS)

Des.(N)

Planning Dat

**Flow Inputs**

Volume, V	7066 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

**Calculate Flow Adjustments**

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

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	70.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

$f_{LW}$	
$f_{LC}$	
$f_{ID}$	
$f_N$	
FFS	70.0

**LOS and Performance Measures**

Operational (LOS)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2012 pc/h/ln
S	64.6 mi/h
$D = v_p / S$	31.1 pc/mi/ln
LOS	D

**Design (N)**

Design (N)	
Design LOS	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	
S	
$D = v_p / S$	
Required Number of Lanes, N	

**Glossary**

N - Number of lanes      S - Speed

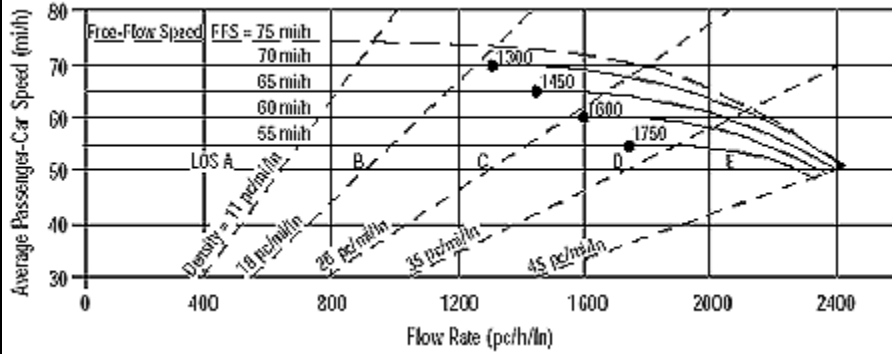
**Factor Location**

$E_R$  - Exhibits 23-8, 23-10       $f_{LW}$  - Ex



V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, $v_p$
Design (N)	FFS, LOS, $v_p$
Design ( $v_p$ )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning ( $v_p$ )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: PM

**Site Information**

Highway/Direction of Travel: I-405 NB  
 From/To: Carson St to Avalon  
 Jurisdiction:  
 Analysis Year: 2030

Project Description: NO BUILD

Oper.(LOS)       Des.(N)       Planning Dat

**Flow Inputs**

Volume, V	7021 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade %    Length	mi
Driver type adjustment	1.00	Up/Down %	

**Calculate Flow Adjustments**

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

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

$f_{LW}$	
$f_{LC}$	
$f_{ID}$	
$f_N$	
FFS	65.0

**LOS and Performance Measures**

Operational (LOS)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1999 pc/h/ln
S	61.5 mi/h
$D = v_p / S$	32.5 pc/mi/ln
LOS	D

**Design (N)**

Design (N)	
Design LOS	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	
S	
$D = v_p / S$	
Required Number of Lanes, N	

**Glossary**

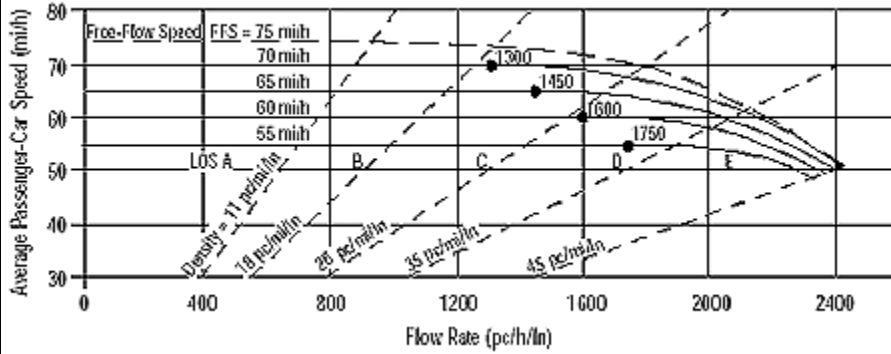
N - Number of lanes      S - Speed

**Factor Location**

$E_R$  - Exhibits 23-8, 23-10       $f_{LW}$  - Ex

V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, $v_p$
Design (N)	FFS, LOS, $v_p$
Design ( $v_p$ )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning ( $v_p$ )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: AM

**Site Information**

Highway/Direction of Travel: I-405 NB  
 From/To: Avalon Bl to Main S  
 Jurisdiction:  
 Analysis Year: 2030

Project Description: NO BUILD

Oper.(LOS)       Des.(N)       Planning Dat

**Flow Inputs**

Volume, V	7454 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade % Length	mi
Driver type adjustment	1.00	Up/Down %	

**Calculate Flow Adjustments**

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

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

$f_{LW}$	
$f_{LC}$	
$f_{ID}$	
$f_N$	
FFS	65.0

**LOS and Performance Measures**

Operational (LOS)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2122 pc/h/ln
S	59.0 mi/h
$D = v_p / S$	36.0 pc/mi/ln
LOS	E

**Design (N)**

Design (N)	
Design LOS	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	
S	
$D = v_p / S$	
Required Number of Lanes, N	

**Glossary**

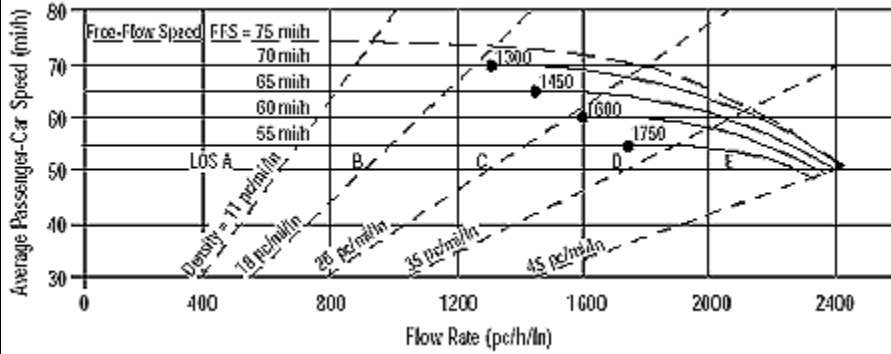
N - Number of lanes      S - Speed

**Factor Location**

$E_R$  - Exhibits 23-8, 23-10       $f_{LW}$  - Ex

V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, $v_p$
Design (N)	FFS, LOS, $v_p$
Design ( $v_p$ )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning ( $v_p$ )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: PM

**Site Information**

Highway/Direction of Travel: I-405 NB  
 From/To: Avalon Bl to Main S  
 Jurisdiction:  
 Analysis Year: 2030

Project Description: NO BUILD

Oper.(LOS)       Des.(N)       Planning Dat

**Flow Inputs**

Volume, V	7960 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade %	mi
Driver type adjustment	1.00	Length	mi
		Up/Down %	

**Calculate Flow Adjustments**

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

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

$f_{LW}$	
$f_{LC}$	
$f_{ID}$	
$f_N$	
FFS	65.0

**LOS and Performance Measures**

Operational (LOS)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2266 pc/h/ln
S	55.1 mi/h
$D = v_p / S$	41.1 pc/mi/ln
LOS	E

**Design (N)**

Design (N)	
Design LOS	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	
S	
$D = v_p / S$	
Required Number of Lanes, N	

**Glossary**

N - Number of lanes      S - Speed

**Factor Location**

$E_R$  - Exhibits23-8, 23-10       $f_{LW}$  - Ex

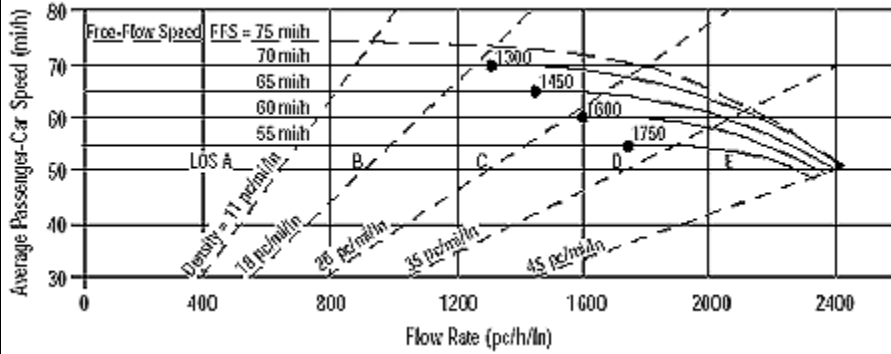
V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

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Version 4.1d

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, $v_p$
Design (N)	FFS, LOS, $v_p$
Design ( $v_p$ )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning ( $v_p$ )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: AM

**Site Information**

Highway/Direction of Travel: I-405 SB  
 From/To: Main St to Avalon E  
 Jurisdiction:  
 Analysis Year: 2030

Project Description: NO BUILD

Oper.(LOS)       Des.(N)       Planning Dat

**Flow Inputs**

Volume, V	6937 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade %    Length	mi
Driver type adjustment	1.00	Up/Down %	

**Calculate Flow Adjustments**

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

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

$f_{LW}$	
$f_{LC}$	
$f_{ID}$	
$f_N$	
FFS	65.0

**LOS and Performance Measures**

Operational (LOS)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	1975      pc/h/ln
S	61.9      mi/h
$D = v_p / S$	31.9      pc/mi/ln
LOS	D

**Design (N)**

Design (N)	
Design LOS	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	
S	
$D = v_p / S$	
Required Number of Lanes, N	

**Glossary**

N - Number of lanes      S - Speed

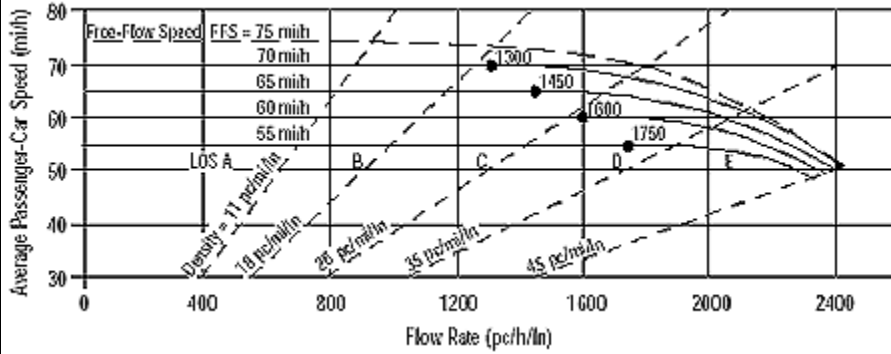
**Factor Location**

$E_R$  - Exhibits 23-8, 23-10       $f_{LW}$  - Ex



V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, v <sub>p</sub>
Design (N)	FFS, LOS, v <sub>p</sub>
Design (v <sub>p</sub> )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v <sub>p</sub> )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: PM

**Site Information**

Highway/Direction of Travel: I-405 SB  
 From/To: Main St to Avalon E  
 Jurisdiction:  
 Analysis Year: 2030

Project Description: NO BUILD

Oper.(LOS)                       Des.(N)                       Planning Dat

**Flow Inputs**

Volume, V	7437 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P <sub>T</sub>	5
Peak-Hr Prop. of AADT, K		%RVs, P <sub>R</sub>	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade %	Length mi
Driver type adjustment	1.00	Up/Down %	

**Calculate Flow Adjustments**

f <sub>p</sub>	1.00	E <sub>R</sub>	1.2
E <sub>T</sub>	1.5	f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)]	0.976

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

f <sub>LW</sub>	
f <sub>LC</sub>	
f <sub>ID</sub>	
f <sub>N</sub>	
FFS	65.0

**LOS and Performance Measures**

Operational (LOS)	
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )	2117 pc/h/ln
S	59.1 mi/h
D = v <sub>p</sub> / S	35.8 pc/mi/ln
LOS	E

**Design (N)**

Design (N)	
Design LOS	
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )	
S	
D = v <sub>p</sub> / S	
Required Number of Lanes, N	

**Glossary**

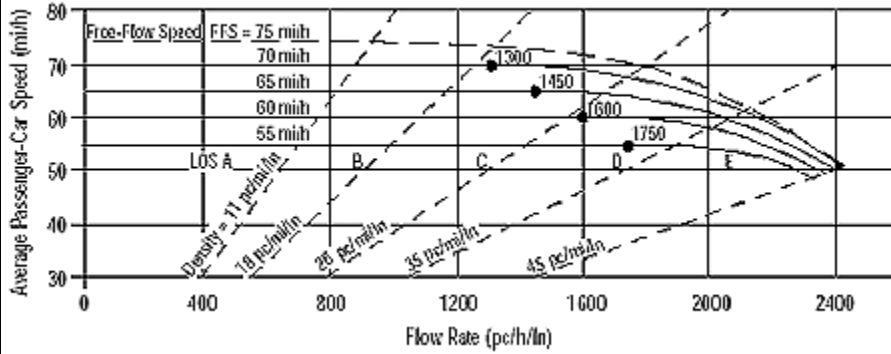
N - Number of lanes                      S - Speed

**Factor Location**

E<sub>R</sub> - Exhibits 23-8, 23-10                      f<sub>LW</sub> - Ex

V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, v <sub>p</sub>
Design (N)	FFS, LOS, v <sub>p</sub>
Design (v <sub>p</sub> )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v <sub>p</sub> )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: AM

**Site Information**

Highway/Direction of Travel: I-405 SB  
 From/To: Avalon BI to Corsor  
 Jurisdiction:  
 Analysis Year: 2030

Project Description: BUILD

Oper.(LOS)       Des.(N)       Planning Dat

**Flow Inputs**

Volume, V	6358 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, P <sub>T</sub>	5
Peak-Hr Prop. of AADT, K		%RVs, P <sub>R</sub>	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade %	Length mi
Driver type adjustment	1.00	Up/Down %	

**Calculate Flow Adjustments**

f <sub>p</sub>	1.00	E <sub>R</sub>	1.2
E <sub>T</sub>	1.5	f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)]	0.976

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

f <sub>LW</sub>	
f <sub>LC</sub>	
f <sub>ID</sub>	
f <sub>N</sub>	
FFS	65.0

**LOS and Performance Measures**

Operational (LOS)		
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )	1810	pc/h/ln
S	63.8	mi/h
D = v <sub>p</sub> / S	28.4	pc/mi/ln
LOS	D	

**Design (N)**

Design (N)		
Design LOS		
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )		
S		
D = v <sub>p</sub> / S		
Required Number of Lanes, N		

**Glossary**

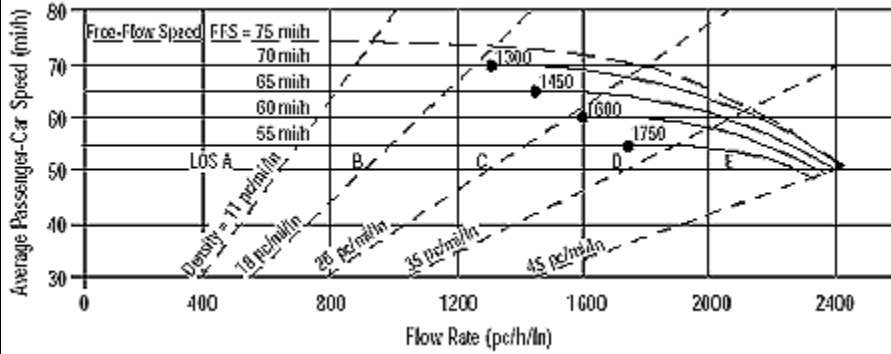
N - Number of lanes      S - Speed

**Factor Location**

E<sub>R</sub> - Exhibits 23-8, 23-10      f<sub>LW</sub> - Ex

V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

**BASIC FREEWAY SEGMENTS WORKSHEET**



Application	Input
Operational (LOS)	FFS, N, $v_p$
Design (N)	FFS, LOS, $v_p$
Design ( $v_p$ )	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning ( $v_p$ )	FFS, LOS, N

**General Information**

Analyst: Anjum  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: PM

**Site Information**

Highway/Direction of Travel: I-405 SB  
 From/To: Avalon BI to Corsor  
 Jurisdiction:  
 Analysis Year: 2030

Project Description: NO BUILD

Oper.(LOS)       Des.(N)       Planning Dat

**Flow Inputs**

Volume, V	7183 veh/h	Peak-Hour Factor, PHF	0.90
AADT	veh/day	%Trucks and Buses, $P_T$	5
Peak-Hr Prop. of AADT, K		%RVs, $P_R$	0
Peak-Hr Direction Prop, D		General Terrain:	Level
DDHV = AADT x K x D	veh/h	Grade %    Length	mi
Driver type adjustment	1.00	Up/Down %	

**Calculate Flow Adjustments**

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

**Speed Inputs**

Lane Width	12.0	ft
Rt-Shoulder Lat. Clearance	6.0	ft
Interchange Density	0.50	I/mi
Number of Lanes, N	4	
FFS (measured)	65.0	mi/h
Base free-flow Speed, BFFS		mi/h

**Calc Speed Adj and FFS**

$f_{LW}$	
$f_{LC}$	
$f_{ID}$	
$f_N$	
FFS	65.0

**LOS and Performance Measures**

Operational (LOS)	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	2045 pc/h/ln
S	60.6 mi/h
$D = v_p / S$	33.7 pc/mi/ln
LOS	D

**Design (N)**

Design (N)	
Design LOS	
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	
S	
$D = v_p / S$	
Required Number of Lanes, N	

**Glossary**

N - Number of lanes      S - Speed

**Factor Location**

$E_R$  - Exhibits 23-8, 23-10       $f_{LW}$  - Ex

V	- Hourly volume	D	- Density	E <sub>T</sub>	- Exhibits 23-8, 23-10, 23-11	f <sub>LC</sub>	- Exl
V <sub>p</sub>	- Flow rate	FFS	- Free-flow speed	f <sub>p</sub>	- Page 23-12	f <sub>N</sub>	- Exh
LOS	- Level of service	BFFS	- Base free-flow speed	LOS, S, FFS, v <sub>p</sub>	- Exhibits 23-2, 23-3	f <sub>ID</sub>	- Exh
DDHV	- Directional design hour volume						

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Northbound			
Agency or Company	Kaku Associates			Junction	Carson Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	AM			Analysis Year	2030			
Project Description No Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain				Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off		
$L_{up}$ =	ft	$S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph				$L_{down}$ =	ft	
$V_u$ =	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )				$V_D$ =	veh/h	
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v = V/PHF$ $f_{HV} f_p$
Freeway	7066	0.90	Level	5	0	0.976	0.90	8942
Ramp	448	0.90	Level	5	0	0.976	0.90	567
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation $V_{12} =$ pc/h				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} = 0.436$ using Equation 8 $V_{12} = 4218$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	8942	9400	No	
				$V_{12}$	4218	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F - V_R$	8375	9400	No	
				$V_R$	567	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/ mi /ln) LOS = (Exhibit 25-4)				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ $D_R = 36.0$ (pc/ mi /ln) LOS = E (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)				$D_s = 0.349$ (Exhibit 25-19) $S_R = 57.0$ mph (Exhibit 25-19) $S_0 = 66.0$ mph (Exhibit 25-19) $S = 61.4$ mph (Exhibit 25-15)				



RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Northbound			
Agency or Company	Kaku Associates			Junction	Carson Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	PM			Analysis Year	2030			
Project Description No Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain					Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
$VD =$	veh/h							
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v = V/PHF$ $f_{HV} f_p$
Freeway	7021	0.90	Level	5	0	0.976	0.90	8885
Ramp	741	0.90	Level	5	0	0.976	0.90	938
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 4403$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	8885	9400	No	
			$V_{12}$	4403	4400:All	Yes		
$V_{R12}$		4600:All		$V_{FO} = V_F - V_R$	7947	9400	No	
			$V_R$	938	2100	No		
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 37.6$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS = F (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.382$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 56.2$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 66.5$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 61.0$ mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	Northbound						
Agency or Company	Kaku Associates	Junction	Carson On Ramp						
Date Performed	9/13/2006	Jurisdiction	Caltrans						
Analysis Time Period	AM	Analysis Year	2030						
Project Description No Build Scenario									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h		Terrain Level  <div style="text-align: center;"> <math>S_{FF} = 65.0 \text{ mph}</math>                      <math>S_{FR} = 45.0 \text{ mph}</math> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )					Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h		
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	7066	0.90	Level	5	0	0.976	0.90	8942	
Ramp	383	0.90	Level	5	0	0.976	0.90	485	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.281 using Equation 4 V <sub>12</sub> = 2513 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	9427	See Exhibit 25-7	Yes		V <sub>FI</sub> =V <sub>F</sub>	See Exhibit 25-14			
					V <sub>12</sub>	4400:All			
V <sub>R12</sub>	2998	4600:All	No		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	See Exhibit 25-14			
					V <sub>R</sub>	See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        25.5 (pc/ m/ln) LOS =        F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        (pc/ m/ln) LOS =        (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> =        0.354 (Exhibit 25-19) S <sub>R</sub> =        56.9 mph (Exhibit 25-19) S <sub>0</sub> =        53.0 mph (Exhibit 25-19) S =        54.2 mph (Exhibit 25-14)					D <sub>s</sub> =        (Exhibit 25-19) S <sub>R</sub> =        mph (Exhibit 25-19) S <sub>0</sub> =        mph (Exhibit 25-19) S =        mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	Northbound						
Agency or Company	Kaku Associates	Junction	Carson On Ramp						
Date Performed	9/13/2006	Jurisdiction	Caltrans						
Analysis Time Period	PM	Analysis Year	2030						
Project Description No Build Scenario									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =    ft V <sub>u</sub> =    veh/h	Terrain Level   <div style="text-align: center;"> <math>S_{FF} = 65.0 \text{ mph}</math>                      <math>S_{FR} = 45.0 \text{ mph}</math> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =    ft V <sub>D</sub> =    veh/h							
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	7021	0.90	Level	5	0	0.976	0.90	8885	
Ramp	556	0.90	Level	5	0	0.976	0.90	704	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.254 using Equation 4 V <sub>12</sub> = 2254 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	9589	See Exhibit 25-7	Yes	V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14			
				V <sub>12</sub>		4400:All			
V <sub>R12</sub>	2958	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14			
				V <sub>R</sub>		See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 25.1 (pc/ m/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/ m/ln) LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> = 0.351 (Exhibit 25-19) S <sub>R</sub> = 56.9 mph (Exhibit 25-19) S <sub>0</sub> = 52.4 mph (Exhibit 25-19) S = 53.7 mph (Exhibit 25-14)					D <sub>s</sub> = (Exhibit 25-19) S <sub>R</sub> = mph (Exhibit 25-19) S <sub>0</sub> = mph (Exhibit 25-19) S = mph (Exhibit 25-15)				

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2030

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain   S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7066	0.90	Level	5	0	0.976	0.90	8942
Ramp	624	0.90	Level	5	0	0.976	0.90	790
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4344 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8942	9400	No
				V <sub>12</sub>	4344	4400:All	No
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	8152	9400	No
				V <sub>R</sub>	790	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        37.1 (pc/ mi /ln)  
 LOS =        E (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.369 (Exhibit 25-19)  
 S<sub>R</sub> =        56.5 mph (Exhibit 25-19)  
 S<sub>0</sub> =        66.2 mph (Exhibit 25-19)  
 S =        61.1 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2030

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft  V <sub>u</sub> =        veh/h	Terrain    S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft  V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7021	0.90	Level	5	0	0.976	0.90	8885
Ramp	617	0.90	Level	5	0	0.976	0.90	781
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4314 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7	
V <sub>R12</sub>		4600:All	

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>	8885	9400	No
V <sub>12</sub>	4314	4400:All	No
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	8104	9400	No
V <sub>R</sub>	781	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        36.9 (pc/ mi /ln)  
 LOS =        E (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.368 (Exhibit 25-19)  
 S<sub>R</sub> =        56.5 mph (Exhibit 25-19)  
 S<sub>0</sub> =        66.3 mph (Exhibit 25-19)  
 S =        61.2 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2030
Project Description No Build Scenario			

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level     S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7454	0.90	Level	5	0	0.976	0.90	9433
Ramp	942	0.90	Level	5	0	0.976	0.90	1192
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.193 using Equation 4  
 V<sub>12</sub> = 1818 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	10625	See Exhibit 25-7	Yes
V <sub>R12</sub>	3010	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 25.3 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.355 (Exhibit 25-19)  
 S<sub>R</sub> = 56.8 mph (Exhibit 25-19)  
 S<sub>0</sub> = 49.4 mph (Exhibit 25-19)  
 S = 51.3 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2030

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level  <div style="text-align: center;"> <math>S_{FF} = 65.0 \text{ mph}</math>                      <math>S_{FR} = 45.0 \text{ mph}</math> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7960	0.90	Level	5	0	0.976	0.90	10073
Ramp	1373	0.90	Level	5	0	0.976	0.90	1737
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.125 using Equation 4  
 V<sub>12</sub> = 1255 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	11810	See Exhibit 25-7	Yes
V <sub>R12</sub>	2992	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.9 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.354 (Exhibit 25-19)  
 S<sub>R</sub> = 56.9 mph (Exhibit 25-19)  
 S<sub>0</sub> = 45.8 mph (Exhibit 25-19)  
 S = 48.2 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Northbound			
Agency or Company	Kaku Associates			Junction	Main Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	AM			Analysis Year	2030			
Project Description No Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain					Downstream Adj Ramp	
<input type="checkbox"/> Yes	<input type="checkbox"/> On						<input type="checkbox"/> Yes	<input type="checkbox"/> On
<input type="checkbox"/> No	<input type="checkbox"/> Off	<input type="checkbox"/> No	<input type="checkbox"/> Off					
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
$VD =$	veh/h							
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v = V/PHF$ $f_{HV} f_p$
Freeway	7454	0.90	Level	5	0	0.976	0.90	9433
Ramp	513	0.90	Level	5	0	0.976	0.90	649
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 3657$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	7547	9400	No	
				$V_{12}$	3657	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F -$	6898	9400	No	
				$V_R$	649	2100	No	
				$V_R$	649	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 31.2$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS= D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.356$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 56.8$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 67.6$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 61.9$ mph (Exhibit 25-15)				



RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Northbound			
Agency or Company	Kaku Associates			Junction	Main Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	PM			Analysis Year	2030			
Project Description No Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain				Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off		
$L_{up}$ =	ft	$S_{FF}$ = 65.0 mph		$S_{FR}$ = 45.0 mph		$L_{down}$ =	ft	
$V_u$ =	veh/h	Sketch ( show lanes, $L_A$ , $L_D$ , $V_R$ , $V_f$ )						
<b>Conversion to pc/h Under Base Conditions</b>								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF$ $f_{HV} f_p$
Freeway	7960	0.90	Level	5	0	0.976	0.90	10073
Ramp	407	0.90	Level	5	0	0.976	0.90	515
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation $V_{12} =$ pc/h				$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} = 0.436$ using Equation 8 $V_{12} = 3804$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	8059	9400	No	
				$V_{12}$	3804	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F -$	7544	9400	No	
				$V_R$	515	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/ mi /ln) LOS = (Exhibit 25-4)				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ $D_R = 32.5$ (pc/ mi /ln) LOS = D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)				$D_s = 0.344$ (Exhibit 25-19) $S_R = 57.1$ mph (Exhibit 25-19) $S_0 = 66.9$ mph (Exhibit 25-19) $S = 61.9$ mph (Exhibit 25-15)				

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Main On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2030
Project Description No Build Scenario			

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6937	0.90	Level	5	0	0.976	0.90	8778
Ramp	299	0.90	Level	5	0	0.976	0.90	378
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.294 using Equation 4  
 V<sub>12</sub> = 1848 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	6656	See Exhibit 25-7	No
V <sub>R12</sub>	2226	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 19.5 (pc/ m/ln)  
 LOS = B (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.312 (Exhibit 25-19)  
 S<sub>R</sub> = 57.8 mph (Exhibit 25-19)  
 S<sub>0</sub> = 58.8 mph (Exhibit 25-19)  
 S = 58.5 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Main On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2030
Project Description No Build Scenario			

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7437	0.90	Level	5	0	0.976	0.90	9411
Ramp	407	0.90	Level	5	0	0.976	0.90	515
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.277 using Equation 4  
 V<sub>12</sub> = 1917 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	7426	See Exhibit 25-7	No
V <sub>R12</sub>	2432	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 21.1 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.320 (Exhibit 25-19)  
 S<sub>R</sub> = 57.6 mph (Exhibit 25-19)  
 S<sub>0</sub> = 57.3 mph (Exhibit 25-19)  
 S = 57.4 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2030

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain   S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6937	0.90	Level	5	0	0.976	0.90	8778
Ramp	1205	0.90	Level	5	0	0.976	0.90	1525
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4687 pc/h

### Capacity Checks

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8778	9400	No
				V <sub>12</sub>	4687	4400:All	Yes
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7253	9400	No
				V <sub>R</sub>	1525	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        40.1 (pc/ mi /ln)  
 LOS =        F (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.435 (Exhibit 25-19)  
 S<sub>R</sub> =        55.0 mph (Exhibit 25-19)  
 S<sub>0</sub> =        67.2 mph (Exhibit 25-19)  
 S =        60.1 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2030

Project Description No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7437	0.90	Level	5	0	0.976	0.90	9411
Ramp	1199	0.90	Level	5	0	0.976	0.90	1517
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4959 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	9411	9400	Yes
				V <sub>12</sub>	4959	4400:All	Yes
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7894	9400	No
				V <sub>R</sub>	1517	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        42.4 (pc/ mi /ln)  
 LOS =        F (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.435 (Exhibit 25-19)  
 S<sub>R</sub> =        55.0 mph (Exhibit 25-19)  
 S<sub>0</sub> =        66.5 mph (Exhibit 25-19)  
 S =        59.9 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2030
Project Description No Build Scenario			

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level  <div style="text-align: center;"> <math>S_{FF} = 65.0 \text{ mph}</math>                      <math>S_{FR} = 45.0 \text{ mph}</math> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	---	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6937	0.90	Level	5	0	0.976	0.90	8778
Ramp	311	0.90	Level	5	0	0.976	0.90	394
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.292 using Equation 4  
 V<sub>12</sub> = 2567 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	9172	See Exhibit 25-7	No
V <sub>R12</sub>	2961	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 25.3 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.351 (Exhibit 25-19)  
 S<sub>R</sub> = 56.9 mph (Exhibit 25-19)  
 S<sub>0</sub> = 53.6 mph (Exhibit 25-19)  
 S = 54.7 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst: Analyst2  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: PM

### Site Information

Freeway/Dir of Travel: Southbound  
 Junction: Avalon On Ramp  
 Jurisdiction: Caltrans  
 Analysis Year: 2030

Project Description: No Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level    <div style="text-align: center;">                     S<sub>FF</sub> = 65.0 mph                      S<sub>FR</sub> = 45.0 mph                      Sketch ( show lanes, L<sub>A</sub>, L<sub>D</sub>, V<sub>R</sub>, V<sub>f</sub>)                 </div>	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7437	0.90	Level	5	0	0.976	0.90	9411
Ramp	747	0.90	Level	5	0	0.976	0.90	945
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.224 using Equation 4  
 V<sub>12</sub> = 2104 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	10356	See Exhibit 25-7	Yes
V <sub>R12</sub>	3049	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 25.7 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.358 (Exhibit 25-19)  
 S<sub>R</sub> = 56.8 mph (Exhibit 25-19)  
 S<sub>0</sub> = 50.4 mph (Exhibit 25-19)  
 S = 52.1 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Southbound			
Agency or Company	Kaku Associates			Junction	Carson Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	AM			Analysis Year	2030			
Project Description No Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain					Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
$VD =$	veh/h							
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF$ $f_{HV} f_p$
Freeway	6358	0.90	Level	5	0	0.976	0.90	8046
Ramp	340	0.90	Level	5	0	0.976	0.90	430
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 3751$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	8046	9400	No	
				$V_{12}$	3751	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F -$	7616	9400	No	
				$V_R$	430	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 32.0$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS= D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.337$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 57.3$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 66.8$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 62.0$ mph (Exhibit 25-15)				



RAMPS AND RAMP JUNCTIONS WORKSHEET																																																														
General Information				Site Information																																																										
Analyst	Anjum			Freeway/Dir of Travel	Southbound																																																									
Agency or Company	Kaku Associates			Junction	Avalon Off Ramp																																																									
Date Performed	9/13/2006			Jurisdiction	Caltrans																																																									
Analysis Time Period	PM			Analysis Year	2030																																																									
Project Description No Build Scenario																																																														
Inputs																																																														
Upstream Adj Ramp		Terrain				Downstream Adj Ramp																																																								
<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off					<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off																																																							
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft																																																							
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )																																																												
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th colspan="9">Conversion to pc/h Under Base Conditions</th> </tr> <tr> <th>(pc/h)</th> <th>V (Veh/hr)</th> <th>PHF</th> <th>Terrain</th> <th>Truck</th> <th>%Rv</th> <th><math>f_{HV}</math></th> <th><math>f_p</math></th> <th><math>v=V/PHF</math> <math>f_{HV} f_p</math></th> </tr> </thead> <tbody> <tr> <td>Freeway</td> <td>7183</td> <td>0.90</td> <td>Level</td> <td>5</td> <td>0</td> <td>0.976</td> <td>0.90</td> <td>9090</td> </tr> <tr> <td>Ramp</td> <td>262</td> <td>0.90</td> <td>Level</td> <td>5</td> <td>0</td> <td>0.976</td> <td>0.90</td> <td>332</td> </tr> <tr> <td>UpStream</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>DownStream</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>									Conversion to pc/h Under Base Conditions									(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF$ $f_{HV} f_p$	Freeway	7183	0.90	Level	5	0	0.976	0.90	9090	Ramp	262	0.90	Level	5	0	0.976	0.90	332	UpStream									DownStream								
Conversion to pc/h Under Base Conditions																																																														
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Freeway	7183	0.90	Level	5	0	0.976	0.90	9090																																																						
Ramp	262	0.90	Level	5	0	0.976	0.90	332																																																						
UpStream																																																														
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Merge Areas				Diverge Areas																																																										
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<b>Capacity Checks</b> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Actual</th> <th>Maximum</th> <th>LOS F?</th> </tr> </thead> <tbody> <tr> <td><math>V_{FO}</math></td> <td></td> <td>See Exhibit 25-7</td> <td></td> </tr> <tr> <td><math>V_{R12}</math></td> <td></td> <td>4600:All</td> <td></td> </tr> </tbody> </table>					Actual	Maximum	LOS F?	$V_{FO}$		See Exhibit 25-7		$V_{R12}$		4600:All		<b>Capacity Checks</b> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Actual</th> <th>Maximum</th> <th>LOS F?</th> </tr> </thead> <tbody> <tr> <td><math>V_{FI} = V_F</math></td> <td>9090</td> <td>9400</td> <td>No</td> </tr> <tr> <td><math>V_{12}</math></td> <td>4150</td> <td>4400:All</td> <td>No</td> </tr> <tr> <td><math>V_{FO} = V_F - V_R</math></td> <td>8758</td> <td>9400</td> <td>No</td> </tr> <tr> <td><math>V_R</math></td> <td>332</td> <td>2100</td> <td>No</td> </tr> </tbody> </table>						Actual	Maximum	LOS F?	$V_{FI} = V_F$	9090	9400	No	$V_{12}$	4150	4400:All	No	$V_{FO} = V_F - V_R$	8758	9400	No	$V_R$	332	2100	No																						
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<b>Level of Service Determination (if not F)</b> $D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/ mi /ln) LOS = (Exhibit 25-4)				<b>Level of Service Determination (if not F)</b> $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ $D_R = 35.4$ (pc/ mi /ln) LOS = E (Exhibit 25-4)																																																										
<b>Speed Estimation</b> $M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)				<b>Speed Estimation</b> $D_s = 0.328$ (Exhibit 25-19) $S_R = 57.5$ mph (Exhibit 25-19) $S_0 = 65.6$ mph (Exhibit 25-19) $S = 61.6$ mph (Exhibit 25-15)																																																										

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum			Freeway/Dir of Travel		Southbound			
Agency or Company	Kaku Associates			Junction		Carson On Ramp			
Date Performed	9/13/2006			Jurisdiction		Caltrans			
Analysis Time Period	AM			Analysis Year		2030			
Project Description No Build Scenario									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =    ft V <sub>u</sub> =    veh/h		Terrain Level   $S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )					Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =    ft V <sub>D</sub> =    veh/h		
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	6358	0.90	Level	5	0	0.976	0.90	8046	
Ramp	780	0.90	Level	5	0	0.976	0.90	987	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.218 using Equation 4 V <sub>12</sub> = 1757 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	9033	See Exhibit 25-7	No		V <sub>F1</sub> =V <sub>F</sub>	See Exhibit 25-14			
					V <sub>12</sub>	4400:All			
V <sub>R12</sub>	2744	4600:All	No		V <sub>FO</sub> = V <sub>F</sub> -	See Exhibit 25-14			
					V <sub>R</sub>	See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 23.3 (pc/ m/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/ m/ln) LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> = 0.337 (Exhibit 25-19) S <sub>R</sub> = 57.3 mph (Exhibit 25-19) S <sub>0</sub> = 53.4 mph (Exhibit 25-19) S = 54.5 mph (Exhibit 25-14)					D <sub>s</sub> = (Exhibit 25-19) S <sub>R</sub> = mph (Exhibit 25-19) S <sub>0</sub> = mph (Exhibit 25-19) S = mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum			Freeway/Dir of Travel		Southbound			
Agency or Company	Kaku Associates			Junction		Carson On Ramp			
Date Performed	9/13/2006			Jurisdiction		Caltrans			
Analysis Time Period	PM			Analysis Year		2030			
Project Description No Build Scenario									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h		Terrain Level  <div style="text-align: center;"> <math>S_{FF} = 65.0 \text{ mph}</math>                      <math>S_{FR} = 45.0 \text{ mph}</math> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )					Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h		
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	7183	0.90	Level	5	0	0.976	0.90	9090	
Ramp	875	0.90	Level	5	0	0.976	0.90	1107	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.203 using Equation 4 V <sub>12</sub> = 1848 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	10197	See Exhibit 25-7	Yes	V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14			
				V <sub>12</sub>		4400:All			
V <sub>R12</sub>	2955	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> -		See Exhibit 25-14			
				V <sub>R</sub>		See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        24.9 (pc/ m/ln) LOS =        F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        (pc/ m/ln) LOS =        (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> =        0.351 (Exhibit 25-19) S <sub>R</sub> =        56.9 mph (Exhibit 25-19) S <sub>0</sub> =        50.5 mph (Exhibit 25-19) S =        52.2 mph (Exhibit 25-14)					D <sub>s</sub> =        (Exhibit 25-19) S <sub>R</sub> =        mph (Exhibit 25-19) S <sub>0</sub> =        mph (Exhibit 25-19) S =        mph (Exhibit 25-15)				

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency/Company	Kaku Associates	Weaving Seg Location	Carson St to Avalon Bl
Date Performed	9/14/2006	Jurisdiction	Caltrans
Analysis Time Period	AM No Build Scenario	Analysis Year	2030

### Inputs

Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.14
Weaving seg length, L (ft)	1600	Weaving ratio, R	0.38
Terrain	Level		

### Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6442	0.90	5	0	1.5	1.2	0.976	0.90	8151
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	624	0.90	5	0	1.5	1.2	0.976	0.90	789
Vw2	383	0.90	5	0	1.5	1.2	0.976	0.90	484
Vw				1273	Vnw				8151
V									9424

### Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.98	0.50		
Weaving and non-weaving speeds, Si (mi/h)	42.71	51.57		

Number of lanes required for unconstrained operation, Nw	0.33
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 200px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

### Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment speed, S (mi/h)	50.17
Weaving segment density, D (pc/mi/ln)	93.93
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

### Notes

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency/Company	Kaku Associates	Weaving Seg Location	Carson St to Avalon Bl
Date Performed	9/14/2006	Jurisdiction	Caltrans
Analysis Time Period	PM No Build Scenario	Analysis Year	2030

### Inputs

Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.15
Weaving seg length, L (ft)	1600	Weaving ratio, R	0.47
Terrain	Level		

### Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v	
Vo1	6404	0.90	5	0	1.5	1.2	0.976	0.90	8103	
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0	
Vw1	617	0.90	5	0	1.5	1.2	0.976	0.90	780	
Vw2	556	0.90	5	0	1.5	1.2	0.976	0.90	703	
Vw				1483	Vnw				8103	
V										9586

### Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.03	0.57		
Weaving and non-weaving speeds, Si (mi/h)	42.03	50.07		

Number of lanes required for unconstrained operation, Nw	0.39
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 200px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

### Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment speed, S (mi/h)	48.63
Weaving segment density, D (pc/mi/ln)	98.55
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

### Notes

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency/Company	Kaku Associates	Weaving Seg Location	Avalon Bl to Carson St
Date Performed	9/14/2006	Jurisdiction	Caltrans
Analysis Time Period	AM No Build Scenario	Analysis Year	2030

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.10
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.48
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6018	0.90	5	0	1.5	1.2	0.976	0.90	7615
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	340	0.90	5	0	1.5	1.2	0.976	0.90	430
Vw2	311	0.90	5	0	1.5	1.2	0.976	0.90	393
Vw				823	Vnw				7615
V									8438

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.68	0.29		
Weaving and non-weaving speeds, Si (mi/h)	47.79	57.47		

Number of lanes required for unconstrained operation, Nw	0.15
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 100px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	56.36
Weaving segment density, D (pc/mi/ln)	74.86
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency/Company	Kaku Associates	Weaving Seg Location	Avalon Bl to Carson St
Date Performed	9/14/2006	Jurisdiction	Caltrans
Analysis Time Period	PM No Build Scenario	Analysis Year	2030

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.13
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.26
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6921	0.90	5	0	1.5	1.2	0.976	0.90	8758
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	262	0.90	5	0	1.5	1.2	0.976	0.90	331
Vw2	747	0.90	5	0	1.5	1.2	0.976	0.90	945
Vw				1276	Vnw				8758
V									10034

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.81	0.41		
Weaving and non-weaving speeds, Si (mi/h)	45.38	53.96		

Number of lanes required for unconstrained operation, Nw	0.23
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 200px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	52.70
Weaving segment density, D (pc/mi/ln)	95.21
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

**APPENDIX H**

**DESIGN YEAR (2030) BUILD ALTERNATIVE  
LEVEL OF SERVICE WORKSHEETS**



## INTERSECTIONS

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	1	1	0	1	1	0	1
Lane group	L	TR		L	T	R	L		R	L		R
Volume (vph)	116	962	11	3	1045	288	5		0	23		405
% Heavy veh	0	0	0	0	0	0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90		0.90
Actuated (P/A)	P	P	A	P	P	A	P		P	P		P
Startup lost time	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Ext. eff. green	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Arrival type	3	3		3	3	3	3		3	3		3
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0		12.0	12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0	0	0		0	0		0
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Phasing	EW Perm	EW Perm	03	04	NS Perm	06	07	08				
Timing	G = 11.5	G = 31.7	G =	G =	G = 7.8	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	129	1081		3	1161	320	6		0	26		450
Lane group cap.	346	2781		266	1912	1615	235		1615	235		1615
v/c ratio	0.37	0.39		0.01	0.61	0.20	0.03		0.00	0.11		0.28
Green ratio	0.19	0.77		0.53	0.53	1.00	0.13		1.00	0.13		1.00
Unif. delay d1	21.1	2.3		6.7	9.8	0.0	22.8		0.0	23.0		0.0
Delay factor k	0.50	0.50		0.50	0.50	0.11	0.50		0.11	0.50		0.50
Increm. delay d2	3.1	0.4		0.1	1.4	0.1	0.2		0.0	1.0		0.4
PF factor	1.000	1.000		1.000	1.000	0.950	1.000		0.950	1.000		0.950
Control delay	24.2	2.7		6.8	11.3	0.1	23.0		0.0	24.0		0.4
Lane group LOS	C	A		A	B	A	C		A	C		A
Apprch. delay	5.0			8.8			23.0			1.7		
Approach LOS	A			A			C			A		
Intersec. delay	6.3			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	1	1	0	1	1	0	1
Lane group	L	TR		L	T	R	L		R	L		R
Volume (vph)	132	1040	8	1	775	344	23		5	32		450
% Heavy veh	0	0	0	0	0	0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90		0.90
Actuated (P/A)	P	P	A	P	P	A	P		P	P		P
Startup lost time	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Ext. eff. green	2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0		2.0
Arrival type	3	3		3	3	3	3		3	3		3
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0		12.0	12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0	0	0		0	0		0
Unit Extension	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Phasing	EW Perm	EW Perm	03	04	NS Perm	06	07	08				
Timing	G = 11.5	G = 31.7	G =	G =	G = 7.8	G =	G =	G =				
	Y = 3	Y = 3	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	147	1165		1	861	382	26		6	36		500
Lane group cap.	346	2782		245	1912	1615	235		1615	235		1615
v/c ratio	0.42	0.42		0.00	0.45	0.24	0.11		0.00	0.15		0.31
Green ratio	0.19	0.77		0.53	0.53	1.00	0.13		1.00	0.13		1.00
Unif. delay d1	21.3	2.3		6.7	8.8	0.0	23.0		0.0	23.2		0.0
Delay factor k	0.50	0.50		0.50	0.50	0.11	0.50		0.11	0.50		0.50
Increm. delay d2	3.8	0.5		0.0	0.8	0.1	1.0		0.0	1.4		0.5
PF factor	1.000	1.000		1.000	1.000	0.950	1.000		0.950	1.000		0.950
Control delay	25.1	2.8		6.7	9.5	0.1	24.0		0.0	24.5		0.5
Lane group LOS	C	A		A	A	A	C		A	C		A
Apprch. delay	5.3			6.6			19.5			2.1		
Approach LOS	A			A			B			A		
Intersec. delay	5.4			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	1	1	3	0	1	0	1	0	0	0
Lane group	L	TR	R	L	TR		L		R			
Volume (vph)	8	857	583	83	1401	10	74		199			
% Heavy veh	0	0	0	0	0	0	0		0			
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90			
Actuated (P/A)	P	P	P	P	P	P	P		P			
Startup lost time	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Ext. eff. green	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Arrival type	3	3	3	3	3		3		3			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N		N
Parking/hr												
Bus stops/hr	0	0	0	0	0		0		0			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Phasing	WB Only	EW Perm	03		04		NB Only	06		07		08
Timing	G = 7.8	G = 54.0	G =		G =		G = 9.2	G =		G =		G =
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y =		Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 80.0					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	9	952	648	92	1568		82		221			
Lane group cap.	192	2442	1090	176	4188		208		1615			
v/c ratio	0.05	0.39	0.59	0.52	0.37		0.39		0.14			
Green ratio	0.68	0.68	0.68	0.10	0.81		0.11		1.00			
Unif. delay d1	4.4	5.7	7.1	34.3	2.1		32.8		0.0			
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50		0.11			
Increm. delay d2	0.5	0.5	2.4	10.7	0.3		5.5		0.0			
PF factor	1.000	1.000	1.000	1.000	1.000		1.000		0.950			
Control delay	4.8	6.2	9.4	45.0	2.3		38.3		0.0			
Lane group LOS	A	A	A	D	A		D		A			
Apprch. delay	7.5			4.7			10.4					
Approach LOS	A			A			B					
Intersec. delay	6.4			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Carson St & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	1	1	3	0	1	0	1	0	0	0
Lane group	L	TR	R	L	TR		L		R			
Volume (vph)	6	1072	577	80	1194	16	60		97			
% Heavy veh	0	0	0	0	0	0	0		0			
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90			
Actuated (P/A)	P	P	P	P	P	P	P		P			
Startup lost time	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Ext. eff. green	2.0	2.0	2.0	2.0	2.0		2.0		2.0			
Arrival type	3	3	3	3	3		3		3			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N		N
Parking/hr												
Bus stops/hr	0	0	0	0	0		0		0			
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0		3.0			
Phasing	WB Only	EW Perm	03		04		NB Only	06		07		08
Timing	G = 7.8	G = 54.0	G =		G =		G = 9.2	G =		G =		G =
	Y = 3	Y = 3	Y =		Y =		Y = 3	Y =		Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 80.0					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	7	1191	641	89	1345		67		108			
Lane group cap.	244	2442	1090	176	4184		208		1615			
v/c ratio	0.03	0.49	0.59	0.51	0.32		0.32		0.07			
Green ratio	0.68	0.68	0.68	0.10	0.81		0.11		1.00			
Unif. delay d1	4.3	6.3	7.0	34.3	2.0		32.5		0.0			
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50		0.11			
Increm. delay d2	0.2	0.7	2.3	10.0	0.2		4.1		0.0			
PF factor	1.000	1.000	1.000	1.000	1.000		1.000		0.950			
Control delay	4.5	7.0	9.3	44.3	2.2		36.6		0.0			
Lane group LOS	A	A	A	D	A		D		A			
Apprch. delay	7.8			4.8			14.0					
Approach LOS	A			A			B					
Intersec. delay	6.9			Intersection LOS						A		

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	1	2	2	1	1	3	1	1	3	1	
Lane group	L	T	R	L	T	R	L	T	R	L	T	R	
Volume (vph)	195	729	55	331	750	126	109	918	398	160	735	137	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Arrival type	3	3	3	3	3	3	3	3	3	3	3	3	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.0	G = 16.2	G =			G =			G = 7.1	G = 17.7	G =		
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		
Duration of Analysis (hrs) = 0.25							Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	217	810	61	368	833	140	121	1020	442	178	817	152	
Lane group cap.	409	977	436	409	977	436	214	1527	476	214	1527	476	
v/c ratio	0.53	0.83	0.14	0.90	0.85	0.32	0.57	0.67	0.93	0.83	0.54	0.32	
Green ratio	0.12	0.27	0.27	0.12	0.27	0.27	0.12	0.30	0.30	0.12	0.30	0.30	
Unif. delay d1	25.0	20.6	16.6	26.2	20.8	17.5	25.0	18.6	20.5	25.9	17.7	16.5	
Delay factor k	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
Increm. delay d2	4.9	8.1	0.7	25.3	9.3	1.9	10.4	2.3	26.8	29.8	1.3	1.8	
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Control delay	29.8	28.7	17.3	51.5	30.1	19.4	35.4	20.9	47.3	55.7	19.1	18.2	
Lane group LOS	C	C	B	D	C	B	D	C	D	E	B	B	
Apprch. delay	28.3			34.9			29.4			24.6			
Approach LOS	C			C			C			C			
Intersec. delay	29.5			Intersection LOS						C			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	PM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	1	2	2	1	1	3	1	1	3	1	
Lane group	L	T	R	L	T	R	L	T	R	L	T	R	
Volume (vph)	331	944	119	269	789	185	199	880	281	278	932	282	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Arrival type	3	3	3	3	3	3	3	3	3	3	3	3	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 9.8	G = 20.2	G =			G =			G = 14.1	G = 13.9	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 70.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	368	1049	132	299	877	206	221	978	312	309	1036	313	
Lane group cap.	491	1044	466	491	1044	466	364	1028	321	364	1028	321	
v/c ratio	0.75	1.00	0.28	0.61	0.84	0.44	0.61	0.95	0.97	0.85	1.01	0.98	
Green ratio	0.14	0.29	0.29	0.14	0.29	0.29	0.20	0.20	0.20	0.20	0.20	0.20	
Unif. delay d1	28.9	24.9	19.3	28.3	23.4	20.3	25.4	27.7	27.9	26.9	28.0	27.9	
Delay factor k	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
Increm. delay d2	10.1	29.0	1.5	5.5	8.1	3.0	7.3	18.5	43.6	21.2	30.0	44.3	
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Control delay	39.0	53.9	20.8	33.8	31.5	23.3	32.8	46.3	71.5	48.1	58.0	72.2	
Lane group LOS	D	D	C	C	C	C	C	D	E	D	E	E	
Apprch. delay	47.6			30.8			49.5			58.9			
Approach LOS	D			C			D			E			
Intersec. delay	47.3			Intersection LOS						D			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Main St & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	0	2	2	0	1	3	0	1	3	0	
Lane group	L	TR		L	TR		L	TR		L	TR		
Volume (vph)	231	612	60	138	811	156	154	719	150	93	573	208	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Arrival type	3	3		3	3		3	3		3	3		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0		0	0		0	0		0	0		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 8.9	G = 21.7	G =			G =			G = 13.7	G = 13.7	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 70.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	257	747		153	1074		171	966		103	868		
Lane group cap.	446	1106		446	1094		353	987		353	973		
v/c ratio	0.58	0.68		0.34	0.98		0.48	0.98		0.29	0.89		
Green ratio	0.13	0.31		0.13	0.31		0.20	0.20		0.20	0.20		
Unif. delay d1	28.8	21.1		27.9	24.0		25.0	28.0		24.0	27.4		
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50		
Increm. delay d2	5.3	3.3		2.1	23.2		4.7	24.0		2.1	12.2		
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000		
Control delay	34.1	24.4		30.0	47.1		29.7	52.0		26.1	39.6		
Lane group LOS	C	C		C	D		C	D		C	D		
Apprch. delay	26.9			45.0			48.6			38.2			
Approach LOS	C			D			D			D			
Intersec. delay	40.2			Intersection LOS						D			



SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Main St & Carson St						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	PM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	0	2	2	0	1	3	0	1	3	0	
Lane group	L	TR		L	TR		L	TR		L	TR		
Volume (vph)	375	1090	178	266	814	160	225	772	160	205	969	472	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Arrival type	3	3		3	3		3	3		3	3		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0		0	0		0	0		0	0		
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.2	G = 29.5	G =			G =			G = 7.5	G = 23.8	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	417	1409		296	1082		250	1036		228	1601		
Lane group cap.	315	1306		315	1301		169	1500		169	1464		
v/c ratio	1.32	1.08		0.94	0.83		1.48	0.69		1.35	1.09		
Green ratio	0.09	0.37		0.09	0.37		0.09	0.30		0.09	0.30		
Unif. delay d1	36.4	25.3		36.2	23.0		36.3	24.8		36.3	28.1		
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50		
Increm. delay d2	166.2	49.1		37.4	6.3		244.7	2.6		191.0	53.4		
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000		
Control delay	202.6	74.4		73.6	29.3		280.9	27.5		227.2	81.5		
Lane group LOS	F	E		E	C		F	C		F	F		
Apprch. delay	103.6			38.8			76.7			99.7			
Approach LOS	F			D			E			F			
Intersec. delay	82.9			Intersection LOS						F			

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & 213th St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	1	2	0	1	3	0	1	2	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	161	167	70	100	158	97	86	1114	208	76	1079	80
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 15.3	G =	G =	G =	G = 7.0	G = 28.7	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25							Cycle Length C = 60.0					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	179	264		111	284		96	1469		84	1288	
Lane group cap.	261	463		200	870		211	2417		211	1712	
v/c ratio	0.69	0.57		0.56	0.33		0.45	0.61		0.40	0.75	
Green ratio	0.25	0.25		0.25	0.25		0.12	0.48		0.12	0.48	
Unif. delay d1	20.2	19.5		19.4	18.2		24.7	11.5		24.5	12.8	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	13.7	5.0		10.7	1.0		6.9	1.1		5.5	3.1	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	33.9	24.5		30.1	19.2		31.6	12.7		30.1	15.9	
Lane group LOS	C	C		C	B		C	B		C	B	
Apprch. delay	28.3			22.2			13.8			16.7		
Approach LOS	C			C			B			B		
Intersec. delay	17.5			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & 213th St					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	1	2	0	1	3	0	1	2	0
Lane group	L	TR		L	TR		L	TR		L	TR	
Volume (vph)	142	191	72	151	155	110	179	1265	222	182	1377	161
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext. eff. green	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Arrival type	3	3		3	3		3	3		3	3	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0		0	0		0	0	
Unit Extension	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 23.0	G =	G =	G =	G = 12.5	G = 45.5	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	158	292		168	294		199	1653		202	1709	
Lane group cap.	238	466		160	867		251	2558		251	1800	
v/c ratio	0.66	0.63		1.05	0.34		0.79	0.65		0.80	0.95	
Green ratio	0.26	0.26		0.26	0.26		0.14	0.51		0.14	0.51	
Unif. delay d1	30.0	29.7		33.5	27.3		37.5	16.3		37.6	21.2	
Delay factor k	0.50	0.50		0.50	0.50		0.50	0.50		0.50	0.50	
Increm. delay d2	13.7	6.2		85.0	1.1		22.2	1.3		23.4	12.2	
PF factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Control delay	43.7	35.9		118.5	28.4		59.7	17.6		60.9	33.4	
Lane group LOS	D	D		F	C		E	B		E	C	
Apprch. delay	38.7			61.2			22.1			36.3		
Approach LOS	D			E			C			D		
Intersec. delay	33.4			Intersection LOS						C		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	2	0	1	2	2	0	0	3	1
Lane group				L		R	L	T			T	R
Volume (vph)				198		622	609	1540			985	401
% Heavy veh				0		0	0	0			0	0
PHF				0.90		0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P		P	P	P			P	P
Startup lost time				2.0		2.0	2.0	2.0			2.0	2.0
Ext. eff. green				2.0		2.0	2.0	2.0			2.0	2.0
Arrival type				3		3	3	3			3	3
Unit Extension				3.0		3.0	3.0	3.0			3.0	3.0
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width				12.0		12.0	12.0	12.0			12.0	12.0
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr				0		0	0	0			0	0
Unit Extension				3.0		3.0	3.0	3.0			3.0	3.0
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 11.1	G =	G =	G =	G = 43.9	G = 26.0	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				220		691	677	1711			1094	446
Lane group cap.				432		1615	1013	2931			2525	1041
v/c ratio				0.51		0.43	0.67	0.58			0.43	0.43
Green ratio				0.12		1.00	0.29	0.81			0.49	0.64
Unif. delay d1				36.9		0.0	28.2	3.1			15.0	7.9
Delay factor k				0.50		0.50	0.50	0.50			0.50	0.50
Increm. delay d2				4.2		0.8	3.5	0.9			0.5	1.3
PF factor				1.000		0.950	1.000	1.000			1.000	1.000
Control delay				41.1		0.8	31.7	3.9			15.5	9.1
Lane group LOS				D		A	C	A			B	A
Apprch. delay				10.6			11.8			13.7		
Approach LOS				B			B			B		
Intersec. delay	12.2			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon Bl & I-405 NB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	8/7/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	2	0	1	2	2	0	0	3	1
Lane group				L		R	L	T			T	R
Volume (vph)				433		468	713	1437			1652	827
% Heavy veh				0		0	0	0			0	0
PHF				0.90		0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P		P	P	P			P	P
Startup lost time				2.0		2.0	2.0	2.0			2.0	2.0
Ext. eff. green				2.0		2.0	2.0	2.0			2.0	2.0
Arrival type				3		3	3	3			3	3
Unit Extension				3.0		3.0	3.0	3.0			3.0	3.0
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width				12.0		12.0	12.0	12.0			12.0	12.0
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr				0		0	0	0			0	0
Unit Extension				3.0		3.0	3.0	3.0			3.0	3.0
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 19.8	G =	G =	G =	G = 39.9	G = 21.3	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				481		520	792	1597			1836	919
Lane group cap.				771		1615	830	2581			2295	1125
v/c ratio				0.62		0.32	0.95	0.62			0.80	0.82
Green ratio				0.22		1.00	0.24	0.71			0.44	0.70
Unif. delay d1				31.7		0.0	33.9	6.6			21.6	9.6
Delay factor k				0.50		0.50	0.50	0.50			0.50	0.50
Increm. delay d2				3.8		0.5	21.9	1.1			3.0	6.6
PF factor				1.000		0.950	1.000	1.000			1.000	1.000
Control delay				35.5		0.5	55.8	7.7			24.6	16.2
Lane group LOS				D		A	E	A			C	B
Apprch. delay				17.3			23.7			21.8		
Approach LOS				B			C			C		
Intersec. delay	21.8			Intersection LOS						C		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon/Leandro & I-405 SB					
Agency or Co.	Kaku Associates						Ramp					
Date Performed	8/7/2006					Area Type	All other areas					
Time Period	AM					Jurisdiction						
						Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	2	1	0	0	0	1	2	0	0	2	1
Lane group	L	TR	R				L	TR			T	R
Volume (vph)	886	137	625				101	1282	74		677	471
% Heavy veh	0	0	0				0	0	0		0	0
PHF	0.90	0.90	0.90				0.90	0.90	0.90		0.90	0.90
Actuated (P/A)	P	P	P				P	P	P		P	A
Startup lost time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext. eff. green	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Arrival type	3	3	3				3	3			3	3
Unit Extension	3.0	3.0	3.0				3.0	3.0			3.0	3.0
Ped/Bike/RTOR Volume	0		0	0			0		0	0		0
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0	0				0	0			0	0
Unit Extension	3.0	3.0	3.0				3.0	3.0			3.0	3.0
Phasing	EB Only	02	03	04	Thru & RT	NS Perm	07	08				
Timing	G = 40.3	G =	G =	G =	G = 31.2	G = 9.5	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	984	152	694				112	1506			752	523
Lane group cap.	1569	1620	1615				191	1742			1254	1615
v/c ratio	0.63	0.09	0.43				0.59	0.86			0.60	0.32
Green ratio	0.45	0.45	1.00				0.11	0.49			0.35	1.00
Unif. delay d1	19.1	14.3	0.0				38.4	20.5			24.2	0.0
Delay factor k	0.50	0.50	0.50				0.50	0.50			0.50	0.11
Increm. delay d2	1.9	0.1	0.8				12.5	6.0			2.1	0.1
PF factor	1.000	1.000	0.950				1.000	1.000			1.000	0.950
Control delay	21.0	14.4	0.8				50.9	26.5			26.4	0.1
Lane group LOS	C	B	A				D	C			C	A
Apprch. delay	12.8						28.2			15.6		
Approach LOS	B						C			B		
Intersec. delay	18.8			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Avalon/Leandro & I-405 SB					
Agency or Co.	Kaku Associates						Ramp					
Date Performed	8/7/2006					Area Type	All other areas					
Time Period	PM					Jurisdiction						
						Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	2	2	1	0	0	0	1	2	0	0	2	1
Lane group	L	TR	R				L	TR			T	R
Volume (vph)	739	440	716				173	1413	73		1084	956
% Heavy veh	0	0	0				0	0	0		0	0
PHF	0.90	0.90	0.90				0.90	0.90	0.90		0.90	0.90
Actuated (P/A)	P	P	P				P	P	P		P	A
Startup lost time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext. eff. green	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Arrival type	3	3	3				3	3			3	3
Unit Extension	3.0	3.0	3.0				3.0	3.0			3.0	3.0
Ped/Bike/RTOR Volume	0		0	0			0		0	0		0
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0	0				0	0			0	0
Unit Extension	3.0	3.0	3.0				3.0	3.0			3.0	3.0
Phasing	EB Only	02	03	04	Thru & RT	NS Perm	07	08				
Timing	G = 35.1	G =	G =	G =	G = 34.5	G = 11.4	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	821	489	796				192	1651			1204	1062
Lane group cap.	1367	1411	1615				229	1951			1387	1615
v/c ratio	0.60	0.35	0.49				0.84	0.85			0.87	0.66
Green ratio	0.39	0.39	1.00				0.13	0.54			0.38	1.00
Unif. delay d1	21.9	19.4	0.0				38.4	17.4			25.6	0.0
Delay factor k	0.50	0.50	0.50				0.50	0.50			0.50	0.23
Increm. delay d2	2.0	0.7	1.1				29.1	4.8			7.6	1.0
PF factor	1.000	1.000	0.950				1.000	1.000			1.000	0.950
Control delay	23.8	20.0	1.1				67.5	22.1			33.2	1.0
Lane group LOS	C	C	A				E	C			C	A
Apprch. delay	14.3						26.9			18.1		
Approach LOS	B						C			B		
Intersec. delay	19.4			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Lenardo Dr & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	9/8/2006					Jurisdiction	All other areas					
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	3	0	0	2	1	0	0	0	2	0	1
Lane group		T			T	R				L		R
Volume (vph)		304			254	319				1344		132
% Heavy veh		0			0	0				0		0
PHF		0.90			0.90	0.90				0.90		0.90
Actuated (P/A)		P			P	P				P		P
Startup lost time		2.0			2.0	2.0				2.0		2.0
Ext. eff. green		2.0			2.0	2.0				2.0		2.0
Arrival type		3			3	3				3		3
Unit Extension		3.0			3.0	3.0				3.0		3.0
Ped/Bike/RTOR Volume				0		0	0			0		0
Lane Width		12.0			12.0	12.0				12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr		0			0	0				0		0
Unit Extension		3.0			3.0	3.0				3.0		3.0
Phasing	Thru & RT	02	03	04	SB Only	06	07	08				
Timing	G = 15.7	G =	G =	G =	G = 69.3	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 91.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate		338			282	354				1493		147
Lane group cap.		893			624	1615				2669		1615
v/c ratio		0.38			0.45	0.22				0.56		0.09
Green ratio		0.17			0.17	1.00				0.76		1.00
Unif. delay d1		33.3			33.8	0.0				4.5		0.0
Delay factor k		0.50			0.50	0.50				0.50		0.50
Increm. delay d2		1.2			2.4	0.3				0.9		0.1
PF factor		1.000			1.000	0.950				1.000		0.950
Control delay		34.6			36.1	0.3				5.4		0.1
Lane group LOS		C			D	A				A		A
Apprch. delay	34.6			16.2						4.9		
Approach LOS	C			B						A		
Intersec. delay	11.5			Intersection LOS						B		



SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Lenardo Dr & I-405 SB					
Agency or Co.	Kaku Associates					Area Type	Ramps					
Date Performed	9/8/2006					Jurisdiction	All other areas					
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	3	0	0	2	1	0	0	0	2	0	1
Lane group		T			T	R				L		R
Volume (vph)		906			556	573				988		308
% Heavy veh		0			0	0				0		0
PHF		0.90			0.90	0.90				0.90		0.90
Actuated (P/A)		P			P	P				P		P
Startup lost time		2.0			2.0	2.0				2.0		2.0
Ext. eff. green		2.0			2.0	2.0				2.0		2.0
Arrival type		3			3	3				3		3
Unit Extension		3.0			3.0	3.0				3.0		3.0
Ped/Bike/RTOR Volume				0		0	0			0		0
Lane Width		12.0			12.0	12.0				12.0		12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr		0			0	0				0		0
Unit Extension		3.0			3.0	3.0				3.0		3.0
Phasing	Thru & RT	02	03	04	SB Only	06	07	08				
Timing	G = 42.1	G =	G =	G =	G = 41.9	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate		1007			618	637				1098		342
Lane group cap.		2421			1692	1615				1632		1615
v/c ratio		0.42			0.37	0.39				0.67		0.21
Green ratio		0.47			0.47	1.00				0.47		1.00
Unif. delay d1		15.8			15.4	0.0				18.7		0.0
Delay factor k		0.50			0.50	0.50				0.50		0.50
Increm. delay d2		0.5			0.6	0.7				2.2		0.3
PF factor		1.000			1.000	0.950				1.000		0.950
Control delay		16.4			16.0	0.7				20.9		0.3
Lane group LOS		B			B	A				C		A
Apprch. delay	16.4			8.2						16.0		
Approach LOS	B			A						B		
Intersec. delay	13.5			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Torrance Bl					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	1	0	2	1	1	1	2	1
Lane group	L	TR			LTR		L	T	R	L	T	R
Volume (vph)	288	20	161	15	90	30	315	972	8	26	778	244
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Ext. eff. green	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival type	3	3			3		3	3	3	3	3	3
Unit Extension	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0			0		0	0	0	0	0	0
Unit Extension	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 25.6	G =	G =	G =	G = 13.4	G = 52.0	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 100.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	320	201		150			350	1080	9	29	864	271
Lane group cap.	270	421		454			470	988	840	242	1881	840
v/c ratio	1.19	0.48		0.33			0.74	1.09	0.01	0.12	0.46	0.32
Green ratio	0.26	0.26		0.26			0.13	0.52	0.52	0.13	0.52	0.52
Unif. delay d1	37.2	31.5		30.2			41.7	24.0	11.6	38.1	15.1	13.8
Delay factor k	0.50	0.50		0.50			0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	114.4	3.8		1.9			10.3	57.5	0.0	1.0	0.8	1.0
PF factor	1.000	1.000		1.000			1.000	1.000	1.000	1.000	1.000	1.000
Control delay	151.6	35.4		32.2			51.9	81.5	11.6	39.1	15.9	14.9
Lane group LOS	F	D		C			D	F	B	D	B	B
Apprch. delay	106.8			32.2			73.9			16.3		
Approach LOS	F			C			E			B		
Intersec. delay	56.7			Intersection LOS						E		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Torrance Bl					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	1	0	2	1	1	1	2	1
Lane group	L	TR			LTR		L	T	R	L	T	R
Volume (vph)	465	61	327	14	46	21	212	961	27	53	1266	420
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
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
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Ext. eff. green	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival type	3	3			3		3	3	3	3	3	3
Unit Extension	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0
Lane Width	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0			0		0	0	0	0	0	0
Unit Extension	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 26.5	G =	G =	G =	G = 9.5	G = 45.0	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 90.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	517	431		90			236	1068	30	59	1407	467
Lane group cap.	387	489		427			370	950	808	191	1809	808
v/c ratio	1.34	0.88		0.21			0.64	1.12	0.04	0.31	0.78	0.58
Green ratio	0.29	0.29		0.29			0.11	0.50	0.50	0.11	0.50	0.50
Unif. delay d1	31.8	30.3		23.9			38.6	22.5	11.5	37.2	18.4	15.8
Delay factor k	0.50	0.50		0.50			0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	167.8	19.9		1.1			8.2	69.7	0.1	4.2	3.4	3.0
PF factor	1.000	1.000		1.000			1.000	1.000	1.000	1.000	1.000	1.000
Control delay	199.6	50.2		25.0			46.8	92.2	11.5	41.4	21.8	18.8
Lane group LOS	F	D		C			D	F	B	D	C	B
Apprch. delay	131.6			25.0			82.3			21.7		
Approach LOS	F			C			F			C		
Intersec. delay	64.7			Intersection LOS						E		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Lenardo Dr					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	1	0	1	0	2	1	1	2	0
Lane group				L		R		T	R	L	T	
Volume (vph)				227		103		1010	246	89	829	
% Heavy veh				0		0		0	0	0	0	
PHF				0.90		0.90		0.90	0.90	0.90	0.90	
Actuated (P/A)				P		P		P	P	P	P	
Startup lost time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext. eff. green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0			0		0	0		0			
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr				0		0		0	0	0	0	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Phasing	WB Only	02	03	04	NS Perm	06	07	08				
Timing	G = 15.0	G =	G =	G =	G = 39.0	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				252		114		1122	273	99	921	
Lane group cap.				451		404		2352	1615	256	2352	
v/c ratio				0.56		0.28		0.48	0.17	0.39	0.39	
Green ratio				0.25		0.25		0.65	1.00	0.65	0.65	
Unif. delay d1				19.6		18.2		5.3	0.0	4.9	4.9	
Delay factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Increm. delay d2				4.9		1.7		0.7	0.2	4.4	0.5	
PF factor				1.000		1.000		1.000	0.950	1.000	1.000	
Control delay				24.5		19.9		6.0	0.2	9.3	5.4	
Lane group LOS				C		B		A	A	A	A	
Apprch. delay				23.1			4.9			5.8		
Approach LOS				C			A			A		
Intersec. delay	7.6			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & Lenardo Dr					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	1	0	1	0	2	1	1	2	0
Lane group				L		R		T	R	L	T	
Volume (vph)				547		216		810	560	171	1189	
% Heavy veh				0		0		0	0	0	0	
PHF				0.90		0.90		0.90	0.90	0.90	0.90	
Actuated (P/A)				P		P		P	P	P	P	
Startup lost time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext. eff. green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0			0		0	0		0			
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N		N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr				0		0		0	0	0	0	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Phasing	WB Only	02	03	04	NS Perm	06	07	08				
Timing	G = 31.1	G =	G =	G =	G = 42.9	G =	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y =	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				608		240		900	622	190	1321	
Lane group cap.				702		628		1940	1615	246	1940	
v/c ratio				0.87		0.38		0.46	0.39	0.77	0.68	
Green ratio				0.39		0.39		0.54	1.00	0.54	0.54	
Unif. delay d1				22.5		17.6		11.5	0.0	14.7	13.6	
Delay factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Increm. delay d2				13.5		1.8		0.8	0.7	20.7	2.0	
PF factor				1.000		1.000		1.000	0.950	1.000	1.000	
Control delay				36.1		19.3		12.3	0.7	35.3	15.5	
Lane group LOS				D		B		B	A	D	B	
Apprch. delay				31.3			7.5			18.0		
Approach LOS				C			A			B		
Intersec. delay	16.8			Intersection LOS						B		

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	2	1	1	2	1	1	3	1	2	3	0	
Lane group	L	T	R	L	T	R	L	T	R	L	TR		
Volume (vph)	172	488	97	320	737	122	160	563	180	147	614	206	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Arrival type	3	3	3	3	3	3	3	3	3	3	3		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 12.0	G = 13.8	G =			G =			G = 7.3	G = 14.9	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	191	542	108	356	819	136	178	626	200	163	911		
Lane group cap.	361	832	649	361	832	649	220	1285	805	426	1237		
v/c ratio	0.53	0.65	0.17	0.99	0.98	0.21	0.81	0.49	0.25	0.38	0.74		
Green ratio	0.20	0.23	0.40	0.20	0.23	0.40	0.12	0.25	0.50	0.12	0.25		
Unif. delay d1	21.5	20.9	11.5	23.9	23.0	11.7	25.7	19.3	8.6	24.3	20.7		
Delay factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50		
Increm. delay d2	5.5	3.9	0.1	44.0	27.6	0.2	26.5	1.3	0.2	2.6	3.9		
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Control delay	26.9	24.9	11.6	67.9	50.6	11.9	52.2	20.6	8.8	26.9	24.7		
Lane group LOS	C	C	B	E	D	B	D	C	A	C	C		
Apprch. delay	23.6			51.3			23.8			25.0			
Approach LOS	C			D			C			C			
Intersec. delay	32.6			Intersection LOS						C			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Avalon Bl & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	PM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	1	2	1	1	2	1	1	3	1	2	3	0	
Lane group	L	T	R	L	T	R	L	T	R	L	TR		
Volume (vph)	328	917	169	197	769	176	242	947	300	203	822	269	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Arrival type	3	3	3	3	3	3	3	3	3	3	3		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0		
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 19.2	G = 24.3	G =			G =			G = 22.3	G = 22.2	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25							Cycle Length C = 100.0						
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	364	1019	188	219	854	196	269	1052	333	226	1212		
Lane group cap.	347	879	801	347	879	801	403	1149	717	782	1106		
v/c ratio	1.05	1.16	0.23	0.63	0.97	0.24	0.67	0.92	0.46	0.29	1.10		
Green ratio	0.19	0.24	0.50	0.19	0.24	0.50	0.22	0.22	0.44	0.22	0.22		
Unif. delay d1	40.4	37.9	14.4	37.1	37.5	14.5	35.5	38.0	19.5	32.3	38.9		
Delay factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50		
Increm. delay d2	61.7	84.3	0.2	8.4	24.2	0.2	8.5	12.7	0.5	0.9	57.2		
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Control delay	102.1	122.2	14.5	45.6	61.7	14.6	44.0	50.7	20.0	33.2	96.1		
Lane group LOS	F	F	B	D	E	B	D	D	B	C	F		
Apprch. delay	104.7			51.7			43.4			86.2			
Approach LOS	F			D			D			F			
Intersec. delay	71.8			Intersection LOS						E			

SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Stamps Dr & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	AM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	2	2	2	1	2	1	2	1	1	1	
Lane group	L	T	R	L	T	R	L	T	R	L	TR	R	
Volume (vph)	27	1334	355	139	1141	11	369	0	152	12	2	31	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Arrival type	3	3	3	3	3	3	3	3	3	3	3	3	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 7.9	G = 42.5	G =			G =			G = 10.1	G = 7.5	G =		
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		
Duration of Analysis (hrs) = 0.25							Cycle Length C = 80.0						
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	30	1482	394	154	1268	12	410	0	169	13	2	34	
Lane group cap.	346	1922	1987	346	1922	1122	443	178	658	228	178	151	
v/c ratio	0.09	0.77	0.20	0.45	0.66	0.01	0.93	0.00	0.26	0.06	0.01	0.23	
Green ratio	0.10	0.53	0.69	0.10	0.53	0.69	0.13	0.09	0.23	0.13	0.09	0.09	
Unif. delay d1	32.8	14.9	4.3	34.0	13.5	3.7	34.6	32.9	25.2	30.8	32.9	33.6	
Delay factor k	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.50	
Increm. delay d2	0.5	3.1	0.0	4.1	1.8	0.0	27.7	0.0	0.2	0.5	0.1	3.4	
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Control delay	33.3	18.0	4.4	38.1	15.3	3.8	62.2	32.9	25.4	31.2	33.0	37.0	
Lane group LOS	C	B	A	D	B	A	E	C	C	C	C	D	
Apprch. delay	15.4			17.7			51.5			35.3			
Approach LOS	B			B			D			D			
Intersec. delay	21.7			Intersection LOS						C			



SHORT REPORT													
General Information						Site Information							
Analyst	Anjum					Intersection	Stamps Dr & Del Amo Bl						
Agency or Co.	Kaku Associates					Area Type	All other areas						
Date Performed	8/7/2006					Jurisdiction							
Time Period	PM					Analysis Year	2030						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Num. of Lanes	2	2	2	2	2	1	2	1	2	1	1	1	
Lane group	L	T	R	L	T	R	L	T	R	L	TR	R	
Volume (vph)	68	667	918	343	1090	28	849	1	272	27	1	69	
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0	
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	
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P	
Startup lost time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Ext. eff. green	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Arrival type	3	3	3	3	3	3	3	3	3	3	3	3	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0		0	0		0	0		0	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N	
Parking/hr													
Bus stops/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Unit Extension	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Phasing	Excl. Left	Thru & RT	03			04			Excl. Left	Thru & RT	07		08
Timing	G = 9.0	G = 20.9	G =			G =			G = 9.7	G = 8.4	G =		G =
	Y = 3	Y = 3	Y =			Y =			Y = 3	Y = 3	Y =		Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adj. flow rate	76	741	1020	381	1211	31	943	1	302	30	1	77	
Lane group cap.	526	1260	1601	526	1260	904	567	266	972	292	266	226	
v/c ratio	0.14	0.59	0.64	0.72	0.96	0.03	1.66	0.00	0.31	0.10	0.00	0.34	
Green ratio	0.15	0.35	0.56	0.15	0.35	0.56	0.16	0.14	0.34	0.16	0.14	0.14	
Unif. delay d1	22.2	16.0	9.0	24.3	19.2	5.9	25.2	22.2	14.6	21.4	22.2	23.3	
Delay factor k	0.50	0.50	0.22	0.50	0.50	0.11	0.50	0.50	0.11	0.50	0.50	0.50	
Increm. delay d2	0.6	2.0	0.9	8.4	17.6	0.0	306.2	0.0	0.2	0.7	0.0	4.1	
PF factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Control delay	22.7	18.0	9.9	32.7	36.8	5.9	331.3	22.2	14.8	22.1	22.2	27.4	
Lane group LOS	C	B	A	C	D	A	F	C	B	C	C	C	
Apprch. delay	13.7			35.2			254.4			25.9			
Approach LOS	B			D			F			C			
Intersec. delay	83.5			Intersection LOS						F			

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 NB Off Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	2	0	1	2	0	0	2	0
Lane group					LTR		L	T			TR	
Volume (vph)				85	361	230	20	896			778	71
% Heavy veh				0	0	0	0	0			0	0
PHF				0.90	0.90	0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P	P	P	P	P			P	P
Startup lost time					2.0		2.0	2.0			2.0	
Ext. eff. green					2.0		2.0	2.0			2.0	
Arrival type					3		3	3			3	
Unit Extension					3.0		3.0	3.0			3.0	
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width					12.0		12.0	12.0			12.0	
Parking/Grade/Parking	N			N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr					0		0	0			0	
Unit Extension					3.0		3.0	3.0			3.0	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 19.0	G =	G =	G =	G = 22.5	G = 9.5	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				751			22	996			943	
Lane group cap.				1080			286	2110			1340	
v/c ratio				0.70			0.08	0.47			0.70	
Green ratio				0.32			0.16	0.58			0.38	
Unif. delay d1				18.0			21.5	7.2			15.9	
Delay factor k				0.50			0.50	0.50			0.50	
Increm. delay d2				3.7			0.5	0.8			3.1	
PF factor				1.000			1.000	1.000			1.000	
Control delay				21.7			22.0	7.9			19.0	
Lane group LOS				C			C	A			B	
Apprch. delay				21.7			8.3			19.0		
Approach LOS				C			A			B		
Intersec. delay	15.7			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 NB Off Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	0	0	0	2	0	1	2	0	0	2	0
Lane group					LTR		L	T			TR	
Volume (vph)				122	93	101	30	832			1474	70
% Heavy veh				0	0	0	0	0			0	0
PHF				0.90	0.90	0.90	0.90	0.90			0.90	0.90
Actuated (P/A)				P	P	P	P	P			P	P
Startup lost time					2.0		2.0	2.0			2.0	
Ext. eff. green					2.0		2.0	2.0			2.0	
Arrival type					3		3	3			3	
Unit Extension					3.0		3.0	3.0			3.0	
Ped/Bike/RTOR Volume	0			0		0				0		0
Lane Width					12.0		12.0	12.0			12.0	
Parking/Grade/Parking	N			N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr					0		0	0			0	
Unit Extension					3.0		3.0	3.0			3.0	
Phasing	WB Only	02	03	04	Thru & RT	NB Only	07	08				
Timing	G = 13.3	G =	G =	G =	G = 49.2	G = 8.5	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 80.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate				351			33	924			1716	
Lane group cap.				562			192	2745			2210	
v/c ratio				0.62			0.17	0.34			0.78	
Green ratio				0.17			0.11	0.76			0.62	
Unif. delay d1				31.0			32.5	3.1			11.3	
Delay factor k				0.50			0.50	0.50			0.50	
Increm. delay d2				5.2			1.9	0.3			2.8	
PF factor				1.000			1.000	1.000			1.000	
Control delay				36.2			34.5	3.5			14.1	
Lane group LOS				D			C	A			B	
Apprch. delay				36.2			4.5			14.1		
Approach LOS				D			A			B		
Intersec. delay	13.6			Intersection LOS						B		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 SB On Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	AM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	0	0	0	2	0	1	2	0
Lane group	L	TR						TR		L	T	
Volume (vph)	32	118	12					865	80	105	821	
% Heavy veh	0	0	0					0	0	0	0	
PHF	0.90	0.90	0.90					0.90	0.90	0.90	0.90	
Actuated (P/A)	P	P	P					P	P	P	P	
Startup lost time	2.0	2.0						2.0		2.0	2.0	
Ext. eff. green	2.0	2.0						2.0		2.0	2.0	
Arrival type	3	3						3		3	3	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0		0			
Lane Width	12.0	12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0						0		0	0	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Phasing	EB Only	02	03	04	Thru & RT	SB Only	07	08				
Timing	G = 11.2	G =	G =	G =	G = 31.7	G = 8.1	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	36	144						1050		117	912	
Lane group cap.	337	350						1887		244	2581	
v/c ratio	0.11	0.41						0.56		0.48	0.35	
Green ratio	0.19	0.19						0.53		0.13	0.71	
Unif. delay d1	20.2	21.5						9.5		24.0	3.3	
Delay factor k	0.50	0.50						0.50		0.50	0.50	
Increm. delay d2	0.6	3.5						1.2		6.6	0.4	
PF factor	1.000	1.000						1.000		1.000	1.000	
Control delay	20.9	25.0						10.6		30.6	3.7	
Lane group LOS	C	C						B		C	A	
Apprch. delay	24.2						10.6			6.7		
Approach LOS	C						B			A		
Intersec. delay	9.9			Intersection LOS						A		

SHORT REPORT												
General Information						Site Information						
Analyst	Anjum					Intersection	Main St & I-405 SB On Ramp					
Agency or Co.	Kaku Associates					Area Type	All other areas					
Date Performed	8/7/2006					Jurisdiction						
Time Period	PM					Analysis Year	2030					
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	1	0	0	0	0	0	2	0	1	2	0
Lane group	L	TR						TR		L	T	
Volume (vph)	50	233	69					796	147	307	1300	
% Heavy veh	0	0	0					0	0	0	0	
PHF	0.90	0.90	0.90					0.90	0.90	0.90	0.90	
Actuated (P/A)	P	P	P					P	P	P	P	
Startup lost time	2.0	2.0						2.0		2.0	2.0	
Ext. eff. green	2.0	2.0						2.0		2.0	2.0	
Arrival type	3	3						3		3	3	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0		0			
Lane Width	12.0	12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0						0		0	0	
Unit Extension	3.0	3.0						3.0		3.0	3.0	
Phasing	EB Only	02	03	04	Thru & RT	SB Only	07	08				
Timing	G = 13.2	G =	G =	G =	G = 24.9	G = 12.9	G =	G =				
	Y = 3	Y =	Y =	Y =	Y = 3	Y = 3	Y =	Y =				
Duration of Analysis (hrs) = 0.25						Cycle Length C = 60.0						
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adj. flow rate	56	336						1047		341	1444	
Lane group cap.	397	404						1466		388	2460	
v/c ratio	0.14	0.83						0.71		0.88	0.59	
Green ratio	0.22	0.22						0.41		0.21	0.68	
Unif. delay d1	18.8	22.3						14.6		22.8	5.1	
Delay factor k	0.50	0.50						0.50		0.50	0.50	
Increm. delay d2	0.7	17.8						3.0		23.5	1.0	
PF factor	1.000	1.000						1.000		1.000	1.000	
Control delay	19.6	40.2						17.6		46.3	6.1	
Lane group LOS	B	D						B		D	A	
Apprch. delay	37.2						17.6			13.8		
Approach LOS	D						B			B		
Intersec. delay	17.9			Intersection LOS						B		

**FREEWAY**

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Northbound			
Agency or Company	Kaku Associates			Junction	Carson Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	AM			Analysis Year	2030			
Project Description Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain				Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off		
$L_{up}$ =	ft	$S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph				$L_{down}$ =	ft	
$V_u$ =	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )				$V_D$ =	veh/h	
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v = V/PHF$ $f_{HV} f_p$
Freeway	7159	0.90	Level	5	0	0.976	0.90	9059
Ramp	316	0.90	Level	5	0	0.976	0.90	400
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation $V_{12} =$ pc/h				$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} = 0.436$ using Equation 8 $V_{12} = 4175$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	9059	9400	No	
				$V_{12}$	4175	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F - V_R$	8659	9400	No	
				$V_R$	400	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/ mi /ln) LOS = (Exhibit 25-4)				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ $D_R = 35.7$ (pc/ mi /ln) LOS = E (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)				$D_s = 0.334$ (Exhibit 25-19) $S_R = 57.3$ mph (Exhibit 25-19) $S_0 = 65.7$ mph (Exhibit 25-19) $S = 61.5$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Northbound			
Agency or Company	Kaku Associates			Junction	Carson Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	PM			Analysis Year	2030			
Project Description Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain					Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off
$L_{up}$ =	ft	$S_{FF}$ = 65.0 mph		$S_{FR}$ = 45.0 mph		$L_{down}$ =	ft	
$V_u$ =	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
$VD$ =	veh/h							
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF$ $f_{HV} f_p$
Freeway	7271	0.90	Level	5	0	0.976	0.90	9201
Ramp	469	0.90	Level	5	0	0.976	0.90	593
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 4346$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	9201	9400	No	
				$V_{12}$	4346	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F - V_R$	8608	9400	No	
				$V_R$	593	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 37.1$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS = E (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.351$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 56.9$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 65.7$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 61.3$ mph (Exhibit 25-15)				



<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	Northbound						
Agency or Company	Kaku Associates	Junction	Carson On Ramp						
Date Performed	9/13/2006	Jurisdiction	Caltrans						
Analysis Time Period	AM	Analysis Year	2030						
Project Description Build Scenario									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h							
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	7159	0.90	Level	5	0	0.976	0.90	9059	
Ramp	383	0.90	Level	5	0	0.976	0.90	485	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.281 using Equation 4 V <sub>12</sub> = 2546 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	9544	See Exhibit 25-7	Yes	V <sub>F1</sub> =V <sub>F</sub>		See Exhibit 25-14			
				V <sub>12</sub>		4400:All			
V <sub>R12</sub>	3031	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14			
				V <sub>R</sub>		See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 25.8 (pc/ m/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/ m/ln) LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> = 0.357 (Exhibit 25-19) S <sub>R</sub> = 56.8 mph (Exhibit 25-19) S <sub>0</sub> = 52.7 mph (Exhibit 25-19) S = 54.0 mph (Exhibit 25-14)					D <sub>s</sub> = (Exhibit 25-19) S <sub>R</sub> = mph (Exhibit 25-19) S <sub>0</sub> = mph (Exhibit 25-19) S = mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	Northbound						
Agency or Company	Kaku Associates	Junction	Carson On Ramp						
Date Performed	9/13/2006	Jurisdiction	Caltrans						
Analysis Time Period	PM	Analysis Year	2030						
Project Description Build Scenario									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =    ft V <sub>u</sub> =    veh/h		Terrain Level   $S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )					Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =    ft V <sub>D</sub> =    veh/h		
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	7271	0.90	Level	5	0	0.976	0.90	9201	
Ramp	556	0.90	Level	5	0	0.976	0.90	704	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.254 using Equation 4 V <sub>12</sub> = 2334 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	9905	See Exhibit 25-7	Yes		V <sub>F1</sub> =V <sub>F</sub>	See Exhibit 25-14			
					V <sub>12</sub>	4400:All			
V <sub>R12</sub>	3038	4600:All	No		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	See Exhibit 25-14			
					V <sub>R</sub>	See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 25.7 (pc/ m/ln) LOS = F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/ m/ln) LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> = 0.357 (Exhibit 25-19) S <sub>R</sub> = 56.8 mph (Exhibit 25-19) S <sub>0</sub> = 51.7 mph (Exhibit 25-19) S = 53.1 mph (Exhibit 25-14)					D <sub>s</sub> = (Exhibit 25-19) S <sub>R</sub> = mph (Exhibit 25-19) S <sub>0</sub> = mph (Exhibit 25-19) S = mph (Exhibit 25-15)				

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2030

Project Description Build Scenario

### Inputs

Upstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft  V <sub>u</sub> =        veh/h	Terrain     <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft  V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7159	0.90	Level	5	0	0.976	0.90	9059
Ramp	763	0.90	Level	5	0	0.976	0.90	966
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4495 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	9059	9400	No
				V <sub>12</sub>	4495	4400:All	Yes
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	8093	9400	No
				V <sub>R</sub>	966	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        38.4 (pc/ mi /ln)  
 LOS =        F (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.385 (Exhibit 25-19)  
 S<sub>R</sub> =        56.1 mph (Exhibit 25-19)  
 S<sub>0</sub> =        66.3 mph (Exhibit 25-19)  
 S =        60.8 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2030

Project Description Build Scenario

Inputs		
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7271	0.90	Level	5	0	0.976	0.90	9201
Ramp	917	0.90	Level	5	0	0.976	0.90	1160
UpStream								
DownStream								

Merge Areas				Diverge Areas			
Estimation of v <sub>12</sub>				Estimation of v <sub>12</sub>			
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h				$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 4666 pc/h			

Capacity Checks				Capacity Checks			
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	9201	9400	No
				V <sub>12</sub>	4666	4400:All	Yes
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	8041	9400	No
				V <sub>R</sub>	1160	2100	No

Level of Service Determination (if not F)		Level of Service Determination (if not F)	
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/ mi /ln) LOS =        (Exhibit 25-4)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        39.9 (pc/ mi /ln) LOS =        F (Exhibit 25-4)		

Speed Estimation		Speed Estimation	
M <sub>S</sub> = (Exhibit 25-19)	D <sub>s</sub> = 0.402 (Exhibit 25-19)	S <sub>R</sub> = 55.7 mph (Exhibit 25-19)	S <sub>0</sub> = 66.4 mph (Exhibit 25-19)
S <sub>R</sub> = mph (Exhibit 25-19)	S = 60.5 mph (Exhibit 25-15)		
S <sub>0</sub> = mph (Exhibit 25-19)			
S = mph (Exhibit 25-14)			

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2  
Agency or Company  
Date Performed  
Analysis Time Period

Anjum  
Kaku Associates  
9/13/2006  
AM

### Site Information

Freeway/Dir of Travel  
Junction  
Jurisdiction  
Analysis Year

Northbound  
Avalon On Ramp  
Caltrans  
2030

Project Description Build Scenario

### Inputs

Upstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft  V <sub>u</sub> =        veh/h	Terrain Level          <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft  V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7434	0.90	Level	5	0	0.976	0.90	9407
Ramp	939	0.90	Level	5	0	0.976	0.90	1188
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.193 using Equation 4  
 V<sub>12</sub> = 1817 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	10595	See Exhibit 25-7	Yes
V <sub>R12</sub>	3005	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 25.2 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.355 (Exhibit 25-19)  
 S<sub>R</sub> = 56.8 mph (Exhibit 25-19)  
 S<sub>0</sub> = 49.5 mph (Exhibit 25-19)  
 S = 51.4 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Northbound
Agency or Company	Kaku Associates	Junction	Avalon On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2030

Project Description Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level   S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7978	0.90	Level	5	0	0.976	0.90	10096
Ramp	1480	0.90	Level	5	0	0.976	0.90	1873
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.108 using Equation 4  
 V<sub>12</sub> = 1086 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	11969	See Exhibit 25-7	Yes
V <sub>R12</sub>	2959	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 24.6 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.351 (Exhibit 25-19)  
 S<sub>R</sub> = 56.9 mph (Exhibit 25-19)  
 S<sub>0</sub> = 45.2 mph (Exhibit 25-19)  
 S = 47.7 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Northbound			
Agency or Company	Kaku Associates			Junction	Main Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	AM			Analysis Year	2030			
Project Description Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain					Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
$VD =$	veh/h							
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF$ $f_{HV} f_p$
Freeway	7434	0.90	Level	5	0	0.976	0.90	9407
Ramp	512	0.90	Level	5	0	0.976	0.90	648
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 3647$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	7526	9400	No	
				$V_{12}$	3647	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F -$	6878	9400	No	
				$V_R$	648	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 31.1$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS= D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.356$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 56.8$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 67.6$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 61.9$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Northbound			
Agency or Company	Kaku Associates			Junction	Main Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	PM			Analysis Year	2030			
Project Description Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain				Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off		
$L_{up}$ =	ft	$S_{FF}$ = 65.0 mph		$S_{FR}$ = 45.0 mph		$L_{down}$ =	ft	
$V_u$ =	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
<b>Conversion to pc/h Under Base Conditions</b>								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF$ $f_{HV} f_p$
Freeway	7978	0.90	Level	5	0	0.976	0.90	10096
Ramp	407	0.90	Level	5	0	0.976	0.90	515
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$ $L_{EQ} =$ (Equation 25-2 or 25-3) $P_{FM} =$ using Equation $V_{12} =$ pc/h				$V_{12} = V_R + (V_F - V_R)P_{FD}$ $L_{EQ} =$ (Equation 25-8 or 25-9) $P_{FD} = 0.436$ using Equation 8 $V_{12} = 3812$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	8077	9400	No	
				$V_{12}$	3812	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F - V_R$	7562	9400	No	
				$V_R$	515	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ $D_R =$ (pc/ mi /ln) LOS = (Exhibit 25-4)				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ $D_R = 32.5$ (pc/ mi /ln) LOS = D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19) $S_R =$ mph (Exhibit 25-19) $S_0 =$ mph (Exhibit 25-19) $S =$ mph (Exhibit 25-14)				$D_s = 0.344$ (Exhibit 25-19) $S_R = 57.1$ mph (Exhibit 25-19) $S_0 = 66.9$ mph (Exhibit 25-19) $S = 61.9$ mph (Exhibit 25-15)				



## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst2  
Agency or Company  
Date Performed  
Analysis Time Period

Anjum  
Kaku Associates  
9/13/2006  
AM

### Site Information

Freeway/Dir of Travel  
Junction  
Jurisdiction  
Analysis Year

Southbound  
Main On Ramp  
Caltrans  
2030

Project Description Build Scenario

### Inputs

Upstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft  V <sub>u</sub> =        veh/h	Terrain Level          <div style="display: flex; justify-content: space-around;"> <span>S<sub>FF</sub> = 65.0 mph</span> <span>S<sub>FR</sub> = 45.0 mph</span> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp  <input type="checkbox"/> Yes <input type="checkbox"/> On  <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft  V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6948	0.90	Level	5	0	0.976	0.90	8792
Ramp	299	0.90	Level	5	0	0.976	0.90	378
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.294 using Equation 4  
 V<sub>12</sub> = 1853 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	6670	See Exhibit 25-7	No
V <sub>R12</sub>	2231	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 19.6 (pc/ m/ln)  
 LOS = B (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.312 (Exhibit 25-19)  
 S<sub>R</sub> = 57.8 mph (Exhibit 25-19)  
 S<sub>0</sub> = 58.8 mph (Exhibit 25-19)  
 S = 58.5 mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Main On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2030

Project Description Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level     $S_{FF} = 65.0$ mph $S_{FR} = 45.0$ mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7460	0.90	Level	5	0	0.976	0.90	9440
Ramp	565	0.90	Level	5	0	0.976	0.90	715
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.252 using Equation 4  
 V<sub>12</sub> = 1751 pc/h

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>	7655	See Exhibit 25-7	No	V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
				V <sub>12</sub>		4400:All	
V <sub>R12</sub>	2466	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> -		See Exhibit 25-14	
				V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 21.2 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

### Speed Estimation

M<sub>S</sub> = 0.322 (Exhibit 25-19)  
 S<sub>R</sub> = 57.6 mph (Exhibit 25-19)  
 S<sub>0</sub> = 56.7 mph (Exhibit 25-19)  
 S = 57.0 mph (Exhibit 25-14)

D<sub>s</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2030

Project Description Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain   S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off  L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6948	0.90	Level	5	0	0.976	0.90	8792
Ramp	1244	0.90	Level	5	0	0.976	0.90	1574
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = 0.436 using Equation 8  
 V<sub>12</sub> = 4721 pc/h

### Capacity Checks

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	8792	9400	No
				V <sub>12</sub>	4721	4400:All	Yes
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7218	9400	No
				V <sub>R</sub>	1574	2100	No

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        (pc/ mi /ln)  
 LOS =        (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> =        40.4 (pc/ mi /ln)  
 LOS =        F (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> =        (Exhibit 25-19)  
 S<sub>R</sub> =        mph (Exhibit 25-19)  
 S<sub>0</sub> =        mph (Exhibit 25-19)  
 S =        mph (Exhibit 25-14)

### Speed Estimation

D<sub>s</sub> =        0.440 (Exhibit 25-19)  
 S<sub>R</sub> =        54.9 mph (Exhibit 25-19)  
 S<sub>0</sub> =        67.3 mph (Exhibit 25-19)  
 S =        60.0 mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon Off Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2030

Project Description Build Scenario

Inputs		
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain  S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h

Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7460	0.90	Level	5	0	0.976	0.90	9440
Ramp	1307	0.90	Level	5	0	0.976	0.90	1654
UpStream								
DownStream								

Merge Areas				Diverge Areas			
Estimation of v <sub>12</sub>				Estimation of v <sub>12</sub>			
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = using Equation V <sub>12</sub> = pc/h				$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = 0.436 using Equation 8 V <sub>12</sub> = 5049 pc/h			

Capacity Checks				Capacity Checks			
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	9440	9400	Yes
				V <sub>12</sub>	5049	4400:All	Yes
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	7786	9400	No
				V <sub>R</sub>	1654	2100	No

Level of Service Determination (if not F)		Level of Service Determination (if not F)	
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        (pc/ mi /ln) LOS =        (Exhibit 25-4)	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        43.2 (pc/ mi /ln) LOS =        F (Exhibit 25-4)		

Speed Estimation		Speed Estimation	
M <sub>S</sub> = (Exhibit 25-19)	D <sub>s</sub> = 0.447 (Exhibit 25-19)	S <sub>R</sub> = mph (Exhibit 25-19)	S <sub>0</sub> = 66.6 mph (Exhibit 25-19)
S <sub>R</sub> = mph (Exhibit 25-19)	S = 59.7 mph (Exhibit 25-15)	S <sub>0</sub> = mph (Exhibit 25-19)	
S <sub>0</sub> = mph (Exhibit 25-19)		S = mph (Exhibit 25-14)	

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

### Site Information

Analyst2	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2030
Project Description Build Scenario			

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level  <div style="text-align: center;"> <math>S_{FF} = 65.0 \text{ mph}</math>                      <math>S_{FR} = 45.0 \text{ mph}</math> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
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### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6442	0.90	Level	5	0	0.976	0.90	8152
Ramp	259	0.90	Level	5	0	0.976	0.90	328
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.301 using Equation 4  
 V<sub>12</sub> = 2451 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	8480	See Exhibit 25-7	No
V <sub>R12</sub>	2779	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 23.9 (pc/ m/ln)  
 LOS = C (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.339 (Exhibit 25-19)  
 S<sub>R</sub> = 57.2 mph (Exhibit 25-19)  
 S<sub>0</sub> = 55.2 mph (Exhibit 25-19)  
 S = 55.8 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information

Analyst: Analyst2  
 Agency or Company: Kaku Associates  
 Date Performed: 9/13/2006  
 Analysis Time Period: PM

Anjum  
 Kaku Associates  
 9/13/2006  
 PM

### Site Information

Freeway/Dir of Travel: Southbound  
 Junction: Avalon On Ramp  
 Jurisdiction: Caltrans  
 Analysis Year: 2030

Project Description: Build Scenario

### Inputs

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h	Terrain Level     $S_{FF} = 65.0 \text{ mph}$ $S_{FR} = 45.0 \text{ mph}$ Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h
---	--	---

### Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7435	0.90	Level	5	0	0.976	0.90	9408
Ramp	560	0.90	Level	5	0	0.976	0.90	709
UpStream								
DownStream								

Merge Areas

Diverge Areas

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
 P<sub>FM</sub> = 0.253 using Equation 4  
 V<sub>12</sub> = 2381 pc/h

### Estimation of v<sub>12</sub>

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

L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
 P<sub>FD</sub> = using Equation  
 V<sub>12</sub> = pc/h

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FO</sub>	10117	See Exhibit 25-7	Yes
V <sub>R12</sub>	3090	4600:All	No

### Capacity Checks

	Actual	Maximum	LOS F?
V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
V <sub>12</sub>		4400:All	
V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		See Exhibit 25-14	
V <sub>R</sub>		See Exhibit 25-3	

### Level of Service Determination (if not F)

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

D<sub>R</sub> = 26.1 (pc/ m/ln)  
 LOS = F (Exhibit 25-4)

### Level of Service Determination (if not F)

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

D<sub>R</sub> = (pc/ m/ln)  
 LOS = (Exhibit 25-4)

### Speed Estimation

M<sub>S</sub> = 0.362 (Exhibit 25-19)  
 S<sub>R</sub> = 56.7 mph (Exhibit 25-19)  
 S<sub>0</sub> = 51.2 mph (Exhibit 25-19)  
 S = 52.8 mph (Exhibit 25-14)

### Speed Estimation

D<sub>S</sub> = (Exhibit 25-19)  
 S<sub>R</sub> = mph (Exhibit 25-19)  
 S<sub>0</sub> = mph (Exhibit 25-19)  
 S = mph (Exhibit 25-15)

**RAMPS AND RAMP JUNCTIONS WORKSHEET**

**General Information**

**Site Information**

Analyst2	Anjum	Freeway/Dir of Travel	Southbound
Agency or Company	Kaku Associates	Junction	Avalon On Ramp
Date Performed	9/13/2006	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2030 (Opening Year)

Project Description Build Scenario

**Inputs**

Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h	Terrain Level   S <sub>FF</sub> = 65.0 mph S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )	Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h
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**Conversion to pc/h Under Base Conditions**

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	6662	0.90	Level	5	0	0.976	0.90	8430
Ramp	211	0.90	Level	5	0	0.976	0.90	267
UpStream								
DownStream								

Merge Areas

Diverge Areas

**Estimation of v<sub>12</sub>**

**Estimation of v<sub>12</sub>**

$V_{12} = V_F (P_{FM})$   
L<sub>EQ</sub> = (Equation 25-2 or 25-3)  
P<sub>FM</sub> = 0.308 using Equation 4  
V<sub>12</sub> = 2599 pc/h

$V_{12} = V_R + (V_F - V_R)P_{FD}$   
L<sub>EQ</sub> = (Equation 25-8 or 25-9)  
P<sub>FD</sub> = using Equation  
V<sub>12</sub> = pc/h

**Capacity Checks**

**Capacity Checks**

	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?
V <sub>FO</sub>	8697	See Exhibit 25-7	No	V <sub>FI</sub> =V <sub>F</sub>		See Exhibit 25-14	
				V <sub>12</sub>		4400:All	
V <sub>R12</sub>	2866	4600:All	No	V <sub>FO</sub> = V <sub>F</sub> -		See Exhibit 25-14	
				V <sub>R</sub>		See Exhibit 25-3	

**Level of Service Determination (if not F)**

**Level of Service Determination (if not F)**

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$   
D<sub>R</sub> = 24.6 (pc/ m/ln)  
LOS = C (Exhibit 25-4)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$   
D<sub>R</sub> = (pc/ m/ln)  
LOS = (Exhibit 25-4)

**Speed Estimation**

**Speed Estimation**

M<sub>S</sub> = 0.345 (Exhibit 25-19)  
S<sub>R</sub> = 57.1 mph (Exhibit 25-19)  
S<sub>0</sub> = 54.8 mph (Exhibit 25-19)  
S = 55.5 mph (Exhibit 25-14)

D<sub>s</sub> = (Exhibit 25-19)  
S<sub>R</sub> = mph (Exhibit 25-19)  
S<sub>0</sub> = mph (Exhibit 25-19)  
S = mph (Exhibit 25-15)

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>								
<b>General Information</b>				<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	Southbound					
Agency or Company	Kaku Associates	Junction	Avalon On Ramp					
Date Performed	9/13/2006	Jurisdiction	Caltrans					
Analysis Time Period	PM	Analysis Year	2030 (Opening Year)					
Project Description Build Scenario								
<b>Inputs</b>								
Upstream Adj Ramp		Terrain Level		Downstream Adj Ramp				
<input type="checkbox"/> Yes	<input type="checkbox"/> On			<input type="checkbox"/> Yes	<input type="checkbox"/> On			
<input type="checkbox"/> No	<input type="checkbox"/> Off			<input type="checkbox"/> No	<input type="checkbox"/> Off			
$L_{up} =$	ft			$L_{down} =$	ft			
$V_u =$	veh/h	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$V_D =$ veh/h		
Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )								
<b>Conversion to pc/h Under Base Conditions</b>								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v=V/PHF f_{HV} f_p$
Freeway	7903	0.90	Level	5	0	0.976	0.90	10001
Ramp	513	0.90	Level	5	0	0.976	0.90	649
UpStream								
DownStream								
Merge Areas				Diverge Areas				
<b>Estimation of <math>v_{12}</math></b>				<b>Estimation of <math>v_{12}</math></b>				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + (V_F - V_R)P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} = 0.261$ using Equation 4				$P_{FD} =$ using Equation				
$V_{12} = 2606$ pc/h				$V_{12} =$ pc/h				
<b>Capacity Checks</b>				<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$	10650	See Exhibit 25-7	Yes	$V_{FI} = V_F$		See Exhibit 25-14		
				$V_{12}$		4400:All		
$V_{R12}$	3255	4600:All	No	$V_{FO} = V_F -$		See Exhibit 25-14		
				$V_R$		See Exhibit 25-3		
				$V_R$				
<b>Level of Service Determination (if not F)</b>				<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R = 27.4$ (pc/ m/ln)				$D_R =$ (pc/ m/ln)				
LOS = F (Exhibit 25-4)				LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>				<b>Speed Estimation</b>				
$M_S = 0.377$ (Exhibit 25-19)				$D_s =$ (Exhibit 25-19)				
$S_R = 56.3$ mph (Exhibit 25-19)				$S_R =$ mph (Exhibit 25-19)				
$S_0 = 50.1$ mph (Exhibit 25-19)				$S_0 =$ mph (Exhibit 25-19)				
$S = 51.8$ mph (Exhibit 25-14)				$S =$ mph (Exhibit 25-15)				



RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Southbound			
Agency or Company	Kaku Associates			Junction	Carson Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	AM			Analysis Year	2030			
Project Description Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain					Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On	<input type="checkbox"/> No <input type="checkbox"/> Off
$L_{up} =$	ft	$S_{FF} = 65.0$ mph		$S_{FR} = 45.0$ mph		$L_{down} =$	ft	
$V_u =$	veh/h	Sketch ( show lanes, $L_A, L_D, V_R, V_f$ )						
$VD =$	veh/h							
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	$f_{HV}$	$f_p$	$v = V/PHF$ $f_{HV} f_p$
Freeway	6442	0.90	Level	5	0	0.976	0.90	8152
Ramp	340	0.90	Level	5	0	0.976	0.90	430
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of $v_{12}$				Estimation of $v_{12}$				
$V_{12} = V_F ( P_{FM} )$				$V_{12} = V_R + ( V_F - V_R ) P_{FD}$				
$L_{EQ} =$ (Equation 25-2 or 25-3)				$L_{EQ} =$ (Equation 25-8 or 25-9)				
$P_{FM} =$ using Equation				$P_{FD} = 0.436$ using Equation 8				
$V_{12} =$ pc/h				$V_{12} = 3797$ pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
$V_{FO}$		See Exhibit 25-7		$V_{FI} = V_F$	8152	9400	No	
				$V_{12}$	3797	4400:All	No	
$V_{R12}$		4600:All		$V_{FO} = V_F -$	7722	9400	No	
				$V_R$	430	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$				$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$				
$D_R =$ (pc/ mi /ln)				$D_R = 32.4$ (pc/ mi /ln)				
LOS = (Exhibit 25-4)				LOS = D (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
$M_S =$ (Exhibit 25-19)				$D_s = 0.337$ (Exhibit 25-19)				
$S_R =$ mph (Exhibit 25-19)				$S_R = 57.3$ mph (Exhibit 25-19)				
$S_0 =$ mph (Exhibit 25-19)				$S_0 = 66.7$ mph (Exhibit 25-19)				
$S =$ mph (Exhibit 25-14)				$S = 61.9$ mph (Exhibit 25-15)				

RAMPS AND RAMP JUNCTIONS WORKSHEET								
General Information				Site Information				
Analyst	Anjum			Freeway/Dir of Travel	Southbound			
Agency or Company	Kaku Associates			Junction	Avalon Off Ramp			
Date Performed	9/13/2006			Jurisdiction	Caltrans			
Analysis Time Period	PM			Analysis Year	2030			
Project Description Build Scenario								
Inputs								
Upstream Adj Ramp		Terrain				Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off						<input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off		
L <sub>up</sub> =        ft		S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph				L <sub>down</sub> =        ft		
Vu =            veh/h		Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )				VD =            veh/h		
Conversion to pc/h Under Base Conditions								
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>
Freeway	7435	0.90	Level	5	0	0.976	0.90	9408
Ramp	262	0.90	Level	5	0	0.976	0.90	332
UpStream								
DownStream								
Merge Areas				Diverge Areas				
Estimation of v <sub>12</sub>				Estimation of v <sub>12</sub>				
V <sub>12</sub> = V <sub>F</sub> ( P <sub>FM</sub> )				V <sub>12</sub> = V <sub>R</sub> + (V <sub>F</sub> - V <sub>R</sub> )P <sub>FD</sub>				
L <sub>EQ</sub> = (Equation 25-2 or 25-3)				L <sub>EQ</sub> = (Equation 25-8 or 25-9)				
P <sub>FM</sub> = using Equation				P <sub>FD</sub> =0.436 using Equation 8				
V <sub>12</sub> = pc/h				V <sub>12</sub> = 4289 pc/h				
Capacity Checks				Capacity Checks				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?	
V <sub>FO</sub>		See Exhibit 25-7		V <sub>FI</sub> =V <sub>F</sub>	9408	9400	Yes	
				V <sub>12</sub>	4289	4400:All	No	
V <sub>R12</sub>		4600:All		V <sub>FO</sub> = V <sub>F</sub> -	9076	9400	No	
				V <sub>R</sub>	332	2100	No	
Level of Service Determination (if not F)				Level of Service Determination (if not F)				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>				D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> =        (pc/ mi /ln)				D <sub>R</sub> =    36.6 (pc/ mi /ln)				
LOS =        (Exhibit 25-4)				LOS=    F (Exhibit 25-4)				
Speed Estimation				Speed Estimation				
M <sub>S</sub> =        (Exhibit 25-19)				D <sub>s</sub> =    0.328 (Exhibit 25-19)				
S <sub>R</sub> =        mph (Exhibit 25-19)				S <sub>R</sub> =    57.5 mph (Exhibit 25-19)				
S <sub>0</sub> =        mph (Exhibit 25-19)				S <sub>0</sub> =    65.2 mph (Exhibit 25-19)				
S=         mph (Exhibit 25-14)				S =     61.4 mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum			Freeway/Dir of Travel		Southbound			
Agency or Company	Kaku Associates			Junction		Carson On Ramp			
Date Performed	9/13/2006			Jurisdiction		Caltrans			
Analysis Time Period	AM			Analysis Year		2030			
Project Description Build Scenario									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =    ft V <sub>u</sub> =    veh/h		Terrain Level   S <sub>FF</sub> = 65.0 mph                      S <sub>FR</sub> = 45.0 mph Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )					Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =    ft V <sub>D</sub> =    veh/h		
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	6442	0.90	Level	5	0	0.976	0.90	8152	
Ramp	651	0.90	Level	5	0	0.976	0.90	824	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.239 using Equation 4 V <sub>12</sub> = 1946 pc/h					$V_{12} = V_R + (V_F - V_R) P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	8976	See Exhibit 25-7	No		V <sub>F1</sub> =V <sub>F</sub>	See Exhibit 25-14			
					V <sub>12</sub>	4400:All			
V <sub>R12</sub>	2770	4600:All	No		V <sub>FO</sub> = V <sub>F</sub> -	See Exhibit 25-14			
					V <sub>R</sub>	See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 23.6 (pc/ m/ln) LOS = C (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/ m/ln) LOS = (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> = 0.338 (Exhibit 25-19) S <sub>R</sub> = 57.2 mph (Exhibit 25-19) S <sub>0</sub> = 53.7 mph (Exhibit 25-19) S = 54.7 mph (Exhibit 25-14)					D <sub>s</sub> = (Exhibit 25-19) S <sub>R</sub> = mph (Exhibit 25-19) S <sub>0</sub> = mph (Exhibit 25-19) S = mph (Exhibit 25-15)				

<b>RAMPS AND RAMP JUNCTIONS WORKSHEET</b>									
<b>General Information</b>					<b>Site Information</b>				
Analyst2	Anjum	Freeway/Dir of Travel	Southbound						
Agency or Company	Kaku Associates	Junction	Carson On Ramp						
Date Performed	9/13/2006	Jurisdiction	Caltrans						
Analysis Time Period	PM	Analysis Year	2030						
Project Description Build Scenario									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> =        ft V <sub>u</sub> =        veh/h		Terrain Level   <div style="text-align: center;"> <math>S_{FF} = 65.0 \text{ mph}</math>                      <math>S_{FR} = 45.0 \text{ mph}</math> </div> Sketch ( show lanes, L <sub>A</sub> , L <sub>D</sub> , V <sub>R</sub> , V <sub>f</sub> )					Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> =        ft V <sub>D</sub> =        veh/h		
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v=V/PHF f <sub>HV</sub> f <sub>p</sub>	
Freeway	7435	0.90	Level	5	0	0.976	0.90	9408	
Ramp	557	0.90	Level	5	0	0.976	0.90	705	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F ( P_{FM} )$ L <sub>EQ</sub> = (Equation 25-2 or 25-3) P <sub>FM</sub> = 0.254 using Equation 4 V <sub>12</sub> = 2386 pc/h					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 25-8 or 25-9) P <sub>FD</sub> = using Equation V <sub>12</sub> = pc/h				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Maximum	LOS F?		Actual	Maximum	LOS F?		
V <sub>FO</sub>	10113	See Exhibit 25-7	Yes		V <sub>F1</sub> =V <sub>F</sub>	See Exhibit 25-14			
					V <sub>12</sub>	4400:All			
V <sub>R12</sub>	3091	4600:All	No		V <sub>FO</sub> = V <sub>F</sub> -	See Exhibit 25-14			
					V <sub>R</sub>	See Exhibit 25-3			
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> =        26.1 (pc/ m/ln) LOS =        F (Exhibit 25-4)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> =        (pc/ m/ln) LOS =        (Exhibit 25-4)				
<b>Speed Estimation</b>					<b>Speed Estimation</b>				
M <sub>S</sub> =        0.362 (Exhibit 25-19) S <sub>R</sub> =        56.7 mph (Exhibit 25-19) S <sub>0</sub> =        51.2 mph (Exhibit 25-19) S =        52.8 mph (Exhibit 25-14)					D <sub>s</sub> =        (Exhibit 25-19) S <sub>R</sub> =        mph (Exhibit 25-19) S <sub>0</sub> =        mph (Exhibit 25-19) S =        mph (Exhibit 25-15)				

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency/Company	Kaku Associates	Weaving Seg Location	Carson St to Avalon Bl
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	BUILD AM	Analysis Year	2030

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.15
Weaving seg length, L (ft)	1600	Weaving ratio, R	0.33
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6396	0.90	5	0	1.5	1.2	0.976	0.90	8093
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	763	0.90	5	0	1.5	1.2	0.976	0.90	965
Vw2	383	0.90	5	0	1.5	1.2	0.976	0.90	484
Vw				1449	Vnw				8093
V									9542

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.03	0.56		
Weaving and non-weaving speeds, Si (mi/h)	42.15	50.32		
Number of lanes required for unconstrained operation, Nw			0.38	
Maximum number of lanes, Nw (max)			3.50	
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 150px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>				

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	48.88
Weaving segment density, D (pc/mi/ln)	97.60
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 NB
Agency/Company	Kaku Associates	Weaving Seg Location	Carson St to Avalon Bl
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	BUILD PM	Analysis Year	2030

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.19
Weaving seg length, L (ft)	1600	Weaving ratio, R	0.38
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6354	0.90	5	0	1.5	1.2	0.976	0.90	8040
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	917	0.90	5	0	1.5	1.2	0.976	0.90	1160
Vw2	556	0.90	5	0	1.5	1.2	0.976	0.90	703
Vw				1863	Vnw				8040
V									9903

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	1.13	0.70		
Weaving and non-weaving speeds, Si (mi/h)	40.85	47.42		
Number of lanes required for unconstrained operation, Nw			0.49	
Maximum number of lanes, Nw (max)			3.50	
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 150px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>				

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	46.03
Weaving segment density, D (pc/mi/ln)	107.57
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency/Company	Kaku Associates	Weaving Seg Location	Avalon Bl to Carson St
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	BUILD AM	Analysis Year	2030

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.12
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.42
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	6102	0.90	5	0	1.5	1.2	0.976	0.90	7721
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	340	0.90	5	0	1.5	1.2	0.976	0.90	430
Vw2	470	0.90	5	0	1.5	1.2	0.976	0.90	594
Vw				1024	Vnw				7721
V									8745

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.72	0.34		
Weaving and non-weaving speeds, Si (mi/h)	46.94	56.05		
Number of lanes required for unconstrained operation, Nw			0.19	
Maximum number of lanes, Nw (max)			3.50	
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 150px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>				

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	54.80
Weaving segment density, D (pc/mi/ln)	79.78
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

**Notes**

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

## FREEWAY WEAVING WORKSHEET

General Information		Site Information	
Analyst	Anjum	Freeway/Dir of Travel	I-405 SB
Agency/Company	Kaku Associates	Weaving Seg Location	Avalon Bl to Carson St
Date Performed	9/14/2006	Jurisdiction	
Analysis Time Period	BUILD PM	Analysis Year	2030

Inputs			
Freeway free-flow speed, SFF (mi/h)	65	Weaving type	B
Weaving number of lanes, N	2	Volume ratio, VR	0.16
Weaving seg length, L (ft)	2500	Weaving ratio, R	0.20
Terrain	Level		

Conversions to pc/h Under Base Conditions									
(pc/h)	V	PHF	Truck %	RV %	$E_T$	$E_R$	$f_{HV}$	$f_p$	v
Vo1	7173	0.90	5	0	1.5	1.2	0.976	0.90	9076
Vo2	0	0.90	5	0	1.5	1.2	0.976	0.90	0
Vw1	262	0.90	5	0	1.5	1.2	0.976	0.90	331
Vw2	1073	0.90	5	0	1.5	1.2	0.976	0.90	1357
Vw				1688	Vnw				9076
V									10764

Weaving and Non-Weaving Speeds				
	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.08	0.00		
b (Exhibit 24-6)	2.20	6.00		
c (Exhibit 24-6)	0.70	1.00		
d (Exhibit 24-6)	0.50	0.50		
Weaving intensity factor, Wi	0.90	0.52		
Weaving and non-weaving speeds, Si (mi/h)	43.92	51.28		

Number of lanes required for unconstrained operation, Nw	0.31
Maximum number of lanes, Nw (max)	3.50
<input checked="" type="checkbox"/> If Nw < Nw(max) unconstrained operation <span style="margin-left: 200px;"><input type="checkbox"/> if Nw &gt; Nw (max) constrained operation</span>	

Weaving Segment Speed, Density, Level of Service, and Capacity	
Weaving segment speed, S (mi/h)	49.97
Weaving segment density, D (pc/mi/ln)	107.71
Level of service, LOS	F
Capacity of base condition, $c_b$ (pc/h)	
Capacity as a 15-minute flow rate, c (veh/h)	
Capacity as a full-hour volume, $c_h$ (veh/h)	

- Notes**
- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
  - b. Capacity constrained by basic freeway capacity.
  - c. Capacity occurs under constrained operating conditions.
  - d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
  - e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
  - f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
  - g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
  - h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
  - i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.



## **APPENDIX I**

### **SYNCHRO/SIMTRAFFIC ANALYSIS RESULTS**

## **APPENDIX I**

### **SYNCHRO/SIMTRAFFIC ANALYSIS RESULTS**

A queuing and LOS analysis of the I-405/Avalon Boulevard interchange was conducted using the Synchro/Simtraffic software program. This program simulates projected traffic flows and considers the effects of upstream and downstream intersection queuing when calculating traffic operations. The use of a simulation software program when analyzing traffic operations at closely spaced intersections that experience congestion during peak hours, such as the three intersections serving the I-405 on- and off-ramps at the Avalon Boulevard interchange, is desirable to ensure that interaction between the intersections is considered.

The Synchro/Simtraffic software program models arterial operations and was used to estimate vehicle queuing at the ramp terminal intersections providing access to Avalon Boulevard and Lenardo Drive. Synchro/Simtraffic does not model freeway operations. Therefore, this analysis does not include the potential effects of congestion on the freeway mainline during peak hours under future conditions.

The Synchro/Simtraffic model contained Avalon Boulevard between 213<sup>th</sup> Street and Dominguez Street and Lenardo Drive between the Carson Marketplace and Avalon Boulevard. The model also included ramp meters on the I-405 northbound on-ramp, the I-405 southbound on-ramp from Lenardo Drive, and the new I-405 southbound on-ramp from Avalon Boulevard. The Avalon Boulevard/213<sup>th</sup> Street and Avalon Boulevard/Dominguez Street intersections were included in the model to reflect forecasted traffic flows entering/exiting the I-405 and Avalon Boulevard interchange. However, queuing and LOS results were not reported at these two intersections. Queuing and LOS results were analyzed for the following three intersections serving the proposed interchange:

- Avalon Boulevard & I-405 northbound ramps
- Avalon Boulevard & Lenardo Drive & I-405 southbound on-ramp
- Lenardo Drive & I-405 southbound ramps

These three intersections were analyzed during the AM and PM peak hours with the projected future (year 2030) traffic forecasts under the Build Alternative. A 90-second cycle length was used for each intersection, and the traffic signals were assumed to operate under actuated-coordinated conditions to optimize traffic flows through the interchange (signal timing worksheets are contained in the latter part of this appendix). To determine the queuing results during peak hours, the Synchro/Simtraffic model was simulated for 20 iterations using different random seed numbers and the results of the 10 average runs were used to report the projected vehicle-queues and LOS.

The Synchro/Simtraffic model was first run for the original Build Alternative. Based on results from the initial testing of the original Build Alternative, lane configurations were modified at certain intersections and the modified Build Alternative was rerun.

## **ANALYSIS OF ORIGINAL BUILD ALTERNATIVE**

Table I-1 displays the simulated 95<sup>th</sup> percentile queues for the critical movements through the I-405 and Avalon Boulevard interchange during the AM and PM peak hours under the original Build Alternative (technical calculation worksheets are contained in the latter part of this appendix). Vehicle queues for movements not reported were found to be minimal based on observations of the Synchro/Simtraffic model.

As shown in Table I-1, the estimated vehicle queues were not expected to extend beyond the storage provided during the AM peak hour under the original Build Alternative except for the northbound through movement on Avalon Boulevard at the I-405 northbound ramps intersection.

The following queues were expected to exceed the available storage during the PM peak hour:

- Northbound left-turn movement from Avalon Boulevard to the I-405 northbound on-ramp
- Northbound through movement on Avalon Boulevard at the I-405 northbound ramps intersection
- Southbound right-turn movement from Avalon Boulevard to the I-405 northbound on-ramp

- Westbound left-turn movement from I-405 northbound ramps to Avalon Boulevard
- Westbound right-turn movement from I-405 northbound ramps to Avalon Boulevard
- Eastbound left-turn movement from Lenardo Drive to Avalon Boulevard
- Southbound left-turn movement from I-405 southbound off-ramp to Lenardo Drive

Based on observations of the Synchro/Simtraffic model, the bottleneck within the interchange occurred at the Avalon Boulevard and I-405 northbound ramps intersection during the PM peak hour. The vehicle queues along northbound Avalon Boulevard impacted operations at the Avalon Boulevard and Lenardo Drive intersection, which in turn impacted operations at the Lenardo Drive and I-405 southbound ramps intersection due to extensive queuing from vehicles traveling from eastbound Lenardo Drive to northbound Avalon Boulevard. Extending the green-time for the northbound left-turn and through movements at the Avalon Boulevard and I-405 northbound ramps intersection resulted in shorter queue lengths; however, the already congested southbound and westbound approaches to the intersection further degraded in operation. Therefore, physical modifications were tested to improve traffic operations through the interchange.

## **MODIFICATIONS TO BUILD ALTERNATIVE BASED ON SYNCHRO RESULTS**

After testing a variety of possible improvements, the following design modifications were found to produce optimal results and found to be feasible based on conversations with DMJM Harris:

- Provide three southbound through lanes on Avalon Boulevard at the I-405 northbound ramps intersection. The Avalon Boulevard overcrossing already provides three southbound receiving lanes; therefore, no additional widening is required on the southbound departure.
- Provide an exclusive right-turn lane on southbound Avalon Boulevard to serve vehicles traveling to the I-405 northbound on-ramp.
- Modify the proposed striping on the I-405 northbound off-ramp to contain dual left-turn lanes and a free right-turn lane. Avalon Boulevard north of the off-ramp intersection already provides an exclusive receiving lane to accommodate the free right-turn lane from the northbound off-ramp; therefore, no additional widening is required on the northbound departure.

These revisions have been incorporated into the Build Alternative project design.

In addition, subsequent to the revisions described above, direction was received from Caltrans to modify the project such that the HOV bypass lane originally planned on the southbound loop on-ramp from Lenardo Drive should be redesignated as a mixed-flow lane and both lanes on the on-ramp should be metered. Along with these changes, the left-turn lane on eastbound Lenardo Drive at the on-ramp (originally to be designated as HOV-only) would be eliminated altogether, and all traffic (HOV and mixed-flow) wishing to enter the southbound I-405 freeway from Lenardo Drive would proceed easterly on Lenardo Drive and across Avalon Boulevard to the new southbound on-ramp. The westbound Lenardo Drive approach to the southbound loop on-ramp would be modified to permit right turns from the middle lane (resulting in one through lane, one through/right-turn lane, and one free-flow right-turn lane). This project change would eliminate the eastbound left-turn phase at the Lenardo/southbound ramps intersection, which would allow allocation of a greater share of green time to the southbound off-ramp. These revisions have also been incorporated into the Build Alternative project design.

Also subsequent to the revisions described above, direction was received from Caltrans to modify the project such that the southbound Avalon Boulevard approach to Lenardo Drive would provide two through lanes and one exclusive right-turn lane controlled by the signal (instead of one exclusive through lane, one shared through/right-turn lane, and one free-flow right-turn lane). The westbound Lenardo Drive approach to the I-405 southbound ramps intersection would provide two through lanes and one free-flow right-turn lane onto the on-ramp.

Table I-2 summarizes the simulated AM and PM peak hour vehicle queues with the improvements listed above. As shown in Table I-2, the simulated vehicle queues are estimated to extend beyond the storage provided at three locations during the PM peak hour under the modified Build Alternative: right turns from southbound Avalon Boulevard to westbound Lenardo Drive; right turns from the northbound I-405 off-ramp to northbound Avalon Boulevard, and left turns from the northbound I-405 off-ramp to southbound Avalon Boulevard. Although the projected queues on the northbound off-ramp would extend back beyond the flared portion of the off-ramp, they are not projected to extend back to the freeway mainline.

Ramp metering rates were determined based on the amount of storage available on the on-ramp and the projected peak hour traffic forecasts under future conditions. The minimum ramp

metering rate was applied to eliminate vehicle queues beyond the storage provided on the on-ramp. Table I-3 summarizes the ramp metering rates, the storage provided for each on-ramp, and the estimated vehicle queues during the AM and PM peak hours. As shown, ramp metering rates ranged from 250 vehicles per hour per lane to 800 vehicles per hour per lane and the simulated vehicle queues do not exceed the storage provided.

The LOS at the three intersections serving the proposed interchange was analyzed during the AM and PM peak hours under the original Build Alternative and the revised Build Alternative using the Synchro/Simtraffic simulation model. The LOS was calculated based on the methodology outlined in the 2000 HCM. Since the Synchro/Simtraffic model considers the effects of upstream and downstream intersection queuing when calculating LOS, the average vehicle delays reported at each study intersection differ slightly from those reported in Chapter V. Table I-4 shows the LOS results during the AM and PM peak hours under the original Build and revised Build Alternatives (technical calculation worksheets are contained in the following pages). As shown in Table I-4, the simulation indicates that the revised Build Alternative would result in acceptable levels of service at each of the three intersections during both the AM and PM peak hours.

Caltrans has postulated that future congestion on the I-405 freeway mainline may, at some theoretical (but undetermined) point in time, limit the number of vehicles entering I-405 during peak travel hours. This in turn could cause on-ramp vehicle queues to extend into and beyond the upstream ramp termini intersection and onto city streets, in both the No Build and Project Build scenarios. This effect is not modeled in the Synchro/Simtraffic simulation, which is appropriate for modeling closely spaced intersections, but does not model the freeway mainline. Although different methodologies could be employed, on-ramp queuing caused by mainline congestion is an effect which could occur in both the No Build and Project Build scenarios whether or not the I-405/Avalon Boulevard interchange project is implemented.

**TABLE I-1  
I-405/AVALON QUEUING ANALYSIS  
DESIGN YEAR (2030) WITH ORIGINAL BUILD ALTERNATIVE**

Intersection	Turning Movement	Storage Provided (feet) [1]	95th Percentile Queue [2]			
			AM Peak Hour	Does queue exceed storage?	PM Peak Hour	Does queue exceed storage?
6 Avalon BI & I-405 N/B Ramps	NB Avalon Left	250 ft.	180 ft.	No	300 ft.	<b>Yes</b>
	NB Avalon Thru	300 ft.	320 ft.	<b>Yes</b>	330 ft.	<b>Yes</b>
	SB Avalon Thru	650 ft.	315 ft.	No	620 ft.	No
	SB Avalon Right	660 ft.	185 ft.	No	670 ft.	<b>Yes</b>
	NB Off-Ramp Left	660 ft.	190 ft.	No	860 ft.	<b>Yes</b>
	NB Off-Ramp Right	660 ft.	265 ft.	No	600 ft.	<b>Yes</b>
7 Avalon BI & Lenardo Dr/I-405 S/B On-Ramp	EB Avalon Left	430 ft.	310 ft.	No	435 ft.	<b>Yes</b>
8 Lenardo Dr & I-405 S/B Ramps	SB Off-Ramp Left	300 ft.	290 ft.	No	305 ft.	<b>Yes</b>

Notes:

[1] Storage provided reflects pocket length or distance to upstream intersection.

[2] 95th percentile queue calculated using the Synchro/Simtraffic model.

**TABLE I-2  
I-405/AVALON QUEUING ANALYSIS  
DESIGN YEAR (2030) WITH REVISED BUILD ALTERNATIVE**

Intersection	Turning Movement	Storage Provided (feet) [1]	95th Percentile Queue [2]			
			AM Peak Hour	Does queue exceed storage?	PM Peak Hour	Does queue exceed storage?
6 Avalon Bl & I-405 N/B Ramps	NB Avalon Left	250 ft.	180 ft.	No	250 ft.	No
	NB Avalon Thru	300 ft.	280 ft.	No	225 ft.	No
	SB Avalon Thru	650 ft.	185 ft.	No	635 ft.	No
	SB Avalon Right	660 ft.	205 ft.	No	625 ft.	No
	NB Off-Ramp Left	660 ft.	90 ft.	No	830 ft.	<b>Yes</b>
	NB Off-Ramp Right	660 ft.	35 ft.	No	845 ft.	<b>Yes</b>
7 Avalon Bl & Lenardo Dr/I-405 S/B On-Ramp	NB Avalon Left	200 ft.	155 ft.	No	125 ft.	No
	SB Avalon Thru	300 ft.	290 ft.	No	120 ft.	No
	SB Avalon Right	300 ft.	215 ft.	No	445 ft.	<b>Yes</b>
	EB Lenardo Left	430 ft.	275 ft.	No	245 ft.	No
	EB Lenardo Thru	430 ft.	180 ft.	No	240 ft.	No
8 Lenardo Dr & I-405 S/B Ramps	SB Off-Ramp Left	300 ft.	250 ft.	No	210 ft.	No
	SB Off-Ramp Right	300 ft.	70 ft.	No	90 ft.	No

Notes:

[1] Storage provided reflects pocket length or distance to upstream intersection.

[2] 95th percentile queue calculated using the Synchro/Simtraffic model.



**TABLE I-3  
I-405/AVALON RAMP METERING ANALYSIS  
DESIGN YEAR (2030) BUILD ALTERNATIVE**

On-Ramp	Ramp Metering Rate [1]		Number of Lanes at Meter	Storage Provided (feet) [2]	95th Percentile Queue [3]			
	AM Peak Hour	PM Peak Hour			AM Peak Hour	Does queue exceed storage?	PM Peak Hour	Does queue exceed storage?
1 NB On-Ramp	600	800	2	300 ft.	245 ft.	No	245 ft.	No
2 SB Loop On-Ramp	500	700	1	200 ft.	95 ft.	No	85 ft.	No
3 SB Diagonal On-Ramp	250	300	2	600 ft.	75 ft.	No	210 ft.	No

Notes:

- [1] Ramp metering rate in vehicles per hour per lane.
- [2] Storage provided reflects distance to upstream intersection.
- [3] 95th percentile queue calculated using the Synchro/Simtraffic model.

**TABLE I-4  
SYNCHRO LEVEL OF SERVICE ANALYSIS  
DESIGN YEAR (2030) ORIGINAL BUILD AND REVISED BUILD**

INTERSECTION	PEAK HOUR	2030 ORIGINAL BUILD ALTERNATIVE		2030 REVISED BUILD ALTERNATIVE	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
6. Avalon Blvd. & I-405 NB on-/off-ramps	A.M.	21	C	15	B
	P.M.	47	D	42	D
7. Avalon Blvd. & Lenardo St./I-405 SB on-ramp	A.M.	14	B	18	B
	P.M.	25	C	17	B
8. I-405 SB on-/off-ramps Lenardo St.	A.M.	14	B	13	B
	P.M.	19	B	15	B

Note: LOS reported is average of 10 iterations of Synchro/Simtraffic model.

5: 213th St. & Avalon Blvd. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.5	1.1	0.2	1.2	1.1	0.2	1.3	5.4	0.4	0.8	3.1	0.2
Delay / Veh (s)	38.8	27.1	11.6	43.5	24.4	8.9	52.8	17.3	7.0	41.0	9.6	6.7
Vehicles Entered	135	152	61	96	160	101	88	1126	209	65	1159	82
Vehicles Exited	135	153	59	99	159	101	90	1123	209	66	1161	82
Hourly Exit Rate	135	153	59	99	159	101	90	1123	209	66	1161	82
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

5: 213th St. & Avalon Blvd. Performance by movement

Movement	All
Total Delay (hr)	16.4
Delay / Veh (s)	17.2
Vehicles Entered	3434
Vehicles Exited	3437
Hourly Exit Rate	3437
Denied Entry Before	0
Denied Entry After	0

6: Avalon Blvd. & I-405 NB Ramps Performance by movement

Movement	NBL	NBT	SBT	SBR	NWL	NWR	All
Total Delay (hr)	4.4	3.2	7.1	1.6	1.6	0.5	18.4
Delay / Veh (s)	24.8	7.4	26.9	15.5	31.9	3.1	15.4
Vehicles Entered	647	1539	948	377	180	606	4297
Vehicles Exited	643	1545	949	375	176	606	4294
Hourly Exit Rate	643	1545	949	375	176	606	4294
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

7: Lenardo Dr. & Avalon Blvd. Performance by movement

Movement	EBL	EBT	EBR	EBR2	NBL	NBT	NBR	SBT	SBR	All
Total Delay (hr)	6.0	0.0	0.7	0.8	0.9	5.4	0.2	6.1	0.7	20.8
Delay / Veh (s)	24.2	1.0	19.9	4.2	40.9	15.0	10.4	32.8	5.5	17.6
Vehicles Entered	895	3	126	669	81	1281	71	669	455	4250
Vehicles Exited	897	3	126	668	81	1289	71	671	459	4265
Hourly Exit Rate	897	3	126	668	81	1289	71	671	459	4265
Denied Entry Before	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0

8: Lenardo Dr. & SB Ramps Performance by movement

Movement	EBT	WBT	WBR	SBL	SBR	All
Total Delay (hr)	3.4	2.0	0.1	3.0	0.1	8.6
Delay / Veh (s)	35.6	30.3	1.4	8.0	2.3	13.0
Vehicles Entered	340	238	306	1347	126	2357
Vehicles Exited	342	240	309	1349	126	2366
Hourly Exit Rate	342	240	309	1349	126	2366
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0

9: E. Dominquez St. & Avalon Blvd. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.1	0.2	0.0	2.4	0.2	0.2	0.5	7.7	1.2	0.9	1.7	0.0
Delay / Veh (s)	37.8	49.4	8.6	39.1	36.2	11.4	39.6	17.4	8.5	38.0	5.5	3.8
Vehicles Entered	14	14	19	222	16	58	41	1595	498	88	1082	19
Vehicles Exited	14	14	19	221	15	60	41	1598	498	89	1084	19
Hourly Exit Rate	14	14	19	221	15	60	41	1598	498	89	1084	19
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

9: E. Dominquez St. & Avalon Blvd. Performance by movement

Movement	All
Total Delay (hr)	15.1
Delay / Veh (s)	14.8
Vehicles Entered	3666
Vehicles Exited	3672
Hourly Exit Rate	3672
Denied Entry Before	0
Denied Entry After	0

11: SB Ramps & SB Off-Ramp Performance by movement

Movement	NBR	SER	All
Total Delay (hr)	0.2	8.3	8.5
Delay / Veh (s)	2.6	20.2	17.1
Vehicles Entered	309	1469	1778
Vehicles Exited	311	1473	1784
Hourly Exit Rate	311	1473	1784
Denied Entry Before	0	2	2
Denied Entry After	0	1	1

Intersection: 5: 213th St. & Avalon Blvd.

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB	
Directions Served	L	TR	L	T	TR	L	T	T	TR	L	T	T	
Maximum Queue (ft)	179	202	182	94	134	151	418	409	204	97	117	116	
Average Queue (ft)	87	104	77	54	59	86	192	165	87	45	54	78	
95th Queue (ft)	147	161	138	87	107	159	307	281	172	82	99	110	
Link Distance (ft)	1130	1130	1885	1885	1885		888	888	888		744	744	
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (ft)						125					150		
Storage Blk Time (%)						0	15						
Queuing Penalty (veh)						0	13						

Intersection: 5: 213th St. & Avalon Blvd.

Movement	SB
Directions Served	TR
Maximum Queue (ft)	158
Average Queue (ft)	79
95th Queue (ft)	132
Link Distance (ft)	744
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Avalon Blvd. & I-405 NB Ramps

Movement	NB	NB	NB	NB	SB	SB	SB	SB	NW	NW	NW
Directions Served	L	L	T	T	T	T	T	R	L	LT	R
Maximum Queue (ft)	161	186	304	352	203	212	212	240	92	117	62
Average Queue (ft)	108	118	113	173	119	126	125	125	45	48	6
95th Queue (ft)	160	179	221	281	182	181	185	207	79	92	34
Link Distance (ft)			304	304	468	468	468	468	660	660	660
Upstream Blk Time (%)			0	0							
Queuing Penalty (veh)			0	5							
Storage Bay Dist (ft)	300	300									
Storage Blk Time (%)			0								
Queuing Penalty (veh)			0								

## Intersection: 7: Lenardo Dr. &amp; Avalon Blvd.

Movement	EB	EB	EB	EB	EB	NB	NB	NB	B20	SB	SB	SB
Directions Served	L	L	R	R>	>	L	T	TR	T	T	T	R
Maximum Queue (ft)	269	286	89	163	163	248	332	304	55	281	312	338
Average Queue (ft)	184	197	38	96	15	49	187	160	3	194	192	55
95th Queue (ft)	257	273	79	178	87	154	321	285	21	284	292	214
Link Distance (ft)			447	447	447		261	261	744	304	304	304
Upstream Blk Time (%)						0	3	1			1	1
Queuing Penalty (veh)						0	17	6			2	3
Storage Bay Dist (ft)	400	400				250						
Storage Blk Time (%)						0	3					
Queuing Penalty (veh)						0	3					

## Intersection: 8: Lenardo Dr. &amp; SB Ramps

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB
Directions Served	T	T	T	T	T	R	L	L	R
Maximum Queue (ft)	288	54	37	157	182	32	220	159	133
Average Queue (ft)	170	23	3	69	82	10	208	96	28
95th Queue (ft)	259	49	20	118	138	33	247	164	72
Link Distance (ft)	682	682	682	447	447	447	141	141	141
Upstream Blk Time (%)							20	1	0
Queuing Penalty (veh)							97	4	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

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**Intersection: 27: 405 SB Ramps & Ramp Metering**


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Movement	SE	SE
Directions Served	T	T
Maximum Queue (ft)	94	74
Average Queue (ft)	48	43
95th Queue (ft)	77	69
Link Distance (ft)	484	484
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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**Intersection: 29: SB On-Ramp & Ramp Metering**


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Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	92	74
Average Queue (ft)	60	66
95th Queue (ft)	95	81
Link Distance (ft)	25	25
Upstream Blk Time (%)	45	66
Queuing Penalty (veh)	73	105
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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**Intersection: 31: I-405 NB Ramps & Ramp Metering**


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Movement	NW	NW
Directions Served	T	T
Maximum Queue (ft)	234	250
Average Queue (ft)	161	170
95th Queue (ft)	239	245
Link Distance (ft)	239	239
Upstream Blk Time (%)	0	1
Queuing Penalty (veh)	1	3
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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**Network Summary**


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Network wide Queuing Penalty: 408

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2: SB Off-Ramp & Performance by movement

Movement	SER	NER	All
Total Delay (hr)	4.8	0.1	4.9
Delay / Veh (s)	13.4	0.9	9.8
Vehicles Entered	1284	512	1796
Vehicles Exited	1293	514	1807
Hourly Exit Rate	1293	514	1807
Denied Entry Before	9	0	9
Denied Entry After	4	0	4

5: 213th St. & Avalon Blvd. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.7	1.6	0.5	2.1	1.0	0.3	4.5	10.5	0.6	1.4	6.2	0.7
Delay / Veh (s)	46.8	32.3	24.9	54.8	23.6	9.7	78.0	31.3	9.5	32.1	16.2	15.5
Vehicles Entered	135	181	75	135	159	107	212	1209	243	158	1389	155
Vehicles Exited	132	181	74	137	159	104	200	1201	243	159	1385	159
Hourly Exit Rate	132	181	74	137	159	104	200	1201	243	159	1385	159
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	5	2	0	0	0

5: 213th St. & Avalon Blvd. Performance by movement

Movement	All
Total Delay (hr)	31.2
Delay / Veh (s)	27.1
Vehicles Entered	4158
Vehicles Exited	4134
Hourly Exit Rate	4134
Denied Entry Before	0
Denied Entry After	7

6: Avalon Blvd. & I-405 NB Ramps Performance by movement

Movement	NBL	NBT	SBT	SBR	NWL	NWR	All
Total Delay (hr)	6.1	3.4	10.0	5.8	19.4	15.0	59.7
Delay / Veh (s)	31.7	8.5	23.8	28.7	163.0	128.5	41.2
Vehicles Entered	690	1426	1519	729	431	431	5226
Vehicles Exited	692	1428	1511	727	425	412	5195
Hourly Exit Rate	692	1428	1511	727	425	412	5195
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0



## 7: Lenardo &amp; Avalon Blvd. Performance by movement

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBT	SBR	All
Total Delay (hr)	4.8	3.8	1.6	1.3	5.4	0.3	3.2	3.0	23.3
Delay / Veh (s)	22.6	32.2	8.1	32.9	14.3	12.1	10.9	12.4	15.6
Vehicles Entered	757	427	694	136	1360	86	1057	877	5394
Vehicles Exited	758	428	691	139	1358	85	1056	876	5391
Hourly Exit Rate	758	428	691	139	1358	85	1056	876	5391
Denied Entry Before	0	0	0	0	3	0	0	0	3
Denied Entry After	0	0	0	0	1	0	0	0	1

## 8: Lenardo &amp; SB Ramp Performance by movement

Movement	EBT	WBT	WBR	SWL	SWR	All
Total Delay (hr)	6.7	2.7	0.2	3.5	0.4	13.5
Delay / Veh (s)	26.7	19.4	1.7	13.1	4.1	15.2
Vehicles Entered	899	503	512	977	316	3207
Vehicles Exited	898	501	512	980	316	3207
Hourly Exit Rate	898	501	512	980	316	3207
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0

## 9: E. Dominguez St. &amp; Avalon Blvd. Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.5	0.9	0.8	190.5	0.3	21.3	1.0	9.4	1.2	2.5	12.6	0.1
Delay / Veh (s)	115.6	129.7	110.0	858.3	968.4	709.5	95.2	23.9	11.1	59.6	31.9	22.4
Vehicles Entered	46	26	24	801	1	109	38	1423	377	149	1420	20
Vehicles Exited	46	26	25	797	1	107	36	1413	379	149	1425	21
Hourly Exit Rate	46	26	25	797	1	107	36	1413	379	149	1425	21
Denied Entry Before	0	0	0	24	0	7	0	0	0	0	0	0
Denied Entry After	0	0	0	293	0	38	0	0	0	0	0	0

## 9: E. Dominguez St. &amp; Avalon Blvd. Performance by movement

Movement	All
Total Delay (hr)	242.0
Delay / Veh (s)	196.7
Vehicles Entered	4434
Vehicles Exited	4425
Hourly Exit Rate	4425
Denied Entry Before	31
Denied Entry After	331

Intersection: 2: SB Off-Ramp &

Movement	SE	SE	NE	NE
Directions Served	R	R	R	R
Maximum Queue (ft)	744	135	26	55
Average Queue (ft)	131	31	1	24
95th Queue (ft)	484	115	9	51
Link Distance (ft)	729		99	99
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)		100		
Storage Blk Time (%)	3			
Queuing Penalty (veh)	24			

Intersection: 5: 213th St. & Avalon Blvd.

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	TR	L	T	T	TR	L	T	T
Maximum Queue (ft)	175	416	181	118	177	194	891	649	392	174	224	222
Average Queue (ft)	83	143	100	51	62	155	355	249	119	88	101	124
95th Queue (ft)	143	285	163	91	115	209	659	474	242	147	173	187
Link Distance (ft)		1130		1885	1885		876	876	876		744	744
Upstream Blk Time (%)							1					
Queuing Penalty (veh)							0					
Storage Bay Dist (ft)	150		150			150				150		
Storage Blk Time (%)	4	7	3			15	25			1	2	
Queuing Penalty (veh)	11	10	2			64	44			5	3	

Intersection: 5: 213th St. & Avalon Blvd.

Movement	SB	B20	B20
Directions Served	TR	T	T
Maximum Queue (ft)	224	448	437
Average Queue (ft)	140	15	57
95th Queue (ft)	204	148	297
Link Distance (ft)	744	262	262
Upstream Blk Time (%)		0	1
Queuing Penalty (veh)		1	3
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

## Intersection: 6: Avalon Blvd. &amp; I-405 NB Ramps

Movement	NB	NB	NB	NB	SB	SB	SB	SB	NW	NW	NW	B14
Directions Served	L	L	T	T	T	T	T	R	L	LT	R	T
Maximum Queue (ft)	288	291	213	268	267	609	612	572	688	736	740	302
Average Queue (ft)	159	168	99	144	139	255	337	344	338	580	573	108
95th Queue (ft)	244	247	192	226	230	555	636	624	772	830	845	318
Link Distance (ft)			304	304		468	468	468	664	664	664	268
Upstream Blk Time (%)	0	0				1	3	2	1	21	11	9
Queuing Penalty (veh)	0	0				9	24	16	0	0	0	0
Storage Bay Dist (ft)	250	250			350							
Storage Blk Time (%)	0	1				0						
Queuing Penalty (veh)	0	4				0						

## Intersection: 7: Lenardo &amp; Avalon Blvd.

Movement	EB	EB	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	R>	>	L	T	TR	T	T	R
Maximum Queue (ft)	243	290	210	261	253	176	299	292	203	217	484
Average Queue (ft)	134	153	146	171	90	60	163	163	56	49	232
95th Queue (ft)	225	246	201	238	235	126	254	240	115	119	445
Link Distance (ft)			437	437	437		262	262	304	304	304
Upstream Blk Time (%)							1	1			4
Queuing Penalty (veh)							9	6			29
Storage Bay Dist (ft)	400	400				250					
Storage Blk Time (%)							1				
Queuing Penalty (veh)							2				

## Intersection: 8: Lenardo &amp; SB Ramp

Movement	EB	EB	EB	WB	WB	WB	SW	SW	SW
Directions Served	T	T	T	T	T	R	L	L	R
Maximum Queue (ft)	394	409	227	140	161	46	179	164	120
Average Queue (ft)	256	159	74	85	100	17	166	106	46
95th Queue (ft)	367	304	178	138	158	44	209	179	90
Link Distance (ft)	689	689	689	437	437	437	99	99	99
Upstream Blk Time (%)							28	9	1
Queuing Penalty (veh)							119	39	4
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 9: E. Dominguez St. & Avalon Blvd.

Movement	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	LT	R	L	T	T	T	R	L	T	T
Maximum Queue (ft)	238	294	925	906	150	287	248	610	326	275	561	494
Average Queue (ft)	108	275	905	623	30	153	133	206	90	127	273	247
95th Queue (ft)	226	282	912	1245	101	245	219	480	187	242	477	425
Link Distance (ft)	224		891	891		468	468	468			932	932
Upstream Blk Time (%)	4		44	10				0				
Queuing Penalty (veh)	0		0	0				2				
Storage Bay Dist (ft)		250			125				300	250		
Storage Blk Time (%)		52	18		0	9		0	0		9	
Queuing Penalty (veh)		277	97		0	3		0	0		13	

Intersection: 9: E. Dominguez St. & Avalon Blvd.

Movement	SB
Directions Served	TR
Maximum Queue (ft)	478
Average Queue (ft)	191
95th Queue (ft)	371
Link Distance (ft)	932
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

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**Intersection: 27: SB On-Ramp & Ramp Metering**


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Movement	SE	SE
Directions Served	T	T
Maximum Queue (ft)	222	226
Average Queue (ft)	142	141
95th Queue (ft)	196	210
Link Distance (ft)	485	485
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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**Intersection: 28: SB Loop On-Ramp & Ramp Metering**


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Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	87	74
Average Queue (ft)	63	70
95th Queue (ft)	83	80
Link Distance (ft)	22	22
Upstream Blk Time (%)	47	70
Queuing Penalty (veh)	135	201
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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**Intersection: 31: I-405 NB Ramps & Ramp Metering**


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Movement	NW	NW
Directions Served	T	T
Maximum Queue (ft)	232	253
Average Queue (ft)	158	166
95th Queue (ft)	232	243
Link Distance (ft)	238	238
Upstream Blk Time (%)	0	1
Queuing Penalty (veh)	1	4
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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**Network Summary**


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Network wide Queuing Penalty: 1558

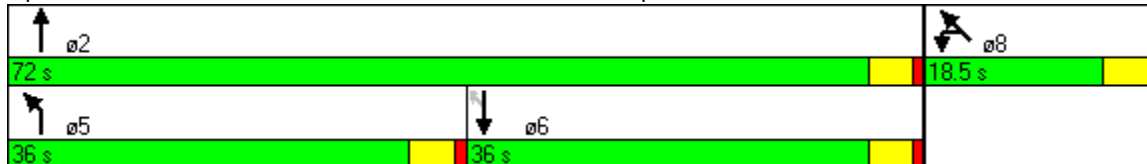
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Lane Group	NBL	NBT	SBT	SBR	NWL	NWT	NWR
Lane Configurations							
Volume (vph)	609	1540	985	401	198	0	622
Turn Type	Prot			Perm	Split		Free
Protected Phases	5	2	6		8	8	
Permitted Phases				6			Free
Detector Phases	5	2	6	6	8	8	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.5	20.5	20.5	20.5	15.0	15.0	
Total Split (s)	36.0	72.0	36.0	36.0	18.5	18.5	0.0
Total Split (%)	39.8%	79.6%	39.8%	39.8%	20.4%	20.4%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	Max	C-Max	C-Max	C-Max	None	None	

**Intersection Summary**

Cycle Length: 90.5  
 Actuated Cycle Length: 90.5  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated

Splits and Phases: 6: Avalon Blvd. & I-405 NB Ramps



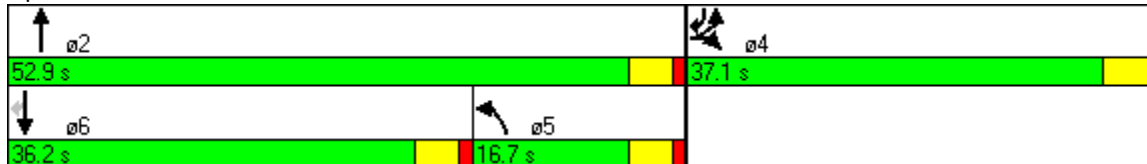


Lane Group	EBL	EBR	EBR2	NBL	NBT	SBT	SBR
Lane Configurations							
Volume (vph)	886	137	625	101	1282	677	471
Turn Type	Split		Free	Prot			pm+ov
Protected Phases	4	4		5	2	6	4
Permitted Phases			Free				6
Detector Phases	4	4		5	2	6	4
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	20.5		8.5	20.5	20.5	20.5
Total Split (s)	37.1	37.1	0.0	16.7	52.9	36.2	37.1
Total Split (%)	41.2%	41.2%	0.0%	18.6%	58.8%	40.2%	41.2%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0
Lead/Lag				Lag		Lead	
Lead-Lag Optimize?				Yes		Yes	
Recall Mode	C-Max	C-Max		None	Max	Max	C-Max

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 70 (78%), Referenced to phase 4:EBL, Start of Green  
 Natural Cycle: 50  
 Control Type: Actuated-Coordinated

Splits and Phases: 7: Lenardo Dr. & Avalon Blvd.



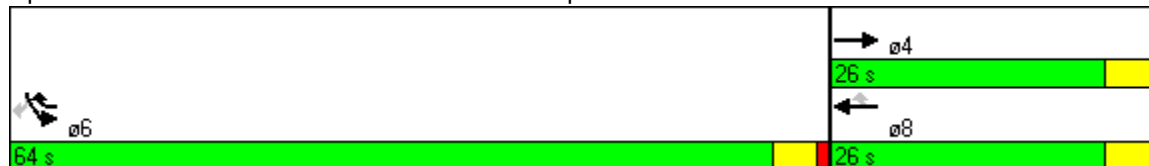


Lane Group	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑↑↑	↑↑	↑	↑↑	↑
Volume (vph)	304	254	319	1344	132
Turn Type			pm+ov		Perm
Protected Phases	4	8	6	6	
Permitted Phases			8		6
Detector Phases	4	8	6	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	20.5	20.5	20.5	20.5
Total Split (s)	26.0	26.0	64.0	64.0	64.0
Total Split (%)	28.9%	28.9%	71.1%	71.1%	71.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	C-Max	C-Max	C-Max




















**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 63 (70%), Referenced to phase 6:SBL, Start of Green  
 Natural Cycle: 50  
 Control Type: Actuated-Coordinated

Splits and Phases: 8: Lenardo Dr. & SB Ramps



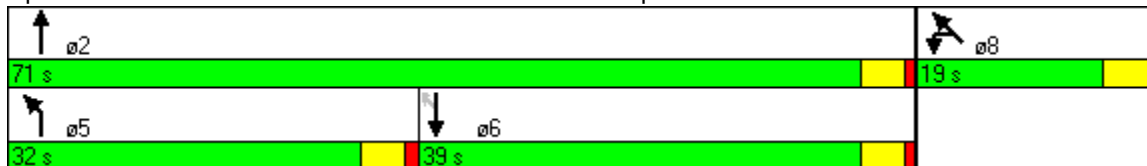


							
Lane Group	NBL	NBT	SBT	SBR	NWL	NWT	NWR
Lane Configurations	 	 	  			 	
Volume (vph)	713	1437	1652	827	433	0	468
Turn Type	Prot		Perm		Split	Free	
Protected Phases	5	2	6	8		8	
Permitted Phases				6	Free		
Detector Phases	5	2	6	6	8	8	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.5	20.5	20.5	20.5	15.0	15.0	
Total Split (s)	32.0	71.0	39.0	39.0	19.0	19.0	
Total Split (%)	35.6%	78.9%	43.3%	43.3%	21.1%	21.1%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead		Lag		Lag		
Lead-Lag Optimize?	Yes		Yes		Yes		
Recall Mode	Max C-Max		C-Max		C-Max	None None	

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated

Splits and Phases: 6: Avalon Blvd. & I-405 NB Ramps



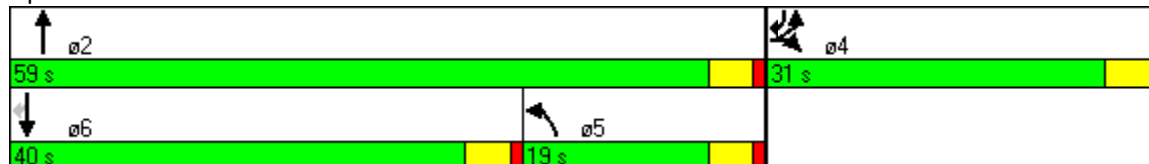


Lane Group	EBL	EBR	EBR2	NBL	NBT	SBT	SBR
Lane Configurations							
Volume (vph)	739	440	716	173	1413	1084	956
Turn Type	Split		Free	Prot			pm+ov
Protected Phases	4	4		5	2	6	4
Permitted Phases			Free				6
Detector Phases	4	4		5	2	6	4
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	20.5		8.5	20.5	20.5	20.5
Total Split (s)	31.0	31.0	0.0	19.0	59.0	40.0	31.0
Total Split (%)	34.4%	34.4%	0.0%	21.1%	65.6%	44.4%	34.4%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0
Lead/Lag				Lag		Lead	
Lead-Lag Optimize?				Yes		Yes	
Recall Mode	C-Max	C-Max		None	Max	Max	C-Max

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 66 (73%), Referenced to phase 4:EBL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated

Splits and Phases: 7: Lenardo & Avalon Blvd.





Lane Group	EBT	WBT	WBR	SWL	SWR
Lane Configurations	↑↑↑	↑↑	↑	↑↑	↑
Volume (vph)	906	556	573	988	308
Turn Type			pm+ov		Perm
Protected Phases	4	8	6	6	
Permitted Phases			8		6
Detector Phases	4	8	6	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	19.5	18.0	18.0	18.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	C-Max	C-Max	C-Max

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 2 (2%), Referenced to phase 6:SWL, Start of Green  
 Natural Cycle: 45  
 Control Type: Actuated-Coordinated

Splits and Phases: 8: Lenardo & SB Ramp

