LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

WESTSIDE PURPLE LINE EXTENSION PROJECT, SECTION 3

ADVANCED PRELIMINARY ENGINEERING

Contract No. PS-4350-2000

Westwood/VA Hospital Station Passenger Drop-off Facility Traffic Impact Study

Task No. 62.04.010.03.07E

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Acronyms and Abbreviations

Caltrans	California Department of Transportation
CBM09	Metro Corridors Base Model 2009
CEQA	California Environmental Quality Act
EIS/EIR	environmental impact statement/environmental impact report
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HOV	high-occupancy vehicle
I-	Interstate
LOS	level-of-service
Metro	Los Angeles County Metropolitan Transportation Authority
NB	northbound
NEPA	National Environmental Policy Act
SB	southbound
TAZ	Transportation Analysis Zone
VA	Veterans Affairs
VA WLA Campus	Veterans Affairs West Los Angeles Campus
WPLE	Westside Purple Line Extension

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1.0 INTRODUCTION

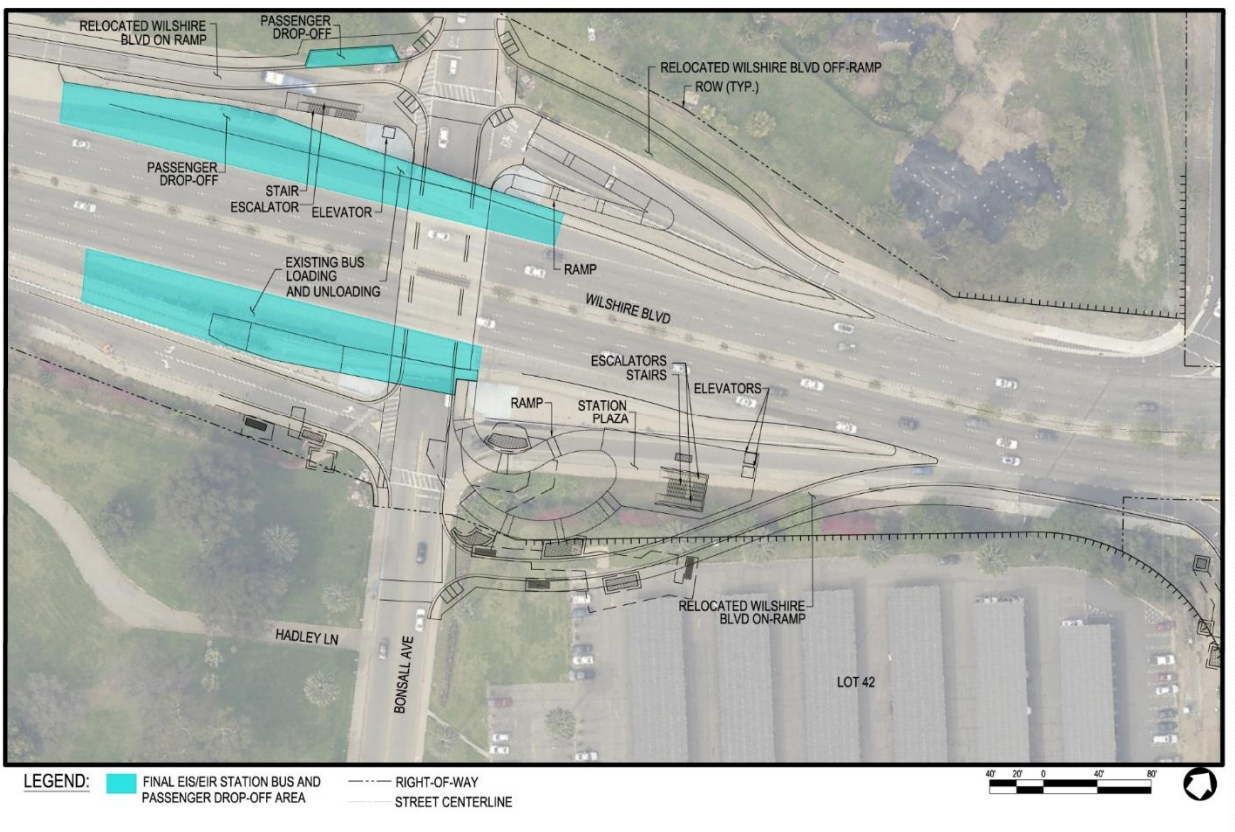
1.1 Study Background

In August 2010, the Los Angeles County Metropolitan Transportation Authority (Metro) published the *Traffic Impact Analysis Report* (Metro 2010a) in support of the *Westside Subway Extension Draft Environmental Impact Statement/Environmental Impact Report* (Draft EIS/EIR) (Metro 2010b). The Draft EIS/EIR analyzed 192 intersections under Existing Conditions, Future 2035 No Build, and Future 2035 Build Alternatives. Of these 192 intersections, four intersections were near the proposed Westwood/ Veterans Affairs (VA) Hospital Station. From west to east they are as follows: Wilshire Boulevard and Barrington Avenue, Wilshire Boulevard and Federal Avenue, Wilshire Boulevard and Sepulveda Boulevard, and Wilshire Boulevard and Veteran Avenue. The horizon year analysis did not require updates for the *Westside Subway Extension Final Environmental Impact Statement/Environmental Impact Report* (Final EIS/EIR) published in March 2012 (Metro 2012); however, an "existing plus project" analysis was conducted for purposes of the California Environmental Quality Act (CEQA). In October 2016, a supplemental traffic impact study (*Traffic Impact Study Westside Purple Line Extension at the Interstate 405/Wilshire Boulevard Interchange* (Metro 2016)) was prepared for the California Department of Transportation (Caltrans) to further analyze the impacts of the Westside Purple Line Extension (WPLE) Project near the Interstate 405 (I-405)/Wilshire Boulevard Interchange in West Los Angeles, California (the study is included in Appendix A). This study was prepared in support of a Project Study Report/Project Report regarding construction activities for the WPLE Project within Caltrans right-of-way.

1.2 Purpose of Report

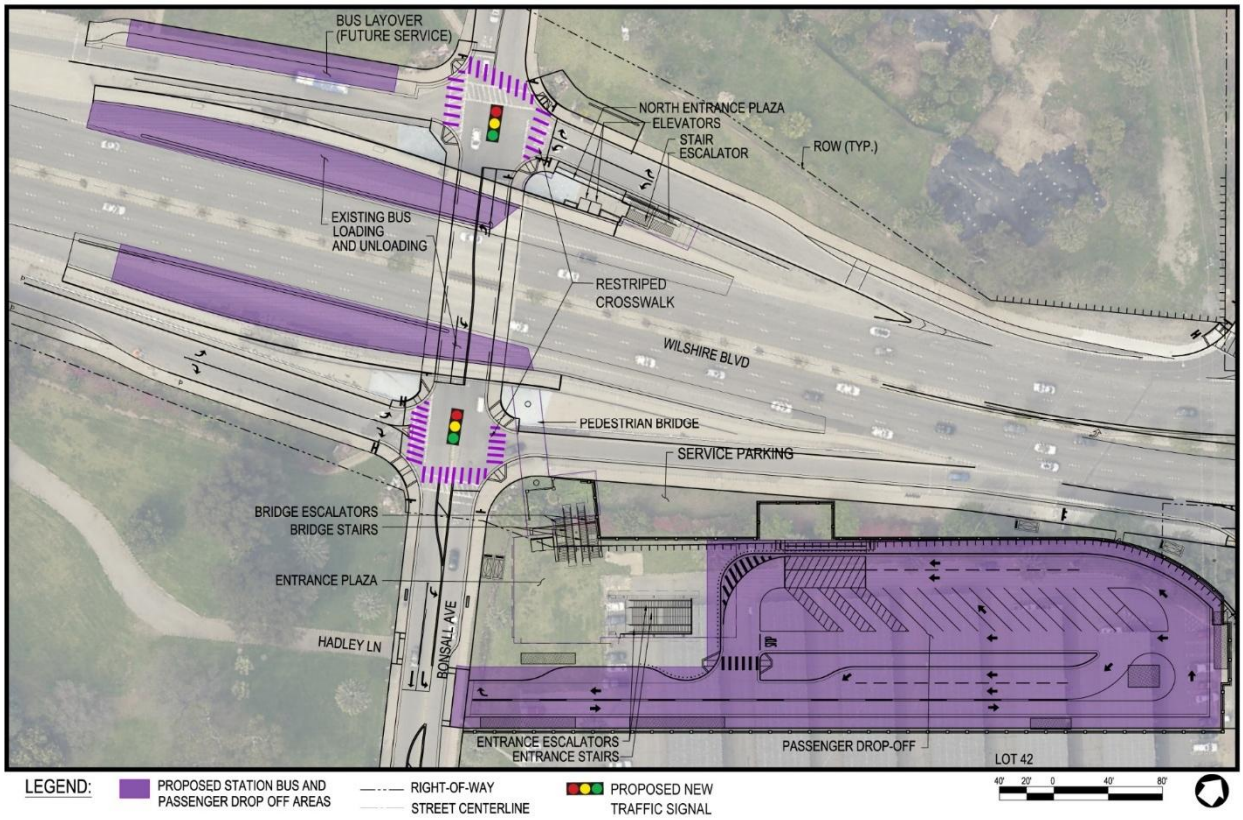
A passenger drop-off area associated with the Westwood/VA Hospital Station was included as part of the Project in the Final EIS/EIR. However, the drop-off area was proposed on the westbound off-ramp from Wilshire Boulevard to Bonsall Avenue (i.e., on the north side of Wilshire Boulevard). The *Westside Subway Extension Project Station Circulation Report* (Metro 2011) specified that a passenger drop-off area could not be accommodated on the eastbound bus turnout or access ramps because of space constraints; however, passenger drop-off activities were expected to occur informally in both locations. The location of the passenger drop-off areas as evaluated in the Final EIS/EIR is shown in Figure 1-1.

Figure 1-1: Bus and Passenger Drop-off Areas—Final EIS/EIR



As a result of further design, it was determined that the westbound access ramp from Bonsall Avenue to Wilshire Boulevard was too short to accommodate a passenger drop-off area. Additionally, the slope of the ramp is not ADA compliant to accommodate drop offs without requiring substantial modifications. There was also concern that informal passenger drop off would occur from various locations on the VA WLA Campus. Therefore, through coordination with representatives of the Veterans Affairs West Los Angeles Campus (VA WLA Campus) during Advanced Preliminary Engineering, the passenger drop-off area has been relocated to within the northern portion of the existing VA Hospital parking lot (referred to as Lot 42) just east of the proposed station plaza and entrance. The passenger drop-off area would have approximately 40 spaces for short-term parking (15 to 30 minutes) and include lighting and traffic islands. The new location of the passenger drop-off area is shown in Figure 1-2. The provision of the dedicated passenger drop-off/pick-up area would benefit the VA WLA Campus and the veteran community as it is designed to prevent Metro passengers that are not associated with the VA from being dropped off or picked up within the VA WLA Campus. Signage (including "no stopping" signs) would be located to direct Metro passengers to the drop-off area and to ensure vehicles do not stop at other points on the campus to drop off passengers. Access to the drop-off area would be via Bonsall Avenue; the new intersection would be striped with a dedicated left-turn lane. Based on analyses completed in support of design, consistent with the *California Manual of Uniform Traffic Control Devices*, a traffic signal would be required at the following two locations on Bonsall Avenue: (1) at the intersection with the Wilshire Boulevard westbound on- and off-ramps and (2) at the intersection with the Wilshire Boulevard eastbound on- and off-ramps. These locations are currently all-way stop controlled. The passenger drop-off area would be designed to accommodate bus service operated by the VA Medical Center; however, public transit provided by other operators (e.g., Metro) would not utilize the drop-off area.

Figure 1-2: Bus and Passenger Drop-off Areas—Proposed



The change in location of the passenger drop-off facility associated with the Westwood/VA Hospital Station necessitates an updated traffic study to determine if there are any new significant impacts that were not originally identified in the EIS/EIR and/or the supplemental Caltrans traffic study.

1.3 Study Area

As described in Section 1.1, the most recent traffic study related to the project is the supplemental traffic study prepared for Caltrans in October 2016 (Metro 2016). To maintain consistency, the general study area for this study was kept the same as it was for the Caltrans supplemental traffic study. Additionally, the study area for this traffic impact study was expanded to include the intersections of Wilshire Boulevard with both Federal Avenue and Barrington Avenue to evaluate potential impacts of traffic coming from west of the Westwood/VA Hospital Station. The resulting study area encompassed by this traffic impact study is as follows:

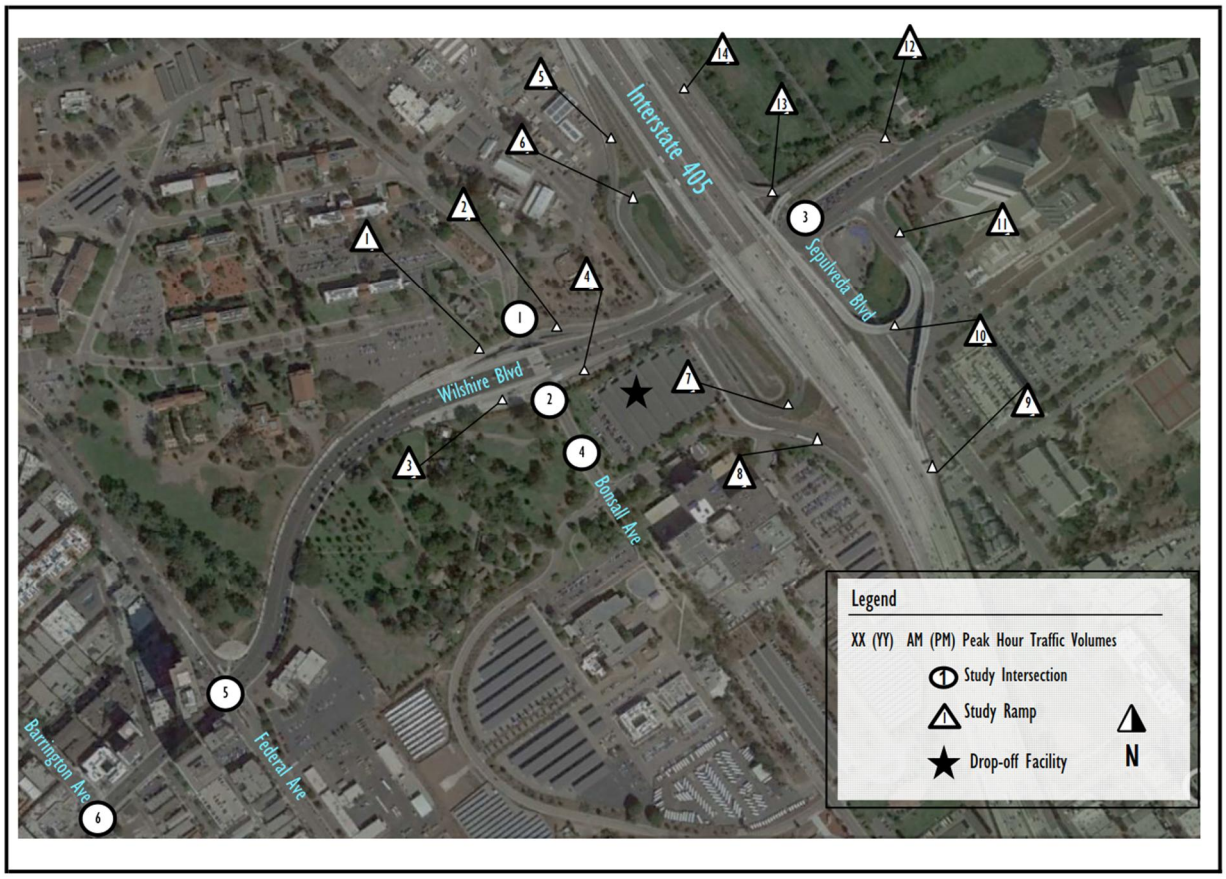
- Freeway Locations
  - I-405/Wilshire Boulevard Interchange
    - Northbound (NB) I-405 to Wilshire Boulevard Off-ramp
    - Wilshire Boulevard to NB I-405 On-ramp

- Southbound (SB) I-405 to Wilshire Boulevard Off-ramp
- Wilshire Boulevard to SB I-405 On-ramp

- Intersections (the numbers in the list below correspond to the numbers shown in circles on Figure 1-3):
  1. Wilshire Boulevard/Bonsall Avenue (North) (unsignalized, would be signalized as part of design)
  2. Wilshire Boulevard/Bonsall Avenue (South) (unsignalized, would be signalized as part of design)
  3. Wilshire Boulevard/Sepulveda Boulevard (signalized)
  4. Bonsall Avenue/Passenger Drop-Off Facility Driveway (proposed unsignalized intersection)
  5. Wilshire Boulevard/Federal Avenue (signalized)
  6. Wilshire Boulevard/Barrington Avenue (signalized)

This study area is shown in Figure 1-3.

Figure 1-3: Project Study Area



1.4 Trip Generation

To maintain consistency with the EIS/EIR, the Metro Corridors Base Model 2009 (CBM 09) was used to determine the 2035 project-related trips from the proposed passenger drop-off facility. The CBM uses the Transportation Analysis Zones (TAZs), divided by geographical locations, for traffic forecasts. Each TAZ contains information such as land use types and socioeconomic data, which are converted to vehicular or person trips. For this study, to determine the project-related trip generation, the trips coming from and going to the project zone were extracted from the model. Table 1-1 summarizes the total number of TAZs that generated trips for the passenger drop-off facility, the total number of daily trips generated, and the total number of the highest singular peak hour (AM peak hour) trips generated. The trips generated in the singular peak hour were assumed for both the AM and PM peak hour to provide a maximum estimate of the drop-off facility's peak hour trip generation. Appendix B contains supplementary maps detailing the trip generation by TAZ. These trips in 2035 will have growth/reduction factors applied to them for analysis conducted in Opening Year (2025) and Horizon Year (2045) Conditions.

Table 1-1: Project Trip Generation

Total No. of TAZs Generating Passenger Drop-Off Trips	Total No. of Daily Trips Generated	Total No. of Peak Hour Trips Generated
387	490	110

Notes: TAZ = Transportation Analysis Zones

1.5 Trip Distribution and Assignment

Trip distribution and assignment information was estimated by analyzing the trips generated by TAZ and assigning them to major roadways that provide a direct route to the Westwood/VA Hospital Station drop-off facility. Based on the location of the Project, it was determined that the project-related trips would access the project site via Wilshire Boulevard and I-405. The trip distribution percentages were then calculated by dividing the number of trips expected on each street over the total trips generated by the Project. The results show that approximately 22 percent of the total inbound trips would arrive at the project site via Wilshire Boulevard from the east, and 78 percent of the total inbound trips would arrive at the project site via Wilshire Boulevard from the west (Figure 1-4). It was assumed that the outbound trips would use identical routes as the inbound trips. The resulting project-related peak hour trips at each of the study locations are shown in Figure 1-5.

Figure 1-4: Inbound Distribution Percentages

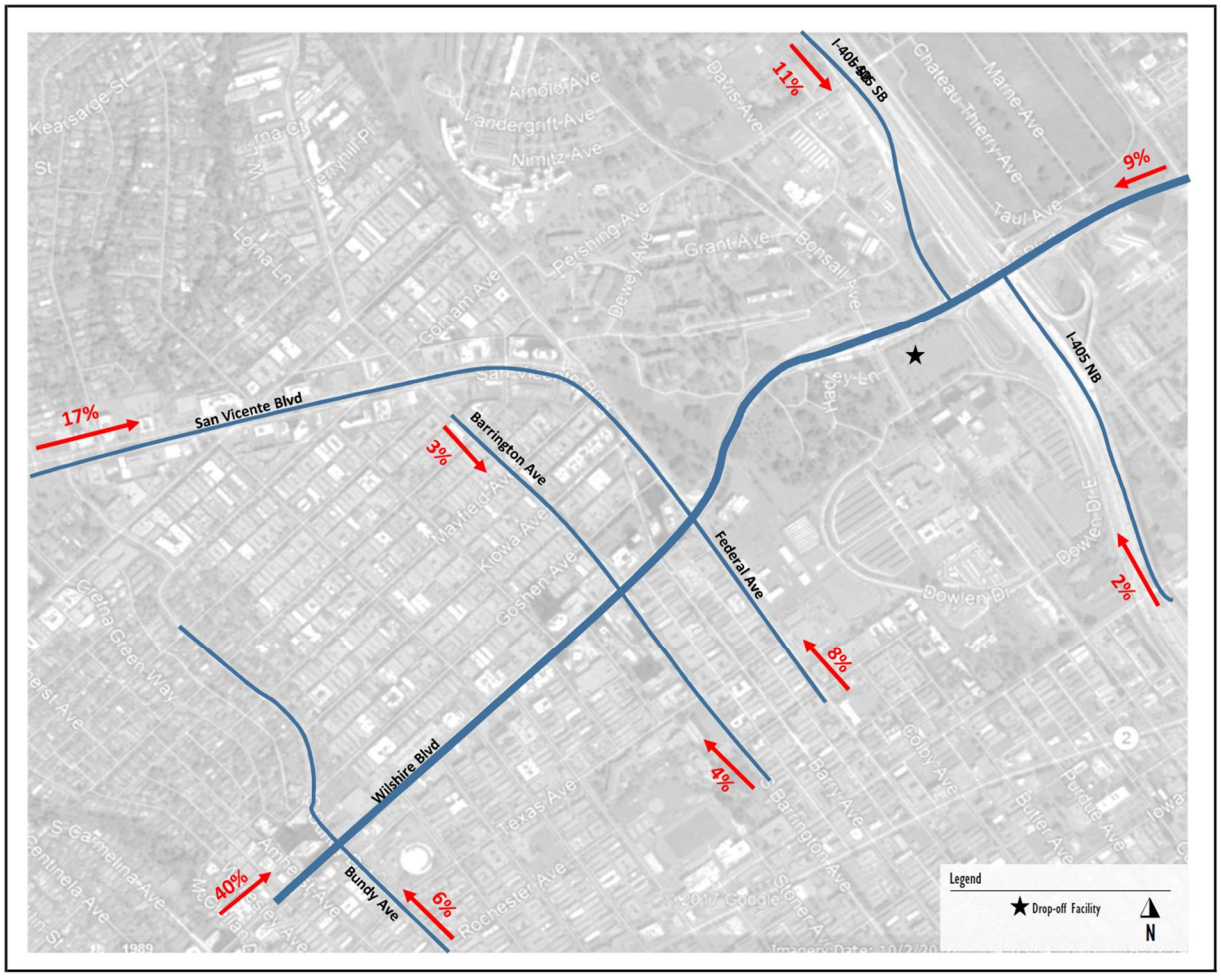
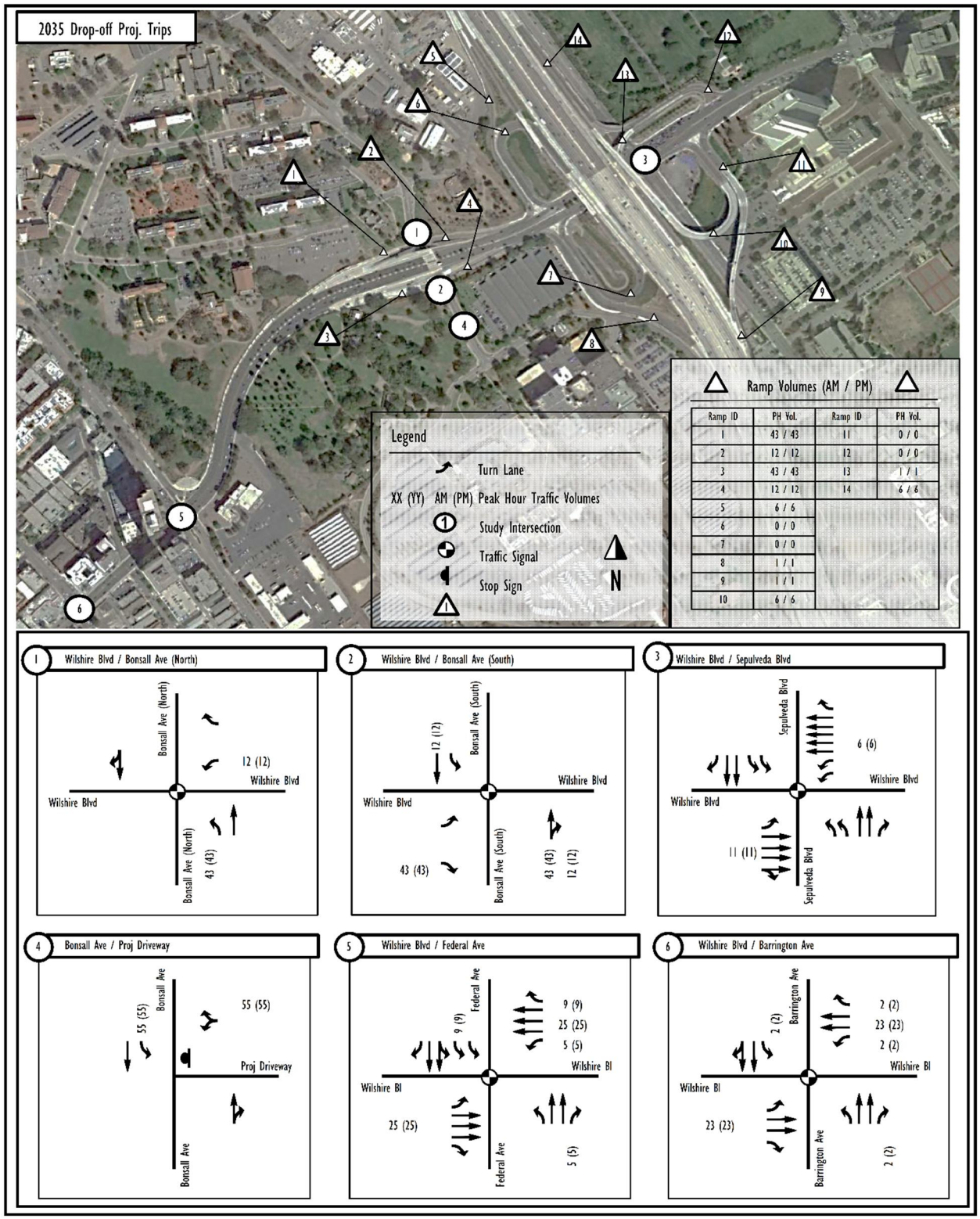


Figure 1-5: 2035 Passenger Drop-Off Facility Project Trips



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2.0 METHODOLOGY

2.1 Study Scenarios

The Draft EIS/EIR analyzed traffic under Existing Conditions and 2035 for a No-Build and Build (WPLE Project) alternative. The Final EIS/EIR also evaluated Existing with Project Conditions for compliance with CEQA. Similarly, the supplemental study prepared for Caltrans (Metro 2016) analyzed Existing, Opening Year (2025) Build and No-Build Conditions, and Horizon Year (2045) Build and No-Build Conditions. To meet both National Environmental Policy Act (NEPA) and CEQA requirements, this study includes the analysis of the following scenarios:

- Existing Conditions
- 2025 (Opening Day) No-Build Conditions
- 2025 (Opening Day) Build Conditions
- 2045 (Horizon Year) No-Build Conditions
- 2045 (Horizon Year) Build Conditions

2.2 Analysis Methodologies

Roadway operating conditions are typically described in terms of "level of service." Level of service (LOS) is a "report card" type scale used to indicate the quality of traffic flow on roadway segments and at intersections under prevailing conditions. The LOS scale ranges from LOS A (free flow, little congestion) to LOS F (forced flow, extreme congestion).

2.2.1 Intersection Analysis

The analysis of peak-hour intersection performance was conducted using Synchro, a traffic analysis and signal optimization software application. Synchro supports the *Highway Capacity Manual* (HCM) methodology (2000 and 2010 methods) for signalized and unsignalized intersections. The HCM 2000 methodology was used for this study (Transportation Research Board 2000). Table 2-1 contains the HCM delay and LOS criteria for signalized and unsignalized intersections.

Table 2-1: Level of Service Definitions

LOS	Signalized Intersection Control Delay (sec/veh)	Stop-Controlled Intersection Control Delay (sec/veh)	Merge and Diverge (pc/mi/ln)	Definition
A	≤10	≤10	≤10	Excellent
B	>10 - 20	>10 - 15	>10 - 20	Very Good
C	>20 - 35	>15 - 25	>20 - 28	Good
D	>35 - 55	>25 - 35	>28 - 35	Fair
E	>55 - 80	>35 - 50	>35	Poor
F	>80 or V/C ratio equal to or greater than 1	>50 or V/C ratio equal to or greater than 1	V/C ratio equal to or greater than 1	Failure

Notes: sec/veh = seconds per vehicle; pc/mi/ln = passenger cars per mile per lane; V/C = volume to capacity

2.2.1.1 Signalized Intersections

The HCM methodology for analyzing signalized intersections is based on the "operational analysis" procedure. This procedure uses 1,900 passenger cars per hour of green per lane as the maximum saturation flow of a single lane at a signalized intersection. This saturation flow rate is adjusted to account for lane width, on-street parking, conflicting pedestrian flow, traffic composition (e.g., percentage of vehicles that are trucks), and shared lane movements (e.g., through and right-turn movements from the same lane). Average control delay is calculated using a volume-weighted average of all the delays for all vehicles entering the intersection.

2.2.1.2 All-Way Stop-Controlled Intersections

The HCM methodology for analyzing all-way stop-controlled intersections is based on conflicting traffic for vehicles stopped at an intersection. Average control delay is calculated using a volume-weighted average of all the delays for all vehicles entering the intersection.

2.2.1.3 Side-Street Stop-Controlled Intersections

The HCM methodology for analyzing two-way stop-controlled intersections is based on gap acceptance and conflicting traffic for vehicles stopped on the minor street approaches. The critical gap (or minimum gap that would be acceptable) is defined as the minimum time interval in the major street traffic flow that allows one vehicle from the minor street to enter the intersection. Control delay and level of service for the "worst" approach are reported, rather than for the intersection as a whole.

2.2.2 Merge/Diverge Ramp Analysis

The analysis of peak-hour freeway merge and diverge ramp performance was conducted using Highway Capacity Software (HCS), a traffic analysis software consistent with HCM 2010 methodologies. The LOS measurement for freeway merge and diverge ramps is based on density in passenger cars per mile per lane. Table 2-1 summarizes the density values and the corresponding LOS categories for the intersection and freeway ramp analyses.

2.3 Measures of Significance

For the traffic impact analysis, the evaluation of significance under NEPA is defined by comparing the Horizon Year (2045) Build Conditions to the Horizon Year (2045) No-Build Conditions. The evaluation of significance under CEQA is defined by comparing the Opening Year 2025 Build Conditions to the Opening Year 2025 No Build Conditions. For the study intersections, the net change in delay is compared to the threshold of significance for determination of impacts.

The intersection LOS analysis assumes that an intersection would be significantly impacted (CEQA)/adversely affected (NEPA) by traffic volume changes if a project alternative causes an increase in average vehicle delay per the following thresholds:

- Final LOS C – A significant/adverse impact has occurred if the delay is increased by 10 or more seconds.
- Final LOS D – A significant/adverse impact has occurred if the delay is increased by 7.5 or more seconds.

- Final LOS E/F – A significant/adverse impact has occurred if the delay is increased by 5 or more seconds.

For Caltrans facilities, Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on state highway facilities; however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing state highway facility is operating at less than the appropriate target LOS, the existing measure of effectiveness should be maintained. Further information on the methodology contained within this study is provided in Appendix C.

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3.0 EXISTING CONDITIONS

3.1 Existing Facilities

The following sections summarize the existing facilities within the study area.

3.1.1 I-405 Freeway (San Diego Freeway)

The I-405 Freeway is a major north/south freeway that connects the San Fernando Valley to West Los Angeles, the South Bay area, and Orange County. I-405 begins at I-5 in the City of Irvine and rejoins I-5 in the City of San Fernando in Los Angeles County. Northbound I-405 has a typical cross-section of five mixed-flow lanes. Southbound I-405 has a typical cross section of five mixed-flow lanes and one high occupancy vehicle (HOV) lane. The Sepulveda Pass project, which added a northbound HOV lane, reconfigured the Wilshire Boulevard interchange within the WPLE Project study area. This reconfiguration was not included in either the EIS/EIR traffic study or the supplemental Caltrans study because the existing year was considered before the completion of the project. For the purposes of this study, all roadway and intersection descriptions include the Sepulveda Pass project and reflect 2017 intersection geometric configurations.

3.1.2 Wilshire Boulevard

Wilshire Boulevard is a major east/west arterial that is classified as a Major Class II Highway and extends from Ocean Avenue in Santa Monica in the west to Grand Avenue in Downtown Los Angeles to the east. Within the study area there are typically three travel lanes in the westbound direction and three travel lanes in the eastbound direction, and this directionality is separated by a continuous raised median. At the I-405 interchange, the cross-section expands to account for five westbound lanes and five eastbound lanes with dedicated turn lanes on the I-405 northbound and southbound on-ramps.

3.1.3 Sepulveda Boulevard

Sepulveda Boulevard is a major north/south arterial that is classified as a Major Class II Highway and extends from the I-405 Freeway in the San Fernando Valley to the north to Artesia Boulevard in the City of Hermosa Beach in the south. Within the study area, Sepulveda Boulevard runs parallel to I-405 with two lanes in the northbound direction and two lanes in the southbound direction. A double yellow line separates the directionality of Sepulveda Boulevard within the study area.

3.1.4 San Vicente Boulevard/Federal Avenue

San Vicente Boulevard is primarily an east/west major street that provides two travel lanes in each direction separated by a landscaped parkway. As San Vicente Boulevard approaches Wilshire Boulevard and the project study area, it turns into a north/south roadway and becomes Federal Avenue. Federal Avenue runs parallel to the I-405 Freeway and separates directionality by painted yellow stripe.

3.1.5 Barrington Avenue

Barrington Avenue is a major north/south street that provides a variable cross-section from a four-lane major roadway to a two-way residential roadway with speed humps and sharrows. Within the study area, Barrington Avenue functions as a four-lane major street as it intersects Wilshire Boulevard and is separated directionally by a double yellow stripe.

3.1.6 Bonsall Avenue

Bonsall Avenue is a north/south collector street that provides direct access to and from the VA WLA Campus, located both north and south of Wilshire Boulevard. Bonsall Avenue is grade separated from Wilshire Boulevard and accessed by diamond interchange ramps on each side of Wilshire Boulevard. Bonsall Avenue then passes under Wilshire Boulevard. Both of the Wilshire Boulevard ramp intersections with Bonsall Avenue are controlled by an all-way three-way stop, and a sidewalk through the underpass links pedestrians to each side of Wilshire Boulevard.

3.2 Existing Conditions Analysis

3.2.1 Traffic Volumes

Existing traffic volumes from the supplemental Caltrans traffic study for intersections 1 through 4 and from the EIS/EIR for intersections 5 and 6 were used for this analysis to maintain consistency with these prior studies. To grow traffic volumes for intersections 5 and 6 from the EIS/EIR existing conditions year (2009) to the existing condition year used in the supplemental Caltrans traffic study (2012), a growth factor was used for each intersection. Table 3-1 presents the peak hour intersection traffic volumes under the Existing Conditions used in this study. Raw data and the growth factor for intersections 5 and 6 are included in Appendix D of this report.

Table 3-1: Existing Conditions Peak Hour Intersection Traffic Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	6	194	0	0	437	38	0	0	0	217	0	144
2. Bonsall Avenue (South) & Wilshire Boulevard	0	99	68	309	390	0	25	0	75	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	105	299	299	142	376	214	65	2522	109	118	2665	74
4. Drop-off Project Driveway & Bonsall Avenue	0	167	0	0	465	0	0	0	0	0	0	0
5. Federal Avenue & Wilshire Boulevard	103	225	165	1304	242	28	32	1691	57	80	1584	927
6. Barrington Avenue & Wilshire Boulevard	112	370	136	185	415	65	51	1439	30	51	1535	69
PM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	16	178	0	0	471	38	0	0	0	44	0	37
2. Bonsall Avenue (South) & Wilshire Boulevard	0	66	111	381	173	0	23	0	44	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	293	355	153	84	250	173	143	2053	84	172	2663	138
4. Drop-off Project Driveway & Bonsall Avenue	0	177	0	0	217	0	0	0	0	0	0	0
5. Federal Avenue & Wilshire Boulevard	96	407	238	870	218	7	22	1321	26	81	1700	948
6. Barrington Avenue & Wilshire Boulevard	61	284	11	38	408	40	14	1333	49	76	1714	48

Notes: EBL = eastbound left; EBR = eastbound right; EBT = eastbound through; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; WBL = westbound left; WBR = westbound right; WBT = westbound through

Existing traffic volumes on the I-405/Wilshire Boulevard interchange ramps were also collected from the supplemental Caltrans study, which originated from the Caltrans Performance Measure System (PeMS). Table 3-2 summarizes the Existing Conditions peak hour freeway ramp junction and segment traffic volumes for this interchange.

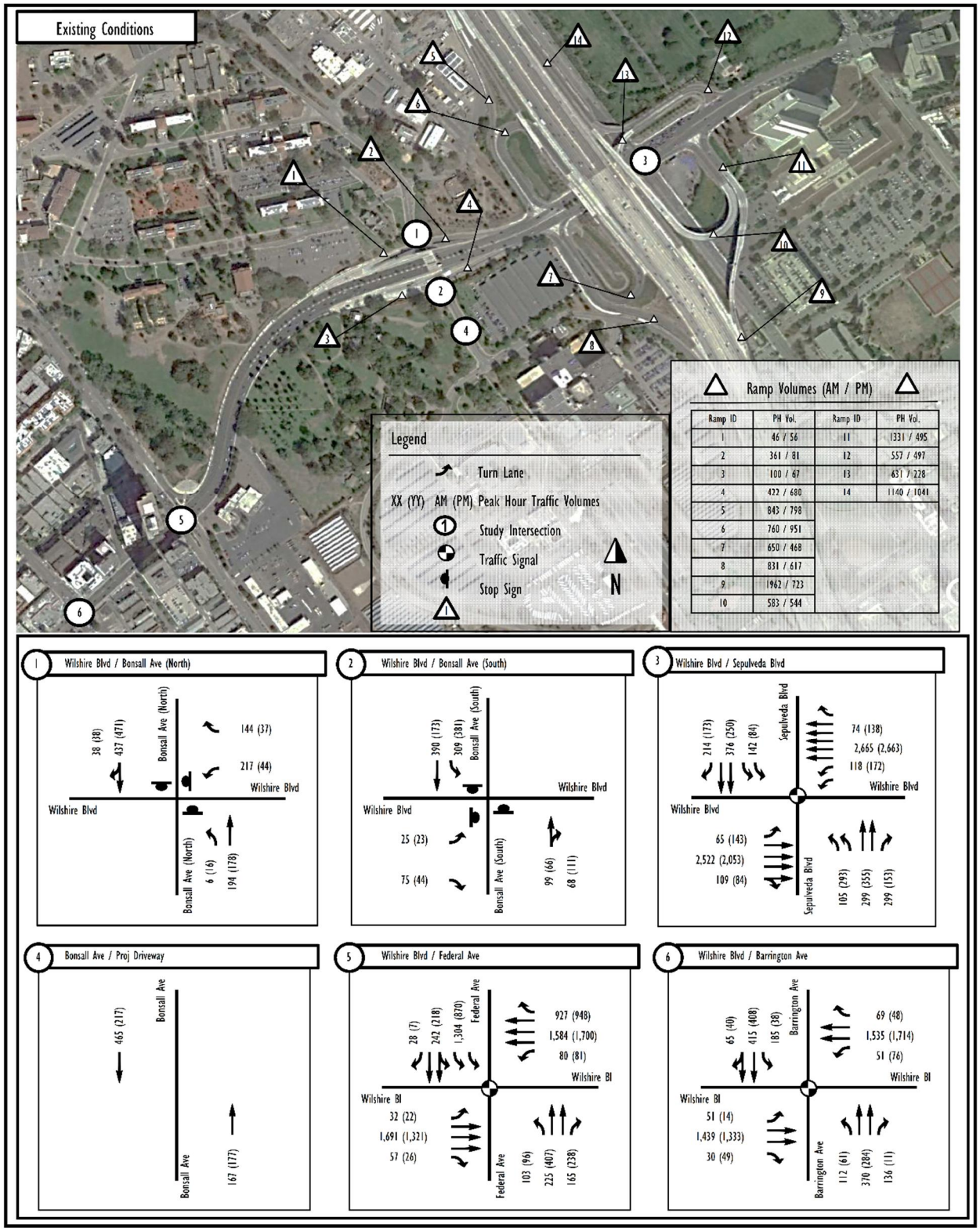
Table 3-2: Existing Conditions Peak Hour Interchange Traffic Volumes

Ramps		Existing Conditions	
Freeway	Name	AM	PM
I-405 Southbound	WB Wilshire Off-Ramp	843	798
	WB Wilshire On-Ramp	760	951
	EB Wilshire Off-Ramp	650	468
	EB Wilshire On-Ramp	831	617
I-405 Northbound	EB/WB Wilshire Off-Ramp	1,962	723
	EB Wilshire On-Ramp	583	544
	EB Wilshire Off-Ramp	1,331	495
	WB Wilshire On-Ramp	557	497
	WB Wilshire Off-Ramp	631	228
	EB/WB Wilshire On-Ramp	1,140	1,041

Notes: EB = eastbound; WB = westbound

Figure 3-1 presents the existing AM and PM peak hour volumes for intersections and freeway interchange ramps within the study limits.

Figure 3-1: Existing Conditions AM/PM Peak Hour Traffic Volumes and Geometric Configurations



3.2.2 Level of Service

LOS was calculated at each study intersection, as described in Section 2.2. Table 3-3 summarizes vehicle delay in seconds per vehicle and the corresponding LOS for each study location.

Table 3-3: Existing Conditions Peak Hour Intersection Level of Service

Intersection	Control Type	AM Peak Hour - Existing Conditions		PM Peak Hour - Existing Conditions	
		Delay	LOS	Delay	LOS
1. Bonsall Avenue (North) & Wilshire Boulevard	All-Way Stop	24.0	C	18.1	C
2. Bonsall Avenue (South) & Wilshire Boulevard	All-Way Stop	12.6	B	12.3	B
3. Sepulveda Boulevard & Wilshire Boulevard	Traffic Signal	31.9	C	35.3	D
4. Drop-off Project Driveway & Bonsall Avenue	N/A	Does not exist under Existing Conditions			
5. Federal Avenue & Wilshire Boulevard	Traffic Signal	57.2	**E**	46.4	D
6. Barrington Avenue & Wilshire Boulevard	Traffic Signal	16.7	B	16.5	B

Notes: = Level of Service F = Level of Service E
LOS = Level of service; N/A = Not Applicable

Of the five study intersections under the Existing Conditions, four operate at LOS D or better during both the AM and PM peak hours. The intersection of Federal Avenue and Wilshire Boulevard operates at an unacceptable level at LOS E during the AM peak hour. Resulting Synchro calculation sheets are provided in Appendix E.

Table 3-4 displays the resulting density and LOS for the I-405/Wilshire Boulevard interchange ramps. The resulting HCS analysis sheets are provided in Appendix F.

Table 3-4: Existing Conditions Peak Hour Interchange Level of Service

Freeway Location	Segment Type	Existing Conditions	
		Density (pc/mi/ln)	LOS
AM Peak Hour			
1. NB I-405 Wilshire Off-Ramp	Diverge	19.9	**F**
2. NB I-405 Wilshire On-Ramp	Merge	25.1	C
3. SB I-405 Westbound Wilshire Off-Ramp	Diverge	29.3	D
4. SB I-405 Westbound Wilshire On-Ramp	Merge	37.7	**F**
5. SB I-405 Eastbound Wilshire Off-Ramp	Diverge	42.1	**F**
6. SB I-405 Eastbound Wilshire On-Ramp	Merge	33.9	**F**
PM Peak Hour			
1. NB I-405 Wilshire Off-Ramp	Diverge	9.7	A
2. NB I-405 Wilshire On-Ramp	Merge	23.1	C
3. SB I-405 Westbound Wilshire Off-Ramp	Diverge	24.4	C
4. SB I-405 Westbound Wilshire On-Ramp	Merge	33.3	D
5. SB I-405 Eastbound Wilshire Off-Ramp	Diverge	36.0	**E**
6. SB I-405 Eastbound Wilshire On-Ramp	Merge	27.6	C

Note: = Level of Service F = Level of Service E

LOS = Level of service; NB = northbound; pc/mi/ln = passenger cars per mile per lane; southbound

4.0 OPENING YEAR (2025) CONDITIONS

4.1 Opening Year (2025) No Build Conditions

4.1.1 Traffic Volumes

To maintain consistency with previous studies, 2025 No Build traffic volumes used in this study are the same as those from the *Traffic Impact Study Westside Purple Line Extension at the Interstate 405/Wilshire Boulevard Interchange* (Metro 2016) for all intersections that correspond with this project study area. These volumes were forecasted based on the Southern California Association of Governments traffic models.

However, because the study area for this traffic study is larger than the supplemental Metro 2016 traffic study, the intersections of Federal Avenue and Barrington Avenue with Wilshire Boulevard did not have turning volumes in the 2025 No Build Conditions; therefore, turning movement volumes for these intersections were taken from the Existing Conditions scenario in the Draft EIS/EIR traffic study. To convert these volumes to 2025 No Build Conditions in this study, a linear growth factor was calculated by percentage taking the difference in peak hour volumes between the 2009 and 2035 No Build Conditions in the Draft EIR/EIS traffic study. This linear growth factor was then applied to the Existing Conditions volumes used in the Draft EIS/EIR traffic study to obtain the volumes for the 2025 No Build Conditions. The growth factor and calculations to derive this factor can be found in Appendix D.

Since the intersection of the proposed passenger drop-off driveway at Bonsall Avenue does not exist in the No Build condition, the peak hour volumes at this intersection were derived by balancing the turning movement volumes at the adjacent intersections. Table 4-1 presents the resulting 2025 No Build Conditions peak hour intersection traffic volumes. Table 4-2 summarizes the Opening Year (2025) peak hour freeway ramp traffic volumes for the I-405/Wilshire Boulevard interchange.

Table 4-1: Opening Year (2025) No Build Conditions Peak Hour Intersection Traffic Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	7	199	0	0	487	42	0	0	0	222	0	148
2. Bonsall Avenue (South) & Wilshire Boulevard	0	171	117	316	400	0	26	0	77	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	108	306	306	146	385	219	67	2582	112	121	2728	76
4. Drop-off Project Driveway & Bonsall Avenue	0	288	0	0	477	0	0	0	0	0	0	0
5. Federal Avenue & Wilshire Boulevard	111	243	178	1407	261	30	35	1825	62	86	1710	1001
6. Barrington Avenue & Wilshire Boulevard	125	412	152	206	462	72	57	1604	33	57	1711	77
PM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	17	180	0	0	513	41	0	0	0	45	0	38
2. Bonsall Avenue (South) & Wilshire Boulevard	0	179	301	383	175	0	24	0	45	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	154	357	295	85	252	175	144	2064	85	174	2677	139
4. Drop-off Project Driveway & Bonsall Avenue	0	480	0	0	220	0	0	0	0	0	0	0
5. Federal Avenue & Wilshire Boulevard	104	440	257	941	236	8	24	1428	28	88	1838	1025
6. Barrington Avenue & Wilshire Boulevard	72	336	13	45	483	47	17	1578	58	90	2028	57

Notes: Notes: EBL = eastbound left; EBR = eastbound right; EBT = eastbound through; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; WBL = westbound left; WBR = westbound right; WBT = westbound through

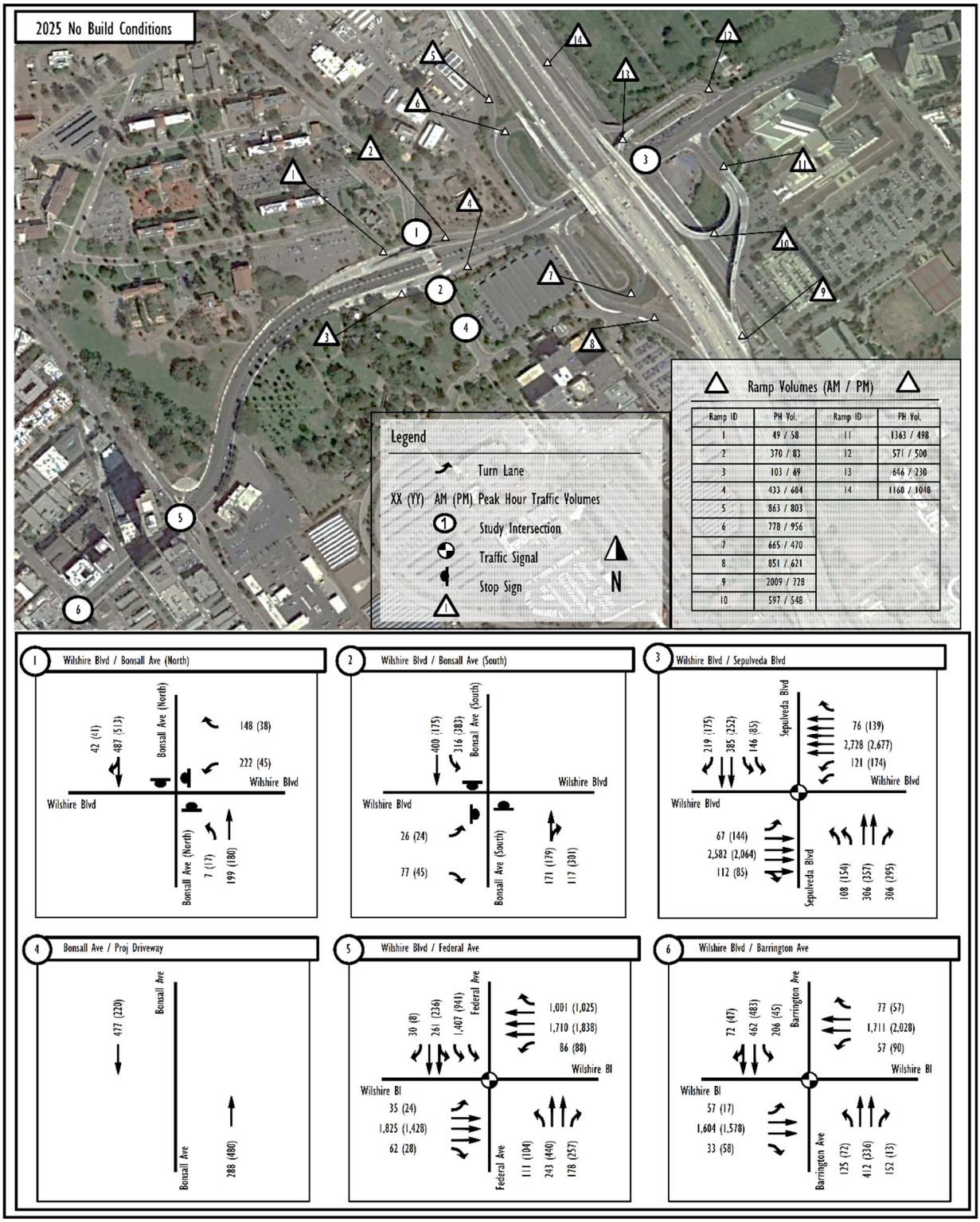
Table 4-2: Opening Year (2025) No Build Conditions Peak Hour Interchange Traffic Volumes

Ramps		2025 No Build Condition	
Freeway	Name	AM	PM
I-405 Southbound	WB Wilshire Off-Ramp	863	803
	WB Wilshire On-Ramp	778	956
	EB Wilshire Off-Ramp	665	470
	EB Wilshire On-Ramp	851	621
I-405 Northbound	EB/WB Wilshire Off-Ramp	2009	728
	EB Wilshire On-Ramp	597	548
	EB Wilshire Off-Ramp	1363	498
	WB Wilshire On-Ramp	571	500
	WB Wilshire Off-Ramp	646	230
	EB/WB Wilshire On-Ramp	1168	1048

Notes: EB = eastbound; WB = westbound

Figure 4-1 presents the 2025 No Build AM and PM peak hour volumes and geometric configurations for all intersections and freeway interchange ramps within the study limits.

Figure 4-1: Opening Year (2025) No Build AM/PM Peak Hour Traffic Volumes and Geometric Configurations



4.1.2 Level of Service

LOS was calculated at each study intersection, as described in Section 2.2. Table 4-3 summarizes vehicle delay in seconds per vehicle and the corresponding LOS for each study location.

Table 4-3: Opening Year (2025) No Build Conditions Peak Hour Intersection Level of Service

Intersection	Control Type	AM Peak Hour – 2025 No Build Conditions		PM Peak Hour – 2025 No Build Conditions	
		Delay	LOS	Delay	LOS
1. Bonsall Avenue (North) & Wilshire Boulevard	All-Way Stop	35.0	D	22.6	C
2. Bonsall Avenue (South) & Wilshire Boulevard	All-Way Stop	13.9	B	17.4	C
3. Sepulveda Boulevard & Wilshire Boulevard	Traffic Signal	30.4	C	32.0	C
4. Drop-off Project Driveway & Bonsall Avenue	N/A	Does not exist under No Build Conditions			
5. Federal Avenue & Wilshire Boulevard	Traffic Signal	69.1	**E**	53.2	D
6. Barrington Avenue & Wilshire Boulevard	Traffic Signal	23.2	C	21.5	C

Note: = Level of Service F = Level of Service E
LOS = level of service; N/A = Not Applicable

Of the five study intersections, four are projected to operate at LOS D or better in the AM peak hours; while all five are projected to operate at LOS D or better in the PM peak hour. The intersection of Federal Avenue and Wilshire Boulevard is projected to operate at an unacceptable LOS E in the AM peak hour. Synchro calculation sheets are provided in Appendix E.

Table 4-4 displays the resulting density and LOS for the I-405/Wilshire Boulevard ramps. The resulting HCS analysis sheets are provided in Appendix F.

Table 4-4: Opening Year (2025) No Build Conditions Peak Hour Interchange Level of Service

Intersection	Segment Type	2025 No Build Conditions	
		Density (pc/mi/ln)	LOS
AM Peak Hour			
1. NB I-405 Wilshire Off-Ramp	Diverge	32.9	**F**
2. NB I-405 Wilshire On-Ramp	Merge	25.1	C
3. SB I-405 Westbound Wilshire Off-Ramp	Diverge	47.0	**F**
4. SB I-405 Westbound Wilshire On-Ramp	Merge	38.7	**F**
5. SB I-405 Eastbound Wilshire On-Ramp	Merge	40.0	**F**
PM Peak Hour			
1. NB I-405 Wilshire Off-Ramp	Diverge	20.5	C
2. NB I-405 Wilshire On-Ramp	Merge	22.7	C
3. SB I-405 Wilshire Off-Ramp	Diverge	39.0	**E**
4. SB I-405 Westbound Wilshire On-Ramp	Merge	33.5	D
5. SB I-405 Eastbound Wilshire On-Ramp	Merge	32.8	D

Note: = F Level of Service Score = E Level of Service Score
LOS = level of service; NB = northbound; pc/mi/ln = passenger cars per mile per lane; SB = southbound

4.2 Opening Year (2025) Drop-off Facility Project Trips

4.2.1 Projected 2025 Project Trips

As described in Section 1.4 and Section 1.5, the Metro CBM was used to determine the 2035 project trips for the passenger drop-off facility. To provide a conservative estimate of the impact of the project trips in 2025, the 2035 project trips discussed in Section 1.4 were used for 2025 project trip turning movement volumes. Table 4-5 presents the resulting 2025 project trip peak hour intersection traffic volumes.

Table 4-5: 2025 Project Trips Peak Hour Intersection Traffic Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	43	0	0	0	0	0	0	0	0	12	0	0
2. Bonsall Avenue (South) & Wilshire Boulevard	0	43	12	0	12	0	0	0	43	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	0	0	0	0	0	0	0	11	0	0	6	0
4. Drop-off Project Driveway & Bonsall Avenue	0	0	0	55	0	0	0	0	0	0	0	55
5. Federal Avenue & Wilshire Boulevard	0	0	5	9	0	0	0	25	0	5	25	9
6. Barrington Avenue & Wilshire Boulevard	0	0	2	2	0	0	0	23	0	2	23	2
PM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	43	0	0	0	0	0	0	0	0	12	0	0
2. Bonsall Avenue (South) & Wilshire Boulevard	0	43	12	0	12	0	0	0	43	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	0	0	0	0	0	0	0	11	0	0	6	0
4. Drop-off Project Driveway & Bonsall Avenue	0	0	0	55	0	0	0	0	0	0	0	55
5. Federal Avenue & Wilshire Boulevard	0	0	5	9	0	0	0	25	0	5	25	9
6. Barrington Avenue & Wilshire Boulevard	0	0	2	2	0	0	0	23	0	2	23	2

Notes: Notes: EBL = eastbound left; EBR = eastbound right; EBT = eastbound through; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; WBL = westbound left; WBR = westbound right; WBT = westbound through

Table 4-6 summarizes the Opening Year (2025) peak hour freeway ramp traffic volumes for the I-405/Wilshire Boulevard interchange.

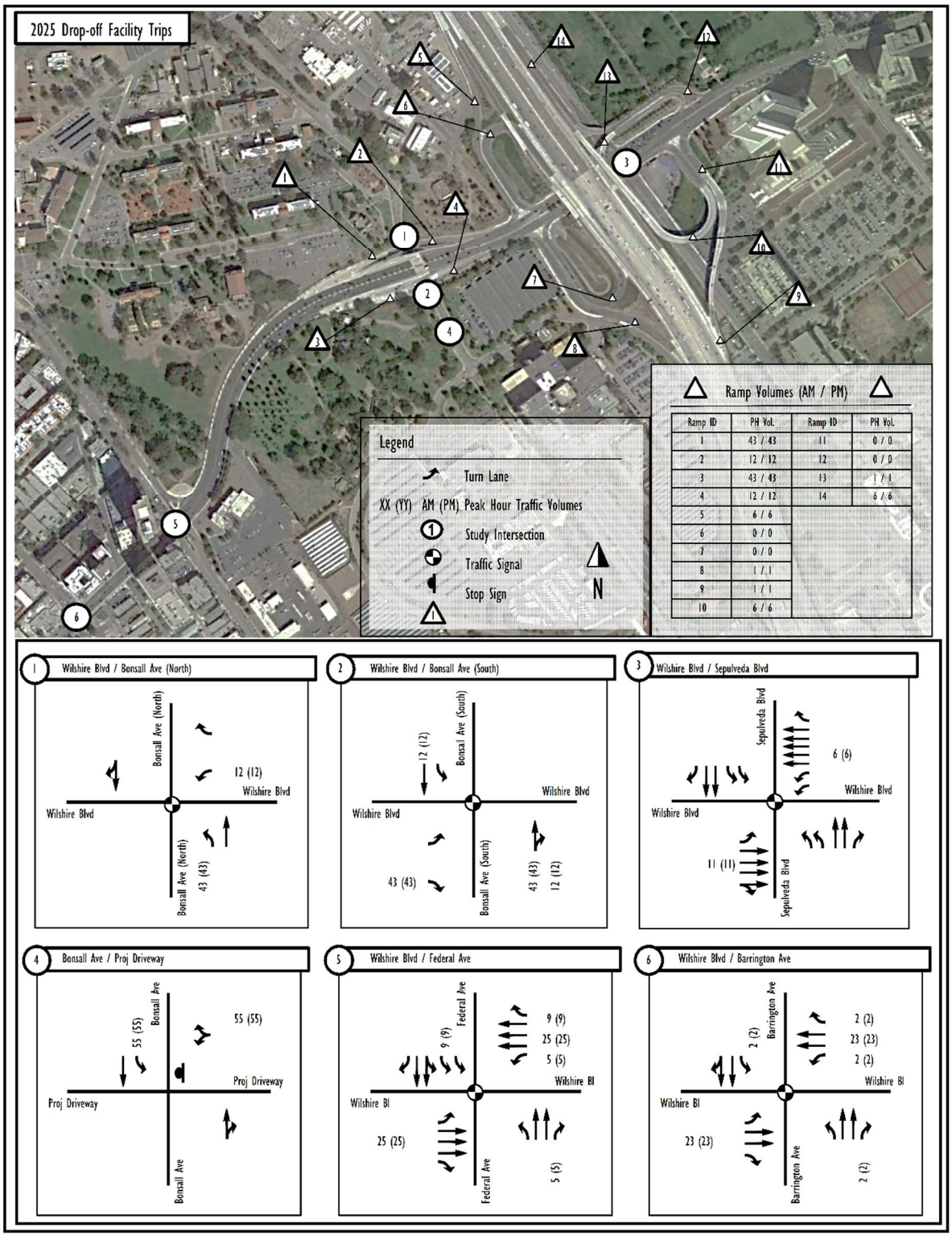
Table 4-6: 2025 Project Trips Peak Hour Interchange Traffic Volumes

Ramps		2025 Project Trips	
Freeway	Name	AM	PM
I-405 Southbound	WB Wilshire Off-Ramp	6	6
	WB Wilshire On-Ramp	0	0
	EB Wilshire Off-Ramp	0	0
	EB Wilshire On-Ramp	1	1
I-405 Northbound	EB/WB Wilshire Off-Ramp	1	1
	EB Wilshire On-Ramp	6	6
	EB Wilshire Off-Ramp	0	0
	WB Wilshire On-Ramp	0	0
	WB Wilshire Off-Ramp	1	1
	EB/WB Wilshire On-Ramp	6	6

Notes: EB = eastbound; WB = westbound

Figure 4-2 presents the Opening Year (2025) No Build Conditions AM and PM peak hour volumes and geometric configurations for all intersections and freeway interchange ramps within the study limits.

Figure 4-2: 2025 Project Trips AM/PM Peak Hour Traffic Volumes



4.3 Opening Year (2025) Build Conditions

4.3.1 Traffic Volumes and Geometric Configuration

The Opening Year (2025) Build Conditions represents the addition of project trip volumes from the passenger drop-off facility (detailed in Section 4.2) to the No Build traffic volumes presented in Section 4.1. Table 4-7 presents the resulting Opening Year (2025) Build Conditions peak hour intersection traffic volumes.

Table 4-7: Opening Year (2025) Build Conditions Peak Hour Intersection Traffic Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	50	199	0	0	487	42	0	0	0	234	0	148
2. Bonsall Avenue (South) & Wilshire Boulevard	0	214	129	316	412	0	26	0	120	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	108	306	306	146	385	219	67	2593	112	121	2734	76
4. Drop-off Project Driveway & Bonsall Avenue	0	288	0	55	477	0	0	0	0	0	0	55
5. Federal Avenue & Wilshire Boulevard	111	243	183	1416	261	30	35	1850	62	91	1735	1010
6. Barrington Avenue & Wilshire Boulevard	125	412	154	208	462	72	57	1627	33	59	1734	79
PM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	60	180	0	0	513	41	0	0	0	57	0	38
2. Bonsall Avenue (South) & Wilshire Boulevard	0	222	313	383	187	0	24	0	88	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	154	357	295	85	252	175	144	2075	85	174	2683	139
4. Drop-off Project Driveway & Bonsall Avenue	0	480	0	55	220	0	0	0	0	0	0	55
5. Federal Avenue & Wilshire Boulevard	104	440	262	950	236	8	24	1453	28	93	1863	1034
6. Barrington Avenue & Wilshire Boulevard	72	336	15	47	483	47	17	1601	58	92	2051	59

Notes: Notes: EBL = eastbound left; EBR = eastbound right; EBT = eastbound through; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; WBL = westbound left; WBR = westbound right; WBT = westbound through

Table 4-8 summarizes the Opening Year (2025) Build Conditions peak hour freeway ramp traffic volumes for the I-405/Wilshire Boulevard interchange.

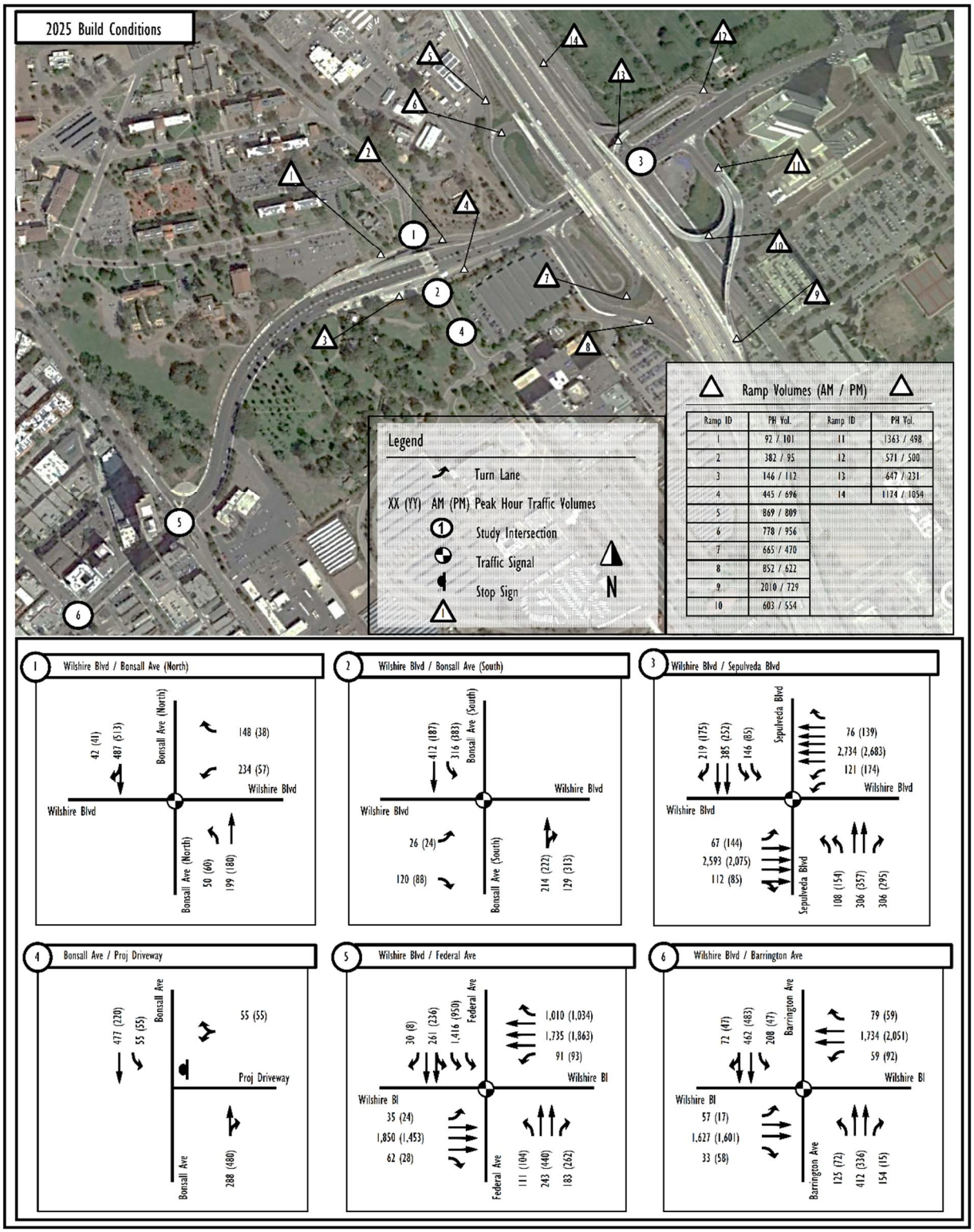
Table 4-8: Opening Year (2025) Build Conditions Peak Hour Interchange Traffic Volumes

Ramps		2025 Build Conditions	
Freeway	Name	AM	PM
I-405 Southbound	WB Wilshire Off-Ramp	869	809
	WB Wilshire On-Ramp	778	956
	EB Wilshire Off-Ramp	665	470
	EB Wilshire On-Ramp	852	622
I-405 Northbound	EB/WB Wilshire Off-Ramp	2010	729
	EB Wilshire On-Ramp	603	554
	EB Wilshire Off-Ramp	1363	498
	WB Wilshire On-Ramp	571	500
	WB Wilshire Off-Ramp	647	231
	EB/WB Wilshire On-Ramp	1174	1054

Notes: EB = eastbound; WB = westbound

To support the addition of the passenger drop-off area, the new driveway for the passenger drop-off area from Bonsall Avenue would include a left-turn pocket to accommodate vehicles traveling southbound on Bonsall Avenue and making a left turn to the drop-off facility. Additionally, as part of design, the intersection of Bonsall Avenue at the westbound and eastbound on- and off-ramps from Wilshire Boulevard (referred to as Bonsall Avenue (North) and Bonsall Avenue (South), respectively, in this study) would be signalized instead of an all-way stop, which will be included in the project documents. Figure 4-3 presents the Opening Year (2025) Build Conditions AM and PM peak hour volumes and geometric configurations for all intersections and freeway interchange ramps within the study limits.

Figure 4-3: Opening Year (2025) Build AM/PM Peak Hour Traffic Volumes and Geometric Configurations



4.3.2 Level of Service

LOS was calculated at each study intersection, as described in Section 2.2. Table 4-9 summarizes vehicle delay in seconds per vehicle and the corresponding LOS for each study location. Table 4-9 also compares the Build Conditions level of service with the Opening Year (2025) No Build Conditions to determine if any significant impacts occurred per the thresholds described in Section 2.3.

Table 4-9: Opening Year (2025) No Build / Build Conditions Peak Hour Intersection Level of Service

Intersection	Control Type	2025 No Build Conditions		2025 Build Conditions		Δ Delay	Significant?
		Delay	LOS	Delay	LOS		
AM Peak Hour							
1. Bonsall Avenue (North) & Wilshire Boulevard	All-Way Stop[1]	35.0	D	14.8	B	-20.2	No
2. Bonsall Avenue (South) & Wilshire Boulevard	All-Way Stop[1]	13.9	B	12.4	B	-1.5	No
3. Sepulveda Boulevard & Wilshire Boulevard	Traffic Signal	30.4	C	30.7	C	0.3	No
4. Drop-off Project Driveway & Bonsall Avenue	Side Street Stop[2]			10.4	B	*N/A*	*N/A*
5. Federal Avenue & Wilshire Boulevard	Traffic Signal	69.1	**E**	71.0	**E**	1.9	No
6. Barrington Avenue & Wilshire Boulevard	Traffic Signal	23.2	C	23.3	C	0.1	No
PM Peak Hour							
1. Bonsall Avenue (North) & Wilshire Boulevard	All-Way Stop[1]	22.6	C	9.5	A	-13.1	No
2. Bonsall Avenue (South) & Wilshire Boulevard	All-Way Stop[1]	17.4	C	20.7	C	3.3	No
3. Sepulveda Boulevard & Wilshire Boulevard	Traffic Signal	32.0	C	32.2	C	0.2	No
4. Drop-off Project Driveway & Bonsall Avenue	Side Street Stop[2]			12.3	B	*N/A*	*N/A*
5. Federal Avenue & Wilshire Boulevard	Traffic Signal	53.2	D	53.8	D	0.6	No
6. Barrington Avenue & Wilshire Boulevard	Traffic Signal	21.5	C	21.6	C	0.1	No

Note: = Level of Service F = Level of Service E

[1] Intersection control changes to signalized in the Build Condition; [2] = Intersection does not exist under No Build Condition but is side street stop controlled in the Build Condition; LOS = level of service; Δ = change in delay

While nearly every intersection experiences an increase in delay under Build Conditions, the increases in delay were less than the significance thresholds as described in Section 2.3. Additionally, the intersection of Bonsall Avenue (North) with Wilshire Boulevard experiences a decrease in delay in both the AM and PM peak hour, while the intersection of Bonsall Avenue (South) with Wilshire Boulevard experiences a decrease in delay in the just AM Peak Hour. These decreases in average delay are due to the signalization of each intersection in the Build condition. The Synchro calculation sheets are provided in Appendix E.

Table 4-10 displays the density and LOS for the I-405/Wilshire Boulevard interchange ramps. This table also compares the Build and No-Build Conditions. It is important to note that because of the low number of project trips accessing the drop-off facility via I-405, the density remains largely unchanged for all study ramps. The HCS analysis sheets are provided in Appendix F.

Table 4-10: Opening Year (2025) No Build / Build Conditions Peak Hour Interchange Level of Service

Interchange Ramp	Segment Type	2025 No Build Conditions		2025 Build Conditions		Δ Density (pc/mi/ln)	Significant?
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS		
AM Peak Hour							
1. NB I-405 Wilshire Off-Ramp	Diverge	32.9	**F**	32.9	**F**	0.0	No
2. NB I-405 Wilshire On-Ramp	Merge	25.1	C	25.1	C	0.0	No
3. SB I-405 Westbound Wilshire Off-Ramp	Diverge	47.0	**F**	47.0	**F**	0.0	No
4. SB I-405 Westbound Wilshire On-Ramp	Merge	38.7	**F**	38.7	**F**	0.0	No
5. SB I-405 Eastbound Wilshire On-Ramp	Merge	40.0	**F**	40.0	**F**	0.0	No
PM Peak Hour							
1. NB I-405 Wilshire Off-Ramp	Diverge	20.5	C	20.5	C	0.0	No
2. NB I-405 Wilshire On-Ramp	Merge	22.7	C	22.8	C	0.1	No
3. SB I-405 Wilshire Off-Ramp	Diverge	39.0	**E**	39.1	**E**	0.1	No
4. SB I-405 Westbound Wilshire On-Ramp	Merge	33.5	D	33.5	D	0.0	No
5. SB I-405 Eastbound Wilshire On-Ramp	Merge	32.8	D	32.8	D	0.0	No

Note: = Level of Service F = Level of Service E

LOS = level of service; NB = northbound; pc/mil/ln = passengers cars per mile per lane; SB = southbound; Δ = change in delay

5.0 HORIZON YEAR (2045) CONDITIONS

5.1 Horizon Year (2045) No Build Conditions

5.1.1 Traffic Volumes

Similar to the methodology used for Opening Year (2025) No Build Conditions and to maintain consistency with previous studies, the 2045 No Build traffic volumes used in this study are the same as those from the *Traffic Impact Study Westside Purple Line Extension at the Interstate 405/Wilshire Boulevard Interchange* (Metro 2016) for all intersections that correspond with this project's study area. These volumes were forecasted based on the Southern California Association of Governments traffic models.

However, because the project study area is larger than the supplemental Metro 2016 traffic study, the intersections of Federal Avenue and Barrington Avenue with Wilshire Boulevard did not have turning movement volumes in the 2045 No Build Conditions. Instead, turning movement volumes for these two intersections were taken from the Existing Conditions scenario in the Draft EIS/EIR traffic study. To convert these volumes to 2045 No Build Conditions for this study, the same linear growth factors discussed in Section 4.1.1 and displayed in Appendix D were applied to grow the volumes to 2045 No Build Conditions.

Similar to the Opening Year (2025) Conditions, the intersection of the proposed passenger drop-off facility driveway at Bonsall Avenue does not exist in the No Build Condition; however, volume balancing was used to carry turning movements south of Bonsall Avenue to ensure that the turning movements for future analysis scenarios are consistent with other intersections in the study area. Table 5-1 presents the resulting 2045 No Build Conditions peak hour intersection traffic volumes.

Table 5-1: Horizon Year (2045) No Build Peak Hour Intersection Traffic Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	38	377	0	0	456	90	0	0	0	492	0	241
2. Bonsall Avenue (South) & Wilshire Boulevard	0	327	73	594	336	0	88	0	36	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	117	331	331	128	416	238	93	3614	157	115	2575	72
4. Drop-off Project Driveway & Bonsall Avenue	0	400	0	0	372	0	0	0	0	0	0	0
5. Federal Avenue & Wilshire Boulevard	121	265	194	1537	285	33	38	1993	67	94	1867	1093
6. Barrington Avenue & Wilshire Boulevard	141	465	171	233	522	82	64	1809	38	64	1930	87
PM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	263	738	0	0	603	88	0	0	0	71	0	28
2. Bonsall Avenue (South) & Wilshire Boulevard	0	836	380	426	247	0	180	0	118	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	222	514	423	122	361	250	222	3177	131	235	3631	189
4. Drop-off Project Driveway & Bonsall Avenue	0	1216	0	0	365	0	0	0	0	0	0	0
5. Federal Avenue & Wilshire Boulevard	114	482	282	1029	258	8	26	1563	31	96	2011	1122
6. Barrington Avenue & Wilshire Boulevard	86	401	16	54	576	57	20	1883	69	107	2422	68

Notes: Notes: EBL = eastbound left; EBR = eastbound right; EBT = eastbound through; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; WBL = westbound left; WBR = westbound right; WBT = westbound through

Table 5-2 summarizes the Opening Year (2045) No Build Conditions peak hour freeway ramp traffic volumes for the I-405/Wilshire Boulevard interchange.

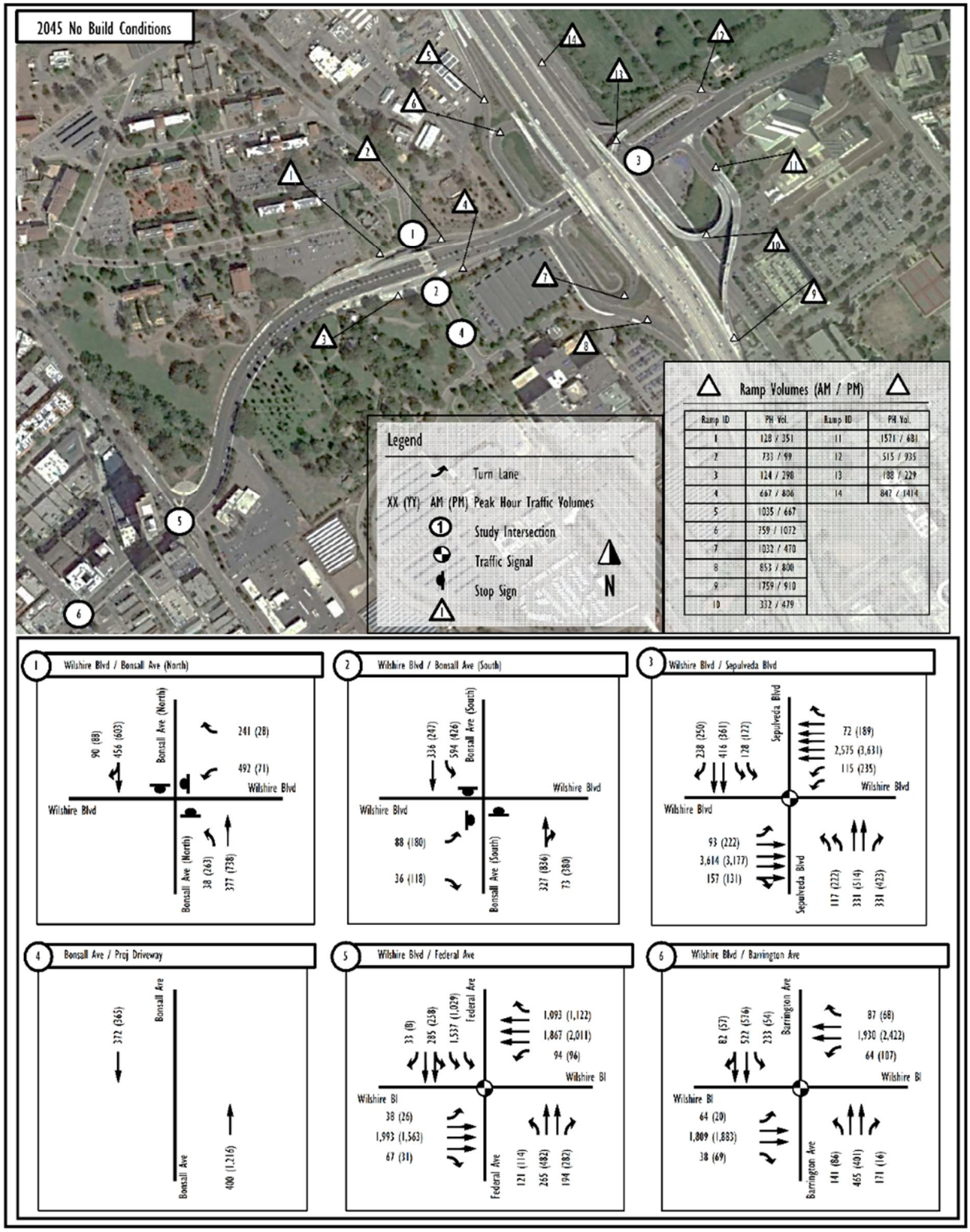
Table 5-2: Horizon Year (2045) No Build Condition Peak Hour Interchange Traffic Volumes

Ramps		2045 No Build Conditions	
Freeway	Name	AM	PM
I-405 Southbound	WB Wilshire Off-Ramp	1035	667
	WB Wilshire On-Ramp	759	1072
	EB Wilshire Off-Ramp	1032	470
	EB Wilshire On-Ramp	853	800
I-405 Northbound	EB/WB Wilshire Off-Ramp	1759	910
	EB Wilshire On-Ramp	332	479
	EB Wilshire Off-Ramp	1571	681
	WB Wilshire On-Ramp	515	935
	WB Wilshire Off-Ramp	188	229
	EB/WB Wilshire On-Ramp	847	1414

Notes: EB = eastbound; WB = westbound

Figure 5-1 presents the Horizon Year (2045) No Build Conditions AM and PM peak hour volumes and geometric configurations for all intersections and freeway interchange ramps within the study limits.

Figure 5-1: Horizon Year (2045) No Build AM/PM Peak Hour Traffic Volumes and Geometric Configurations



5.1.2 Level of Service

LOS was calculated at each study intersection, as described in Section 2.2. Table 5-3 summarizes vehicle delay in seconds per vehicle and the corresponding LOS for each study location.

Table 5-3: Horizon Year (2045) No Build Conditions Peak Hour Intersection Level of Service

Intersection	Control Type	AM Peak Hour – 2045 No Build Conditions		PM Peak Hour – 2045 No Build Conditions	
		Delay	LOS	Delay	LOS
1. Bonsall Avenue (North) & Wilshire Boulevard	All-Way Stop	93.2	**F**	109.0	**F**
2. Bonsall Avenue (South) & Wilshire Boulevard	All-Way Stop	45.7	**E**	369.9	**F**
3. Sepulveda Boulevard & Wilshire Boulevard	Traffic Signal	43.6	D	57.2	**E**
4. Drop-off Project Driveway & Bonsall Avenue	N/A	Does not exist under No Build Conditions			
5. Federal Avenue & Wilshire Boulevard	Traffic Signal	99.9	**F**	69.8	**E**
6. Barrington Avenue & Wilshire Boulevard	Traffic Signal	47.7	D	51.0	D

Note: = Level of Service F = Level of Service E

LOS = level of service; N/A = Not Applicable

Of the five study intersections, only two are projected to operate at LOS D or better, and only one in both the AM and PM peak hour. Four of five intersections are projected to operate at an unacceptable level of service of E or F in either the PM peak hour or both the AM and PM peak hour. Synchro calculation sheets are provided in Appendix E.

Table 5-4 displays the resulting density and level of service for the I-405/Wilshire Boulevard interchange ramps. The HCS analysis sheets are provided in Appendix F.

Table 5-4: Horizon Year (2045) No Build Conditions Peak Hour Interchange Level of Service

Intersection	Segment Type	2045 No Build Conditions	
		Density (pc/mi/ln)	LOS
AM Peak Hour			
1. NB I-405 Wilshire Off-Ramp	Diverge	32.9	**F**
2. NB I-405 Wilshire On-Ramp	Merge	25.1	C
3. SB I-405 Westbound Wilshire Off-Ramp	Diverge	47.0	**F**
4. SB I-405 Westbound Wilshire On-Ramp	Merge	38.7	**F**
5. SB I-405 Eastbound Wilshire On-Ramp	Merge	40.0	**F**
PM Peak Hour			
1. NB I-405 Wilshire Off-Ramp	Diverge	20.5	C
2. NB I-405 Wilshire On-Ramp	Merge	22.7	C
3. SB I-405 Wilshire Off-Ramp	Diverge	39.0	**E**
4. SB I-405 Westbound Wilshire On-Ramp	Merge	33.5	D
5. SB I-405 Eastbound Wilshire On-Ramp	Merge	32.8	D

Note: = Level of Service F = Level of Service E

LOS = level of service; pc/mi/ln = passenger cars per mile per lane; NB = northbound; SB = southbound

5.2 Horizon Year (2045) Drop-off Facility Project Trips

5.2.1 Projected 2045 Project Trips

As described in Section 1.4 and Section 1.5, the CBM 09 was used to determine the 2035 project trips for the passenger drop-off facility. To appropriately apply these project trips to the Horizon Year (2045) Conditions, a growth factor was used to grow the trips to 2045 volumes. This factor was calculated as a percentage by taking the difference in peak hour volumes between the 2025 and 2045 No Build Conditions in the *Traffic Impact Study Westside Purple Line Extension at the Interstate 405/Wilshire Boulevard Interchange* (Metro 2016) and then dividing by 20 years. This linear growth factor was then applied to the 2035 Project trip volumes to obtain the 2045 Project trip turning movement volumes. Table 5-5 summarizes the calculation process for the growth factors that were used in the AM and PM peak period to generate 2045 project trip turning movement volumes. Table 5-6 presents the resulting 2045 No Build Conditions peak hour intersection traffic volumes.

Table 5-5: AM and PM Growth Factors

	2025 Entering Intersection Volumes	2045 Entering Intersection Volumes	Δ Volume	Growth per Year (%)
AM Peak Hour	9,368	11,335	1,967	1.05%
PM Peak Hour	8,542	13,455	4,913	2.88%

Notes: Δ = change in delay

Table 5-6: 2045 Project Trips Peak Hour Intersection Traffic Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	51	0	0	0	0	0	0	0	0	14	0	0
2. Bonsall Avenue (South) & Wilshire Boulevard	0	51	14	0	14	0	0	0	51	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	0	0	0	0	0	0	0	13	0	0	7	0
4. Drop-off Project Driveway & Bonsall Avenue	0	0	0	66	0	0	0	0	0	0	0	66
5. Federal Avenue & Wilshire Boulevard	0	0	6	11	0	0	0	30	0	6	30	11
6. Barrington Avenue & Wilshire Boulevard	0	0	2	2	0	0	0	28	0	2	28	2
PM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	51	0	0	0	0	0	0	0	0	14	0	0
2. Bonsall Avenue (South) & Wilshire Boulevard	0	51	14	0	14	0	0	0	51	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	0	0	0	0	0	0	0	13	0	0	7	0
4. Drop-off Project Driveway & Bonsall Avenue	0	0	0	66	0	0	0	0	0	0	0	66
5. Federal Avenue & Wilshire Boulevard	0	0	6	11	0	0	0	30	0	6	30	11
6. Barrington Avenue & Wilshire Boulevard	0	0	2	2	0	0	0	28	0	2	28	2

Notes: Notes: EBL = eastbound left; EBR = eastbound right; EBT = eastbound through; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; WBL = westbound left; WBR = westbound right; WBT = westbound through

Table 5-7 summarizes the Horizon Year (2045) peak hour freeway ramp junction and segment traffic volumes for the I-405/Wilshire Boulevard interchange.

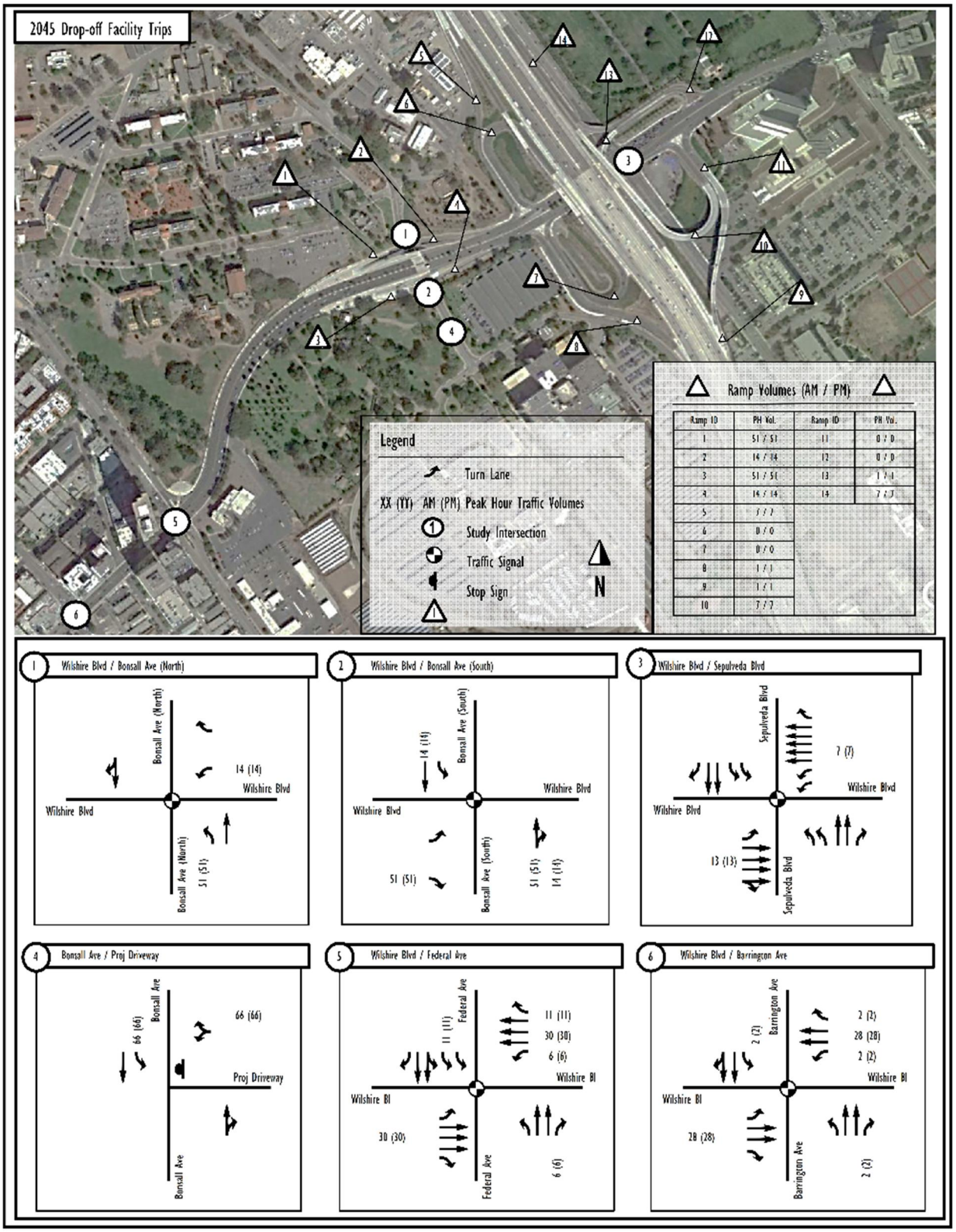
Table 5-7: 2045 Project Trips Peak Hour Interchange Traffic Volumes

Ramps		2045 Project Trips	
Freeway	Name	AM	PM
I-405 Southbound	WB Wilshire Off-Ramp	7	7
	WB Wilshire On-Ramp	0	0
	EB Wilshire Off-Ramp	0	0
	EB Wilshire On-Ramp	1	1
I-405 Northbound	EB/WB Wilshire Off-Ramp	1	1
	EB Wilshire On-Ramp	7	7
	EB Wilshire Off-Ramp	0	0
	WB Wilshire On-Ramp	0	0
	WB Wilshire Off-Ramp	1	1
	EB/WB Wilshire On-Ramp	7	7

Notes: EB = eastbound; WB = westbound

Figure 5-2 presents the 2045 No Build AM and PM peak hour volumes and geometric configurations for all intersections and freeway interchange ramps within the study limits.

Figure 5-2: 2045 Project Trips AM/PM Peak Hour Traffic Volumes



5.3 Horizon Year (2045) Build Conditions

5.3.1 Traffic Volumes and Geometric Configuration

The Horizon Year (2045) Build Conditions represents the addition of project trip volumes from the passenger drop-off facility (detailed in Section 5.2) to the No Build traffic volumes presented in Section 5.1. Table 5-8 presents the resulting 2045 Build Conditions peak hour intersection traffic volumes.

Table 5-8: Horizon Year (2045) Build Conditions Peak Hour Intersection Traffic Volumes

Intersection	Northbound			Southbound			Eastbound			Westbound		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
AM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	89	377	0	0	456	90	0	0	0	506	0	241
2. Bonsall Avenue (South) & Wilshire Boulevard	0	378	87	594	350	0	88	0	87	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	117	331	331	128	416	238	93	3627	157	115	2582	72
4. Drop-off Project Driveway & Bonsall Avenue	0	400	0	66	372	0	0	0	0	0	0	66
5. Federal Avenue & Wilshire Boulevard	121	265	200	1548	285	33	38	2023	67	100	1897	1104
6. Barrington Avenue & Wilshire Boulevard	141	465	173	235	522	82	64	1837	38	66	1958	89
PM Peak Hour												
1. Bonsall Avenue (North) & Wilshire Boulevard	314	738	0	0	603	88	0	0	0	85	0	28
2. Bonsall Avenue (South) & Wilshire Boulevard	0	887	394	426	261	0	180	0	169	0	0	0
3. Sepulveda Boulevard & Wilshire Boulevard	222	514	423	122	361	250	222	3190	131	235	3638	189
4. Drop-off Project Driveway & Bonsall Avenue	0	1216	0	66	365	0	0	0	0	0	0	66
5. Federal Avenue & Wilshire Boulevard	114	482	288	1040	258	8	26	1593	31	102	2041	1133
6. Barrington Avenue & Wilshire Boulevard	86	401	18	56	576	57	20	1911	69	109	2450	70

Notes: Notes: EBL = eastbound left; EBR = eastbound right; EBT = eastbound through; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; WBL = westbound left; WBR = westbound right; WBT = westbound through

Table 5-9 summarizes the Horizon Year (2045) peak hour freeway ramp junction and segment traffic volumes for the I-405/Wilshire Boulevard interchange.

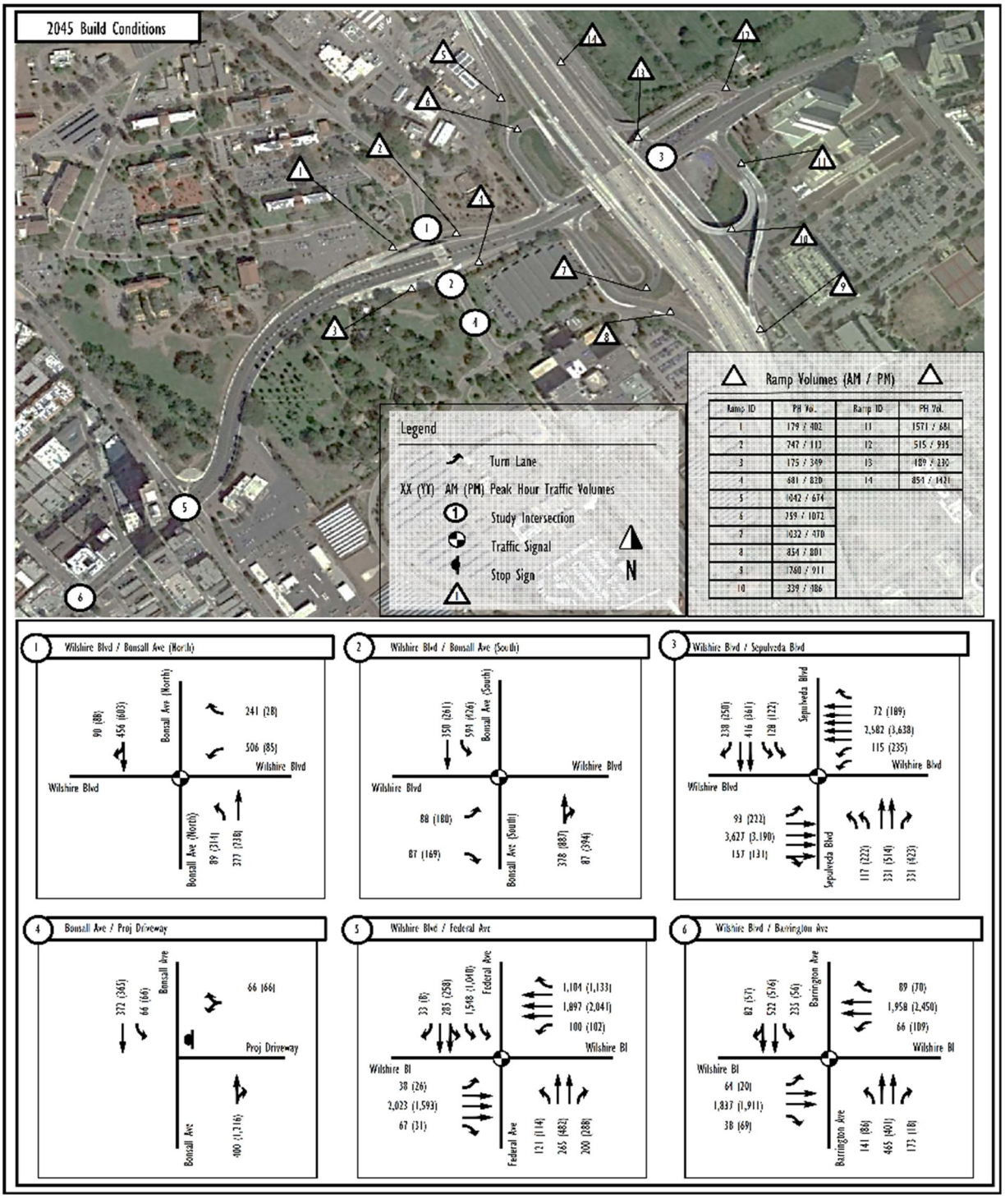
Table 5-9: Horizon Year (2045) Build Conditions Peak Hour Interchange Traffic Volumes

Ramps		2045 Build Conditions	
Freeway	Name	AM	PM
I-405 Southbound	WB Wilshire Off-Ramp	1042	674
	WB Wilshire On-Ramp	759	1072
	EB Wilshire Off-Ramp	1032	470
	EB Wilshire On-Ramp	854	801
I-405 Northbound	EB/WB Wilshire Off-Ramp	1760	911
	EB Wilshire On-Ramp	339	486
	EB Wilshire Off-Ramp	1571	681
	WB Wilshire On-Ramp	515	935
	WB Wilshire Off-Ramp	189	230
	EB/WB Wilshire On-Ramp	854	1421

Notes: EB = eastbound; WB = westbound

To support the addition of the passenger drop-off area, the new driveway for the passenger drop-off area from Bonsall Avenue would include a left-turn pocket to accommodate vehicles traveling southbound on Bonsall Avenue and making a left turn to the drop-off facility. Additionally, as part of design, the intersections of Bonsall Avenue at the westbound and eastbound on- and off-ramps from Wilshire Boulevard (referred to as Bonsall Avenue (North) and Bonsall Avenue (South), respectively, in this study) would be signalized instead of an all-way stop. Figure 5-3 presents the 2045 Build AM and PM peak hour volumes and geometric configurations for all intersections and freeway interchange ramps within the study limits.

Figure 5-3: Horizon Year (2045) Build AM/PM Peak Hour Traffic Volumes and Geometric Configurations



5.3.2 Level of Service

Level of service was calculated at each study intersection, as described in Section 2.2. Table 5-10 summarizes vehicle delay in seconds per vehicle and the corresponding level of service for each study location. Table 5-10 also compares the Build Conditions level of service with the No Build Conditions to determine if any significant impacts occurred per the thresholds shown in Section 2.3.

Table 5-10: Horizon Year (2045) No Build / Build Conditions Peak Hour Intersection Level of Service

Intersection	Control Type	2045 No Build Conditions		2045 Build Conditions		Δ Delay	Significant?
		Delay	LOS	Delay	LOS		
AM Peak Hour							
1. Bonsall Avenue (North) & Wilshire Boulevard	All-Way Stop[1]	93.2	F	26.4	C	-66.8	No
2. Bonsall Avenue (South) & Wilshire Boulevard	All-Way Stop[1]	45.7	E	28.6	C	-17.1	No
3. Sepulveda Boulevard & Wilshire Boulevard	Traffic Signal	43.6	D	42.7	D	-0.9	No
4. Drop-off Project Driveway & Bonsall Avenue	Side Street Stop[2]			11.6	B	N/A	N/A
5. Federal Avenue & Wilshire Boulevard	Traffic Signal	99.9	F	100.9	F	1.0	No
6. Barrington Avenue & Wilshire Boulevard	Traffic Signal	47.7	D	48.7	D	1	No
PM Peak Hour							
1. Bonsall Avenue (North) & Wilshire Boulevard	All-Way Stop[1]	109.0	F	20.4	C	-88.6	No
2. Bonsall Avenue (South) & Wilshire Boulevard	All-Way Stop[1]	369.9	F	151.2	F	-218.7	No
3. Sepulveda Boulevard & Wilshire Boulevard	Traffic Signal	57.2	E	57.8	E	0.6	No
4. Drop-off Project Driveway & Bonsall Avenue	Side Street Stop[2]			34.8	D	N/A	N/A
5. Federal Avenue & Wilshire Boulevard	Traffic Signal	69.8	E	72.0	E	2.2	No
6. Barrington Avenue & Wilshire Boulevard	Traffic Signal	51.0	D	53.7	D	2.7	No

Notes: = Level of Service F = Level of Service E

[1] Intersection control changes to signalized in the Build Condition; 2 = Intersection does not exist under No Build Condition but is side street stop controlled in the Build Condition; LOS = level of service; Δ = change in delay

While nearly every intersection experiences an increase in delay under the Build Conditions, the increases in delay were less than the significance thresholds shown in Section 2.3. Additionally, the intersections of Bonsall Avenue (North) and Bonsall Avenue (South) with Wilshire Boulevard experience decreases in delay due to signalization of each intersection. The Synchro calculation sheets are provided in Appendix E.

Table 5-11 displays the resulting density and level of service for the I-405/Wilshire Boulevard interchange ramp segments and junctions. This table also compares the Build and No-Build Conditions. It is important to note that due to the low number of project trips accessing the drop-off facility via I-405, the density remains largely unchanged for all study ramps. The HCS analysis sheets are provided in Appendix F.

Table 5-11: Horizon Year (2045) No Build / Build Conditions Peak Hour Interchange Level of Service

Intersection	Segment Type	2025 No Build Conditions		2025 Build Conditions		Δ Density (pc/mi/ln)	Significant?
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS		
AM Peak Hour							
1. NB I-405 Wilshire Off-Ramp	Diverge	46.6	F	46.6	F	0.0	No
2. NB I-405 Wilshire On-Ramp	Merge	35.8	E	35.9	E	0.1	No
3. SB I-405 Westbound Wilshire Off-Ramp	Diverge	56.5	F	56.6	F	0.1	No
4. SB I-405 Westbound Wilshire On-Ramp	Merge	44.8	F	44.8	F	0.0	No
5. SB I-405 Eastbound Wilshire On-Ramp	Merge	45.0	F	45.0	F	0.0	No
PM Peak Hour							
1. NB I-405 Wilshire Off-Ramp	Diverge	59.7	F	59.7	F	0.0	No
2. NB I-405 Wilshire On-Ramp	Merge	52.9	F	52.9	F	0.0	No
3. SB I-405 Wilshire Off-Ramp	Diverge	44.4	F	44.5	F	0.1	No
4. SB I-405 Westbound Wilshire On-Ramp	Merge	41.3	F	41.3	F	0.0	No
5. SB I-405 Eastbound Wilshire On-Ramp	Merge	41.5	F	41.5	F	0.0	No

Notes: = Level of Service F = Level of Service E

Notes: LOS = level of service; pc/mi/ln = passenger cars per mile per lane; NB = northbound; SB = southbound; Δ = change in delay

6.0 IMPACT ASSESSMENT

The projected 2025 and 2045 No Build levels of service were analyzed to determine the baseline operating conditions of both the projected Opening Year and the Horizon Year. The level of service and associated delay were compared against levels of service for 2025 and 2045 Build Conditions, respectively, to identify potential impacts of the WPLE Project on the surrounding street system. This chapter summarizes the impact analysis for the passenger drop-off facility.

6.1 Opening Year (2025) Conditions

The proposed drop-off facility provides a net benefit in terms of delay in the surrounding area by signalizing the intersections of Bonsall Avenue (North) and Bonsall Avenue (South) with Wilshire Boulevard and improving future delay at those intersections (20.2 and 13.1 seconds in the AM and PM peak hour for Bonsall Avenue (North) and by 1.5 seconds in the AM peak hour and only increasing the delay by 3.3 seconds in the PM peak hour for Bonsall Avenue (South)). The proposed project driveway is projected to operate at LOS B in both the AM and PM peak hour. Additionally, there are no significant impacts per the significance impact criteria described in Section 2.2.1.3**.** The comparison analysis of the I-405/Wilshire Boulevard interchange also shows only a 0.1 passenger car per mile per lane difference in density, which is negligible in terms of the performance of the facility. Therefore, there are no significant impacts from the WPLE Project in the opening year.

6.2 Horizon Year (2045) Conditions

As with the Opening Year (2025) Conditions, the passenger drop-off facility provides a net benefit in terms of delay in the surrounding area in the Horizon Year (2045) by signalizing the intersections of Bonsall Avenue (North) and Bonsall Avenue (South) with Wilshire Boulevard and improving projected future delay at those intersections (66.8 and 88.6 seconds in the AM and PM peak hour for Bonsall Avenue (North) and 17.1 and 218.7 seconds in the AM and PM peak hour for Bonsall Avenue (South)). The proposed project driveway is projected to operate at LOS B in the AM peak hour and LOS D in the PM peak hour. Additionally, there are no significant impacts per the significant impact criteria described in Section 2.2.1.3**.** The comparison analysis of the I-405/Wilshire Boulevard interchange also shows only a 0.1 passenger car per mile per lane difference in density, which is negligible in terms of the performance of the facility. Therefore, there are no significant impacts from the WPLE Project in the horizon year.

6.3 Impact Summary

Based on the results of this study, it is determined that there are no direct impacts under NEPA or CEQA for the relocation of the passenger drop-off facility for the WPLE Project at the Westwood/VA Hospital Station (Table 6-1).

Table 6-1: Impact Summary Table

Peak Hour	2025 Build Conditions	2045 Build Conditions
AM	None	None
PM	None	None

6.4 Sensitivity Analysis

During the review process of this traffic study, the Department of Veterans Affairs (VA) provided comments concerning the trip generation of the drop-off facility based on the potential for Metro service vehicles to service the facility during peak hours. It is not anticipated that service vehicles would access the station during the peak hours; however, to address this comment, a sensitivity analysis was conducted for the 2045 Build Condition, assuming that service vehicle trips would originate from the east. Using an iterative process of adding trips in Synchro in both an inbound and outbound direction, the approximate number service vehicles needed during the peak hour to trigger a significant impact was determined (Table 6-2). As shown in Table 6-2, a minimum of 275 vehicles during the a.m. peak hour and a minimum of 100 vehicles during the p.m. peak hour would be required for an adverse impact to occur. The Synchro analysis is included in Appendix E.

Table 6-2: 2045 Build Conditions: Sensitivity Analysis

Intersection	Control Type	2045 No Build Conditions		Δ Delay needed to trigger a significant impact	2045 Build Conditions		Δ Delay due to Build Conditions	Approximate # of service vehicles needed during the peak hour to trigger a significant impact*
		Delay	LOS		Delay	LOS		
AM Peak Hour								
1. Bonsall Avenue (North) & Wilshire Boulevard	All-Way Stop	93.2	**F**	+5 seconds	26.4	C	-66.8	550
2. Bonsall Avenue (South) & Wilshire Boulevard	All-Way Stop	45.7	**E**	+5 seconds	28.6	C	-17.1	275
3. Sepulveda Boulevard & Wilshire Boulevard	Traffic Signal	43.6	D	+7.5 seconds	42.7	D	-0.9	275
PM Peak Hour								
1. Bonsall Avenue (North) & Wilshire Boulevard	All-Way Stop	109.0	**F**	+5 seconds	20.4	C	-88.6	700
2. Bonsall Avenue (South) & Wilshire Boulevard	All-Way Stop	369.9	**F**	+5 seconds	151.2	**F**	-218.7	1050
3. Sepulveda Boulevard & Wilshire Boulevard	Traffic Signal	57.2	**E**	+5 seconds	57.8	**E**	0.6	100

Notes: = Level of Service F = Level of Service E

* Assumes trips will come from the east along Wilshire Boulevard, travel to the Drop-Off Facility and return in the same direction

7.0 REFERENCES

Los Angeles County Metropolitan Transportation Authority (Metro). 2010a. *Traffic Impact Analysis Report.* August.

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APPENDIX A TRAFFIC IMPACT STUDY WESTSIDE PURPLE LINE EXTENSION AT THE INTERSTATE 405/WILSHIRE BOULEVARD INTERCHANGE

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TRAFFIC IMPACT STUDY
WESTSIDE PURPLE LINE EXTENSION AT THE INTERSTATE 405/WILSHIRE BOULEVARD INTERCHANGE
EA 07-28570
PROJECT ID 0712000195

Prepared For:

Metro

Caltrans

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October 2016

TRAFFIC IMPACT STUDY REPORT

October 17, 2016

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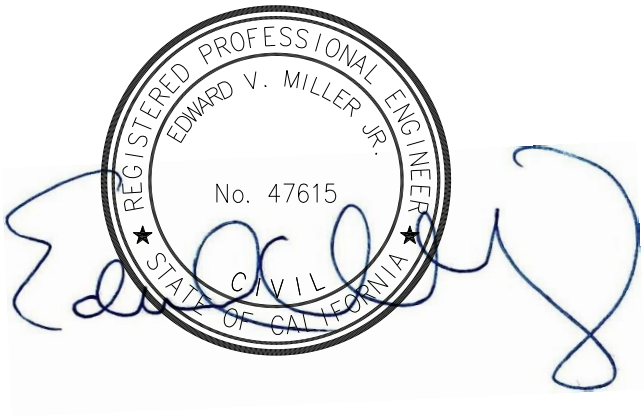
This Traffic Study Report is prepared under the supervision of a California Registered Civil Engineer.



1. Executive Summary

This is a traffic analysis for the proposed Los Angeles County Metropolitan Transportation Agency (METRO) Westside Purple Line Extension (WPLE) Improvements beneath the Interstate 405 (I-405)/Wilshire Boulevard Interchange in West Los Angeles, California (Project). The purpose of this project is to extend the existing Purple Line from its current terminus at the Wilshire/Western station to the VA Hospital west of the I-405 Freeway. This proposed subway extension would provide a more reliable mass transit service to over 275,000 transit users in west Los Angeles area.

Limits of the Project study area from west to east encompass the Wilshire Boulevard/Bonsall Avenue interchange, I-405/Wilshire Boulevard Interchange, including the on- and off-ramps, and the Wilshire Boulevard/Sepulveda Boulevard intersection. The study area includes the following intersections:

- Wilshire Boulevard/Sepulveda Boulevard (currently signalized)
- Wilshire Boulevard/Bonsall Avenue North (currently unsignalized)
- Wilshire Boulevard/Bonsall Avenue South (currently unsignalized)

This reports presents the traffic analysis results for the study area roadway segments and intersections for Existing Year (2012) conditions, Opening Year (2025), and Horizon Year (2045) conditions, with (Build) and without (No Build) the WPLE project.

Table 1.1 and Table 1.2 provide summaries of the Levels of Service (LOS) results for the study intersections and the I-405/Wilshire Boulevard interchange:

Table 1.1 Intersection Level of Service Summary

Level of Service Summary		Existing (Year 2012)		Opening Year (2025) No Build		Opening Year (2025) Build		Horizon Year (2045) No Build		Horizon Year (2045) Build	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Wilshire at Bonsall North	AM	31.0*	D	35.3*	E	10.6	B	55.0*	F	11.0	B
	PM	21.9*	C	22.6*	C	15.3	B	50.0*	E	45.9	D
Wilshire at Bonsall South	AM	13.5*	B	14.4*	B	9.1	A	35.5*	E	13.0	B
	PM	17.1*	C	17.6*	C	12.5	B	47.9*	E	67.9	E
Wilshire at Sepulveda	AM	39.6	D	41.0	D	39.2	D	94.3	F	64.9	E
	PM	41.8	D	49.5	D	30.8	C	131.0	F	68.0	E

* = Unsignalized intersection

Table 1.2 Interchange Level of Service Summary

Level of Service Summary / Freeway Segment & Ramp Junction	Post Mile	Analysis Type	Existing (Year 2012)		Opening Year (2025) No Build		Opening Year (2025) Build		Horizon Year (2045) No Build		Horizon Year (2045) Build	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
			LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS
I-405 Northbound												
EB/WB Wilshire Off-Ramp	31.43	Ramp Diverge	F	A	F	C	F	C	F	F	F	F
EB/WB Wilshire On-Ramp	31.74	Ramp Merge	C	C	C	C	C	B	E	F	F	F
I-405 Southbound												
EB/WB Wilshire Off-Ramp	31.73	Ramp Diverge	F	C	F	E	F	E	F	F	F	F
WB Wilshire On-Ramp	31.65	Ramp Merge	F	D	F	D	F	E	F	F	F	F
EB Wilshire On-Ramp	31.38	Ramp Diverge	F	E	F	D	F	E	F	F	F	F

Traffic volumes and analysis for this study are based on existing counts collected at the end of year 2011 and beginning of year 2012. Socio-economic, demographic and travel patterns impact traffic demand and can vary depending on when traffic data is gathered. The increase or decrease of traffic demands impacts delay and level-of-service evaluation results between traffic studies.

The Year 2025 & 2045 Build condition LOS operations are forecasted to improve or minimally worsen depending on the roadway facility location when compared to the No Build condition. The Year 2025 & 2045 No Build and Build conditions are forecasted to have greater traffic activity due to the area's ambient growth and new traffic patterns. The No Build condition is forecasted to have many roadway facilities operating at LOS E or below because of the high traffic activity. The addition of the WPLE project under the Build condition is forecasted to have an overall minimal impact to the surrounding roadways and intersections which many are forecasted to operate at LOS of E or below under the No Build condition. The area is forecasted to have high traffic activity regardless of the WPLE project. Feasible improvements are being proposed under the Build condition to the Wilshire Boulevard at Bonsall North and Wilshire Boulevard at Bonsall South intersections including installing traffic signals to improve the intersections LOS. These improvements provide relief to the previously noted forecasted high traffic area regardless of the WPLE project construction.

2. Introduction

This report was prepared to document the traffic analysis results of the proposed Westside Purple Line Extension (WPLE) project near the Interstate 405 (I-405)/Wilshire Boulevard Interchange in West Los Angeles, California.

The Los Angeles County Metropolitan Transportation Agency (METRO) proposes to extend the existing Purple Line subway from its current terminus at Wilshire Boulevard/Western Avenue Station to the VA Hospital west of the I-405 freeway interchange at Wilshire Boulevard. The subway extends approximately nine miles from the Wilshire/Western Station to a new western terminus at the West Los Angeles Veterans Administration (VA) Hospital (Project). The extended Metro Purple Line will cross under the I-405, south of Wilshire Boulevard, at the Wilshire Boulevard Interchange (PM 31.54).

The Project is to improve mass transit travel time and thereby provide more reliable mass transit service to over 275,000 transit riders in the West Los Angeles area.

This report presents Existing (Year 2012), Opening Year (2025) and Horizon Year (2045) traffic conditions within the study area and was conducted in accordance with latest edition of *Caltrans Guide for the Preparation of Traffic Impact Studies*.

2.1 Study Area

The study area encompassed by this traffic impact study is as follows:

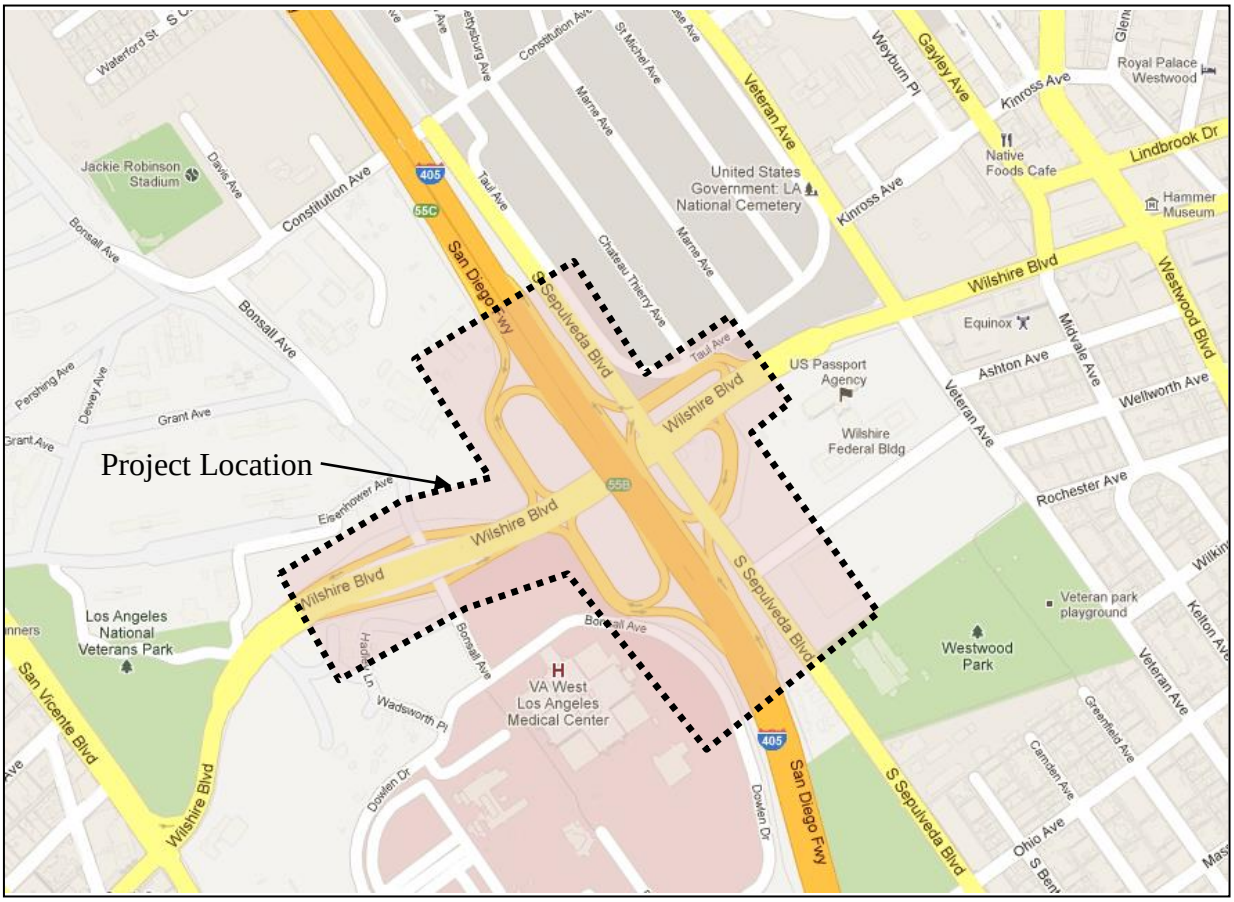
Roadways

- *I-405/Wilshire Boulevard Interchange*
  - *NB I-405 to EB Wilshire Boulevard off ramp*
  - *EB Wilshire Boulevard to NB I-405 on ramp*
  - *NB I-405 to WB Wilshire Boulevard off ramp*
  - *WB Wilshire Boulevard to NB I-405 on ramp*
  - *SB I-405 to WB Wilshire Boulevard off ramp*
  - *WB Wilshire Boulevard to SB I-405 on ramp*
  - *EB Wilshire Boulevard to SB I-405 on ramp*
  - *SB I-405 to EB Wilshire Boulevard off ramp*

Intersections

- *Wilshire Boulevard/Sepulveda Boulevard* (currently signalized)
- *Wilshire Boulevard/Bonsall Avenue North* (currently unsignalized)
- *Wilshire Boulevard/Bonsall Avenue South* (currently unsignalized)

Figure 2.1 Study Area



2.2 Methodology

This report was prepared based on discussions with METRO and the project design team staff in determining approach and methodology to be used in preparing this study. The following methodologies were used for development of the traffic study.

Study Scenarios

- *Existing (Year 2012) Conditions*
- *Opening Year (2025) No Build Conditions*
- *Opening Year (2025) Build Conditions*
- *Horizon Year (2045) No Build Conditions*
- *Horizon Year (2045) Build Conditions*

No Build conditions assumes that the Project has not been built and therefore the Purple Line is not operating between the existing western terminus at the Wilshire/Western Station and the proposed western terminus at the VA Hospital Station. Build conditions assume that the Westside Subway extension is built and is in operation between the aforementioned stations.

Traffic Volumes

Twenty four hour Average Daily Traffic (ADT) counts were conducted from Wednesday May 2nd to Friday May 4th at the following locations:

- *I-405/Wilshire Boulevard Interchange*

  - NB I-405 to EB Wilshire Boulevard off ramp
  - EB Wilshire Boulevard to NB I-405 on ramp
  - NB I-405 to WB Wilshire Boulevard off ramp
  -WB Wilshire Boulevard to NB I-405 on ramp
  - SB I-405 to WB Wilshire Boulevard off ramp
  -WB Wilshire Boulevard to SB I-405 on ramp
  - EB Wilshire Boulevard to SB I-405 on ramp
  - SB I-405 to EB Wilshire Boulevard off ramp

- *Wilshire Boulevard east and west of Sepulveda Boulevard*

AM Peak Hour (6:00AM to 9:00AM) and PM Peak Hour (4:00PM to 7:00PM) turning movement and vehicle classification counts were conducted on Thursday May 3rd at the intersection of *Wilshire Boulevard/Sepulveda Boulevard*. On October 16, 2011, similar counts were conducted at the intersections of *Wilshire Boulevard/Bonsall Avenue* North and *Wilshire Boulevard/Bonsall Avenue South*.

Traffic Forecast

Opening Year (2025) and Horizon Year (2045) traffic volumes were forecasted based on the 2008 and 2035 Regional Transportation Plan (RTP) traffic models, respectively. These models were provided by the Southern California Association of Governments (SCAG).

Roadway Configuration

Roadway and intersection configurations for the Opening Year (2025) and Horizon Year (2045) traffic analysis were developed considering the *I-405 Sepulveda Pass Improvement Project* improvements, which are considered to be constructed and operational as part of the Opening Year (2025) and Horizon Year (2045) traffic analysis.

Level of Service

Methodology used in determining the Level of Service is based on the *Highway Capacity Manual* 2010 criteria. The Traffic Model was developed using Highway Capacity intersection analysis software.

Level of Service (LOS) values range from LOS "A" to LOS "F". LOS "A" indicates excellent operating conditions with little delay to motorists, whereas LOS "F" represents congested conditions with excessive vehicle delay.

Table 2.1 Level of Service Definitions

LOS	Signalized Intersection Control Delay (sec/veh)	All-Way Stop-controlled intersection Control Delay (sec/veh)	Merge and Diverge (pc/mi/ln)	Definition
A	<10	<10	<10	EXCELLENT. No vehicle wait is longer than one red light/gap, and no approach is fully used.
B	>10 and <20	>10 and <15	>10 and <20	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles
C	>20 and <35	>15 and <25	>20 and <28	GOOD. Occasionally drivers may have to wait; backups may develop behind turning vehicles.
D	>35 and <55	>25 and <35	>28 and <35	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	>55 and <80	>35 and <50	>35	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles.
F	>80 or a V/C ratio equal to greater than 1	>50 or a V/C ratio equal to greater than 1	V/C ratio equal to greater than 1	FAILURE. Backups from nearby Facility Types or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Potentially very long delays

Traffic Analysis Tool

Level of Service analysis was conducted using SYNCHRO Version 8.0 for signalized and unsignalized intersections according to the Highway Capacity Manual (HCM) 2010, while Highway Capacity Software (HCS) also adhering to the HCM 2010 was used to analyze merge/diverge and Level of Service on ramp segments.

3. Existing Year (2012) Condition

3.1 Existing Facility

Interstate 405

Interstate 405 (I-405) is a major north-south freeway serving as a "bypass route" to Interstate 5 (I-5). I-405 begins at the I-5 in the City of Irvine in Orange County and terminates at I-5 in the City of San Fernando in Los Angeles County. Within Los Angeles County, I-405 serves the cities of Carson, Los Angeles, Long Beach, Signal Hill, Torrance, Lawndale, Hawthorne, Inglewood, Culver City, and Santa Monica.

Along the freeway mainline, Northbound (NB) I-405 had five mixed-flow lanes. Southbound (SB) I-405 had five mixed-flow lanes and one high occupancy vehicle (HOV) lane. The I-405 Sepulveda Pass project which added a NB HOV lane, reconfigure the Wilshire Boulevard Interchange and provide NB and SB auxiliary lanes between the Wilshire Boulevard and Santa Monica Boulevard Interchanges was not considered part of the existing conditions. This is due to the existing year being considered the year 2012 and the I-405 Sepulveda Pass improvements being complete and operational until the year 2014. All roadway and intersections descriptions are from the year 2012 roadway features.

Wilshire Boulevard

Wilshire Boulevard is a major east-west arterial roadway through the study area. There are three travel lanes in the westbound (WB) direction and three travel lanes in the eastbound (EB) direction. A continuous raised median is located between the EB and WB lanes at the I-405 Interchange. At the interchange, Wilshire Boulevard has 5 WB lanes with one dedicated right turn lane and one through with a right turn option lane to the SB I-405 on-ramp; and 5 EB lanes with one dedicated left turn lane to the NB I-405 on-ramp and one through with a right turn option lane to SB Sepulveda Boulevard.

Bonsall Avenue

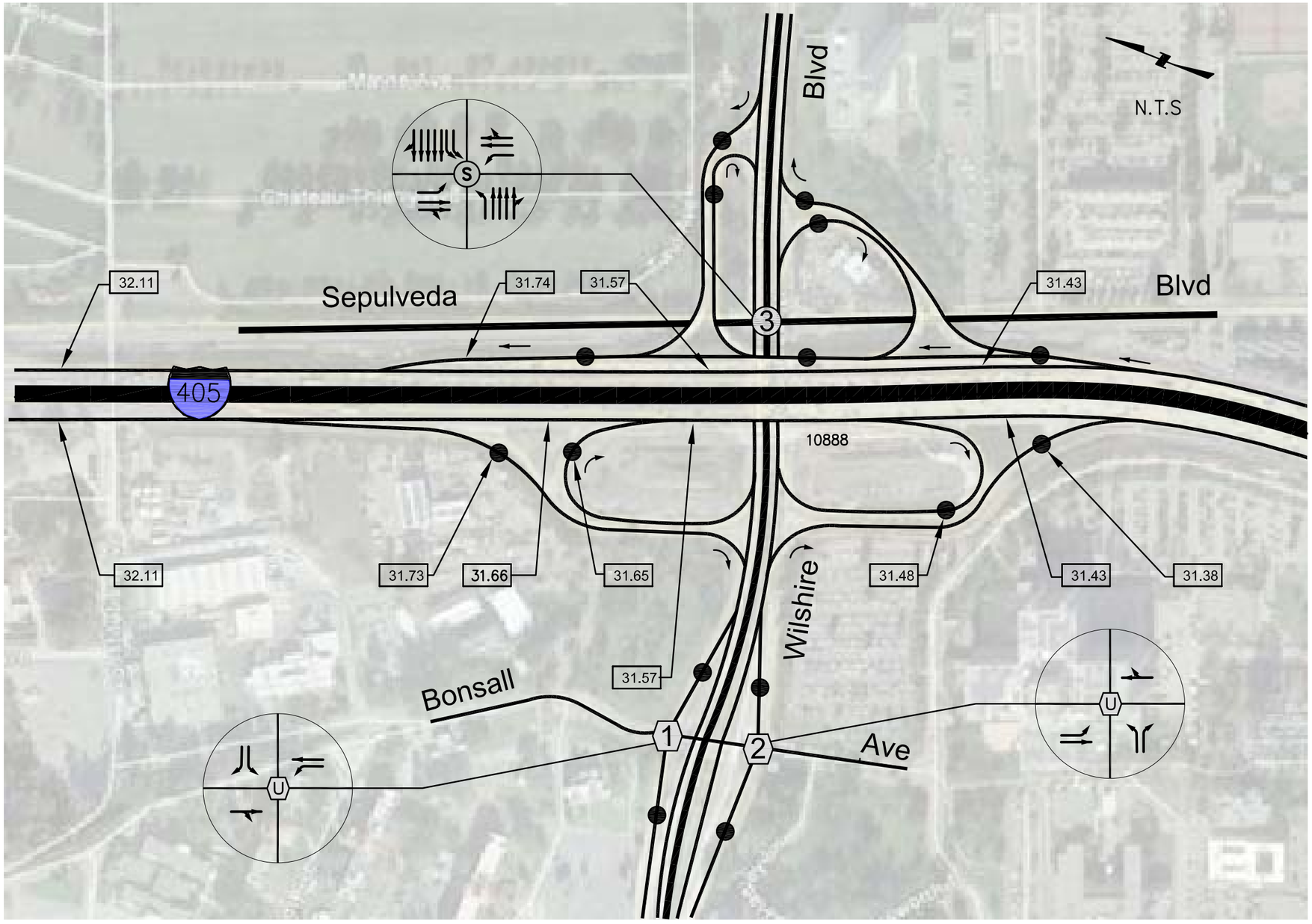
Bonsall Avenue is a north-south collector street providing access to and from the VA Hospital on the south side of Wilshire Boulevard and Brentwood Theatre and north side of veteran housing complex. The intersection of Bonsall Avenue and Wilshire Boulevard is grade-separated, with Wilshire Boulevard passing over Bonsall Avenue. The north and south side Wilshire Boulevard ramp intersections of Bonsall Avenue are four-way stop controlled. Marked crosswalks are currently provided on the west and south intersection legs of the Bonsall Avenue and EB Wilshire Boulevard ramp intersection; and on the west and north intersection legs of the Bonsall Avenue and WB Wilshire Boulevard ramp intersection. A sidewalk is available through the Bonsall Avenue underpass which provides a pedestrian link between the intersections.

Sepulveda Boulevard

Sepulveda Boulevard is a major north-south arterial roadway which parallels the I-405 within the study limits. There are two travel lanes in both the NB and SB directions. The NB and SB

lanes are separated by a double yellow line in the vicinity of the I-405/Wilshire Boulevard Interchange.

Figure 3.1 on the following page presents existing lane configurations at the three intersections.



Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- Direction
- XX Traffic Volumes
- Signalized Intersection
- Unsignalized Intersection
- Ramp Volumes
- XX.XX Post Mile

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	Checked by:	Existing Year 2012 Intersection Configurations	Figure 3.1

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3.2 Existing Year (2012) Analysis

3.2.1 Traffic Volumes

AM and PM Peak period intersection turning movement counts were conducted on Thursday May 3rd, 2012 from 6:00 AM to 9:00 AM and from 4:00 PM to 7:00 PM at the three study intersection locations.

Table 3.1 below presents Existing (Year 2012) peak hour intersection traffic volumes. The raw traffic count data is included in Appendix A of the report.

Table 3.1 Existing Year (2012) Peak Hour Intersection Traffic Volumes

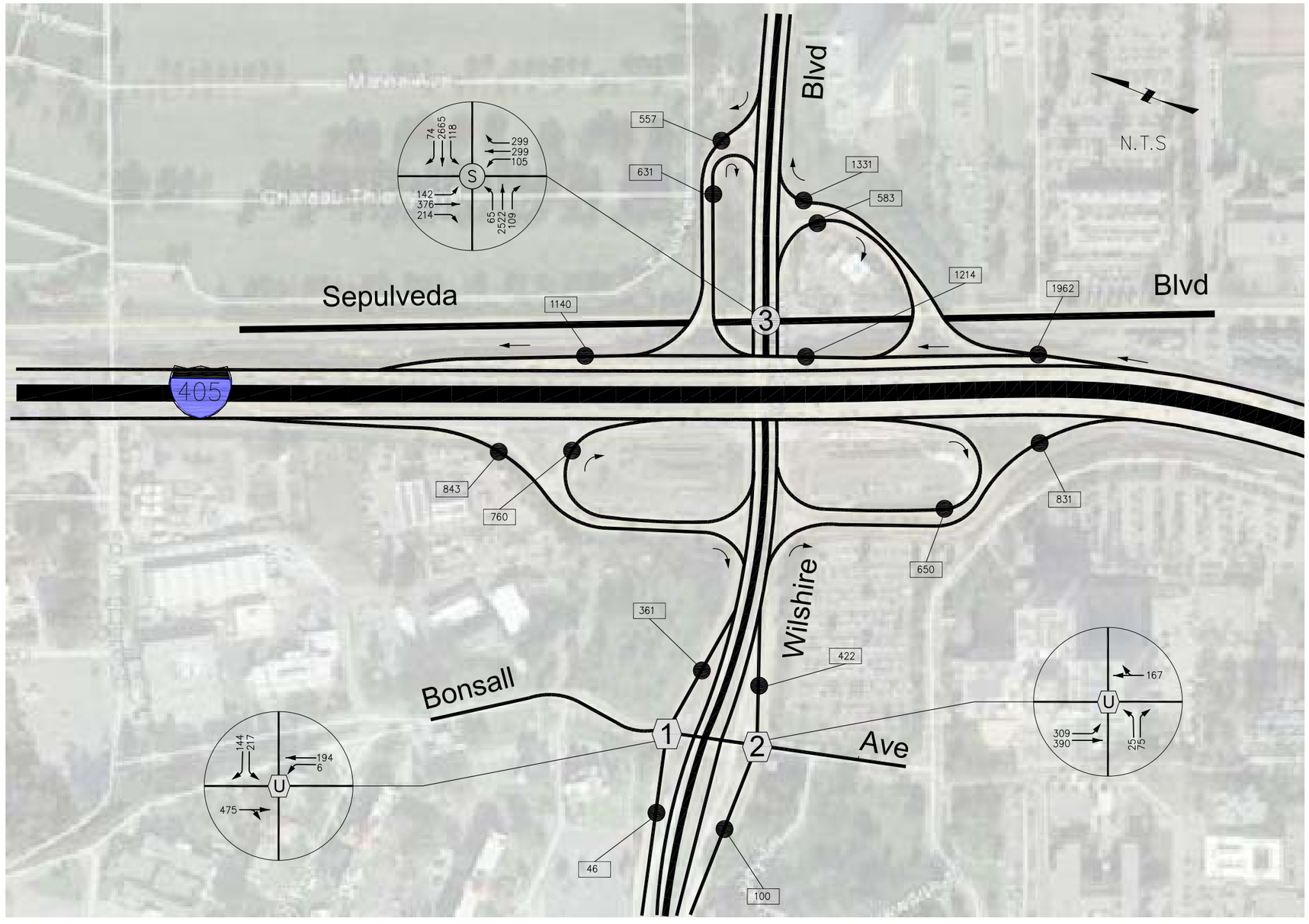
Existing (Year 2012) Traffic Volumes		NB			SB			EB			WB		
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Wilshire at Bonsall North	AM	6	194	0	0	475	40	0	0	0	144	0	217
	PM	16	178	0	0	509	40	0	0	0	44	0	37
Wilshire at Bonsall South	AM	0	167	113	309	390	0	25	3	75	0	0	0
	PM	0	177	299	381	173	0	23	0	44	0	0	0
Wilshire at Sepulveda	AM	105	299	299	142	376	214	65	2522	109	118	2665	74
	PM	153	355	293	84	250	173	143	2053	84	172	2663	138

Traffic volumes on the I-405/Wilshire Boulevard interchange ramps were collected by using the Caltrans Performance Measurement System (PeMS). Table 3.2 below summarizes Existing (Year 2012) peak hour freeway ramp junction and segment traffic volumes for I-405 interchange.

Table 3.2 Existing Year (2012) Peak Hour Interchange Traffic Volumes

Existing (Year 2012) Peak Hour Traffic Volumes	I-405 Post Mile	Existing (Year 2012)			
		Total Number of Lanes		AM Peak Hour Volumes	PM Peak Hour Volumes
Ramps		Total Number of Lanes	HOV Lane		
I-405 Northbound					
EB/WB Wilshire Off-Ramp	31.43	1	-	1,962	723
EB Wilshire Off-Ramp	31.45	1	-	1,331	495
EB Wilshire On-Ramp	31.48	1	-	583	544
WB Wilshire Off-Ramp	31.63	1	-	631	228
WB Wilshire On-Ramp	31.64	1	-	557	497
EB/WB Wilshire On-Ramp	31.74	1	-	1,140	1,041
I-405 Southbound					
WB Wilshire Off-Ramp	31.73	1	-	843	798
WB Wilshire On-Ramp	31.65	1	-	760	951
EB Wilshire Off-Ramp	31.48	1	-	650	468
EB Wilshire On-Ramp	31.38	1	-	831	617

Figure 3.2 and 3.3 on the following pages depict the existing AM and PM peak hour volumes for the study limits.



Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- Direction
- XX Traffic Volumes
- (X) Signalized Intersection
- ⟨X⟩ Unsignalized Intersection
- ● Ramp Volumes
- [XX.XX] Post Mile

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	Checked by:	Existing Year 2012 – AM Peak Hour Traffic Volumes	Figure 3.2

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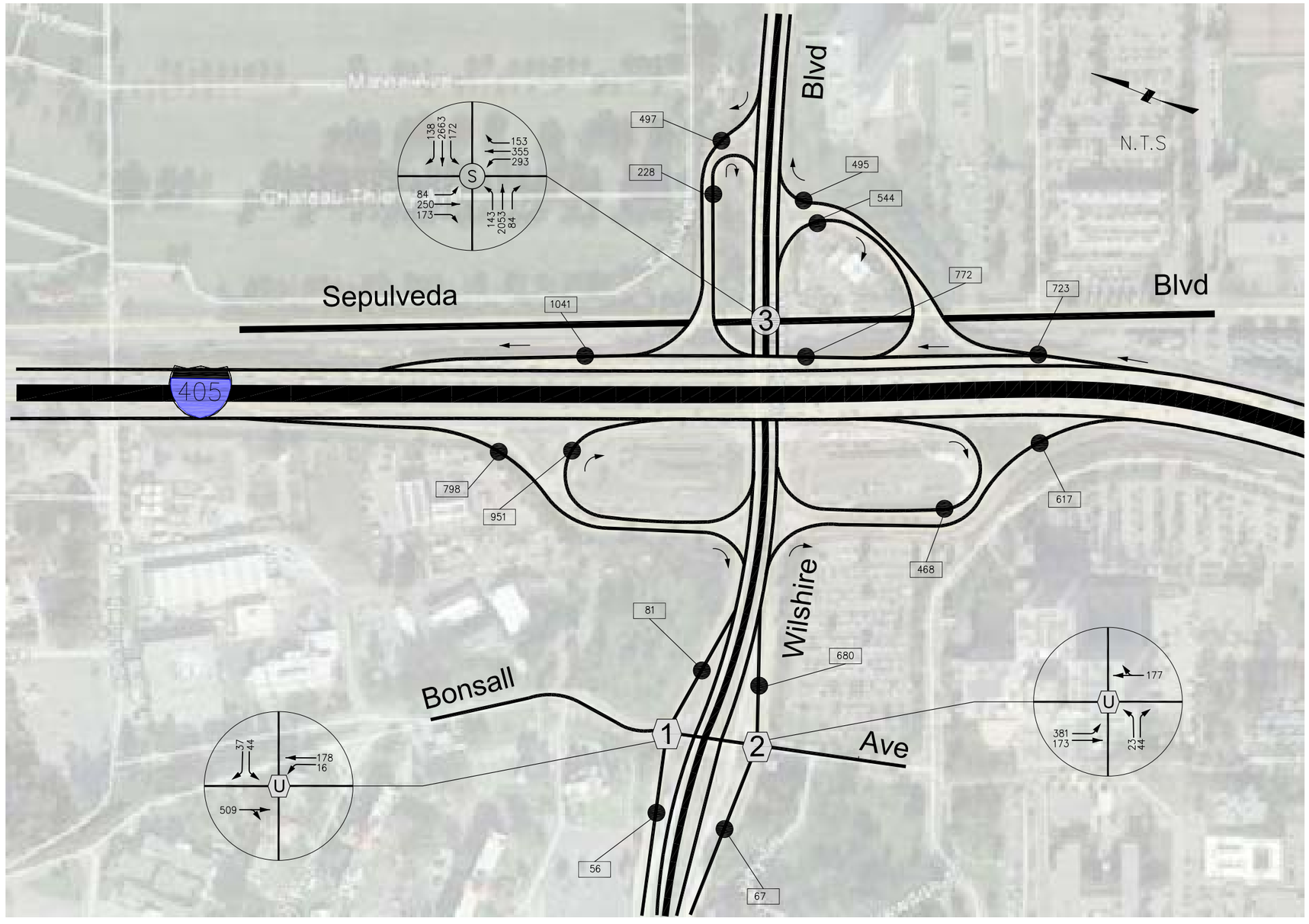

Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- Direction
- XX Traffic Volumes
- (X) Signalized Intersection
- ⟨X⟩ Unsignalized Intersection
- ● Ramp Volumes
- [XX.XX] Post Mile

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	Checked by:	Existing Year 2012 – PM Peak Hour Traffic Volumes	Figure 3.3

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3.2.2 Level of Service

Level of Service at each study intersection was determined based on Highway Capacity Manual 2010 methodology. Table 3.3 below summarizes vehicle delay (seconds per vehicle) results and corresponding Level of Service designation at each study location for the existing condition.

Table 3.3 Existing Year (2012) Intersection Level of Service

Existing (Year 2012) Level of Service		Delay (sec/veh)	LOS
Wilshire at Bonsall North*	AM	31.4	D
	PM	21.9	C
Wilshire at Bonsall South*	AM	14.1	B
	PM	17.4	C
Wilshire at Sepulveda	AM	38.8	D
	PM	48.6	D

* = Unsignalized intersection

For Existing (Year 2012) condition, all three intersections are projected to operate at LOS D or better during the AM and PM peak hours. Traffic analysis output summary results for Existing (Year 2012) conditions are provided in Appendix B.

Table 3.4 below presents I-405/Wilshire Boulevard interchange ramp segment and junction analysis. The traffic analysis output summary for Existing (Year 2012) conditions are provided in Appendix C.

Table 3.4 Existing Year (2012) Interchange Level of Service

Existing (Year 2012) Level of Service Analysis	I-405 Post Mile	Analysis Type	Existing (Year 2012)							
			Total Number of Lanes		AM			PM		
Ramps			General Purpose Lane	HOV Lane	Vol (vph)	Density (pc/mi/ln)	LOS	Vol (vph)	Density (pc/mi/ln)	LOS
I-405 Northbound										
EB/WB Wilshire Off-Ramp	31.43	Ramp Diverge	1	-	1,962	19.9	F	723	9.7	A
EB/WB Wilshire On-Ramp	31.74	Ramp Merge	1	-	1,140	25.1	C	1,041	23.1	C
I-405 Southbound										
WB Wilshire Off-Ramp	31.73	Ramp Diverge	1	-	843	29.3	D	798	24.4	C
WB Wilshire On-Ramp	31.65	Ramp Merge	1	-	760	37.7	F	951	33.3	D
EB Wilshire Off-Ramp	31.48	Ramp Diverge	1	-	650	42.1	F	468	36.0	E
EB Wilshire On-Ramp	31.38	Ramp Merge	1	-	831	33.9	F	617	27.6	C

4. Opening Year (2025) Condition

4.1 Opening Year (2025) No Build

4.1.1 Traffic Volumes

Opening Year (2025) traffic growth were forecasted based on Southern California Association of Governments (SCAG) traffic models. Resulting volumes were calculated based upon percent growth that transpires in the SCAG forecast model between the years of 2008 and 2035. Table 4.1 below presents the Opening Year (2025) intersection peak hour traffic volumes without project (No Build) condition.

Table 4.1 Opening Year (2025) No Build Peak Hour Intersection Traffic Volumes

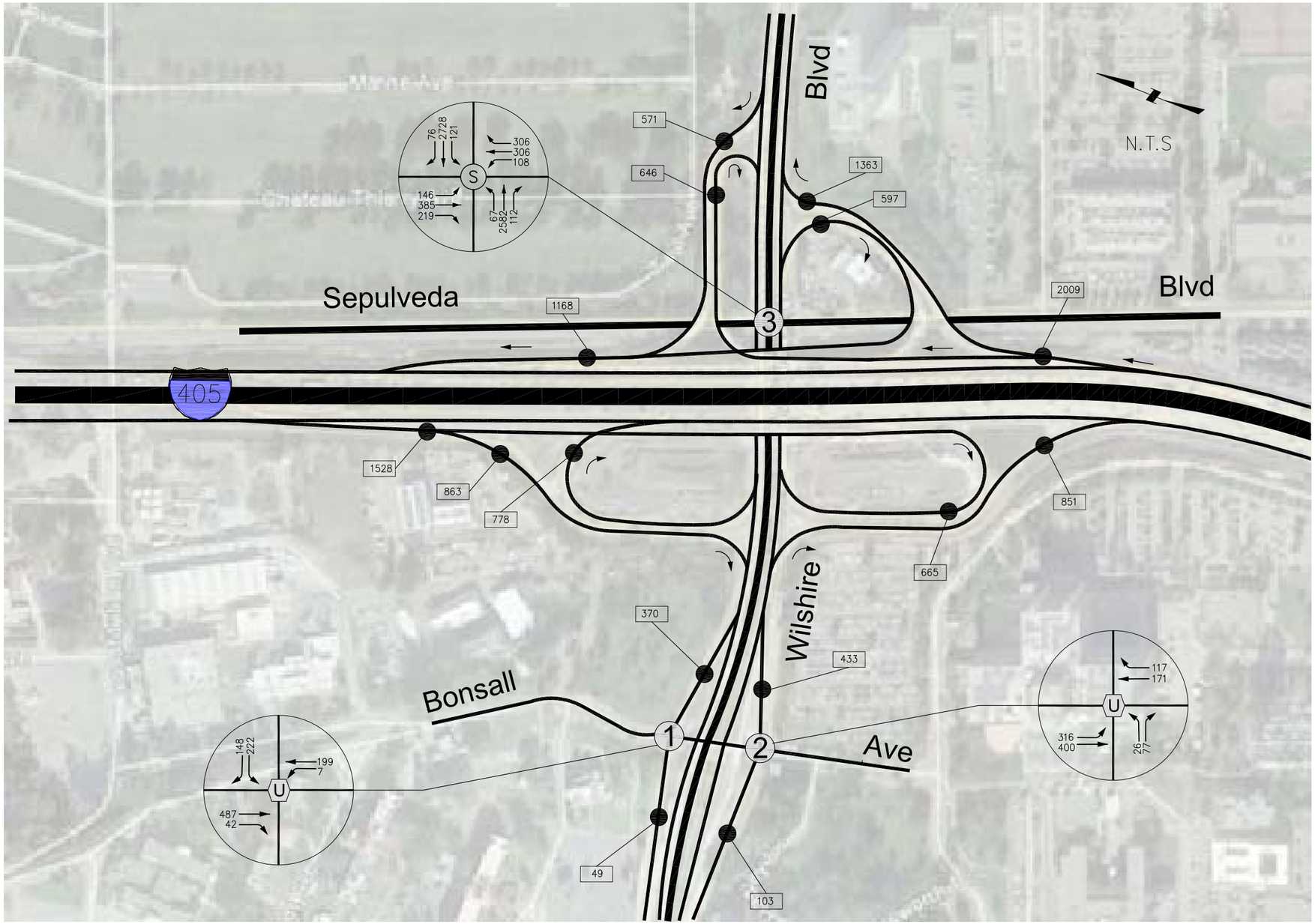
Opening Year (Year 2025) No Build Traffic Volumes		NB			SB			EB			WB		
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Wilshire at Bonsall North	AM	7	199	0	0	487	42	0	0	0	222	0	148
	PM	17	180	0	0	513	41	0	0	0	45	0	38
Wilshire at Bonsall South	AM	0	171	117	316	400	0	26	0	77	0	0	0
	PM	0	179	301	383	175	0	24	0	45	0	0	0
Wilshire at Sepulveda	AM	108	306	306	146	385	219	67	2582	112	122	2728	76
	PM	154	357	295	85	252	175	144	2064	85	174	2677	139

Table 4.2 below presents Opening Year (2025) peak hour freeway segment and I-405/Wilshire Boulevard interchange ramp segment and junction traffic volumes.

Table 4.2 Opening Year (2025) No Build Peak Hour Interchange Traffic Volumes

Opening Year (2025) No Build Peak Hour Traffic Volumes	I-405 Post Mile	Opening Year (2025) No Build			
		Total Number of Lanes		AM Peak Hour Volumes	PM Peak Hour Volumes
Ramps		General Purpose Lane	HOV Lane		
I-405 Northbound					
EB/WB Wilshire Off-Ramp	31.43	1	-	2,009	728
EB Wilshire Off-Ramp	31.45	1	-	1,363	498
EB Wilshire On-Ramp	31.48	1	-	597	548
WB Wilshire Off-Ramp	31.63	1	-	646	230
WB Wilshire On-Ramp	31.64	1	-	571	500
EB/WB Wilshire On-Ramp	31.74	1	-	1,168	1,048
I-405 Southbound					
EB/WB Wilshire Off-Ramp	31.73	1	-	863	803
WB Wilshire On-Ramp	31.65	1	-	778	956
EB Wilshire Off-Ramp	31.48	1	-	665	470
EB Wilshire On-Ramp	31.38	1	-	851	621

Figure 4.1 and 4.2 on the following pages depict Opening Year (2025) No Build AM and PM peak hour volumes for the study limits.



Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- ← Direction
- XX Traffic Volumes
- (X) Signalized Intersection
- ⟨X⟩ Unsignalized Intersection
- ● Ramp Volumes
- [XX.XX] Post Mile

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	Checked by:	Opening Year 2025 NO BUILD – AM Peak Hour Traffic Volumes	Figure 4.1

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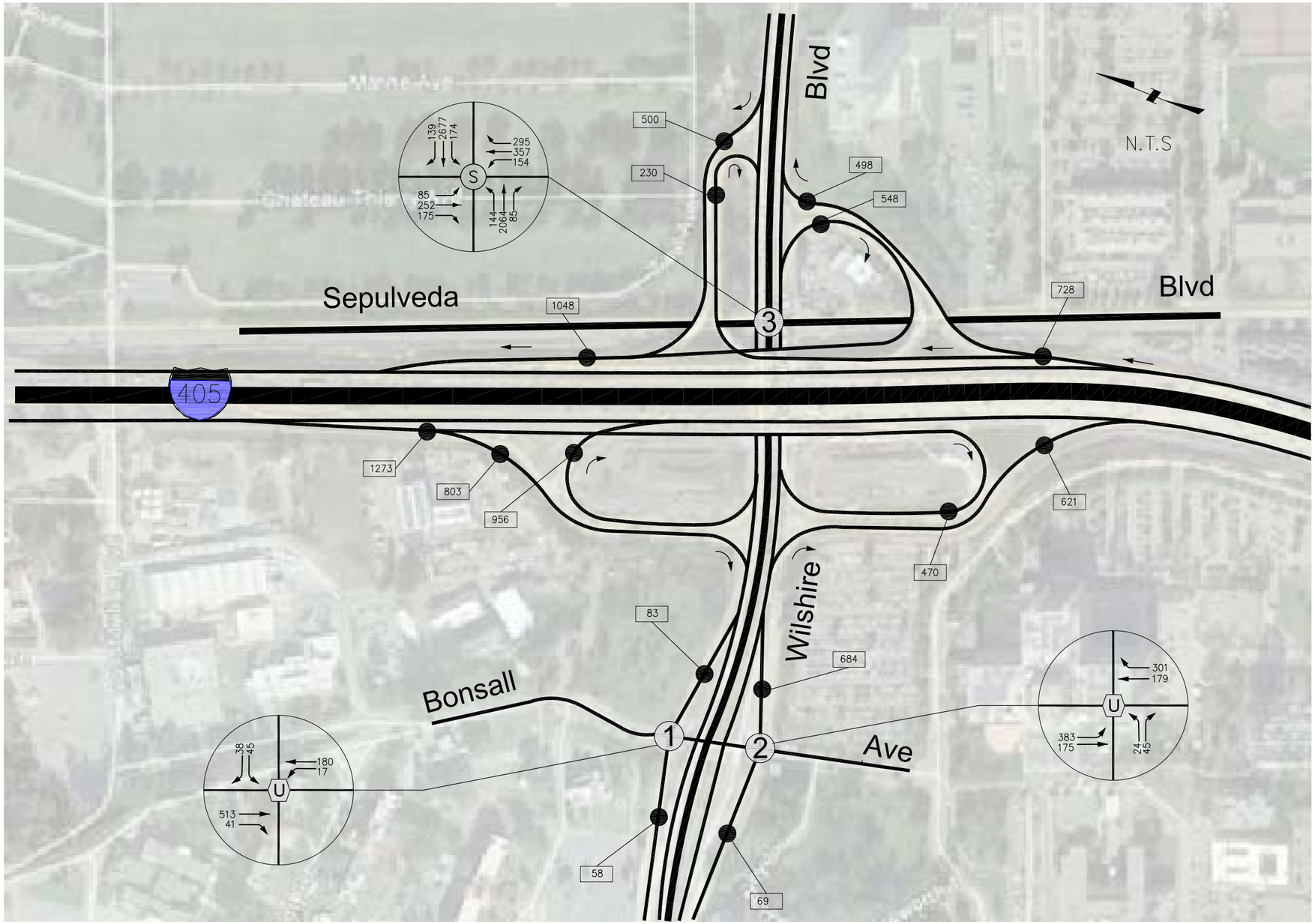

Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- Direction
- XX Traffic Volumes
- (X) Signalized Intersection
- (X) Unsignalized Intersection
- Ramp Volumes
- [XX.XX] Post Mile

ADVANTEC Consulting Engineers Traffic • ITS • Civil • Electrical	Drawn by:	Project Name: Traffic Impact Study for Westside Subway Extension – I-405/Wilshire Blvd	Project No.: EA 07-28570
	Checked by:	Opening Year 2025 NO BUILD – PM Peak Hour Traffic Volumes	Figure 4.2

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4.1.2 Level of Service

Table 4.3 Opening Year (2025) No Build Intersection Level of Service

Opening Year (2025) No Build Level of Service		Delay (sec/veh)	LOS
Wilshire at Bonsall North*	AM	35.3	E
	PM	22.6	C
Wilshire at Bonsall South*	AM	14.4	B
	PM	17.6	C
Wilshire at Sepulveda	AM	41.0	D
	PM	49.5	D

* = Unsignalized intersection

For Opening Year (2025) No Build condition, all three intersections will operate at LOS D or better during the AM and PM peak hour with the exception of Wilshire at Bonsall North. Traffic analysis output summary results for Opening Year (2025) No Build conditions are provided in Appendix B.

Table 4.4 below presents the I-405/Wilshire Boulevard interchange ramp segment and junction analysis. The traffic analysis output summary for Opening Year (2025) No Build conditions are provided in Appendix C.

Table 4.4 Opening Year (2025) No Build I-405/Wilshire Boulevard Interchange Level of Service

Opening Year (2025) No Build Level of Service	I-405 Post Mile	Analysis Type	Opening Year (2025) (No Build)							
			Total Number of Lanes		AM			PM		
Ramps			General Purpose Lane	HOV Lane	Volumes (vph)	Density (pc/mi/ln)	LOS	Volumes (vph)	Density (pc/mi/ln)	LOS
I-405 Northbound										
EB/WB Wilshire Off-Ramp	31.43	Ramp Diverge	1	-	2,009	32.9	F	728	20.5	C
EB/WB Wilshire On-Ramp	31.74	Ramp Merge	1	-	1,168	25.1	C	1,048	22.7	C
I-405 Southbound										
EB/WB Wilshire Off-Ramp	31.73	Ramp Diverge	1	-	863	47.0	F	803	39.0	E
WB Wilshire On-Ramp	31.65	Ramp Merge	1	-	778	38.7	F	956	33.5	D
EB Wilshire Off-Ramp	31.38	Ramp Merge	1	-	851	40.0	F	621	32.8	D

4.2 Opening Year (2025) Build (With Project Condition)

4.2.1 Traffic Volumes

Opening Year with project (Build) traffic growth were forecasted based on SCAG traffic model. Table 4.5 below presents Opening Year (2025) Build intersection peak hour traffic volumes.

Table 4.5 Opening Year (2025) Build Peak Hour Intersection Traffic Volumes

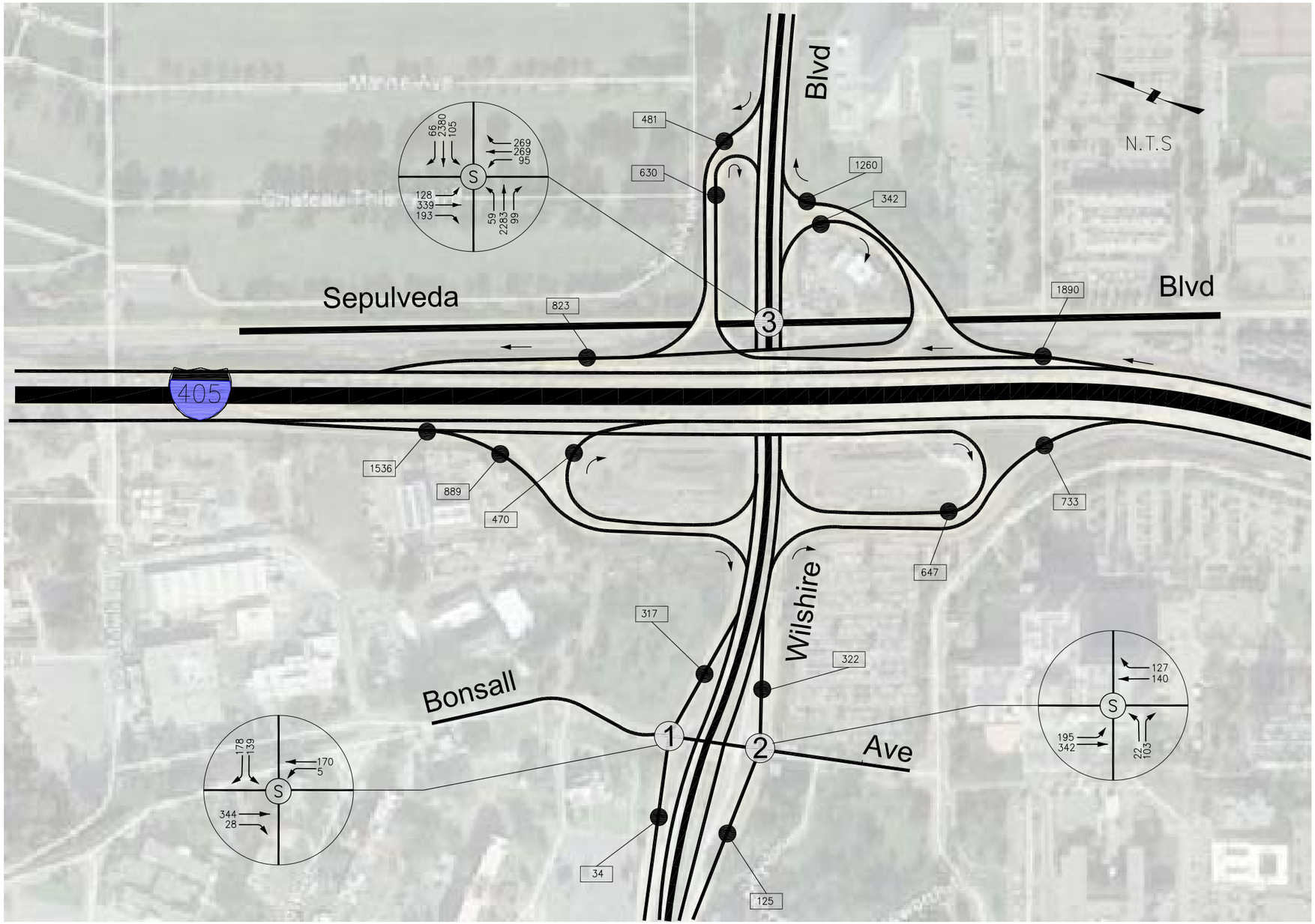
Opening Year (Year 2025) Build Traffic Volumes		NB			SB			EB			WB		
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Wilshire at Bonsall North	AM	5	170	0	0	344	28	0	0	0	178	0	139
	PM	26	48	0	0	362	87	0	0	0	474	0	206
Wilshire at Bonsall South	AM	0	140	127	195	342	0	22	0	103	0	0	0
	PM	0	102	234	420	375	0	14	0	68	0	0	0
Wilshire at Sepulveda	AM	95	269	269	128	339	193	59	2283	99	105	2380	66
	PM	114	263	217	66	195	136	101	1444	60	183	2813	146

Table 4.6 below presents Opening Year (2025) Build I-405/Wilshire Boulevard ramp segment and junction peak hour traffic volumes.

Table 4.6 Opening Year (2025) Build Peak Hour Interchange Traffic Volumes

Opening Year (2025) Build Peak Hour Traffic Volumes	I-405 Post Mile	Opening Year (2025) Build			
		Total Number of Lanes		AM Peak Hour Volumes	PM Peak Hour Volumes
Ramps		General Purpose Lane	HOV Lane		
I-405 Northbound					
EB/WB Wilshire Off-Ramp	31.43	1	-	1,890	1,009
EB Wilshire Off-Ramp	31.45	1	-	1,260	642
EB Wilshire On-Ramp	31.48	1	-	342	382
WB Wilshire Off-Ramp	31.63	1	-	630	367
WB Wilshire On-Ramp	31.64	1	-	481	451
EB/WB Wilshire On-Ramp	31.74	1	-	823	833
I-405 Southbound					
EB/WB Wilshire Off-Ramp	31.73	1	-	889	697
WB Wilshire On-Ramp	31.65	1	-	470	907
EB Wilshire Off-Ramp	31.48	1	-	647	470
EB Wilshire On-Ramp	31.38	1	-	733	779

Figure 4.3 and 4.4 on the following pages depict Opening Year (2025) Build AM and PM peak hour volumes for the study limits.



Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- Direction
- XX Traffic Volumes
- (X) Signalized Intersection
- ● Ramp Volumes
- [XX.XX] Post Mile

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	Checked by:	Opening Year 2025 BUILD– AM Peak Hour Traffic Volumes	Figure 4.3

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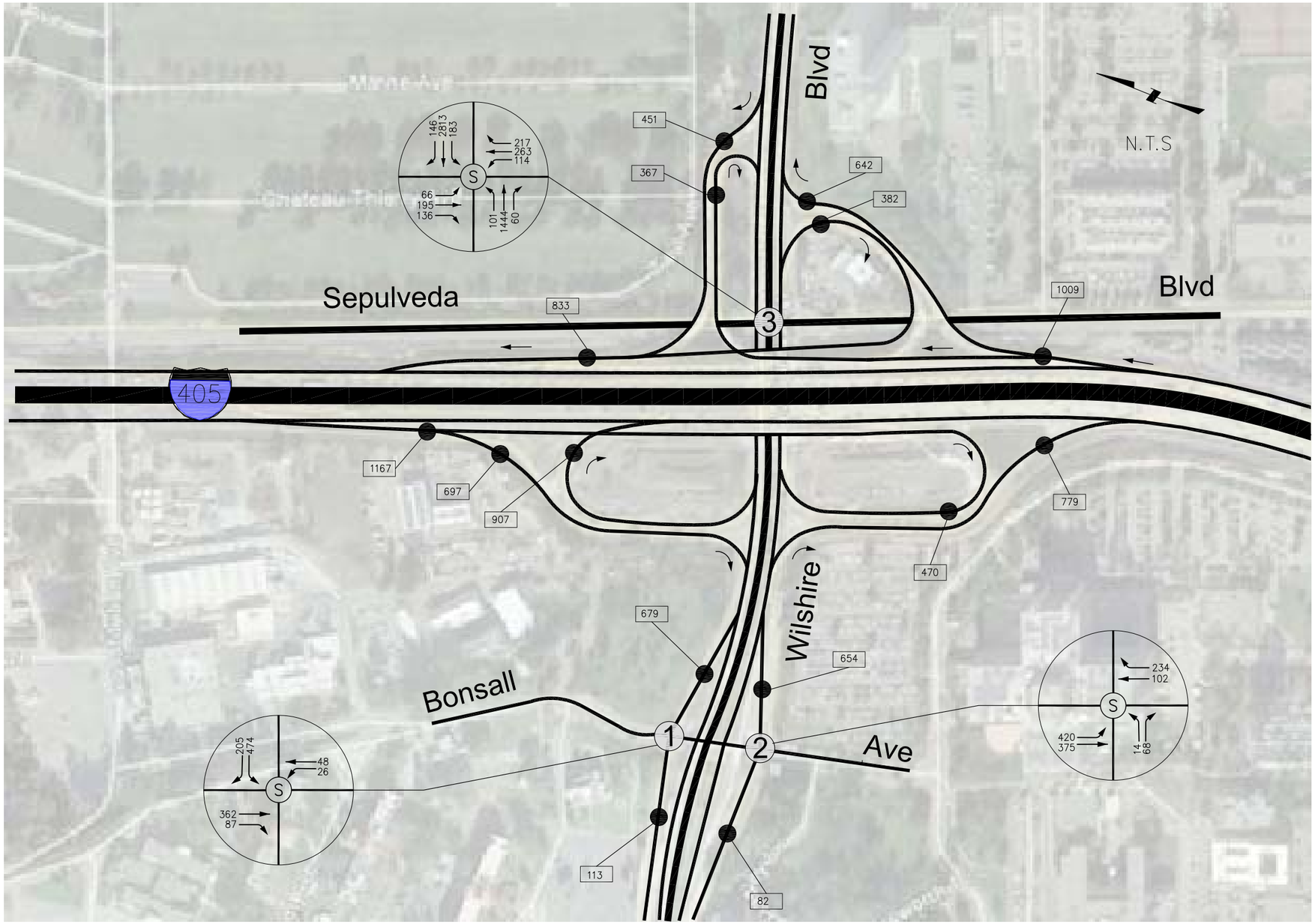

Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- Direction
- XX Traffic Volumes
- Signalized Intersection
- Ramp Volumes
- XX.XX Post Mile

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4.2.2 Level of Service

Level of Service was determined based on Highway Capacity Manual 2010 methodology. Table 4.7 summarizes vehicle delay (seconds per vehicle) results and corresponding Level of Service designation at each study location for the Opening Year (2025) Build conditions.

Table 4.7 Opening Year (2025) Build Intersection Level of Service

Opening Year (2025) (Build) Level of Service		Delay (sec/veh)	LOS
Wilshire at Bonsall North	AM	10.6	B
	PM	15.3	B
Wilshire at Bonsall South	AM	9.1	A
	PM	12.5	B
Wilshire at Sepulveda	AM	39.2	D
	PM	30.8	C

For Opening Year (2025) Build condition, all three signalized intersections will operate at LOS D or better during the AM and PM peak hour. Traffic analysis output summary results for Opening Year (2025) Build conditions are provided in Appendix B.

Table 4.8 below present the I-405/Wilshire Boulevard interchange ramp segment and junction analysis. Traffic analysis output summary for Opening Year (2025) Build conditions are provided in Appendix C.

Table 4.8 Opening Year (2025) Build Interchange Level of Service

Opening Year (2025) Build Level of Service	I-405 Post Mile	Analysis Type	Opening Year (2025) (Build)							
			Total Number of Lanes		AM			PM		
Ramps			General Purpose Lane	HOV Lane	Volumes (vph)	Density (pc/mi/ln)	LOS	Volumes (vph)	Density (pc/mi/ln)	LOS
I-405 Northbound										
EB/WB Wilshire Off-Ramp	31.43	Ramp Diverge	1	-	1,890	33.7	F	1,009	21.5	C
EB/WB Wilshire On-Ramp	31.74	Ramp Merge	1	-	823	24.5	C	833	19.8	B
I-405 Southbound										
EB/WB Wilshire Off-Ramp	31.73	Ramp Diverge	1	-	889	50.4	F	697	40.2	E
WB Wilshire On-Ramp	31.65	Ramp Merge	1	-	470	39.5	F	907	35.3	E
EB Wilshire Off-Ramp	31.38	Ramp Merge	1	-	733	41.4	F	779	36.1	E

The Year 2025 Build condition LOS operations are forecasted to improve or minimally worsen depending on the roadway facility location when compared to the No Build condition. The Year 2025 No Build and Build conditions are forecasted to have greater traffic activity due to the area's ambient growth and new traffic patterns. The No Build condition is forecasted to have many roadway facilities operating at LOS E or below because of the high traffic activity. The addition of the WPLE project under the Build condition is forecasted to have an overall minimal impact to the surrounding roadways and intersections which many are forecasted to operate at LOS of E or below under the No Build condition. The area is forecasted to have high traffic activity regardless of the WPLE project. Feasible improvements are being proposed under the Build condition to the Wilshire Boulevard at Bonsall North and Wilshire Boulevard at Bonsall South intersections including installing traffic signals to improve the intersections LOS. These improvements provide relief to the previously noted forecasted high traffic area regardless of the WPLE project construction.

5. Horizon Year (2045) Condition

5.1 Horizon Year (2045) No Build

5.1.1 Traffic Volumes

Horizon Year (2045) traffic forecast volumes were determined by applying the same procedure used to arrive at the Opening Year (2025) values elaborated in Section 4. Growth percentages were derived from the Southern California Association of Governments (SCAG) traffic forecast models between the years of 2008-2035. Table 5.1 presents the Horizon Year (2045) No Build intersection peak hour traffic volumes.

Table 5.1 Horizon Year (2045) No Build Peak Hour Intersection Traffic Volumes

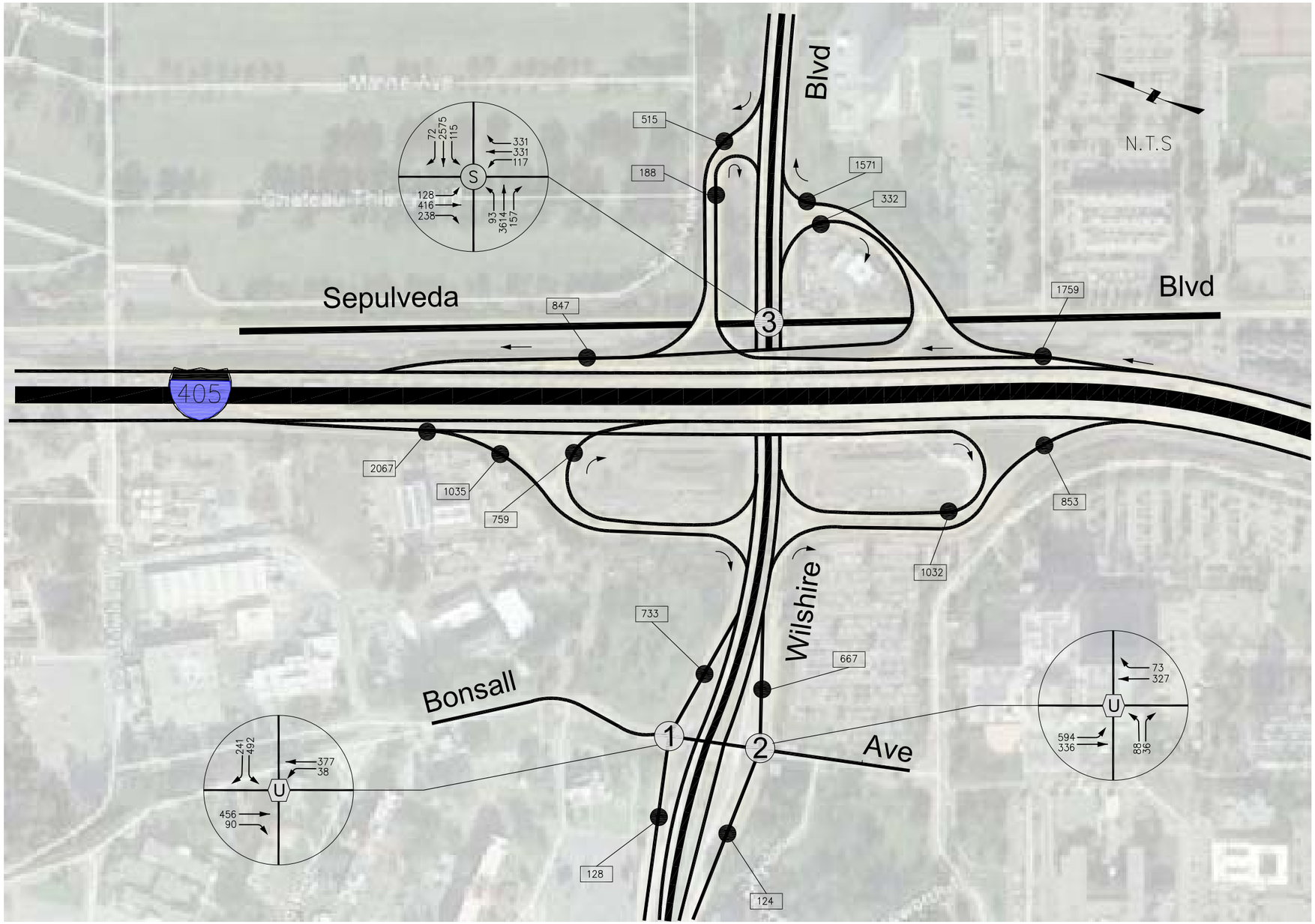
Horizon Year (2045) No Build Traffic Volumes		NB			SB			EB			WB		
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Wilshire at Bonsall North	AM	38	377	0	0	456	90	0	0	0	492	0	241
	PM	263	738	0	0	603	88	0	0	0	71	0	28
Wilshire at Bonsall South	AM	0	327	73	594	336	0	88	0	36	0	0	0
	PM	0	836	380	426	247	0	180	0	118	0	0	0
Wilshire at Sepulveda	AM	117	331	331	128	416	238	93	3614	157	115	2575	72
	PM	222	514	423	122	361	250	222	3177	131	235	3631	189

Table 5.2 presents Horizon Year (2045) No Build peak hour ramp segment and junction traffic volumes.

Table 5.2 Horizon Year (2045) No Build Peak Hour Interchange Traffic Volumes

Opening Year (2045) No Build Peak Hour Traffic Volumes	I-405 Post Mile	Opening Year (2045) No Build			
		Total Number of Lanes		AM Peak Hour Volumes	PM Peak Hour Volumes
Ramps		General Purpose Lane	HOV Lane		
I-405 Northbound					
EB/WB Wilshire Off-Ramp	31.43	1	-	1,759	910
EB Wilshire Off-Ramp	31.45	1	-	1,571	681
EB Wilshire On-Ramp	31.48	1	-	332	479
WB Wilshire Off-Ramp	31.63	1	-	188	229
WB Wilshire On-Ramp	31.64	1	-	515	935
EB/WB Wilshire On-Ramp	31.74	1	-	847	1,414
I-405 Southbound					
EB/WB Wilshire Off-Ramp	31.73	1	-	1,035	667
WB Wilshire On-Ramp	31.65	1	-	759	1,072
EB Wilshire Off-Ramp	31.48	1	-	1,032	470
EB Wilshire On-Ramp	31.38	1	-	853	800

Figure 5.1 and 5.2 on the following pages depict Horizon Year (2045) No Build AM and PM peak hour volumes for the study limits.



Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- Direction
- XX Traffic Volumes
- (X) Signalized Intersection
- ⟨X⟩ Unsignalized Intersection
- Ramp Volumes
- [XX.XX] Post Mile

ADVANTEC Consulting Engineers Traffic • ITS • Civil • Electrical	Drawn by:	Project Name: Traffic Impact Study for Westside Subway Extension – I–405/Wilshire Blvd	Project No.: EA 07–28570
	Checked by:	Horizon Year 2045 NO BUILD– AM Peak Hour Traffic Volumes	Figure 5.1

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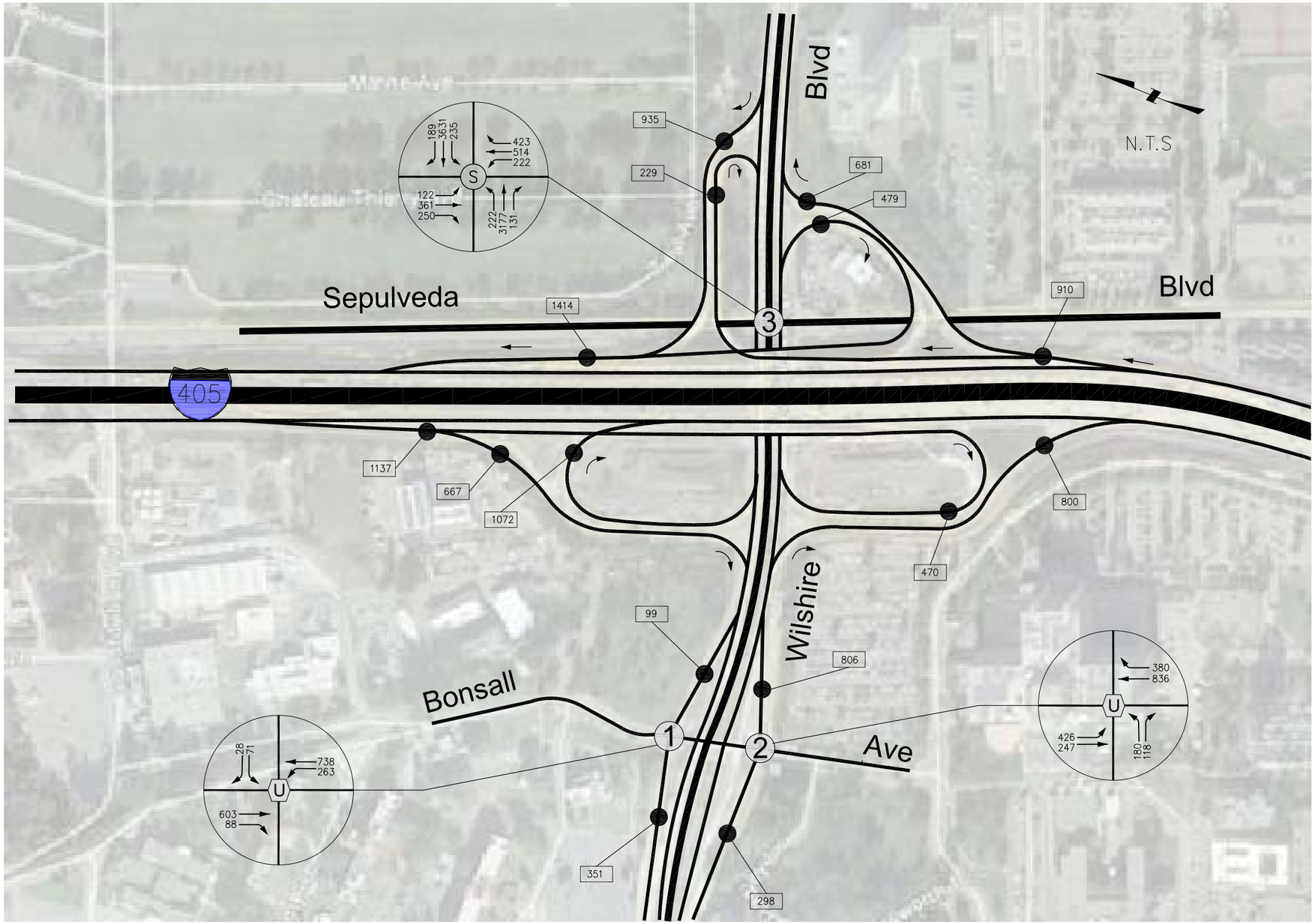

Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- Direction
- XX Traffic Volumes
- Signalized Intersection
- Unsignalized Intersection
- Ramp Volumes
- XX.XX Post Mile

ADVANTEC Consulting Engineers Traffic • ITS • Civil • Electrical	Drawn by:	Project Name: Traffic Impact Study for Westside Subway Extension – I-405/Wilshire Blvd	Project No.: EA 07-28570
	Checked by:	Horizon Year 2045 NO BUILD – PM Peak Hour Traffic Volumes	Figure 5.2

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5.1.2 Level of Service

Level of Service at each study location was determined based on Highway Capacity Manual 2010 methodology. Table 5.3 summarizes vehicle delay (seconds per vehicle) results and corresponding Level of Service designation at each study location for the horizon year condition without project No Build. Traffic analysis output summary for Horizon Year (2045) No Build conditions are provided in Appendix B.

Table 5.3 Horizon Year (2045) No Build Intersection Level of Service

Horizon Year (2040) No Build Level of Service		Delay (sec/veh)	LOS
Wilshire at Bonsall North*	AM	55.0*	F
	PM	50.0*	E
Wilshire at Bonsall South*	AM	35.5*	E
	PM	47.9*	E
Wilshire at Sepulveda	AM	94.3	F
	PM	131.0	F

* =Unsignalized intersection

Table 5.4 below presents results from the I-405/Wilshire Boulevard interchange ramp segment and junction analysis. The traffic analysis output summary for the Horizon Year (2045) No Build conditions are provided in Appendix C.

Table 5.4 Horizon Year (2045) No Build Interchange Level of Service

Horizon Year (2045) No Build Level of Service	I-405 Post Mile	Analysis Type	Horizon Year (2045) No Build							
			Total Number of Lanes		AM			PM		
Ramps			General Purpose Lane	HOV Lane	Volumes (vph)	Density (pc/mi/ln)	LOS	Volumes (vph)	Density (pc/mi/ln)	LOS
I-405 Northbound										
EB/WB Wilshire Off-Ramp	31.43	Ramp Diverge	1	-	1,759	46.6	F	910	59.7	F
EB/WB Wilshire On-Ramp	31.74	Ramp Merge	1	-	847	35.8	E	1,414	52.9	F
I-405 Southbound										
EB/WB Wilshire Off-Ramp	31.73	Ramp Diverge	1	-	1,035	56.5	F	667	44.4	F
WB Wilshire On-Ramp	31.65	Ramp Merge	1	-	759	44.8	F	1,072	41.3	F
EBWilshire On-Ramp	31.38	Ramp Merge	1	-	853	45.0	F	800	41.5	F

5.2 Horizon Year (2045) Build (With Project Condition)

5.2.1 Traffic Volumes

The Horizon Year (2045) Build traffic growth and forecast were based on SCAG traffic model. Table 5.9 presents Horizon Year (2045) Build intersection peak hour traffic volumes.

Table 5.5 Horizon Year (2045) Build Peak Hour Intersection Traffic Volumes

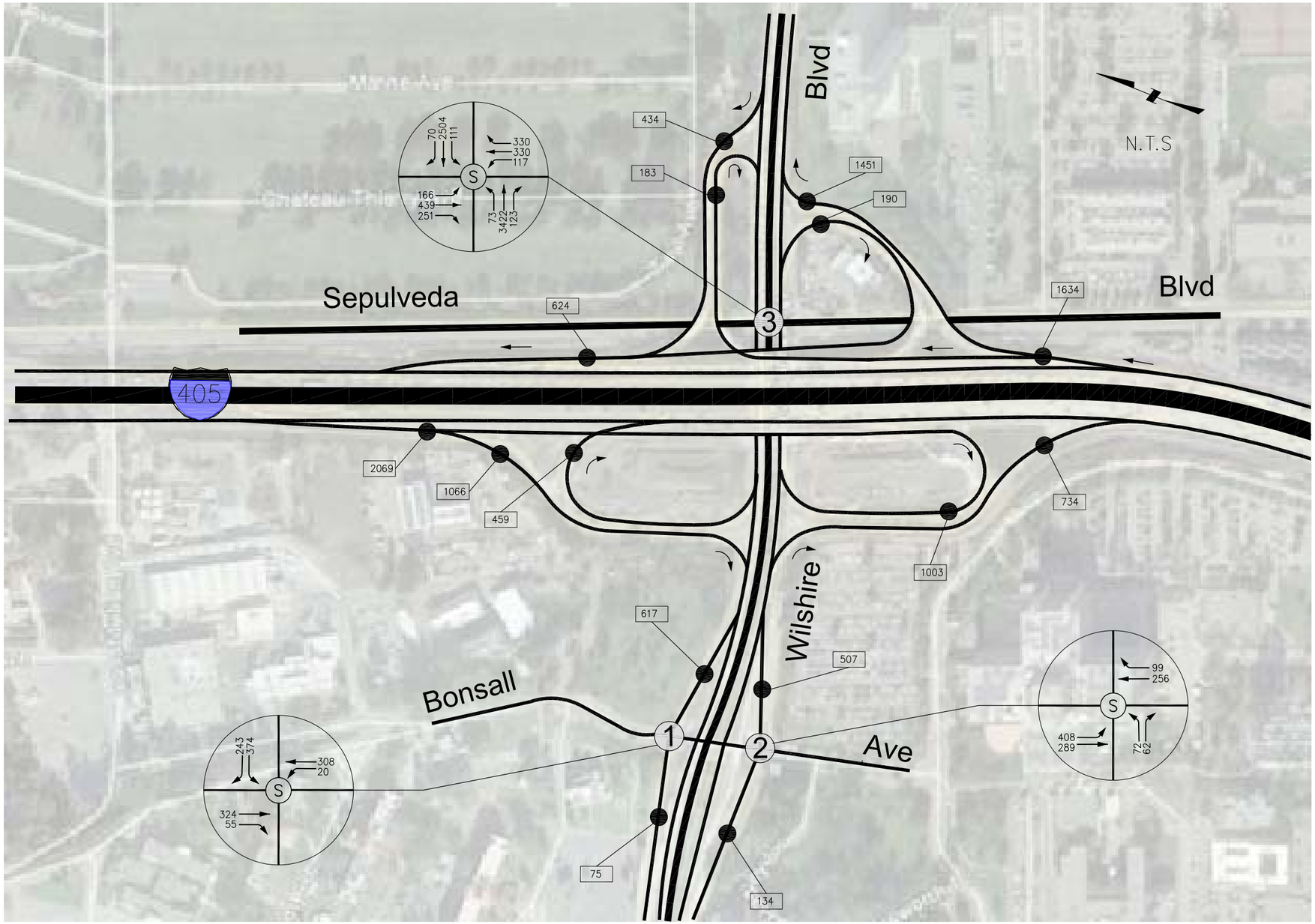
Horizon Year (2045) Build Traffic Volumes		NB			SB			EB			WB		
		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Wilshire at Bonsall North	AM	20	308	0	0	324	55	0	0	0	374	0	243
	PM	227	387	0	0	432	172	0	0	0	524	0	341
Wilshire at Bonsall South	AM	0	256	99	408	289	0	72	0	62	0	0	0
	PM	0	501	339	437	519	0	113	0	225	0	0	0
Wilshire at Sepulveda	AM	117	330	330	166	439	251	73	3422	123	111	2504	70
	PM	163	378	312	95	280	194	156	2236	92	247	3816	198

Table 5.6 below presents Horizon Year (2045) Build I-405/Wilshire Boulevard interchange ramp segment and junction traffic volumes.

Table 5.6 Horizon Year (2045) Build Peak Hour Interchange Traffic Volumes

Opening Year (2045) Build Peak Hour Traffic Volumes	I-405 Post Mile	Opening Year (2045) Build			
		Total Number of Lanes		AM Peak Hour Volumes	PM Peak Hour Volumes
Ramps		General Purpose Lane	HOV Lane		
I-405 Northbound					
EB/WB Wilshire Off-Ramp	31.43	1	-	1,634	1,244
EB Wilshire Off-Ramp	31.45	1	-	1,451	877
EB Wilshire On-Ramp	31.48	1	-	190	335
WB Wilshire Off-Ramp	31.63	1	-	183	367
WB Wilshire On-Ramp	31.64	1	-	434	843
EB/WB Wilshire On-Ramp	31.74	1	-	624	1,178
I-405 Southbound					
EB/WB Wilshire Off-Ramp	31.73	1	-	1,066	580
WB Wilshire On-Ramp	31.65	1	-	459	1,017
EB Wilshire Off-Ramp	31.48	1	-	1,003	470
EB Wilshire On-Ramp	31.38	1	-	734	1,005

Figure 5.3 and 5.4 on the following pages depict Horizon Year (2045) Build AM and PM peak hour volumes for the study limits.



Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- Direction
- XX Traffic Volumes
- Signalized Intersection
- Ramp Volumes
- XX.XX Post Mile

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	Checked by:	Horizon Year 2045 BUILD– AM Peak Hour Traffic Volumes	Figure 5.3

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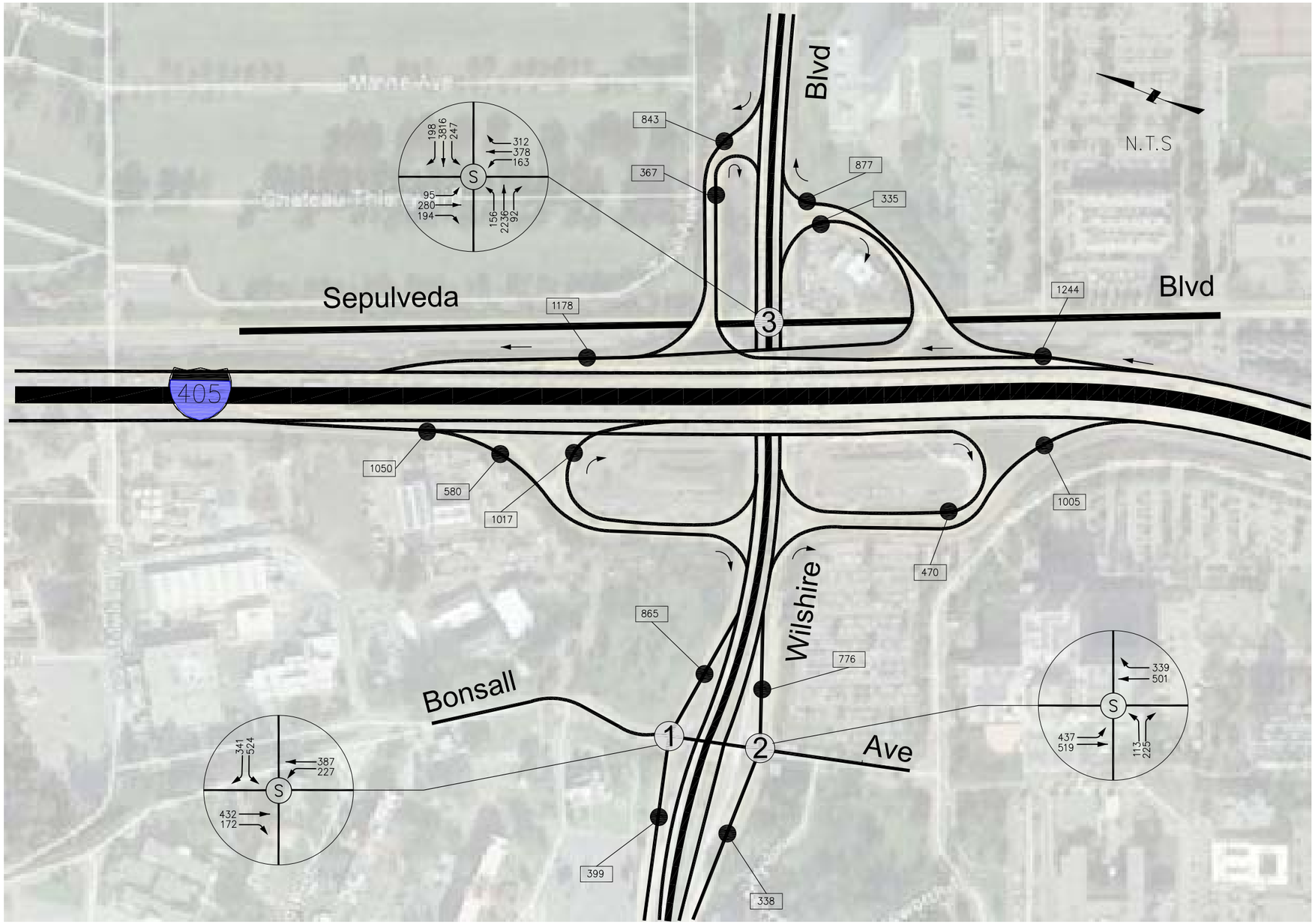

Intersections:

1. Wilshire Blvd at Bonsall Ave North
2. Wilshire Blvd at Bonsall Ave South
3. Wilshire Blvd at Sepulveda Blvd

Legend:

- Direction
- XX Traffic Volumes
- (X) Signalized Intersection
- ● Ramp Volumes
- [XX.XX] Post Mile

ADVANTEC Consulting Engineers Traffic • ITS • Civil • Electrical	Drawn by:	Project Name: Traffic Impact Study for Westside Subway Extension – I-405/Wilshire Blvd	Project No.: EA 07-28570
	Checked by:	Horizon Year 2045 BUILD – PM Peak Hour Traffic Volumes	Figure 5.4

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5.2.2 Level of Service

Level of Service at each intersection location was determined based on Highway Capacity Manual 2010 methodology. Table 5.7 summarizes vehicle delay (seconds per vehicle) results and corresponding Level of Service comparisons at study intersections. Traffic analysis output summary for Horizon Year (2045) Build conditions are provided in Appendix B.

Table 5.7 Horizon Year (2045) Build Intersection Level of Service

Horizon Year (2045) Build Level of Service		Delay (sec/veh)	LOS
Wilshire at Bonsall North	AM	11.0	B
	PM	45.9	D
Wilshire at Bonsall South	AM	13.0	B
	PM	67.9	E
Wilshire at Sepulveda	AM	64.9	E
	PM	68.0	E

Table 5.8 below presents I-405/Wilshire Boulevard interchange ramp segment and junction analysis. Traffic analysis output summary for Horizon Year (2045) Build conditions are provided in Appendix C.

Table 5.8 Horizon Year (2045) Build Interchange Level of Service

Horizon Year (2045) Build Level of Service	I-405 Post Mile	Analysis Type	Horizon Year (2045) Build							
			Total Number of Lanes		AM			PM		
Ramps			General Purpose Lane	HOV Lane	Volumes (vph)	Density (pc/mi/ln)	LOS	Volumes (vph)	Density (pc/mi/ln)	LOS
I-405 Northbound										
EB/WB Wilshire Off-Ramp	31.43	Ramp Diverge	1	-	1,634	51.4	F	1,244	61.7	F
EB/WB Wilshire On-Ramp	31.74	Ramp Merge	1	-	624	39.2	F	1,178	50.7	F
I-405 Southbound										
EB/WB Wilshire Off-Ramp	31.73	Ramp Diverge	1	-	1,066	65.3	F	580	46.1	F
WB Wilshire On-Ramp	31.65	Ramp Merge	1	-	459	46.0	F	1,017	43.4	F
EB Wilshire On-Ramp	31.38	Ramp Merge	1	-	734	47.0	F	1,005	46.1	F

The Year 2045 Build condition LOS operations are forecasted to improve or minimally worsen depending on the roadway facility location when compared to the No Build condition. The Year 2045 No Build and Build conditions are forecasted to have greater traffic activity due to the area's ambient growth and new traffic patterns. The No Build condition is forecasted to have all roadway facilities operating at LOS E or below because of the high traffic activity. The addition of the WPLE project under the Build condition is forecasted to have an overall minimal impact to the surrounding roadways and intersections which all are forecasted to operate at LOS of E or below under the No Build condition. The area is forecasted to have high traffic activity regardless of the WPLE project. Feasible improvements are being proposed under the Build condition to the Wilshire Boulevard at Bonsall North and Wilshire Boulevard at Bonsall South intersections including installing traffic signals to improve the intersections LOS. These improvements provide relief to the previously noted forecasted high traffic area regardless of the WPLE project construction.

6. Accident Analysis

A summary of the Traffic Surveillance and Analysis System (TASAS) Table B accident summary for the three-year period between October 1, 2011 to September 30, 2014 is provided in Table 6.1 herein.

Table 6.1 TASAS Accident Summary

LOCATION	Post Mile	Total	Actual Accident Rates Per Million Vehicle Miles			Statewide Average Accident Rates Per Million Vehicle Miles		
			FAT	F+I	Total	FAT	F+I	Total
I-405 SB Mainline at Wilshire Boulevard	31.40	120	0.000	0.93	3.73	0.006	0.36	1.15
I-405 SB On-Ramp at EB Wilshire Boulevard	31.38	11	0.000	0.42	0.92	0.003	0.18	0.57
I-405 SB Off-Ramp at EB Wilshire Boulevard	31.48	22	0.000	0.51	2.23	0.003	0.30	1.06

The actual accident rates are higher than the Statewide accident rates for similar facilities:

I-405 SB Mainline at Wilshire Boulevard

On I-405 SB, 50 % of accidents were rear-end, 27.3 % were sideswipe, and 13.6 % were hit-object collisions. Roadway congestion can be a contributing cause for rear-end collisions and high weave merge movements for side swipe accidents.

I-405 SB On-Ramp at EB Wilshire Boulevard

For the SB On-ramp, 54.5% of accidents were hit object and 45.5% were rear-end collisions. Similarly, roadway congestion can be a contributing cause for rear-end collisions and high weave merge movements for sideswipe collisions.

I-405 SB Off-Ramp at EB Wilshire Boulevard

For the SB Off-ramp, 50.0% were rear-end collisions, 27.3% were sideswipe, 13.6% were hit-object, 4.5% were auto-pedestrian, and 4.5% were other. Roadway congestion can be considered as a cause for rear-end collisions and high weave merge movements for sideswipe collisions.

APPENDIX B TRIP GENERATION AND DISTRIBUTION MAPS

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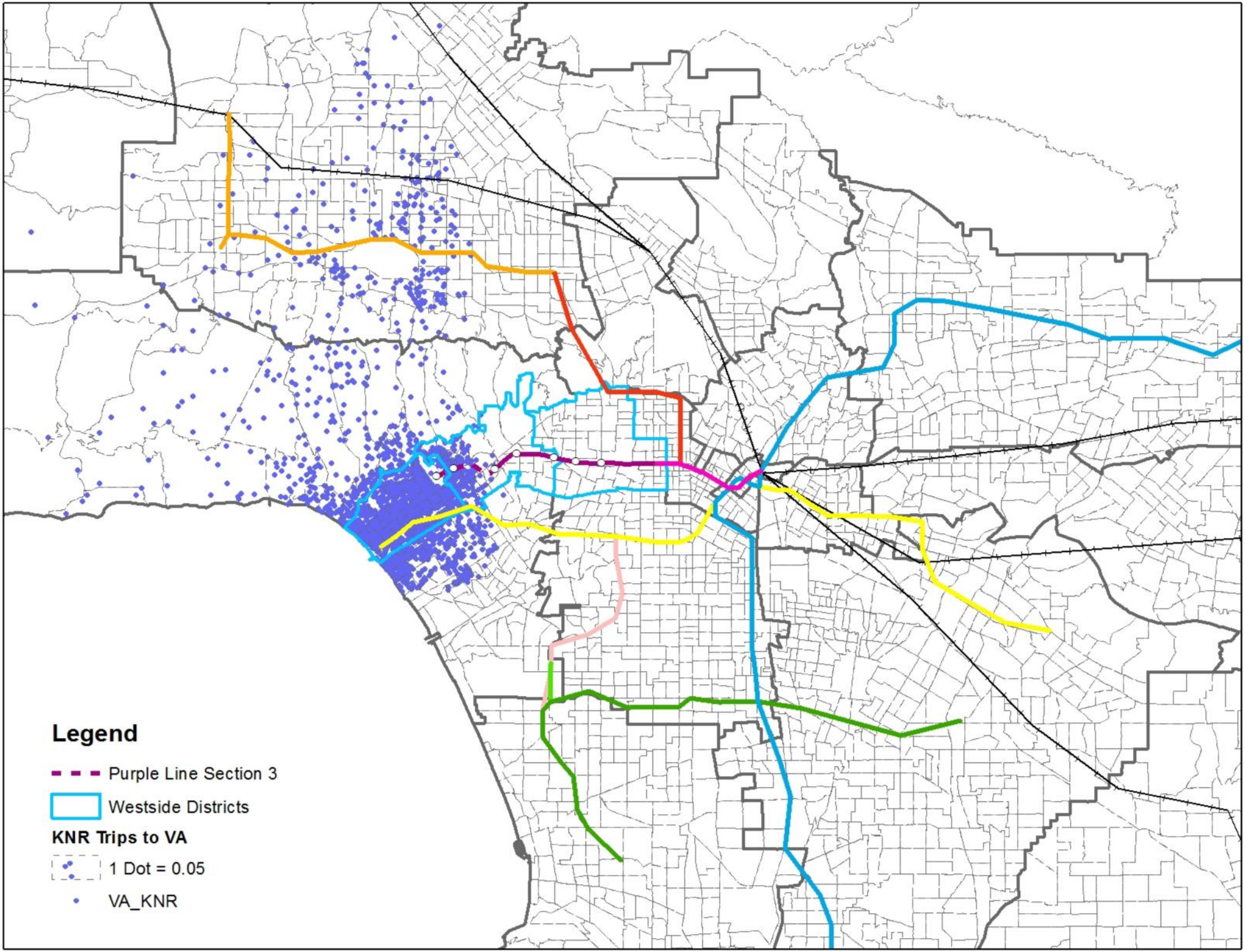
Legend
Purple Line Section 3
Westside Districts
KNR Trips to VA
1 Dot = 0.05
VA_KNR

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DAILY OUTBOUND TRIP GENERATION
by TAZ for WESTSIDE KISS-and-RIDE

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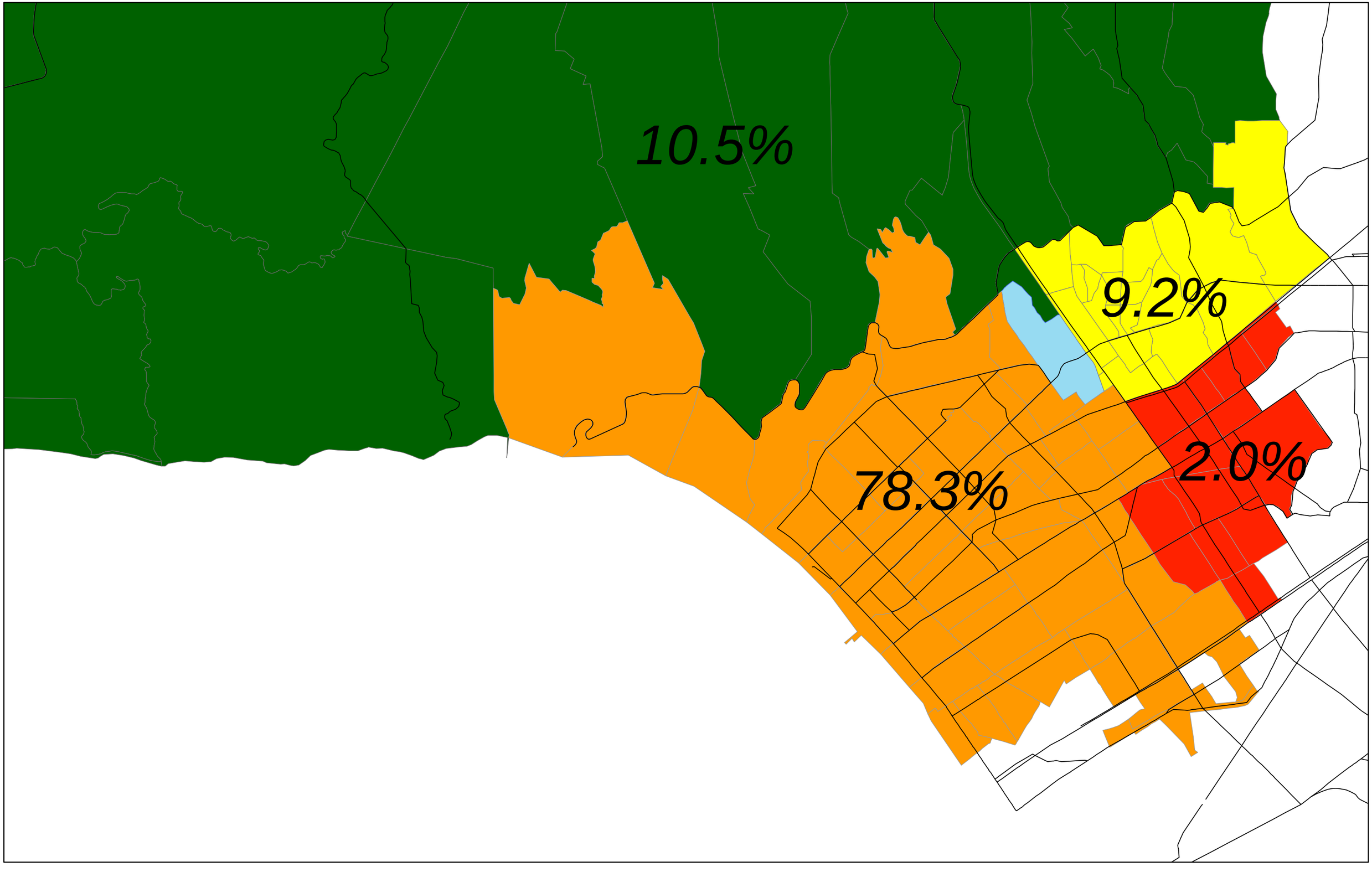
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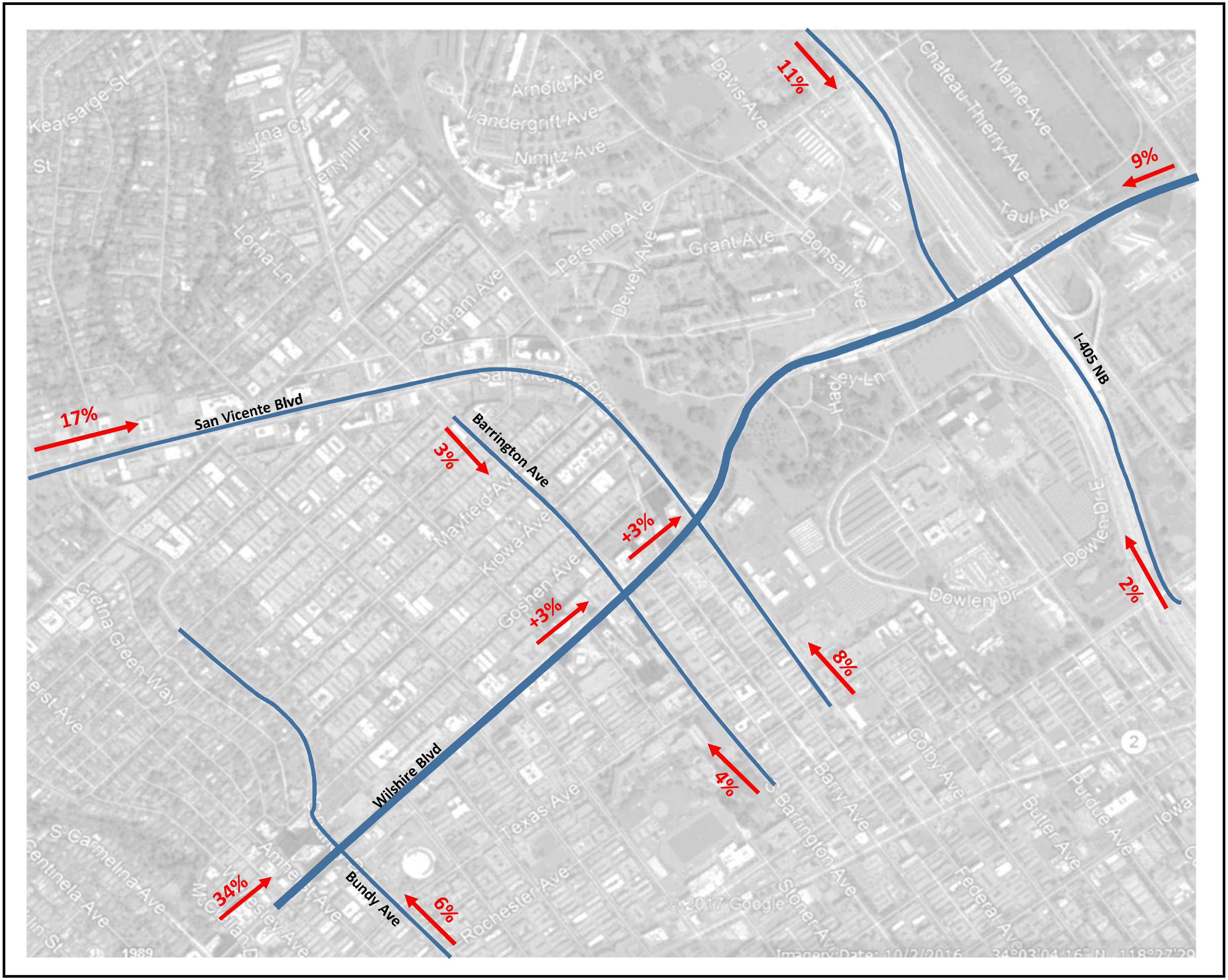
San Vicente Blvd
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Barrington Ave
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I-405 NB
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Wilshire Blvd
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Bundy Ave
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APPENDIX C METHODOLOGY MEMO

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MEMORANDUM

TO: Roger Martin, LA Metro

FROM: Kristin Carlson, AICP, WSP

SUBJECT: Westside Subway Extension: Westwood/VA Hospital Station Traffic Impact Analysis Methodology

DATE: November 3, 2017

INTRODUCTION

In August 2010, the Traffic Impact Analysis Report in support of the Westside Purple Line Extension (WPLE) Project Draft Environmental Impact Statement/Environmental Impact Report (Draft EIS/EIR) was prepared. The Draft EIS/EIR analyzed 192 intersections under Existing Conditions, Future 2035 No Build, and Future 2035 Build Alternatives. Of these 192 intersections, four intersections were near the proposed Westwood/Veterans Affairs (VA) Hospital Station. From west to east they are as follows: Wilshire Boulevard and Barrington Avenue, Wilshire Boulevard and Federal Avenue, Wilshire Boulevard and Sepulveda Boulevard, and Wilshire Boulevard and Veteran Avenue. The horizon year analysis did not require updates for the Final EIS/EIR (March 2012); however, an "existing plus project" analysis was conducted for purposes of the California Environmental Quality Act (CEQA). In October 2016, a supplemental traffic impact study (*Traffic Impact Study Westside Purple Line Extension at the Interstate 405/Wilshire Boulevard Interchange*) was prepared for the California Department of Transportation (Caltrans) to further analyze the impacts of the WPLE Project near the Interstate 405 (I-405)/Wilshire Boulevard Interchange in West Los Angeles, California. This study was prepared in support of a Project Study Report/Project Report (PSR/PR) regarding interchange improvements for the construction of twin tunnels for the WPLE crossing under Caltrans right-of-way at Wilshire Boulevard.

PURPOSE

A passenger drop-off area associated with the Westwood/VA Hospital Station was included as part of the project in the Final EIS/EIR. However, the drop-off area was proposed on the westbound off-ramp from Wilshire Boulevard to Bonsall Avenue (i.e., on the north side of Wilshire Boulevard). The *Westside Subway Extension Project Station Circulation Report* (Metro 2011) specified that a passenger drop-off area could not be accommodated on the eastbound bus turnout or access ramps due to space constraints; however, passenger drop-off activities were expected to occur informally in both locations. Through coordination with representatives of the VA Campus during Advanced Conceptual Design, the passenger drop-off area has been relocated to within the northern portion of the existing VA parking lot

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Wells Fargo Bank Building
401 B Street, Suite 1650
San Diego, CA 92101

Tel.: +1 619 338-9376
Fax: +1 619 338-8123
wsp.com

just east of the proposed station plaza and entrance. The passenger drop-off area would have approximately 60 spaces for short-term parking (15 to 30 minutes) and include lighting and traffic islands.

For both the EIS/EIR traffic study and the supplemental Caltrans traffic study, the Metro Regional Travel Demand Model was used to estimate regional travel patterns throughout Los Angeles County. To improve on the level of detail in the forecasting process and to improve more localized future traffic patterns in and around the VA campus, the VISUM modeling software was then used to extract a sub-area of the regional model and enhance its level of detail. The change in location of the passenger drop-off facility associated with the Westwood/VA Hospital Station necessitates an updated traffic study to determine if there are any new significant impacts that were not originally identified in either the EIS/EIR and the supplemental Caltrans traffic study.

To facilitate the production of the traffic impact study document, this memorandum describes the methodology that will be used to evaluate potential impacts from the relocated passenger drop-off area. Specifically, this memo addresses the following:

- Passenger Drop-off Facility Trip Generation
- Proposed Study Area
- Passenger Drop-off Facility Trip Distribution
- Study Scenarios
- Traffic Volume Assumptions for Baseline Conditions
- Traffic Analysis-Based Assumptions and Parameters

TRIP GENERATION

To maintain consistency with the EIS/EIR document, this study will use the Metro Corridors Base Model 2009 (CBM 09) to determine the 2035 project trips from the proposed passenger drop-off facility. These trips from 2035 were extracted from the model by Transportation Analysis Zone (TAZ). Table 1 displays the total number of TAZs that generated trips for the passenger drop-off facility, as well as the total number of daily trips generated from all TAZs combined and the total number of trips generated in the highest singular peak hour, which is the AM peak hour. The trips generated in the singular peak hour will be assumed for both the AM and PM peak hour to provide a conservative estimate of the drop-off facility's trip generation.

Table 1: Trip Generation Assumptions	
Total Number of TAZs Generating Passenger Drop-off Trips	387
Total Number of Daily Trips Generated	245
Total Number of Peak-Hour Trips Generated	55

STUDY AREA

To maintain consistency with the most recent traffic analysis conducted, the Caltrans traffic study guidelines will be used as the starting point to determine the analysis study area. Caltrans study guidelines

dictate that an intersection or facility that generates over 50 trips and operates at LOS C or D warrants a full traffic study. However, in our study, only 55 trips are generated in the peak hour by the passenger drop-off area and are distributed throughout roadway network. The study area used in the supplemental Caltrans traffic study will also be used to maintain consistency with that prior study. Additionally, this study area will be expanded to include the intersections of Wilshire Boulevard with both Federal Avenue and Barrington Avenue to evaluate potential impacts of traffic coming from west of the Westwood/VA Hospital Station. The resulting study area encompassed by this traffic impact study is as follows:

ROADWAYS

I-405/Wilshire Boulevard Interchange

a. NB I-405 to EB Wilshire Boulevard off-ramp
b. EB Wilshire Boulevard to NB I-405 on-ramp
c. NB I-405 to WB Wilshire Boulevard off-ramp
d. WB Wilshire Boulevard to NB I-405 on-ramp
e. SB I-405 to WB Wilshire Boulevard off-ramp
f. WB Wilshire Boulevard to SB I-405 on-ramp
g. EB Wilshire Boulevard to SB I-405 on-ramp
h. SB I-405 to EB Wilshire Boulevard off-ramp

INTERSECTIONS

- Wilshire Boulevard/Sepulveda Boulevard (currently signalized)
- Wilshire Boulevard/Bonsall Avenue North (currently unsignalized)
- Wilshire Boulevard/Bonsall Avenue South (currently unsignalized)
- Bonsall Avenue/Passenger Drop-off Facility Driveway (proposed unsignalized)
- Wilshire Boulevard/Federal Avenue (currently signalized)
- Wilshire Boulevard/Barrington Avenue (currently signalized)

TRIP DISTRIBUTION

To ensure that the 55 peak-hour trips generated by the passenger drop-off facility pass through the three intersections and eight ramp segments in the study area, all vehicular trips will be loaded onto the analysis network at the following four locations:

- Wilshire Boulevard West
- Wilshire Boulevard East
- I-405 North
- I-405 South

Loading automobile trips generated at these four locations will result in the same intersections and ramps being studied from the *Caltrans Traffic Impact Study Westside Purple Line Extension at the Interstate 405/Wilshire Boulevard Interchange* (October 2016).

To determine the percentage of the total trips that are loading into the roadway network within the study area, a TAZ trip generation analysis was conducted. Figure 1 shows the location of trips generated by TAZ. This data was refined further to show the number of outbound trips generated by TAZ, which is reflected in Figure 2. The major roadways and freeways are also displayed in Figure 2. Using engineering

best practices and judgment, the trips by TAZ were assigned to one of the four load locations, which is summarized visually in Figure 3.

Applying these distribution percentages to the actual peak-hour trip generation total and then moving the resulting trips through the network to and from the passenger drop-off facility produces the peak-hour trip turning movements associated with the project. Figure 4 shows the individual turning movements and ramp volumes from the generated passenger drop-off facility automobile trips in the 2035 AM peak hour. PM peak-hour volumes are assumed to be the same.

FIGURE 1 – WESTSIDE PASSENGER DROP-OFF TRIPS BY TAZ

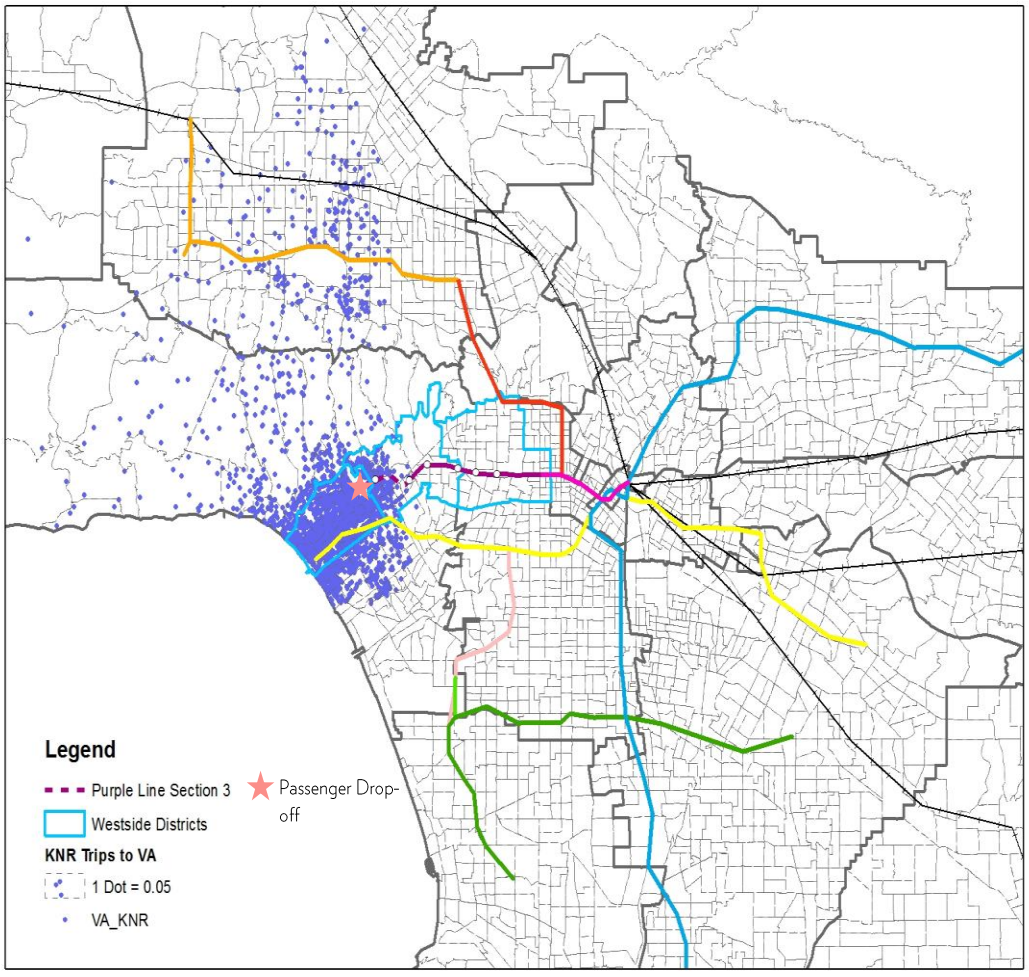


FIGURE 2 – WESTSIDE PASSENGER DROP-OFF DAILY OUTBOUND TRIPS GENERATED BY TAZ

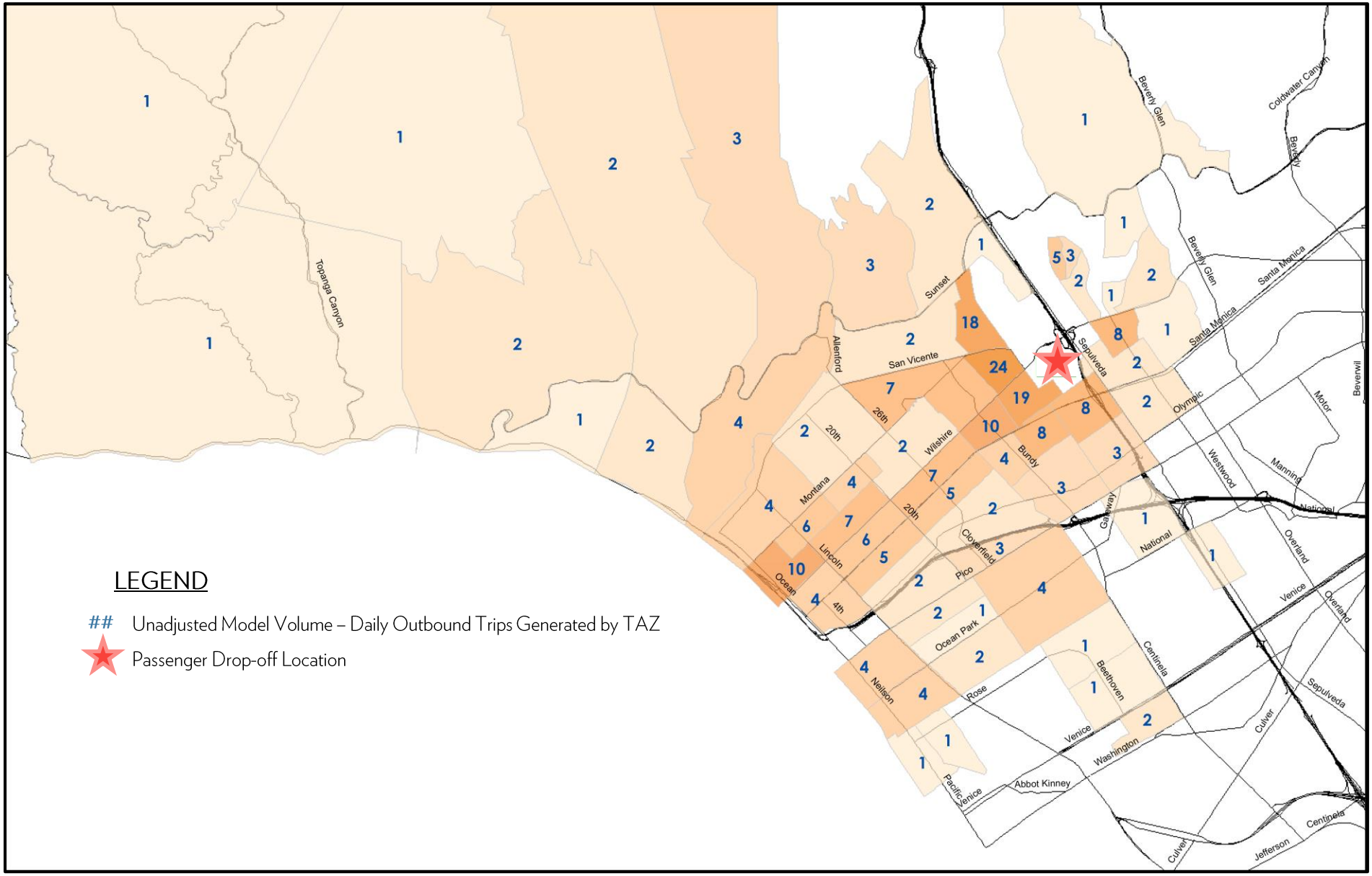


FIGURE 3 – TRIP ASSIGNMENT BASED ON DAILY TRIP GENERATION BY TAZ

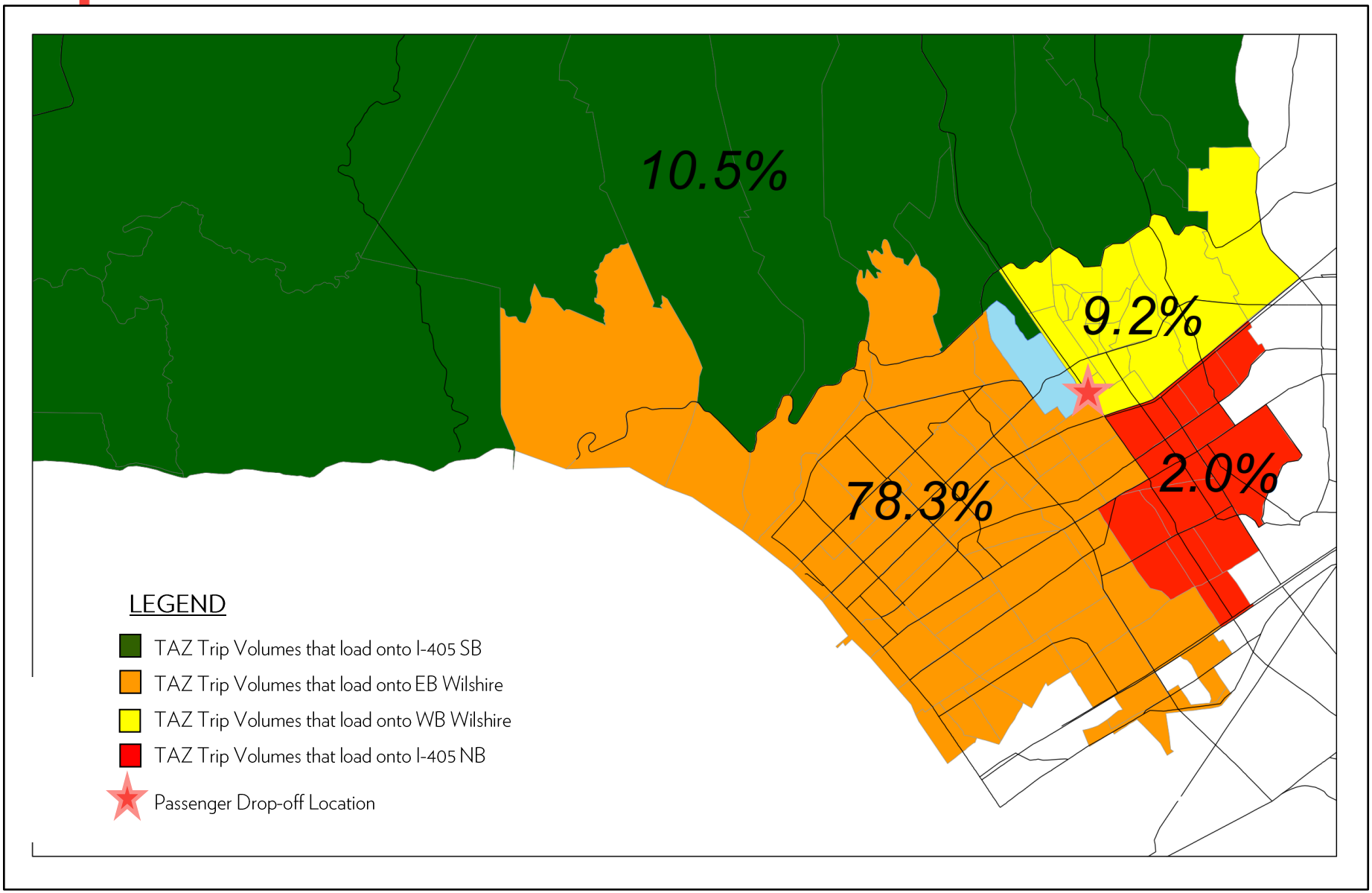
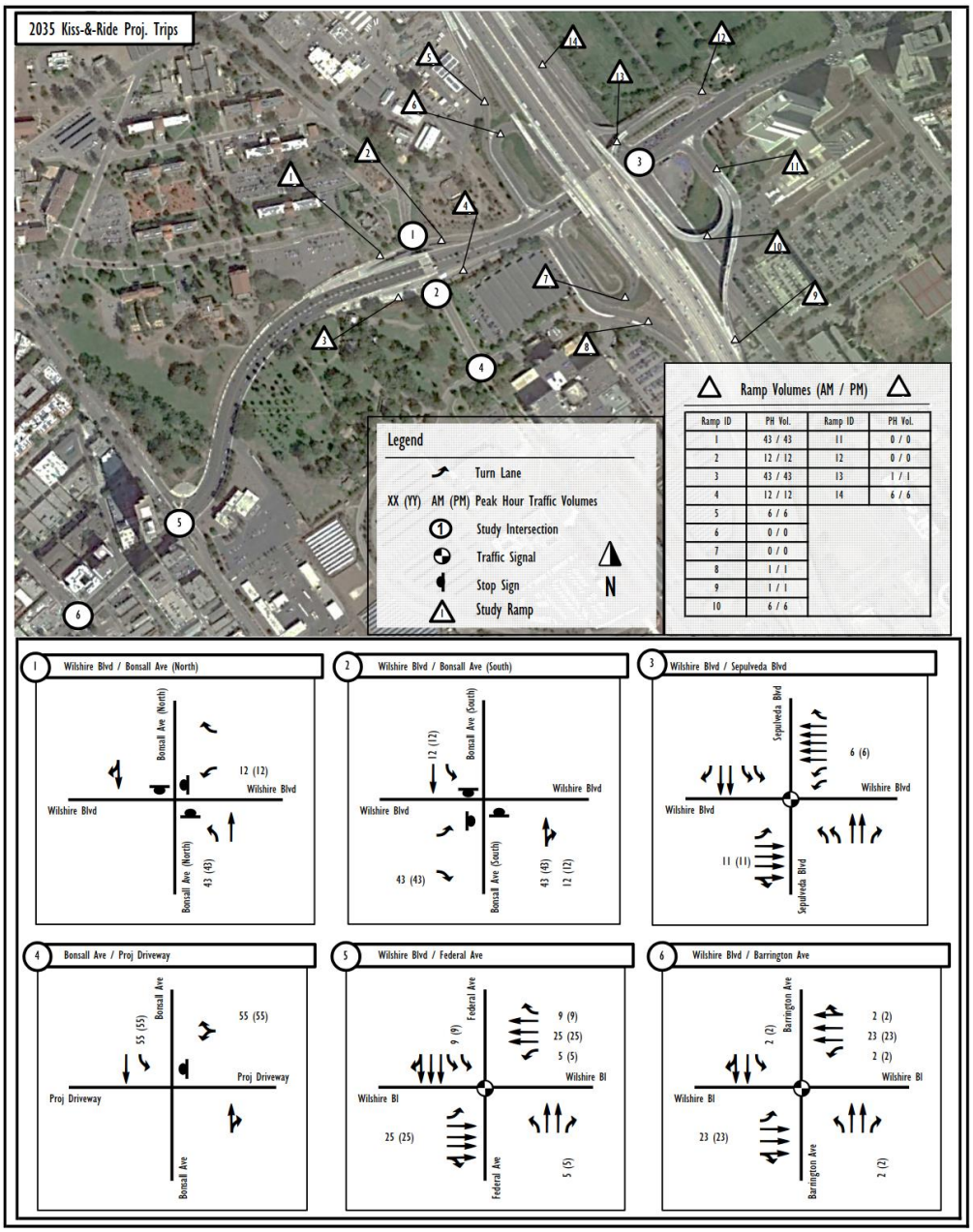


FIGURE 4 – 2035 PASSENGER DROP-OFF GENERATED AUTO TRIPS IN THE PEAK HOUR



PROPOSED STUDY SCENARIOS

The original Draft EIS/EIR analyzed Existing Conditions, 2035 No-Build, and 2035 Build (WPLE Project). The Final EIS/EIR also evaluated Existing Conditions with Project for compliance with CEQA. Similarly, the Caltrans supplemental study analyzed Existing Conditions, 2025 Build and No-Build, and

2045 Build and No-Build. To meet both National Environmental Policy Act and CEQA requirements, this study will analyze the following scenarios:

- Existing Conditions
- 2025 (Opening Day) No-Build
- 2025 (Opening Day) Build
- 2045 (Horizon Year) No-Build
- 2045 (Horizon Year) Build

VOLUME ASSUMPTIONS FOR BASELINE CONDITIONS

To maintain consistency with the most recent traffic volume data, this study will use future year No-Build volumes from the *Traffic Impact Study Westside Purple Line Extension at the Interstate 405/Wilshire Boulevard Interchange* (October 2016) for all intersections that are repeated in this study. All peak-hour turning movement counts and ramp volumes in both 2025 and 2045 in the No-Build condition will provide the basis for comparison for the impact threshold analyses

For the intersections of Federal Avenue and Barrington Avenue with Wilshire Boulevard, turning movement volumes from the Existing Conditions scenario in the Draft EIS/EIR traffic study document will be used. To convert these volumes to 2025 and 2045 No-Build conditions in this study, a growth factor will be applied to grow the volumes, respectively. This growth factor will be calculated as a percent volume growth per year by taking the difference between the 2022009 and 2035 No Build Scenarios from the Draft EIR/EIS document for both the AM and PM peak hours and will be calculated by respective intersection. This linear growth will then be applied to grow the volumes to 2025 and 2045 volumes. The intersection of the project driveway with Bonsall Avenue will not exist in the No-Build conditions of this report. However, volume balancing will be used to ensure that the turning movement volumes for the project driveway are consistent with the volumes at other intersections in the study.

The 2025 Build and 2045 Build traffic volumes will have project trip volumes added from the proposed passenger drop-off facility. Discussion of the trip generation, assignment and distribution of project trips in 2035 can be found in the sections above on trip generation and trip distribution. To provide a conservative estimate of the drop-off facility's impacts, the 2035 generated trips will be added to the 2025 No Build Condition to generate the 2025 Build Condition volumes. For the 2045 Build Conditions, growth factor will be applied to the 2035 Project Trips to grow those volumes to 2045 volumes, to be added to the 2045 No Build Condition.

To determine this factor, AM and PM growth will be calculated by year between 2025 and 2045 No Build conditions in the Caltrans supplemental study. This linear growth will then be applied to grow the trips to 2045.

PARAMETER ASSUMPTIONS

A number of parameters and analysis conditions will need to be assumed to complete the necessary analysis. The following list enumerates those assumptions:

- Highway Capacity Manual (HCM) 2000 methodology will be used on all intersections to maintain consistency with the EIR Traffic Study document. Analysis will be conducted using Synchro software.

- HCM 2010 methodology will be used on all ramp analysis to maintain consistency with the Caltrans supplemental study. Analysis will be conducted using HCS software.
- Intersection lane configuration will be based on current intersection conditions.
- Signal timing sheets will not be used because it is assumed that with the installation of the passenger drop-off facility and subway extension that signal timing will need to be updated.
- Signal phasing will match present day conditions.
- Signal optimazation will be used for all future year scenarios.
- The peak hour factor (PHF) for all analyses will be 0.92. The PHF is the parameter that determines the variability of arriving vehicles to an intersection or facility. A PHF of 1.0 indicates that the arrival of vehicles in the peak 15-minute period is exactly equal to the average 15-minute arrival volume across the entire hour. A typical default value for PHF is 0.92 in most analysis software and is consistent with the supplemental Caltrans traffic impact study.
- A truck percentage of 5 percent will be used on all ramp analysis and 2 percent for all intersection analysis to maintain consistency with the approved supplemental Caltrans traffic impact study.
- Figure 5 shows the proposed site layout that will govern analysis pertaining to the passenger drop-off facility. Specifically, the project driveway will be assumed to be a side street stop, intersection control.
- Figure 6 displays the significant impact threshold that will be used for this study for intersections. It is consistent with the impact thresholds from the Draft EIS/EIR traffic study.
- For freeway ramps segments, the *Caltrans Guide for the Preparation of Traffic Impact Studies* does not have specific significant impact thresholds for ramp analyses. Los Angeles County Congestion Management Program guidelines also do not have thresholds for ramp analyses. As such, HCM 2010 operational analysis will stand as a comparison analysis.

FIGURE 5 – PROPOSED PASSENGER DROP-OFF SITE LAYOUT

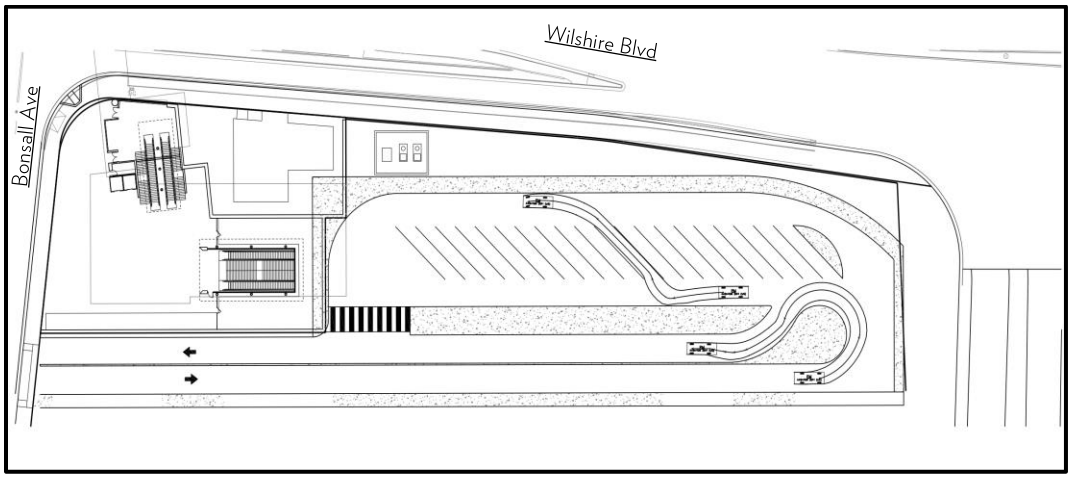


FIGURE 6 – SIGNIFICANT IMPACT THRESHOLDS

Intersection Methodology and Impact Criteria

For the traffic impact analysis, the evaluation of significance under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) is defined by comparing the Future Build Alternative scenario to the Future Year 2035 No Build scenario. The net change in delay at study intersections is compared to thresholds of significance for determination of impacts. The criteria used to measure a significant impact are defined in Table 5-1.

Table 5-1. Westside Subway Extension Traffic Impact Criteria

Definition	Criteria
The intersection LOS analysis assumes that an intersection would be significantly impacted (CEQA)/adversely affected (NEPA) by traffic volume changes if a project alternative causes an increase in average vehicle delay according to the following thresholds:	Final LOS C—a significant/adverse impact has occurred if the delay is increased by 10 or more seconds
	Final LOS D—a significant/adverse impact has occurred if the delay is increased by 7.5 or more seconds
	Final LOS E/F—a significant/adverse impact has occurred if the delay is increased by 5 or more seconds

NEXT STEPS

Upon approval of these methodology and parameter assumptions, WSP will proceed with the completion of the necessary traffic analysis and significant impact threshold analysis for completion as part of the full supplemental traffic study.

APPENDIX D TRAFFIC COUNT DATA

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PCE
1.5
2
3

	1 SBRT (405 NB Off-Ramp @ Wilshire WB)							2 SBTH							3 SBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
730-830	579	5	2	6	4	3	599	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-845	585	3	2	5	3	2	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	585	5	3	8	6	6	612	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-900	596	0	2	7	3	5	613	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	596	0	3	11	6	15	631	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	4 WBRT (405 NB On-Ramp @ Wilshire WB)							5 WBTH (Wilshire)							6 WBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
730-830	578	4	1	4	0	2	589	2108	50	1	26	7	8	2200	0	0	0	0	0	0	0
745-845	572	5	1	4	0	3	585	2132	46	1	28	6	7	2220	0	0	0	0	0	0	0
PCE	572	8	2	6	0	9	596	2132	69	2	42	12	21	2278	0	0	0	0	0	0	0
800-900	542	2	0	4	0	2	550	2079	41	1	35	8	5	2169	0	0	0	0	0	0	0
PCE	542	3	0	6	0	6	557	2079	62	2	53	16	15	2226	0	0	0	0	0	0	0

	7 NBRT (405 NB Off-Ramp @ Wilshire EB)							8 NBTH							9 NBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
730-830	1278	2	0	9	5	3	1297	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-845	1305	2	0	13	4	3	1327	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	1305	3	0	20	8	9	1345	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-900	1297	2	0	14	2	2	1317	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	1297	3	0	21	4	6	1331	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	10 EBRT (405 NB On-Ramp @ Wilshire EB)							11 EBTH (Wilshire)							12 EBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
730-830	662	5	0	7	1	3	678	2242	30	0	10	5	3	2290	0	0	0	0	0	0	0
745-845	578	6	0	7	3	3	597	2319	29	0	20	5	4	2377	0	0	0	0	0	0	0
PCE	578	9	0	11	6	9	613	2319	44	0	30	10	12	2415	0	0	0	0	0	0	0
800-900	550	5	0	7	3	3	568	2279	31	0	23	4	4	2341	0	0	0	0	0	0	0
PCE	550	8	0	11	6	9	583	2279	47	0	35	8	12	2380	0	0	0	0	0	0	0

	ALL MOVEMENT TOTALS						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
730-830	7447	96	4	62	22	22	7653
745-845	7491	91	4	77	21	22	7706
PCE	7491	137	6	116	42	66	7857
800-900	7343	81	3	90	20	21	7558
PCE	7343	122	5	135	40	63	7707

HV %	0.972	0.011	0.000	0.012	0.003	0.003	1.000

PCE
1.5
2
3

HOURLY COUNTS	1 SBRT (405 NB Off-Ramp @ Wilshire WB)							2 SBTH							3 SBLT						
	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
530-630	176	0	0	0	0	0	176	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-645	204	0	0	0	0	0	204	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	204	0	0	0	0	0	204	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-700	228	0	0	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	228	0	0	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HOURLY COUNTS	4 WBRT (405 NB On-Ramp @ Wilshire WB)							5 WBTH (Wilshire)							6 WBLT						
	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
530-630	490	0	0	4	0	0	494	2812	32	0	4	0	1	2849	0	0	0	0	0	0	0
545-645	488	0	1	4	0	0	493	2782	35	0	5	0	2	2824	0	0	0	0	0	0	0
PCE	488	0	2	6	0	0	496	2782	53	0	8	0	6	2848	0	0	0	0	0	0	0
600-700	488	0	1	5	0	0	494	2685	32	0	4	0	2	2723	0	0	0	0	0	0	0
PCE	488	0	2	8	0	0	497	2685	48	0	6	0	6	2745	0	0	0	0	0	0	0

HOURLY COUNTS	7 NBRT (405 NB Off-Ramp @ Wilshire EB)							8 NBTH							9 NBLT						
	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
530-630	487	2	0	3	0	0	492	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-645	445	1	0	3	0	0	449	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	445	2	0	5	0	0	451	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-700	489	2	0	2	0	0	493	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	489	3	0	3	0	0	495	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HOURLY COUNTS	10 EBRT (405 NB On-Ramp @ Wilshire EB)							11 EBTH (Wilshire)							12 EBLT						
	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
530-630	578	3	0	3	3	0	587	1831	33	1	3	2	0	1870	0	0	0	0	0	0	0
545-645	561	3	0	2	2	0	568	1897	29	0	2	2	0	1930	0	0	0	0	0	0	0
PCE	561	5	0	3	4	0	573	1897	44	0	3	4	0	1948	0	0	0	0	0	0	0
600-700	534	3	0	1	2	0	540	1837	31	0	1	0	0	1869	0	0	0	0	0	0	0
PCE	534	5	0	2	4	0	544	1837	47	0	2	0	0	1885	0	0	0	0	0	0	0

HOURLY COUNTS	ALL MOVEMENT TOTALS						
	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
530-630	6374	70	1	17	5	1	6468
545-645	6377	68	1	16	4	2	6468
PCE	6377	102	2	24	8	6	6519
600-700	6261	68	1	13	2	2	6347
PCE	6261	102	2	20	4	6	6394

HV %	0.986	0.011	0.000	0.002	0.000	0.000	1.000

PCE
1.5
2
3

	1 SBRT (405 SB Off-Ramp @ Wilshire WB)							2 SBTH							3 SBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
730-830	775	1	0	10	3	4	793	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-845	788	2	0	7	5	4	806	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	788	3	0	11	10	12	824	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-900	794	1	0	10	7	6	818	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	794	2	0	15	14	18	843	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	4 WBRT (405 SB On-Ramp @ Wilshire WB)							5 WBTH (Wilshire)							6 WBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
730-830	791	7	0	10	7	6	821	2057	38	3	26	3	5	2132	0	0	0	0	0	0	0
745-845	763	10	0	12	7	5	797	2093	28	3	25	1	4	2154	0	0	0	0	0	0	0
PCE	763	15	0	18	14	15	825	2093	42	5	38	2	12	2191	0	0	0	0	0	0	0
800-900	698	13	0	10	9	3	733	2113	23	3	35	1	6	2181	0	0	0	0	0	0	0
PCE	698	20	0	15	18	9	760	2113	35	5	53	2	18	2225	0	0	0	0	0	0	0

	7 NBRT (405 SB Off-Ramp @ Wilshire EB)							8 NBTH							9 NBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
730-830	636	0	0	2	1	1	640	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-845	643	0	0	1	1	2	647	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	643	0	0	2	2	6	653	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-900	637	0	0	2	2	2	643	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	637	0	0	3	4	6	650	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	10 EBRT (405 SB On-Ramp @ Wilshire EB)							11 EBTH (Wilshire)							12 EBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
730-830	852	17	0	4	2	1	876	2099	17	0	14	5	4	2139	0	0	0	0	0	0	0
745-845	826	17	0	4	2	2	851	2032	16	0	27	6	4	2085	0	0	0	0	0	0	0
PCE	826	26	0	6	4	6	868	2032	24	0	41	12	12	2121	0	0	0	0	0	0	0
800-900	779	20	0	4	2	4	809	1951	18	0	29	6	4	2008	0	0	0	0	0	0	0
PCE	779	30	0	6	4	12	831	1951	27	0	44	12	12	2046	0	0	0	0	0	0	0

	ALL MOVEMENT TOTALS						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
730-830	7210	80	3	66	21	21	7401
745-845	7145	73	3	76	22	21	7340
PCE	7145	110	5	114	44	63	7480
800-900	6972	75	3	90	27	25	7192
PCE	6972	113	5	135	54	75	7353

HV %	0.969	0.010	0.000	0.013	0.004	0.003	1.000

PCE
1.5
2
3

	1 SBRT (405 SB Off-Ramp @ Wilshire WB)							2 SBTH							3 SBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
530-630	675	0	1	1	0	1	678	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-645	711	0	1	1	0	2	715	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	711	0	2	2	0	6	720	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-700	787	1	1	1	0	2	792	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	787	2	2	2	0	6	798	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	4 WBRT (405 SB On-Ramp @ Wilshire WB)							5 WBTH (Wilshire)							6 WBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
530-630	1029	7	0	4	0	1	1041	1943	19	0	1	0	1	1964	0	0	0	0	0	0	0
545-645	954	6	0	3	0	1	964	2027	20	0	2	0	0	2049	0	0	0	0	0	0	0
PCE	954	9	0	5	0	3	971	2027	30	0	3	0	0	2060	0	0	0	0	0	0	0
600-700	934	6	0	3	0	1	944	2014	15	0	1	0	0	2030	0	0	0	0	0	0	0
PCE	934	9	0	5	0	3	951	2014	23	0	2	0	0	2038	0	0	0	0	0	0	0

	7 NBRT (405 SB Off-Ramp @ Wilshire EB)							8 NBTH							9 NBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
530-630	359	0	0	0	0	0	359	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-645	412	6	0	1	1	0	420	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	412	9	0	2	2	0	425	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-700	455	6	0	1	1	0	463	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE	455	9	0	2	2	0	468	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	10 EBRT (405 SB On-Ramp @ Wilshire EB)							11 EBTH (Wilshire)							12 EBLT						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
530-630	616	4	0	1	1	1	623	1879	21	0	6	5	0	1911	0	0	0	0	0	0	0
545-645	589	3	0	1	1	1	595	1903	14	0	3	3	0	1923	0	0	0	0	0	0	0
PCE	589	5	0	2	2	3	600	1903	21	0	5	6	0	1935	0	0	0	0	0	0	0
600-700	603	6	0	1	0	1	611	1789	14	0	0	1	0	1804	0	0	0	0	0	0	0
PCE	603	9	0	2	0	3	617	1789	21	0	0	2	0	1812	0	0	0	0	0	0	0

	ALL MOVEMENT TOTALS						
HOURLY COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
530-630	6501	51	1	13	6	4	6576
545-645	6596	49	1	11	5	4	6666
PCE	6596	74	2	17	10	12	6710
600-700	6582	48	1	7	2	4	6644
PCE	6582	72	2	11	4	12	6682

HV %	0.991	0.007	0.000	0.001	0.000	0.001	1.000

WILTEC

INTERSECTION VEHICLE CLASSIFICATION TURNING MOVEMENT COUNT SUMMARY

CLIENT: ADVANTEC CONSULTING ENGINEERS
PROJECT: WEST LOS ANGELES
DATE: THURSDAY MAY 3, 2012
PERIOD: 6:00 AM TO 9:00 AM
INTERSECTION: N/S SEPULVEDA BOULEVARD
E/W WILSHIRE BOULEVARD
CITY: LOS ANGELES

	1 SBRT (Sepulveda)							2 SBTH (Sepulveda)							3 SBLT (Sepulveda)						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	7	0	0	0	0	0	7	18	0	0	1	0	0	19	4	0	0	0	0	0	4
615-630	17	0	0	0	0	1	18	27	0	0	1	2	0	30	7	0	0	0	1	0	8
630-645	32	0	0	0	1	0	33	39	0	0	0	0	0	39	12	0	0	0	0	0	12
645-700	41	0	0	1	0	0	42	50	0	0	4	1	0	55	20	0	0	0	0	0	20
700-715	43	0	0	2	0	0	45	56	0	0	1	1	0	58	17	0	0	1	0	0	18
715-730	47	0	0	0	0	0	47	65	0	0	1	0	0	66	27	0	0	0	0	0	27
730-745	68	0	0	1	1	0	70	69	1	0	0	1	0	71	19	0	0	1	0	0	20
745-800	60	0	0	3	0	0	63	72	0	0	1	0	0	73	32	0	0	1	0	1	34
800-815	56	0	0	0	0	0	56	83	0	0	2	0	0	85	24	0	0	0	0	0	24
815-830	36	0	0	1	0	0	37	94	0	0	3	0	2	99	44	1	0	0	0	0	45
830-845	58	0	0	3	0	0	61	92	0	0	2	0	0	94	36	0	0	0	0	0	36
845-900	52	0	0	4	0	0	56	87	0	0	2	0	0	89	35	0	0	1	0	0	36
HOUR TOTALS																					
600-700	97	0	0	1	1	1	100	134	0	0	6	3	0	143	43	0	0	0	1	0	44
615-715	133	0	0	3	1	1	138	172	0	0	6	4	0	182	56	0	0	1	1	0	58
630-730	163	0	0	3	1	0	167	210	0	0	6	2	0	218	76	0	0	1	0	0	77
645-745	199	0	0	4	1	0	204	240	1	0	6	3	0	250	83	0	0	2	0	0	85
700-800	218	0	0	6	1	0	225	262	1	0	3	2	0	268	95	0	0	3	0	1	99
715-815	231	0	0	4	1	0	236	289	1	0	4	1	0	295	102	0	0	2	0	1	105
730-830	220	0	0	5	1	0	226	318	1	0	6	1	2	328	119	1	0	2	0	1	123
745-845	210	0	0	7	0	0	217	341	0	0	8	0	2	351	136	1	0	1	0	1	139
800-900	202	0	0	8	0	0	210	356	0	0	9	0	2	367	139	1	0	1	0	0	141

	4 WBRT (Wilshire)							5 WBTH (Wilshire)							6 WBLT (Wilshire)						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	13	0	0	0	0	0	13	235	5	0	2	2	2	246	5	1	0	0	0	0	6
615-630	9	0	0	0	0	0	9	268	3	1	8	0	1	281	8	0	0	0	0	0	8
630-645	13	0	0	1	0	0	14	339	6	0	7	1	2	355	11	1	0	0	0	0	12
645-700	5	1	0	1	0	0	7	429	8	0	6	1	1	445	11	1	0	0	0	1	13
700-715	9	0	0	0	1	0	10	502	12	0	10	0	1	525	5	1	0	0	0	0	6
715-730	22	0	0	0	0	0	22	578	11	0	4	1	0	594	16	0	0	1	0	0	17
730-745	18	0	0	0	1	0	19	614	14	0	10	3	3	644	14	2	0	1	0	0	17
745-800	16	0	0	1	0	0	17	636	11	1	5	1	2	656	20	6	0	0	0	0	26
800-815	21	0	0	0	1	0	22	647	9	1	9	3	3	672	27	2	0	0	0	0	29
815-830	19	0	0	1	0	0	20	624	9	1	5	2	2	643	31	2	0	0	0	1	34
830-845	15	0	0	1	0	0	16	636	9	0	9	2	1	657	25	1	0	2	0	0	28
845-900	12	0	0	1	0	0	13	600	9	1	12	3	3	628	18	0	0	2	0	0	20
HOUR TOTALS																					
600-700	40	1	0	2	0	0	43	1271	22	1	23	4	6	1327	35	3	0	0	0	1	39
615-715	36	1	0	2	1	0	40	1538	29	1	31	2	5	1606	35	3	0	0	0	1	39
630-730	49	1	0	2	1	0	53	1848	37	0	27	3	4	1919	43	3	0	1	0	1	48
645-745	54	1	0	1	2	0	58	2123	45	0	30	5	5	2208	46	4	0	2	0	1	53
700-800	65	0	0	1	2	0	68	2330	48	1	29	5	6	2419	55	9	0	2	0	0	66
715-815	77	0	0	1	2	0	80	2475	45	2	28	8	8	2566	77	10	0	2	0	0	89
730-830	74	0	0	2	2	0	78	2521	43	3	29	9	10	2615	92	12	0	1	0	1	106
745-845	71	0	0	3	1	0	75	2543	38	3	28	8	8	2628	103	11	0	2	0	1	117
800-900	67	0	0	3	1	0	71	2507	36	3	35	10	9	2600	101	5	0	4	0	1	111

	7 NBRT (Sepulveda)							8 NBTH (Sepulveda)							9 NBLT (Sepulveda)						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	13	2	0	0	0	0	15	8	0	0	0	0	0	8	12	0	0	0	0	0	12
615-630	18	5	0	0	0	0	23	13	0	0	0	0	0	13	11	0	0	1	0	1	13
630-645	19	5	0	0	1	0	25	19	0	0	0	1	1	21	10	0	0	0	0	0	10
645-700	39	6	0	0	0	0	45	31	1	0	0	1	0	33	17	0	0	0	0	1	18
700-715	41	6	0	0	0	0	47	26	0	0	0	1	0	27	34	0	0	0	0	0	34
715-730	59	2	0	2	0	0	63	39	1	0	1	1	0	42	30	0	0	0	0	0	30
730-745	49	5	0	1	0	0	55	55	1	0	2	0	0	58	32	2	0	0	0	0	34
745-800	61	4	0	1	1	0	67	62	0	0	1	1	0	64	26	0	0	0	0	1	27
800-815	47	5	0	0	0	0	52	59	0	0	3	0	1	63	19	0	0	1	0	0	20
815-830	67	3	0	0	1	1	72	66	0	0	0	0	0	66	30	0	0	1	0	0	31
830-845	86	6	0	1	1	0	94	77	0	0	0	0	0	77	28	0	0	0	0	0	28
845-900	62	3	0	2	0	0	67	89	0	0	0	0	0	89	25	0	0	0	0	0	25
HOUR TOTALS																					
600-700	89	18	0	0	1	0	108	71	1	0	0	2	1	75	50	0	0	1	0	2	53
615-715	117	22	0	0	1	0	140	89	1	0	0	3	1	94	72	0	0	1	0	2	75
630-730	158	19	0	2	1	0	180	115	2	0	1	4	1	123	91	0	0	0	0	1	92
645-745	188	19	0	3	0	0	210	151	3	0	3	3	0	160	113	2	0	0	0	1	116
700-800	210	17	0	4	1	0	232	182	2	0	4	3	0	191	122	2	0	0	0	1	125
715-815	216	16	0	4	1	0	237	215	2	0	7	2	1	227	107	2	0	1	0	1	111
730-830	224	17	0	2	2	1	246	242	1	0	6	1	1	251	107	2	0	2	0	1	112
745-845	261	18	0	2	3	1	285	264	0	0	4	1	1	270	103	0	0	2	0	1	106
800-900	262	17	0	3	2	1	285	291	0	0	3	0	1	295	102	0	0	2	0	0	104

	10 EBRT (Wilshire)							11 EBTH (Wilshire)							12 EBLT (Wilshire)						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	34	0	0	0	0	0	34	290	3	0	1	0	1	295	5	0	0	0	0	0	5
615-630	37	0	0	0	0	0	37	311	4	0	2	0	1	318	6	0	0	0	0	0	6
630-645	34	1	0	0	0	0	35	320	4	0	3	1	1	329	4	0	0	0	0	0	4
645-700	42	0	0	0	0	1	43	383	5	0	2	0	0	390	6	0	0	0	0	0	6
700-715	28	0	0	0	0	0	28	479	3	0	5	0	0	487	10	0	0	1	0	0	11
715-730	28	0	0	0	0	0	28	563	2	0	3	0	0	568	5	0	0	0	0	1	6
730-745	26	0	0	0	0	0	26	644	3	0	2	0	0	649	21	0	0	0	0	0	21
745-800	19	0	0	1	0	0	20	641	3	0	3	2	0	649	23	0	0	0	0	1	24
800-815	29	0	0	0	0	0	29	658	8	0	6	2	4	678	13	0	0	0	2	0	15
815-830	23	0	0	1	0	0	24	618	3	0	2	0	0	623	20	0	0	1	0	0	21
830-845	34	0	0	1	0	0	35	583	2	0	13	1	1	600	14	0	0	0	0	0	14
845-900	18	0	0	1	0	0	19	569	5	0	5	2	1	582	9	0	0	1	1	0	11
HOUR TOTALS																					
600-700	147	1	0	0	0	1	149	1304	16	0	8	1	3	1332	21	0	0	0	0	0	21
615-715	141	1	0	0	0	1	143	1493	16	0	12	1	2	1524	26	0	0	1	0	0	27
630-730	132	1	0	0	0	1	134	1745	14	0	13	1	1	1774	25	0	0	1	0	1	27
645-745	124	0	0	0	0	1	125	2069	13	0	12	0	0	2094	42	0	0	1	0	1	44
700-800	101	0	0	1	0	0	102	2327	11	0	13	2	0	2353	59	0	0	1	0	2	62
715-815	102	0	0	1	0	0	103	2506	16	0	14	4	4	2544	62	0	0	0	2	2	66
730-830	97	0	0	2	0	0	99	2561	17	0	13	4	4	2599	77	0	0	1	2	1	81
745-845	105	0	0	3	0	0	108	2500	16	0	24	5	5	2550	70	0	0	1	2	1	74
800-900	104	0	0	3	0	0	107	2428	18	0	26	5	6	2483	56	0	0	2	3	0	61

	ALL MOVEMENT TOTALS						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	644	11	0	4	2	3	664
615-630	732	12	1	12	3	4	764
630-645	852	17	0	11	5	4	889
645-700	1074	22	0	14	3	4	1117
700-715	1250	22	0	20	3	1	1296
715-730	1479	16	0	12	2	1	1510
730-745	1629	28	0	18	6	3	1684
745-800	1668	24	1	17	5	5	1720
800-815	1683	24	1	21	8	8	1745
815-830	1672	18	1	15	3	6	1715
830-845	1684	18	0	32	4	2	1740
845-900	1576	17	1	31	6	4	1635
HOUR TOTALS							
600-700	3302	62	1	41	13	15	3434
615-715	3908	73	1	57	14	13	4066
630-730	4655	77	0	57	13	10	4812
645-745	5432	88	0	64	14	9	5607
700-800	6026	90	1	67	16	10	6210
715-815	6459	92	2	68	21	17	6659
730-830	6652	94	3	71	22	22	6864
745-845	6707	84	3	85	20	21	6920
800-900	6615	77	3	99	21	20	6835

WILTEC

INTERSECTION VEHICLE CLASSIFICATION TURNING MOVEMENT COUNT SUMMARY

CLIENT: ADVANTEC CONSULTING ENGINEERS
PROJECT: WEST LOS ANGELES
DATE: THURSDAY MAY 3, 2012
PERIOD: 4:00 PM TO 7:00 PM
INTERSECTION: N/S SEPULVEDA BOULEVARD
E/W WILSHIRE BOULEVARD
CITY: LOS ANGELES

	1 SBRT (Sepulveda)							2 SBTH (Sepulveda)							3 SBLT (Sepulveda)						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	66	0	0	0	0	0	66	46	0	0	0	0	0	46	23	1	0	0	0	0	24
415-430	64	0	0	0	1	1	66	64	0	0	0	0	0	64	31	0	0	0	0	0	31
430-445	43	1	0	1	0	0	45	69	0	0	0	0	0	69	29	0	0	0	0	0	29
445-500	60	0	0	0	0	0	60	74	0	0	3	0	0	77	25	0	0	0	0	0	25
500-515	54	0	0	0	0	0	54	54	0	0	0	0	0	54	25	0	0	0	0	0	25
515-530	55	0	0	0	0	0	55	73	0	0	0	0	1	74	31	0	0	0	0	0	31
530-545	49	2	0	1	0	0	52	73	0	0	0	0	0	73	28	0	0	0	0	0	28
545-600	45	2	0	0	0	0	47	58	1	0	0	0	0	59	32	0	0	0	0	0	32
600-615	47	0	0	0	0	0	47	88	1	0	0	0	0	89	21	0	0	0	0	0	21
615-630	47	1	0	0	0	0	48	55	0	0	0	0	0	55	23	0	0	0	0	0	23
630-645	31	0	0	0	0	0	31	49	1	0	1	0	0	51	18	0	0	0	0	0	18
645-700	46	0	0	0	0	0	46	53	0	0	0	0	0	53	20	0	0	1	0	0	21
HOUR TOTALS																					
400-500	233	1	0	1	1	1	237	253	0	0	3	0	0	256	108	1	0	0	0	0	109
415-515	221	1	0	1	1	1	225	261	0	0	3	0	0	264	110	0	0	0	0	0	110
430-530	212	1	0	1	0	0	214	270	0	0	3	0	1	274	110	0	0	0	0	0	110
445-545	218	2	0	1	0	0	221	274	0	0	3	0	1	278	109	0	0	0	0	0	109
500-600	203	4	0	1	0	0	208	258	1	0	0	0	1	260	116	0	0	0	0	0	116
515-615	196	4	0	1	0	0	201	292	2	0	0	0	1	295	112	0	0	0	0	0	112
530-630	188	5	0	1	0	0	194	274	2	0	0	0	0	276	104	0	0	0	0	0	104
545-645	170	3	0	0	0	0	173	250	3	0	1	0	0	254	94	0	0	0	0	0	94
600-700	171	1	0	0	0	0	172	245	2	0	1	0	0	248	82	0	0	1	0	0	83

	4 WBRT (Wilshire)							5 WBTH (Wilshire)							6 WBLT (Wilshire)						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	27	0	0	0	0	0	27	717	4	0	5	1	0	727	70	2	0	0	0	0	72
415-430	33	0	0	0	0	0	33	663	7	0	4	0	0	674	38	3	0	1	0	0	42
430-445	35	0	0	0	0	0	35	600	6	0	2	0	0	608	56	2	0	0	0	0	58
445-500	29	0	0	0	0	0	29	668	7	0	0	1	0	676	64	2	0	0	0	0	66
500-515	37	0	0	0	0	0	37	682	7	0	4	0	0	693	55	1	0	0	0	0	56
515-530	24	0	0	0	0	0	24	658	4	0	1	0	1	664	70	2	0	0	0	0	72
530-545	32	0	0	0	0	0	32	688	4	0	1	0	0	693	74	2	0	0	0	0	76
545-600	37	0	0	0	0	0	37	699	8	0	1	0	0	708	55	3	0	0	0	0	58
600-615	29	0	0	0	0	0	29	631	4	0	2	0	1	638	44	4	0	0	0	0	48
615-630	47	0	0	0	0	0	47	618	5	0	0	0	0	623	34	2	0	0	0	0	36
630-645	32	0	0	0	0	0	32	726	6	0	2	0	0	734	34	3	0	0	0	1	38
645-700	30	0	0	0	0	0	30	649	5	0	0	0	0	654	39	3	0	0	0	0	42
HOUR TOTALS																					
400-500	124	0	0	0	0	0	124	2648	24	0	11	2	0	2685	228	9	0	1	0	0	238
415-515	134	0	0	0	0	0	134	2613	27	0	10	1	0	2651	213	8	0	1	0	0	222
430-530	125	0	0	0	0	0	125	2608	24	0	7	1	1	2641	245	7	0	0	0	0	252
445-545	122	0	0	0	0	0	122	2696	22	0	6	1	1	2726	263	7	0	0	0	0	270
500-600	130	0	0	0	0	0	130	2727	23	0	7	0	1	2758	254	8	0	0	0	0	262
515-615	122	0	0	0	0	0	122	2676	20	0	5	0	2	2703	243	11	0	0	0	0	254
530-630	145	0	0	0	0	0	145	2636	21	0	4	0	1	2662	207	11	0	0	0	0	218
545-645	145	0	0	0	0	0	145	2674	23	0	5	0	1	2703	167	12	0	0	0	1	180
600-700	138	0	0	0	0	0	138	2624	20	0	4	0	1	2649	151	12	0	0	0	1	164

	7 NBRT (Sepulveda)							8 NBTH (Sepulveda)							9 NBLT (Sepulveda)						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	72	4	0	0	1	0	77	99	0	0	0	0	0	99	27	1	0	0	0	0	28
415-430	58	6	0	0	0	1	65	98	0	0	1	0	0	99	20	1	0	0	0	0	21
430-445	67	6	0	0	1	0	74	110	2	0	1	1	0	114	22	0	0	0	0	0	22
445-500	56	7	0	0	1	0	64	80	1	0	0	0	0	81	21	0	0	1	0	0	22
500-515	55	6	0	1	0	0	62	106	1	0	0	0	0	107	37	1	0	0	0	0	38
515-530	58	3	0	0	0	0	61	87	0	0	0	0	0	87	28	0	0	0	0	0	28
530-545	63	4	1	0	0	0	68	108	0	0	1	0	0	109	35	0	0	0	0	1	36
545-600	48	3	0	0	0	0	51	94	0	0	0	0	0	94	26	0	0	0	0	0	26
600-615	73	4	0	0	0	0	77	87	0	0	0	0	0	87	40	0	0	0	0	0	40
615-630	77	5	0	0	0	0	82	96	0	0	0	0	0	96	37	0	0	0	0	0	37
630-645	76	1	0	0	0	0	77	98	1	0	1	0	0	100	44	0	0	0	0	0	44
645-700	44	5	0	0	0	0	49	71	0	0	0	0	0	71	32	0	0	0	0	0	32
HOUR TOTALS																					
400-500	253	23	0	0	3	1	280	387	3	0	2	1	0	393	90	2	0	1	0	0	93
415-515	236	25	0	1	2	1	265	394	4	0	2	1	0	401	100	2	0	1	0	0	103
430-530	236	22	0	1	2	0	261	383	4	0	1	1	0	389	108	1	0	1	0	0	110
445-545	232	20	1	1	1	0	255	381	2	0	1	0	0	384	121	1	0	1	0	1	124
500-600	224	16	1	1	0	0	242	395	1	0	1	0	0	397	126	1	0	0	0	1	128
515-615	242	14	1	0	0	0	257	376	0	0	1	0	0	377	129	0	0	0	0	1	130
530-630	261	16	1	0	0	0	278	385	0	0	1	0	0	386	138	0	0	0	0	1	139
545-645	274	13	0	0	0	0	287	375	1	0	1	0	0	377	147	0	0	0	0	0	147
600-700	270	15	0	0	0	0	285	352	1	0	1	0	0	354	153	0	0	0	0	0	153

	10 EBRT (Wilshire)							11 EBTH (Wilshire)							12 EBLT (Wilshire)						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	8	0	0	0	0	0	8	487	12	0	2	1	1	503	58	0	0	1	0	0	59
415-430	1	2	0	0	0	0	3	446	11	0	2	1	0	460	55	0	0	0	0	0	55
430-445	9	1	0	0	0	0	10	458	5	0	2	0	0	465	51	0	0	1	0	0	52
445-500	9	0	0	0	0	0	9	432	7	0	2	0	0	441	49	0	0	0	0	0	49
500-515	9	0	0	0	0	0	9	432	2	0	1	0	0	435	33	0	0	0	0	0	33
515-530	11	1	0	0	0	0	12	464	9	0	2	0	1	476	29	0	0	0	0	0	29
530-545	6	0	0	0	0	0	6	477	6	0	3	1	0	487	28	0	0	0	0	0	28
545-600	6	0	0	0	0	0	6	516	3	0	3	2	0	524	48	0	0	0	0	0	48
600-615	8	1	0	0	0	0	9	497	8	0	0	2	0	507	33	0	0	0	0	0	33
615-630	15	0	0	0	0	0	15	554	3	0	0	0	0	557	50	0	0	0	0	0	50
630-645	25	0	0	0	0	0	25	523	5	0	1	0	0	529	40	0	0	0	0	0	40
645-700	34	0	0	0	0	0	34	445	3	0	0	0	0	448	20	0	0	0	0	0	20
HOUR TOTALS																					
400-500	27	3	0	0	0	0	30	1823	35	0	8	2	1	1869	213	0	0	2	0	0	215
415-515	28	3	0	0	0	0	31	1768	25	0	7	1	0	1801	188	0	0	1	0	0	189
430-530	38	2	0	0	0	0	40	1786	23	0	7	0	1	1817	162	0	0	1	0	0	163
445-545	35	1	0	0	0	0	36	1805	24	0	8	1	1	1839	139	0	0	0	0	0	139
500-600	32	1	0	0	0	0	33	1889	20	0	9	3	1	1922	138	0	0	0	0	0	138
515-615	31	2	0	0	0	0	33	1954	26	0	8	5	1	1994	138	0	0	0	0	0	138
530-630	35	1	0	0	0	0	36	2044	20	0	6	5	0	2075	159	0	0	0	0	0	159
545-645	54	1	0	0	0	0	55	2090	19	0	4	4	0	2117	171	0	0	0	0	0	171
600-700	82	1	0	0	0	0	83	2019	19	0	1	2	0	2041	143	0	0	0	0	0	143

	ALL MOVEMENT TOTALS						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	1700	24	0	8	3	1	1736
415-430	1571	30	0	8	2	2	1613
430-445	1549	23	0	7	2	0	1581
445-500	1567	24	0	6	2	0	1599
500-515	1579	18	0	6	0	0	1603
515-530	1588	19	0	3	0	3	1613
530-545	1661	18	1	6	1	1	1688
545-600	1664	20	0	4	2	0	1690
600-615	1598	22	0	2	2	1	1625
615-630	1653	16	0	0	0	0	1669
630-645	1696	17	0	5	0	1	1719
645-700	1483	16	0	1	0	0	1500
HOUR TOTALS							
400-500	6387	101	0	29	9	3	6529
415-515	6266	95	0	27	6	2	6396
430-530	6283	84	0	22	4	3	6396
445-545	6395	79	1	21	3	4	6503
500-600	6492	75	1	19	3	4	6594
515-615	6511	79	1	15	5	5	6616
530-630	6576	76	1	12	5	2	6672
545-645	6611	75	0	11	4	2	6703
600-700	6430	71	0	8	2	2	6513

WILTEC

INTERSECTION VEHICLE CLASSIFICATION TURNING MOVEMENT COUNT SUMMARY

CLIENT: ADVANTEC CONSULTING ENGINEERS
PROJECT: WEST LOS ANGELES
DATE: THURSDAY MAY 3, 2012
PERIOD: 6:00 AM TO 9:00 AM
INTERSECTION: N/S NB I-405 RAMPS
E/W WILSHIRE BOULEVARD
CITY: LOS ANGELES

	1 SBRT (405 NB Off-Ramp @ Wilshire WB)							2 SBTH							3 SBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	125	0	0	1	2	2	130	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-630	121	1	1	2	0	0	125	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-645	146	2	0	2	1	1	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-700	158	5	0	3	0	0	166	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700-715	169	2	0	5	1	1	178	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715-730	151	0	0	2	1	0	154	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730-745	147	2	0	2	2	2	155	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-800	131	3	1	2	0	0	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-815	150	0	1	2	2	1	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0
815-830	151	0	0	0	0	0	151	0	0	0	0	0	0	0	0	0	0	0	0	0	0
830-845	153	0	0	1	1	1	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0
845-900	142	0	1	4	0	3	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOUR TOTALS																					
600-700	550	8	1	8	3	3	573	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-715	594	10	1	12	2	2	621	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-730	624	9	0	12	3	2	650	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-745	625	9	0	12	4	3	653	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700-800	598	7	1	11	4	3	624	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715-815	579	5	2	8	5	3	602	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730-830	579	5	2	6	4	3	599	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-845	585	3	2	5	3	2	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-900	596	0	2	7	3	5	613	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	4 WBRT (405 NB On-Ramp @ Wilshire WB)							5 WBTH (Wilshire)							6 WBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	36	0	1	0	0	0	37	128	6	0	1	0	0	135	0	0	0	0	0	0	0
615-630	49	0	0	0	0	0	49	164	2	0	6	0	1	173	0	0	0	0	0	0	0
630-645	59	1	0	0	0	0	60	217	5	0	6	0	1	229	0	0	0	0	0	0	0
645-700	79	1	0	1	0	0	81	287	5	0	4	1	2	299	0	0	0	0	0	0	0
700-715	110	0	0	1	0	0	111	347	11	0	5	0	0	363	0	0	0	0	0	0	0
715-730	114	0	0	2	0	0	116	465	11	0	3	0	0	479	0	0	0	0	0	0	0
730-745	130	1	0	0	0	0	131	499	14	0	9	2	1	525	0	0	0	0	0	0	0
745-800	165	3	1	1	0	2	172	541	14	0	4	1	2	562	0	0	0	0	0	0	0
800-815	153	0	0	3	0	0	156	545	11	0	7	2	2	567	0	0	0	0	0	0	0
815-830	130	0	0	0	0	0	130	523	11	1	6	2	3	546	0	0	0	0	0	0	0
830-845	124	2	0	0	0	1	127	523	10	0	11	1	0	545	0	0	0	0	0	0	0
845-900	135	0	0	1	0	1	137	488	9	0	11	3	0	511	0	0	0	0	0	0	0
HOUR TOTALS																					
600-700	223	2	1	1	0	0	227	796	18	0	17	1	4	836	0	0	0	0	0	0	0
615-715	297	2	0	2	0	0	301	1015	23	0	21	1	4	1064	0	0	0	0	0	0	0
630-730	362	2	0	4	0	0	368	1316	32	0	18	1	3	1370	0	0	0	0	0	0	0
645-745	433	2	0	4	0	0	439	1598	41	0	21	3	3	1666	0	0	0	0	0	0	0
700-800	519	4	1	4	0	2	530	1852	50	0	21	3	3	1929	0	0	0	0	0	0	0
715-815	562	4	1	6	0	2	575	2050	50	0	23	5	5	2133	0	0	0	0	0	0	0
730-830	578	4	1	4	0	2	589	2108	50	1	26	7	8	2200	0	0	0	0	0	0	0
745-845	572	5	1	4	0	3	585	2132	46	1	28	6	7	2220	0	0	0	0	0	0	0
800-900	542	2	0	4	0	2	550	2079	41	1	35	8	5	2169	0	0	0	0	0	0	0

	7 NBRT (405 NB Off-Ramp @ Wilshire EB)							8 NBTH							9 NBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	255	2	0	4	1	3	265	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-630	311	6	0	3	2	1	323	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-645	336	1	0	6	2	0	345	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-700	310	2	0	2	3	1	318	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700-715	283	1	0	7	4	0	295	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715-730	294	1	0	6	0	3	304	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730-745	302	1	0	3	1	0	307	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-800	334	0	0	2	3	1	340	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-815	329	0	0	2	0	1	332	0	0	0	0	0	0	0	0	0	0	0	0	0	0
815-830	313	1	0	2	1	1	318	0	0	0	0	0	0	0	0	0	0	0	0	0	0
830-845	329	1	0	7	0	0	337	0	0	0	0	0	0	0	0	0	0	0	0	0	0
845-900	326	0	0	3	1	0	330	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOUR TOTALS																					
600-700	1212	11	0	15	8	5	1251	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-715	1240	10	0	18	11	2	1281	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-730	1223	5	0	21	9	4	1262	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-745	1189	5	0	18	8	4	1224	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700-800	1213	3	0	18	8	4	1246	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715-815	1259	2	0	13	4	5	1283	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730-830	1278	2	0	9	5	3	1297	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-845	1305	2	0	13	4	3	1327	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-900	1297	2	0	14	2	2	1317	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	10 EBRT (405 NB On-Ramp @ Wilshire EB)							11 EBTH (Wilshire)							12 EBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	39	0	0	0	0	0	39	268	5	0	1	0	1	275	0	0	0	0	0	0	0
615-630	66	4	0	0	0	0	70	270	5	0	2	1	1	279	0	0	0	0	0	0	0
630-645	71	4	0	0	0	1	76	280	5	0	3	2	0	290	0	0	0	0	0	0	0
645-700	93	2	0	1	0	0	96	349	9	0	1	0	0	359	0	0	0	0	0	0	0
700-715	124	1	0	0	0	0	125	413	8	0	6	0	0	427	0	0	0	0	0	0	0
715-730	170	0	0	1	0	0	171	479	4	0	4	0	0	487	0	0	0	0	0	0	0
730-745	209	0	0	1	0	0	210	503	8	0	3	0	0	514	0	0	0	0	0	0	0
745-800	152	1	0	2	0	1	156	582	6	0	3	3	0	594	0	0	0	0	0	0	0
800-815	162	4	0	2	1	2	171	567	9	0	4	1	2	583	0	0	0	0	0	0	0
815-830	139	0	0	2	0	0	141	590	7	0	0	1	1	599	0	0	0	0	0	0	0
830-845	125	1	0	1	2	0	129	580	7	0	13	0	1	601	0	0	0	0	0	0	0
845-900	124	0	0	2	0	1	127	542	8	0	6	2	0	558	0	0	0	0	0	0	0
HOUR TOTALS																					
600-700	269	10	0	1	0	1	281	1167	24	0	7	3	2	1203	0	0	0	0	0	0	0
615-715	354	11	0	1	0	1	367	1312	27	0	12	3	1	1355	0	0	0	0	0	0	0
630-730	458	7	0	2	0	1	468	1521	26	0	14	2	0	1563	0	0	0	0	0	0	0
645-745	596	3	0	3	0	0	602	1744	29	0	14	0	0	1787	0	0	0	0	0	0	0
700-800	655	2	0	4	0	1	662	1977	26	0	16	3	0	2022	0	0	0	0	0	0	0
715-815	693	5	0	6	1	3	708	2131	27	0	14	4	2	2178	0	0	0	0	0	0	0
730-830	662	5	0	7	1	3	678	2242	30	0	10	5	3	2290	0	0	0	0	0	0	0
745-845	578	6	0	7	3	3	597	2319	29	0	20	5	4	2377	0	0	0	0	0	0	0
800-900	550	5	0	7	3	3	568	2279	31	0	23	4	4	2341	0	0	0	0	0	0	0

	ALL MOVEMENT TOTALS						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	851	13	1	7	3	6	881
615-630	981	18	1	13	3	3	1019
630-645	1109	18	0	17	5	3	1152
645-700	1276	24	0	12	4	3	1319
700-715	1446	23	0	24	5	1	1499
715-730	1673	16	0	18	1	3	1711
730-745	1790	26	0	18	5	3	1842
745-800	1905	27	2	14	7	6	1961
800-815	1906	24	1	20	6	8	1965
815-830	1846	19	1	10	4	5	1885
830-845	1834	21	0	33	4	3	1895
845-900	1757	17	1	27	6	5	1813
HOUR TOTALS							
600-700	4217	73	2	49	15	15	4371
615-715	4812	83	1	66	17	10	4989
630-730	5504	81	0	71	15	10	5681
645-745	6185	89	0	72	15	10	6371
700-800	6814	92	2	74	18	13	7013
715-815	7274	93	3	70	19	20	7479
730-830	7447	96	4	62	22	22	7653
745-845	7491	91	4	77	21	22	7706
800-900	7343	81	3	90	20	21	7558

WILTEC

INTERSECTION VEHICLE CLASSIFICATION TURNING MOVEMENT COUNT SUMMARY

CLIENT: ADVANTEC CONSULTING ENGINEERS
PROJECT: WEST LOS ANGELES
DATE: THURSDAY MAY 3, 2012
PERIOD: 4:00 PM TO 7:00 PM
INTERSECTION: N/S NB I-405 RAMPS
E/W WILSHIRE BOULEVARD
CITY: LOS ANGELES

	1 SBRT (405 NB Off-Ramp @ Wilshire WB)							2 SBTH							3 SBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	41	1	0	1	0	1	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0
415-430	30	0	0	1	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0
430-445	36	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
445-500	38	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500-515	43	0	0	0	0	0	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0
515-530	39	0	0	0	0	0	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0
530-545	32	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-600	51	0	0	0	0	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-615	46	0	0	0	0	0	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-630	47	0	0	0	0	0	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-645	60	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-700	75	0	0	0	0	0	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOUR TOTALS																					
400-500	145	1	0	2	0	1	149	0	0	0	0	0	0	0	0	0	0	0	0	0	0
415-515	147	0	0	1	0	0	148	0	0	0	0	0	0	0	0	0	0	0	0	0	0
430-530	156	0	0	0	0	0	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0
445-545	152	0	0	0	0	0	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500-600	165	0	0	0	0	0	165	0	0	0	0	0	0	0	0	0	0	0	0	0	0
515-615	168	0	0	0	0	0	168	0	0	0	0	0	0	0	0	0	0	0	0	0	0
530-630	176	0	0	0	0	0	176	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-645	204	0	0	0	0	0	204	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-700	228	0	0	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	4 WBRT (405 NB On-Ramp @ Wilshire WB)							5 WBTH (Wilshire)							6 WBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	144	0	0	3	0	0	147	773	5	0	4	1	-1	782	0	0	0	0	0	0	0
415-430	134	0	0	0	0	0	134	704	10	0	4	0	0	718	0	0	0	0	0	0	0
430-445	139	0	0	0	0	0	139	655	8	0	2	0	0	665	0	0	0	0	0	0	0
445-500	122	0	0	0	0	1	123	723	9	0	0	1	0	733	0	0	0	0	0	0	0
500-515	132	0	1	1	0	0	134	731	8	0	4	0	0	743	0	0	0	0	0	0	0
515-530	130	1	0	0	0	0	131	713	6	0	1	0	1	721	0	0	0	0	0	0	0
530-545	124	0	0	0	0	0	124	762	6	0	1	0	0	769	0	0	0	0	0	0	0
545-600	127	0	0	0	0	0	127	740	11	0	1	0	0	752	0	0	0	0	0	0	0
600-615	121	0	0	2	0	0	123	658	8	0	2	0	1	669	0	0	0	0	0	0	0
615-630	118	0	0	2	0	0	120	652	7	0	0	0	0	659	0	0	0	0	0	0	0
630-645	122	0	1	0	0	0	123	732	9	0	2	0	1	744	0	0	0	0	0	0	0
645-700	127	0	0	1	0	0	128	643	8	0	0	0	0	651	0	0	0	0	0	0	0
HOUR TOTALS																					
400-500	539	0	0	3	0	1	543	2855	32	0	10	2	-1	2898	0	0	0	0	0	0	0
415-515	527	0	1	1	0	1	530	2813	35	0	10	1	0	2859	0	0	0	0	0	0	0
430-530	523	1	1	1	0	1	527	2822	31	0	7	1	1	2862	0	0	0	0	0	0	0
445-545	508	1	1	1	0	1	512	2929	29	0	6	1	1	2966	0	0	0	0	0	0	0
500-600	513	1	1	1	0	0	516	2946	31	0	7	0	1	2985	0	0	0	0	0	0	0
515-615	502	1	0	2	0	0	505	2873	31	0	5	0	2	2911	0	0	0	0	0	0	0
530-630	490	0	0	4	0	0	494	2812	32	0	4	0	1	2849	0	0	0	0	0	0	0
545-645	488	0	1	4	0	0	493	2782	35	0	5	0	2	2824	0	0	0	0	0	0	0
600-700	488	0	1	5	0	0	494	2685	32	0	4	0	2	2723	0	0	0	0	0	0	0

	7 NBRT (405 NB Off-Ramp @ Wilshire EB)							8 NBTH							9 NBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	97	1	0	0	0	0	98	0	0	0	0	0	0	0	0	0	0	0	0	0	0
415-430	111	0	0	0	0	0	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0
430-445	100	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
445-500	106	3	0	0	0	0	109	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500-515	98	0	0	0	0	0	98	0	0	0	0	0	0	0	0	0	0	0	0	0	0
515-530	120	0	0	2	0	1	123	0	0	0	0	0	0	0	0	0	0	0	0	0	0
530-545	96	1	0	0	0	0	97	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-600	117	0	0	1	0	0	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-615	103	0	0	0	0	0	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-630	171	1	0	2	0	0	174	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-645	54	0	0	0	0	0	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-700	161	1	0	0	0	0	162	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOUR TOTALS																					
400-500	414	4	0	0	0	0	418	0	0	0	0	0	0	0	0	0	0	0	0	0	0
415-515	415	3	0	0	0	0	418	0	0	0	0	0	0	0	0	0	0	0	0	0	0
430-530	424	3	0	2	0	1	430	0	0	0	0	0	0	0	0	0	0	0	0	0	0
445-545	420	4	0	2	0	1	427	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500-600	431	1	0	3	0	1	436	0	0	0	0	0	0	0	0	0	0	0	0	0	0
515-615	436	1	0	3	0	1	441	0	0	0	0	0	0	0	0	0	0	0	0	0	0
530-630	487	2	0	3	0	0	492	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-645	445	1	0	3	0	0	449	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-700	489	2	0	2	0	0	493	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	10 EBRT (405 NB On-Ramp @ Wilshire EB)							11 EBTH (Wilshire)							12 EBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	140	0	0	2	2	0	144	442	17	0	0	0	1	460	0	0	0	0	0	0	0
415-430	134	0	0	2	1	1	138	401	17	0	0	0	0	418	0	0	0	0	0	0	0
430-445	138	0	0	1	0	0	139	416	11	0	1	1	0	429	0	0	0	0	0	0	0
445-500	126	0	0	1	0	0	127	387	14	0	1	1	0	403	0	0	0	0	0	0	0
500-515	126	0	0	0	0	0	126	386	8	0	2	0	0	396	0	0	0	0	0	0	0
515-530	136	0	0	0	0	1	137	417	12	0	2	0	0	431	0	0	0	0	0	0	0
530-545	134	0	0	1	1	0	136	434	10	1	2	0	0	447	0	0	0	0	0	0	0
545-600	120	0	0	2	0	0	122	476	6	0	1	2	0	485	0	0	0	0	0	0	0
600-615	155	2	0	0	2	0	159	436	10	0	0	0	0	446	0	0	0	0	0	0	0
615-630	169	1	0	0	0	0	170	485	7	0	0	0	0	492	0	0	0	0	0	0	0
630-645	117	0	0	0	0	0	117	500	6	0	1	0	0	507	0	0	0	0	0	0	0
645-700	93	0	0	1	0	0	94	416	8	0	0	0	0	424	0	0	0	0	0	0	0
HOUR TOTALS																					
400-500	538	0	0	6	3	1	548	1646	59	0	2	2	1	1710	0	0	0	0	0	0	0
415-515	524	0	0	4	1	1	530	1590	50	0	4	2	0	1646	0	0	0	0	0	0	0
430-530	526	0	0	2	0	1	529	1606	45	0	6	2	0	1659	0	0	0	0	0	0	0
445-545	522	0	0	2	1	1	526	1624	44	1	7	1	0	1677	0	0	0	0	0	0	0
500-600	516	0	0	3	1	1	521	1713	36	1	7	2	0	1759	0	0	0	0	0	0	0
515-615	545	2	0	3	3	1	554	1763	38	1	5	2	0	1809	0	0	0	0	0	0	0
530-630	578	3	0	3	3	0	587	1831	33	1	3	2	0	1870	0	0	0	0	0	0	0
545-645	561	3	0	2	2	0	568	1897	29	0	2	2	0	1930	0	0	0	0	0	0	0
600-700	534	3	0	1	2	0	540	1837	31	0	1	0	0	1869	0	0	0	0	0	0	0

	ALL MOVEMENT TOTALS						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	1637	24	0	10	3	1	1675
415-430	1514	27	0	7	1	1	1550
430-445	1484	19	0	4	1	0	1508
445-500	1502	26	0	2	2	1	1533
500-515	1516	16	1	7	0	0	1540
515-530	1555	19	0	5	0	3	1582
530-545	1582	17	1	4	1	0	1605
545-600	1631	17	0	5	2	0	1655
600-615	1519	20	0	4	2	1	1546
615-630	1642	16	0	4	0	0	1662
630-645	1585	15	1	3	0	1	1605
645-700	1515	17	0	2	0	0	1534
HOUR TOTALS							
400-500	6137	96	0	23	7	3	6266
415-515	6016	88	1	20	4	2	6131
430-530	6057	80	1	18	3	4	6163
445-545	6155	78	2	18	3	4	6260
500-600	6284	69	2	21	3	3	6382
515-615	6287	73	1	18	5	4	6388
530-630	6374	70	1	17	5	1	6468
545-645	6377	68	1	16	4	2	6468
600-700	6261	68	1	13	2	2	6347

WILTEC

INTERSECTION VEHICLE CLASSIFICATION TURNING MOVEMENT COUNT SUMMARY

CLIENT: ADVANTEC CONSULTING ENGINEERS
PROJECT: WEST LOS ANGELES
DATE: THURSDAY MAY 3, 2012
PERIOD: 6:00 AM TO 9:00 AM
INTERSECTION: N/S SB I-405 RAMPS
E/W WILSHIRE BOULEVARD
CITY: LOS ANGELES

	1 SBRT (405 SB Off-Ramp @ Wilshire WB)							2 SBTH							3 SBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	170	2	0	0	0	0	172	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-630	197	0	0	0	1	0	198	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-645	182	0	0	1	1	0	184	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-700	201	0	0	3	0	1	205	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700-715	178	0	0	1	0	2	181	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715-730	195	0	0	1	0	0	196	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730-745	171	0	0	5	0	0	176	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-800	211	1	0	1	0	0	213	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-815	187	0	0	2	2	1	192	0	0	0	0	0	0	0	0	0	0	0	0	0	0
815-830	206	0	0	2	1	3	212	0	0	0	0	0	0	0	0	0	0	0	0	0	0
830-845	184	1	0	2	2	0	189	0	0	0	0	0	0	0	0	0	0	0	0	0	0
845-900	217	0	0	4	2	2	225	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOUR TOTALS																					
600-700	750	2	0	4	2	1	759	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-715	758	0	0	5	2	3	768	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-730	756	0	0	6	1	3	766	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-745	745	0	0	10	0	3	758	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700-800	755	1	0	8	0	2	766	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715-815	764	1	0	9	2	1	777	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730-830	775	1	0	10	3	4	793	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-845	788	2	0	7	5	4	806	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-900	794	1	0	10	7	6	818	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	4 WBRT (405 SB On-Ramp @ Wilshire WB)							5 WBTH (Wilshire)							6 WBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	90	2	0	1	0	0	93	164	3	0	1	2	2	172	0	0	0	0	0	0	0
615-630	82	1	0	4	2	0	89	214	2	1	5	-2	3	223	0	0	0	0	0	0	0
630-645	101	1	0	0	2	1	105	280	5	0	7	0	1	293	0	0	0	0	0	0	0
645-700	125	0	0	2	1	0	128	362	8	0	5	0	2	377	0	0	0	0	0	0	0
700-715	174	3	0	0	0	0	177	405	9	0	12	0	1	427	0	0	0	0	0	0	0
715-730	164	0	0	0	1	0	165	491	11	0	4	0	0	506	0	0	0	0	0	0	0
730-745	190	1	0	1	2	1	195	524	15	0	10	2	2	553	0	0	0	0	0	0	0
745-800	220	1	0	3	1	2	227	502	10	1	5	0	1	519	0	0	0	0	0	0	0
800-815	210	3	0	4	3	2	222	512	6	1	6	0	1	526	0	0	0	0	0	0	0
815-830	171	2	0	2	1	1	177	519	7	1	5	1	1	534	0	0	0	0	0	0	0
830-845	162	4	0	3	2	0	171	560	5	0	9	0	1	575	0	0	0	0	0	0	0
845-900	155	4	0	1	3	0	163	522	5	1	15	0	3	546	0	0	0	0	0	0	0
HOUR TOTALS																					
600-700	398	4	0	7	5	1	415	1020	18	1	18	0	8	1065	0	0	0	0	0	0	0
615-715	482	5	0	6	5	1	499	1261	24	1	29	-2	7	1320	0	0	0	0	0	0	0
630-730	564	4	0	2	4	1	575	1538	33	0	28	0	4	1603	0	0	0	0	0	0	0
645-745	653	4	0	3	4	1	665	1782	43	0	31	2	5	1863	0	0	0	0	0	0	0
700-800	748	5	0	4	4	3	764	1922	45	1	31	2	4	2005	0	0	0	0	0	0	0
715-815	784	5	0	8	7	5	809	2029	42	2	25	2	4	2104	0	0	0	0	0	0	0
730-830	791	7	0	10	7	6	821	2057	38	3	26	3	5	2132	0	0	0	0	0	0	0
745-845	763	10	0	12	7	5	797	2093	28	3	25	1	4	2154	0	0	0	0	0	0	0
800-900	698	13	0	10	9	3	733	2113	23	3	35	1	6	2181	0	0	0	0	0	0	0

	7 NBRT (405 SB Off-Ramp @ Wilshire EB)							8 NBTH							9 NBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	210	1	0	1	1	0	213	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-630	200	1	0	0	0	0	201	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-645	145	1	0	1	0	0	147	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-700	161	0	0	0	0	0	161	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700-715	192	0	0	1	0	0	193	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715-730	151	0	0	0	0	0	151	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730-745	139	0	0	1	0	0	140	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-800	169	0	0	0	0	0	169	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-815	175	0	0	1	1	1	178	0	0	0	0	0	0	0	0	0	0	0	0	0	0
815-830	153	0	0	0	0	0	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0
830-845	146	0	0	0	0	1	147	0	0	0	0	0	0	0	0	0	0	0	0	0	0
845-900	163	0	0	1	1	0	165	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOUR TOTALS																					
600-700	716	3	0	2	1	0	722	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-715	698	2	0	2	0	0	702	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-730	649	1	0	2	0	0	652	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-745	643	0	0	2	0	0	645	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700-800	651	0	0	2	0	0	653	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715-815	634	0	0	2	1	1	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730-830	636	0	0	2	1	1	640	0	0	0	0	0	0	0	0	0	0	0	0	0	0
745-845	643	0	0	1	1	2	647	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800-900	637	0	0	2	2	2	643	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	10 EBRT (405 SB On-Ramp @ Wilshire EB)							11 EBTH (Wilshire)							12 EBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	71	1	0	0	2	0	74	119	2	0	0	-1	1	121	0	0	0	0	0	0	0
615-630	83	0	0	1	0	0	84	154	3	0	2	0	1	160	0	0	0	0	0	0	0
630-645	96	1	0	2	1	0	100	213	4	0	2	1	1	221	0	0	0	0	0	0	0
645-700	155	0	0	0	0	0	155	270	5	0	2	0	1	278	0	0	0	0	0	0	0
700-715	177	3	0	0	1	1	182	325	3	0	5	0	0	333	0	0	0	0	0	0	0
715-730	190	2	0	0	0	1	193	445	2	0	3	0	1	451	0	0	0	0	0	0	0
730-745	208	0	0	0	0	1	209	552	3	0	1	0	0	556	0	0	0	0	0	0	0
745-800	208	1	0	2	1	0	212	514	3	0	4	2	1	524	0	0	0	0	0	0	0
800-815	255	13	0	2	1	0	271	525	8	0	5	3	3	544	0	0	0	0	0	0	0
815-830	181	3	0	0	0	0	184	508	3	0	4	0	0	515	0	0	0	0	0	0	0
830-845	182	0	0	0	0	2	184	485	2	0	14	1	0	502	0	0	0	0	0	0	0
845-900	161	4	0	2	1	2	170	433	5	0	6	2	1	447	0	0	0	0	0	0	0
HOUR TOTALS																					
600-700	405	2	0	3	3	0	413	756	14	0	6	0	4	780	0	0	0	0	0	0	0
615-715	511	4	0	3	2	1	521	962	15	0	11	1	3	992	0	0	0	0	0	0	0
630-730	618	6	0	2	2	2	630	1253	14	0	12	1	3	1283	0	0	0	0	0	0	0
645-745	730	5	0	0	1	3	739	1592	13	0	11	0	2	1618	0	0	0	0	0	0	0
700-800	783	6	0	2	2	3	796	1836	11	0	13	2	2	1864	0	0	0	0	0	0	0
715-815	861	16	0	4	2	2	885	2036	16	0	13	5	5	2075	0	0	0	0	0	0	0
730-830	852	17	0	4	2	1	876	2099	17	0	14	5	4	2139	0	0	0	0	0	0	0
745-845	826	17	0	4	2	2	851	2032	16	0	27	6	4	2085	0	0	0	0	0	0	0
800-900	779	20	0	4	2	4	809	1951	18	0	29	6	4	2008	0	0	0	0	0	0	0

	ALL MOVEMENT TOTALS						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
600-615	824	11	0	3	4	3	845
615-630	930	7	1	12	1	4	955
630-645	1017	12	0	13	5	3	1050
645-700	1274	13	0	12	1	4	1304
700-715	1451	18	0	19	1	4	1493
715-730	1636	15	0	8	1	2	1662
730-745	1784	19	0	18	4	4	1829
745-800	1824	16	1	15	4	4	1864
800-815	1864	30	1	20	10	8	1933
815-830	1738	15	1	13	3	5	1775
830-845	1719	12	0	28	5	4	1768
845-900	1651	18	1	29	9	8	1716
HOUR TOTALS							
600-700	4045	43	1	40	11	14	4154
615-715	4672	50	1	56	8	15	4802
630-730	5378	58	0	52	8	13	5509
645-745	6145	65	0	57	7	14	6288
700-800	6695	68	1	60	10	14	6848
715-815	7108	80	2	61	19	18	7288
730-830	7210	80	3	66	21	21	7401
745-845	7145	73	3	76	22	21	7340
800-900	6972	75	3	90	27	25	7192

WILTEC

INTERSECTION VEHICLE CLASSIFICATION TURNING MOVEMENT COUNT SUMMARY

CLIENT: ADVANTEC CONSULTING ENGINEERS
PROJECT: WEST LOS ANGELES
DATE: THURSDAY MAY 3, 2012
PERIOD: 4:00 PM TO 7:00 PM
INTERSECTION: N/S SB I-405 RAMPS
E/W WILSHIRE BOULEVARD
CITY: LOS ANGELES

	1 SBRT (405 SB Off-Ramp @ Wilshire WB)							2 SBTH							3 SBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	139	0	0	1	0	0	140	0	0	0	0	0	0	0	0	0	0	0	0	0	0
415-430	134	1	0	0	0	0	135	0	0	0	0	0	0	0	0	0	0	0	0	0	0
430-445	125	0	0	0	0	0	125	0	0	0	0	0	0	0	0	0	0	0	0	0	0
445-500	142	0	0	0	0	0	142	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500-515	169	0	0	1	0	0	170	0	0	0	0	0	0	0	0	0	0	0	0	0	0
515-530	160	0	0	0	0	0	160	0	0	0	0	0	0	0	0	0	0	0	0	0	0
530-545	162	0	0	0	0	0	162	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-600	151	0	0	0	0	0	151	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-615	164	0	0	0	0	1	165	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-630	198	0	1	1	0	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-645	198	0	0	0	0	1	199	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-700	227	1	0	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOUR TOTALS																					
400-500	540	1	0	1	0	0	542	0	0	0	0	0	0	0	0	0	0	0	0	0	0
415-515	570	1	0	1	0	0	572	0	0	0	0	0	0	0	0	0	0	0	0	0	0
430-530	596	0	0	1	0	0	597	0	0	0	0	0	0	0	0	0	0	0	0	0	0
445-545	633	0	0	1	0	0	634	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500-600	642	0	0	1	0	0	643	0	0	0	0	0	0	0	0	0	0	0	0	0	0
515-615	637	0	0	0	0	1	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0
530-630	675	0	1	1	0	1	678	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-645	711	0	1	1	0	2	715	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-700	787	1	1	1	0	2	792	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	4 WBRT (405 SB On-Ramp @ Wilshire WB)							5 WBTH (Wilshire)							6 WBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	345	0	0	5	0	0	350	465	5	0	0	1	0	471	0	0	0	0	0	0	0
415-430	330	2	0	3	1	0	336	417	6	0	1	0	1	425	0	0	0	0	0	0	0
430-445	305	1	0	0	0	0	306	360	6	0	3	0	0	369	0	0	0	0	0	0	0
445-500	301	1	0	1	1	0	304	448	6	0	0	0	0	454	0	0	0	0	0	0	0
500-515	331	2	0	2	0	0	335	442	6	0	2	0	0	450	0	0	0	0	0	0	0
515-530	323	0	0	1	0	1	325	428	4	0	0	0	0	432	0	0	0	0	0	0	0
530-545	329	2	0	1	0	0	332	463	4	0	1	0	1	469	0	0	0	0	0	0	0
545-600	260	1	0	0	0	0	261	500	9	0	1	0	0	510	0	0	0	0	0	0	0
600-615	225	1	0	2	0	0	228	493	3	0	0	0	1	497	0	0	0	0	0	0	0
615-630	215	3	0	1	0	1	220	487	3	0	-1	0	-1	488	0	0	0	0	0	0	0
630-645	254	1	0	0	0	0	255	547	5	0	2	0	0	554	0	0	0	0	0	0	0
645-700	240	1	0	0	0	0	241	487	4	0	0	0	0	491	0	0	0	0	0	0	0
HOUR TOTALS																					
400-500	1281	4	0	9	2	0	1296	1690	23	0	4	1	1	1719	0	0	0	0	0	0	0
415-515	1267	6	0	6	2	0	1281	1667	24	0	6	0	1	1698	0	0	0	0	0	0	0
430-530	1260	4	0	4	1	1	1270	1678	22	0	5	0	0	1705	0	0	0	0	0	0	0
445-545	1284	5	0	5	1	1	1296	1781	20	0	3	0	1	1805	0	0	0	0	0	0	0
500-600	1243	5	0	4	0	1	1253	1833	23	0	4	0	1	1861	0	0	0	0	0	0	0
515-615	1137	4	0	4	0	1	1146	1884	20	0	2	0	2	1908	0	0	0	0	0	0	0
530-630	1029	7	0	4	0	1	1041	1943	19	0	1	0	1	1964	0	0	0	0	0	0	0
545-645	954	6	0	3	0	1	964	2027	20	0	2	0	0	2049	0	0	0	0	0	0	0
600-700	934	6	0	3	0	1	944	2014	15	0	1	0	0	2030	0	0	0	0	0	0	0

	7 NBRT (405 SB Off-Ramp @ Wilshire EB)							8 NBTH							9 NBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	66	0	0	0	0	0	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0
415-430	70	0	0	0	0	0	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0
430-445	77	1	0	0	1	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0
445-500	63	0	0	0	0	0	63	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500-515	72	0	0	0	0	0	72	0	0	0	0	0	0	0	0	0	0	0	0	0	0
515-530	77	0	0	0	0	0	77	0	0	0	0	0	0	0	0	0	0	0	0	0	0
530-545	86	0	0	0	0	0	86	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-600	90	0	0	0	0	0	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-615	73	0	0	0	0	0	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0
615-630	110	0	0	0	0	0	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630-645	139	6	0	1	1	0	147	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645-700	133	0	0	0	0	0	133	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOUR TOTALS																					
400-500	276	1	0	0	1	0	278	0	0	0	0	0	0	0	0	0	0	0	0	0	0
415-515	282	1	0	0	1	0	284	0	0	0	0	0	0	0	0	0	0	0	0	0	0
430-530	289	1	0	0	1	0	291	0	0	0	0	0	0	0	0	0	0	0	0	0	0
445-545	298	0	0	0	0	0	298	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500-600	325	0	0	0	0	0	325	0	0	0	0	0	0	0	0	0	0	0	0	0	0
515-615	326	0	0	0	0	0	326	0	0	0	0	0	0	0	0	0	0	0	0	0	0
530-630	359	0	0	0	0	0	359	0	0	0	0	0	0	0	0	0	0	0	0	0	0
545-645	412	6	0	1	1	0	420	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600-700	455	6	0	1	1	0	463	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	10 EBRT (405 SB On-Ramp @ Wilshire EB)							11 EBTH (Wilshire)							12 EBLT						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	130	0	0	0	0	1	131	487	12	0	3	1	1	504	0	0	0	0	0	0	0
415-430	171	2	0	0	0	0	173	432	13	0	2	1	0	448	0	0	0	0	0	0	0
430-445	136	0	1	0	0	2	139	441	5	0	3	-1	0	448	0	0	0	0	0	0	0
445-500	130	0	0	0	0	0	130	427	7	0	2	0	0	436	0	0	0	0	0	0	0
500-515	146	0	0	0	2	1	149	402	2	0	1	0	0	405	0	0	0	0	0	0	0
515-530	164	1	0	2	0	0	167	427	10	0	2	0	1	440	0	0	0	0	0	0	0
530-545	157	1	0	0	0	0	158	425	6	0	3	1	0	435	0	0	0	0	0	0	0
545-600	126	0	0	0	1	1	128	480	3	0	3	2	0	488	0	0	0	0	0	0	0
600-615	159	1	0	1	0	0	161	465	9	0	0	2	0	476	0	0	0	0	0	0	0
615-630	174	2	0	0	0	0	176	509	3	0	0	0	0	512	0	0	0	0	0	0	0
630-645	130	0	0	0	0	0	130	449	-1	0	0	-1	0	447	0	0	0	0	0	0	0
645-700	140	3	0	0	0	1	144	366	3	0	0	0	0	369	0	0	0	0	0	0	0
HOUR TOTALS																					
400-500	567	2	1	0	0	3	573	1787	37	0	10	1	1	1836	0	0	0	0	0	0	0
415-515	583	2	1	0	2	3	591	1702	27	0	8	0	0	1737	0	0	0	0	0	0	0
430-530	576	1	1	2	2	3	585	1697	24	0	8	-1	1	1729	0	0	0	0	0	0	0
445-545	597	2	0	2	2	1	604	1681	25	0	8	1	1	1716	0	0	0	0	0	0	0
500-600	593	2	0	2	3	2	602	1734	21	0	9	3	1	1768	0	0	0	0	0	0	0
515-615	606	3	0	3	1	1	614	1797	28	0	8	5	1	1839	0	0	0	0	0	0	0
530-630	616	4	0	1	1	1	623	1879	21	0	6	5	0	1911	0	0	0	0	0	0	0
545-645	589	3	0	1	1	1	595	1903	14	0	3	3	0	1923	0	0	0	0	0	0	0
600-700	603	6	0	1	0	1	611	1789	14	0	0	1	0	1804	0	0	0	0	0	0	0

	ALL MOVEMENT TOTALS						
15-MIN COUNTS	CARS	BUSES	RV'S	2-AXLE TRUCKS	3-AXLE TRUCKS	4+AXLE TRUCKS	TOTAL
400-415	1632	17	0	9	2	2	1662
415-430	1554	24	0	6	2	1	1587
430-445	1444	13	1	6	0	2	1466
445-500	1511	14	0	3	1	0	1529
500-515	1562	10	0	6	2	1	1581
515-530	1579	15	0	5	0	2	1601
530-545	1622	13	0	5	1	1	1642
545-600	1607	13	0	4	3	1	1628
600-615	1579	14	0	3	2	2	1600
615-630	1693	11	1	1	0	0	1706
630-645	1717	11	0	3	0	1	1732
645-700	1593	12	0	0	0	1	1606
HOUR TOTALS							
400-500	6141	68	1	24	5	5	6244
415-515	6071	61	1	21	5	4	6163
430-530	6096	52	1	20	3	5	6177
445-545	6274	52	0	19	4	4	6353
500-600	6370	51	0	20	6	5	6452
515-615	6387	55	0	17	6	6	6471
530-630	6501	51	1	13	6	4	6576
545-645	6596	49	1	11	5	4	6666
600-700	6582	48	1	7	2	4	6644

WILTEC

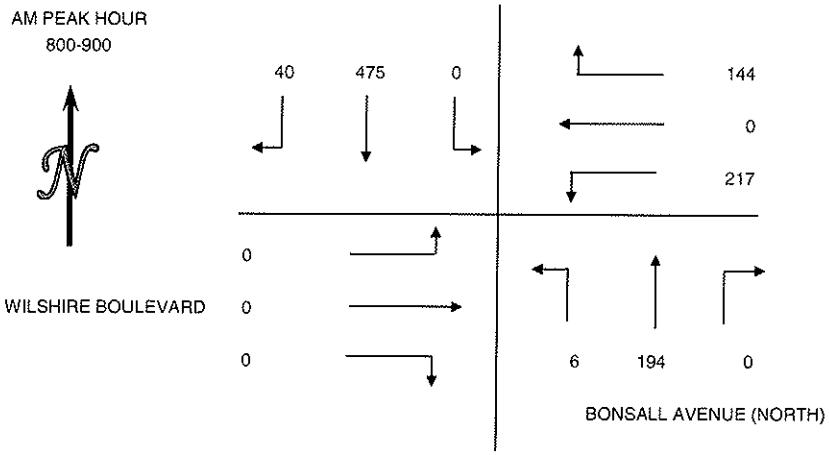
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: INTUEOR CONSULTING INC.
PROJECT: WESTSIDE SUBWAY EXTENSION TRAFFIC COUNTS
DATE: THURSDAY OCTOBER 6, 2011
PERIOD: 7:00 AM TO 9:00 AM
INTERSECTION: N/S BONSALL AVENUE (NORTH)
E/W WILSHIRE BOULEVARD

15 MIN COUNTS PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
700-715	2	45	0	49	0	58	0	41	0	0	0	0	195
715-730	4	46	0	44	0	68	0	41	2	0	0	0	205
730-745	9	90	0	45	0	59	0	39	7	0	0	0	249
745-800	20	93	0	37	0	61	0	41	3	0	0	0	255
800-815	10	106	0	46	0	61	0	52	0	0	0	0	275
815-830	14	112	0	53	0	61	0	46	2	0	0	0	288
830-845	9	126	0	15	0	57	0	45	2	0	0	0	254
845-900	7	131	0	30	0	38	0	51	2	0	0	0	259
HOUR TOTALS													
700-800	35	274	0	175	0	246	0	162	12	0	0	0	904
715-815	43	335	0	172	0	249	0	173	12	0	0	0	984
730-830	53	401	0	181	0	242	0	178	12	0	0	0	1067
745-845	53	437	0	151	0	240	0	184	7	0	0	0	1072
800-900	40	475	0	144	0	217	0	194	6	0	0	0	1076

AM PEAK HOUR
800-900



PEDESTRIAN COUNTS PERIOD 15 MIN COUNTS	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG
700-715	1	0	0	6
715-730	2	1	1	10
730-745	2	1	1	10
745-800	1	1	0	8
800-815	1	2	0	8
815-830	1	0	0	17
830-845	2	1	0	7
845-900	1	1	0	12
HOUR TOTALS				
700-800	6	3	2	34
715-815	6	5	2	36
730-830	5	4	1	43
745-845	5	4	0	40
800-900	5	4	0	44

WILTEC

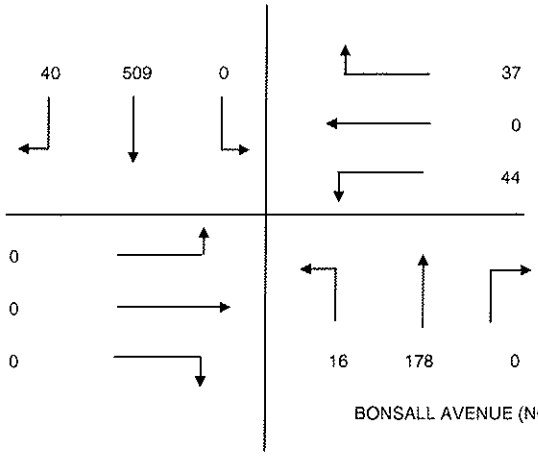
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: INTUEOR CONSULTING INC.
PROJECT: WESTSIDE SUBWAY EXTENSION TRAFFIC COUNTS
DATE: THURSDAY OCTOBER 6, 2011
PERIOD: 4:00 PM TO 6:00 PM
INTERSECTION: N/S BONSALL AVENUE (NORTH)
E/W WILSHIRE BOULEVARD

15 MIN COUNTS PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
400-415	8	152	0	12	0	11	0	54	2	0	0	0	239
415-430	14	138	0	11	0	8	0	49	4	0	0	0	224
430-445	11	132	0	9	0	11	0	40	7	0	0	0	210
445-500	7	87	0	5	0	14	0	35	3	0	0	0	151
500-515	5	81	0	8	0	10	0	52	0	0	0	0	156
515-530	2	101	0	19	0	6	0	46	2	0	0	0	176
530-545	7	116	0	8	0	13	0	45	2	0	0	0	191
545-600	8	140	0	3	0	12	0	51	2	0	0	0	216
HOUR TOTALS													
400-500	40	509	0	37	0	44	0	178	16	0	0	0	824
415-515	37	438	0	33	0	43	0	176	14	0	0	0	741
430-530	25	401	0	41	0	41	0	173	12	0	0	0	693
445-545	21	385	0	40	0	43	0	178	7	0	0	0	674
500-600	22	438	0	38	0	41	0	194	6	0	0	0	739

PM PEAK HOUR
400-500



PEDESTRIAN COUNTS				
PERIOD 15 MIN COUNTS	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG
400-415	1	0	0	6
415-430	2	1	1	10
430-445	2	1	0	10
445-500	1	1	1	10
500-515	1	2	0	6
515-530	1	0	0	7
530-545	2	1	0	17
545-600	1	1	0	7
HOUR TOTALS				
400-500	6	3	2	36
415-515	6	5	2	36
430-530	5	4	1	33
445-545	5	4	1	40
500-600	5	4	0	37

WILTEC

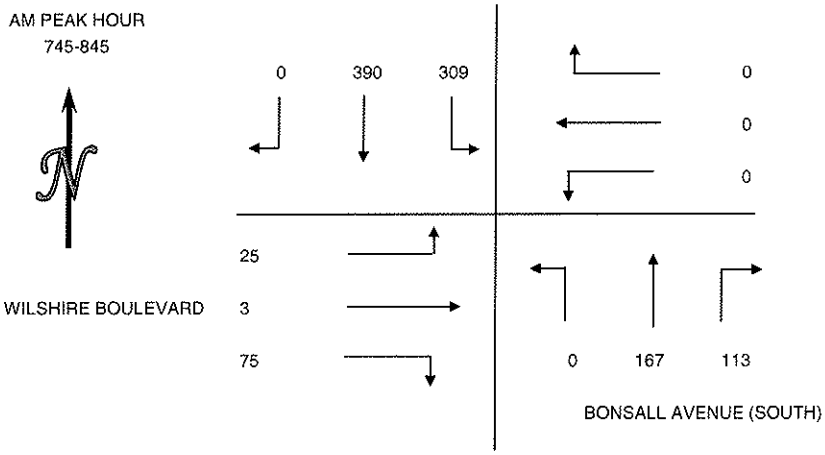
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: INTUEOR CONSULTING INC.
PROJECT: WESTSIDE SUBWAY EXTENSION TRAFFIC COUNTS
DATE: THURSDAY OCTOBER 6, 2011
PERIOD: 7:00 AM TO 9:00 AM
INTERSECTION: N/S BONSALL AVENUE (SOUTH)
E/W WILSHIRE BOULEVARD

15 MIN COUNTS PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
700-715	0	79	13	0	0	0	10	31	0	13	0	7	153
715-730	0	93	23	0	0	0	15	34	0	14	1	7	187
730-745	0	102	47	0	0	0	33	41	0	19	2	7	251
745-800	0	104	60	0	0	0	34	39	0	26	0	4	267
800-815	0	104	67	0	0	0	36	47	0	13	1	9	277
815-830	0	90	75	0	0	0	22	39	0	25	1	7	259
830-845	0	92	107	0	0	0	21	42	0	11	1	5	279
845-900	0	80	88	0	0	0	18	49	0	15	1	6	257
HOUR TOTALS													
700-800	0	378	143	0	0	0	92	145	0	72	3	25	858
715-815	0	403	197	0	0	0	118	161	0	72	4	27	982
730-830	0	400	249	0	0	0	125	166	0	83	4	27	1054
745-845	0	390	309	0	0	0	113	167	0	75	3	25	1082
800-900	0	366	337	0	0	0	97	177	0	64	4	27	1072

AM PEAK HOUR
745-845



PEDESTRIAN COUNTS				
PERIOD 15 MIN COUNTS	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG
700-715	1	1	11	20
715-730	1	2	12	33
730-745	0	1	9	23
745-800	0	4	12	28
800-815	0	0	19	27
815-830	0	1	12	24
830-845	0	2	11	33
845-900	0	1	16	27
HOUR TOTALS				
700-800	2	8	44	104
715-815	1	7	52	111
730-830	0	6	52	102
745-845	0	7	54	112
800-900	0	4	58	111

WILTEC

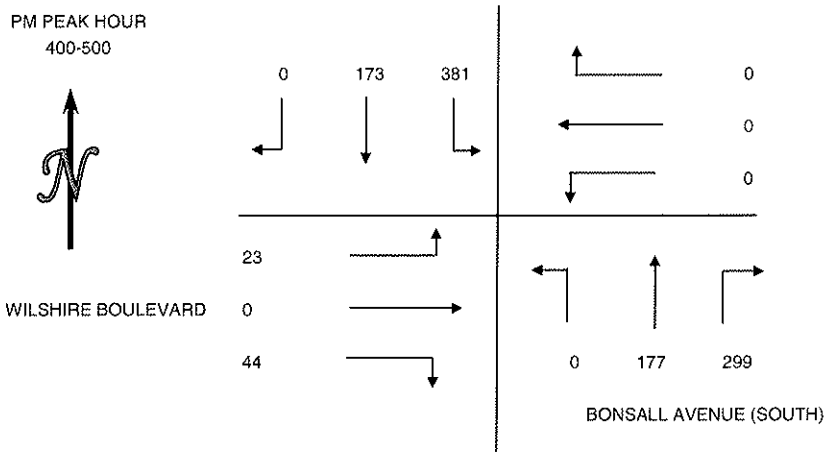
Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION TURNING MOVEMENT COUNT SUMMARY

CLIENT: INTUEOR CONSULTING INC.
PROJECT: WESTSIDE SUBWAY EXTENSION TRAFFIC COUNTS
DATE: THURSDAY OCTOBER 6, 2011
PERIOD: 4:00 PM TO 6:00 PM
INTERSECTION: N/S BONSALL AVENUE (SOUTH)
E/W WILSHIRE BOULEVARD

15 MIN COUNTS PERIOD	1 SBRT	2 SBTH	3 SBLT	4 WBRT	5 WBTH	6 WBLT	7 NBRT	8 NBTH	9 NBLT	10 EBRT	11 EBTH	12 EBLT	TOTALS
400-415	0	52	107	0	0	0	73	56	0	13	0	11	312
415-430	0	51	104	0	0	0	76	43	0	6	0	5	285
430-445	0	40	94	0	0	0	91	44	0	17	0	4	290
445-500	0	30	76	0	0	0	59	34	0	8	0	3	210
500-515	0	37	80	0	0	0	65	45	0	9	0	12	248
515-530	0	22	76	0	0	0	38	39	0	7	0	3	185
530-545	0	43	82	0	0	0	31	50	0	3	0	2	211
545-600	0	39	112	0	0	0	31	40	0	8	0	2	232
HOUR TOTALS													
400-500	0	173	381	0	0	0	299	177	0	44	0	23	1097
415-515	0	158	354	0	0	0	291	166	0	40	0	24	1033
430-530	0	129	326	0	0	0	253	162	0	41	0	22	933
445-545	0	132	314	0	0	0	193	168	0	27	0	20	854
500-600	0	141	350	0	0	0	165	174	0	27	0	19	876

PM PEAK HOUR
400-500



PEDESTRIAN COUNTS				
PERIOD 15 MIN COUNTS	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG
400-415	0	2	12	31
415-430	0	5	12	23
430-445	1	0	11	25
445-500	1	3	7	16
500-515	0	0	3	12
515-530	0	7	10	12
530-545	4	3	12	13
545-600	0	2	9	23
HOUR TOTALS				
400-500	2	10	42	95
415-515	2	8	33	76
430-530	2	10	31	65
445-545	5	13	32	53
500-600	4	12	34	60

City Traffic Counters
626.256.4171

File Name : FedWil
Site Code : 00000000
Start Date : 10/29/2008
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Groups Printed- 1 - Unshifted

	San Vicente Blvd Southbound			Wilshire Blvd Westbound			Federal Ave Northbound			Wilshire Blvd Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
07:00 AM	164	12	3	5	303	182	7	24	8	5	270	7	990
07:15 AM	230	18	5	4	381	244	8	50	31	2	385	5	1363
07:30 AM	304	41	2	16	384	260	17	32	25	45	272	10	1408
07:45 AM	344	53	5	29	381	255	30	48	39	5	478	16	1683
Total	1042	124	15	54	1449	941	62	154	103	57	1405	38	5444
08:00 AM	314	50	5	12	372	216	25	60	49	10	402	11	1526
08:15 AM	381	64	10	15	399	233	22	55	32	6	389	13	1619
08:30 AM	246	71	8	23	409	209	24	59	43	11	397	16	1516
08:45 AM	251	57	8	36	419	217	20	51	45	11	322	17	1454
Total	1192	242	31	86	1599	875	91	225	169	38	1510	57	6115
09:00 AM	235	63	11	30	410	226	22	54	33	3	345	19	1451
09:15 AM	219	58	8	31	424	209	18	42	27	1	318	13	1368
09:30 AM	209	49	1	24	431	219	20	39	34	3	311	8	1348
09:45 AM	216	52	2	43	410	217	26	38	27	5	308	22	1366
Total	879	222	22	128	1675	871	86	173	121	12	1282	62	5533
04:00 PM	203	76	8	34	325	209	19	82	55	7	245	4	1267
04:15 PM	225	66	3	37	322	210	15	69	51	4	259	6	1267
04:30 PM	231	83	3	19	327	188	19	69	45	2	289	9	1284
04:45 PM	212	67	3	20	340	208	16	74	45	10	266	13	1274
Total	871	292	17	110	1314	815	69	294	196	23	1059	32	5092
05:00 PM	213	64	4	31	372	171	19	65	32	3	248	2	1224
05:15 PM	225	61	1	33	351	191	25	104	51	5	242	5	1294
05:30 PM	223	73	1	29	404	221	24	100	33	2	257	2	1369
05:45 PM	230	63	4	22	384	234	27	113	76	2	283	7	1445
Total	891	261	10	115	1511	817	95	382	192	12	1030	16	5332
06:00 PM	224	61	2	24	427	237	19	93	56	4	342	4	1493
06:15 PM	206	59	0	14	420	230	32	95	50	7	323	10	1446
06:30 PM	197	32	1	20	443	233	17	100	52	9	353	5	1462
06:45 PM	164	36	5	30	424	237	20	91	35	5	329	12	1388
Total	791	188	8	88	1714	937	88	379	193	25	1347	31	5789
Grand Total	5666	1329	103	581	9262	5256	491	1607	974	167	7633	236	33305
Apprch %	79.8	18.7	1.5	3.8	61.3	34.8	16.0	52.3	31.7	2.1	95.0	2.9	
Total %	17.0	4.0	0.3	1.7	27.8	15.8	1.5	4.8	2.9	0.5	22.9	0.7	

City Traffic Counters
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File Name : FedWil
Site Code : 00000000
Start Date : 10/29/2008
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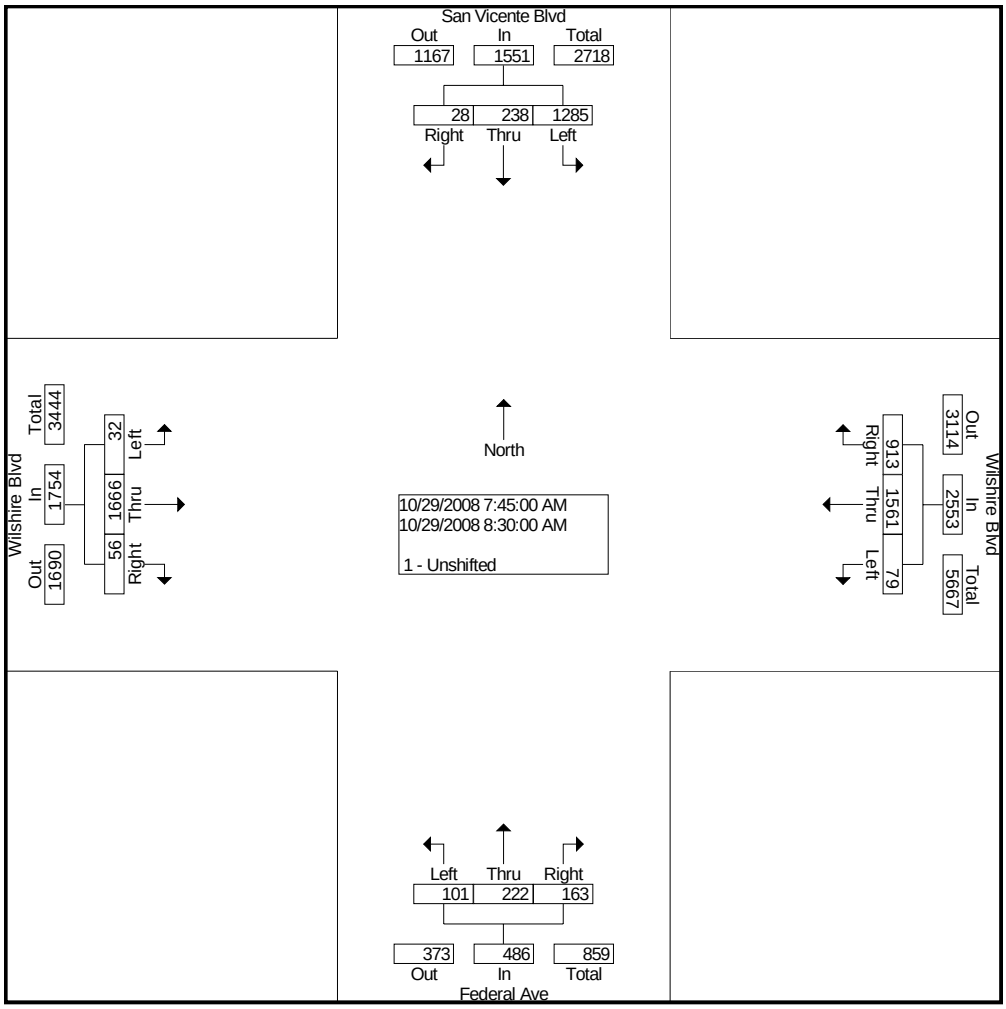
	San Vicente Blvd Southbound				Wilshire Blvd Westbound				Federal Ave Northbound				Wilshire Blvd Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Intersection	07:45 AM																
Volume	1285	238	28	1551	79	1561	913	2553	101	222	163	486	32	1666	56	1754	6344
Percent	82.8	15.3	1.8		3.1	61.1	35.8		20.8	45.7	33.5		1.8	95.0	3.2		
07:45 Volume	344	53	5	402	29	381	255	665	30	48	39	117	5	478	16	499	1683
Peak Factor																	0.942
High Int.	08:15 AM				07:45 AM				08:00 AM				07:45 AM				
Volume	381	64	10	455	29	381	255	665	25	60	49	134	5	478	16	499	
Peak Factor				0.852				0.960				0.907				0.879	



City Traffic Counters
626.256.4171

File Name : FedWil
Site Code : 00000000
Start Date : 10/29/2008
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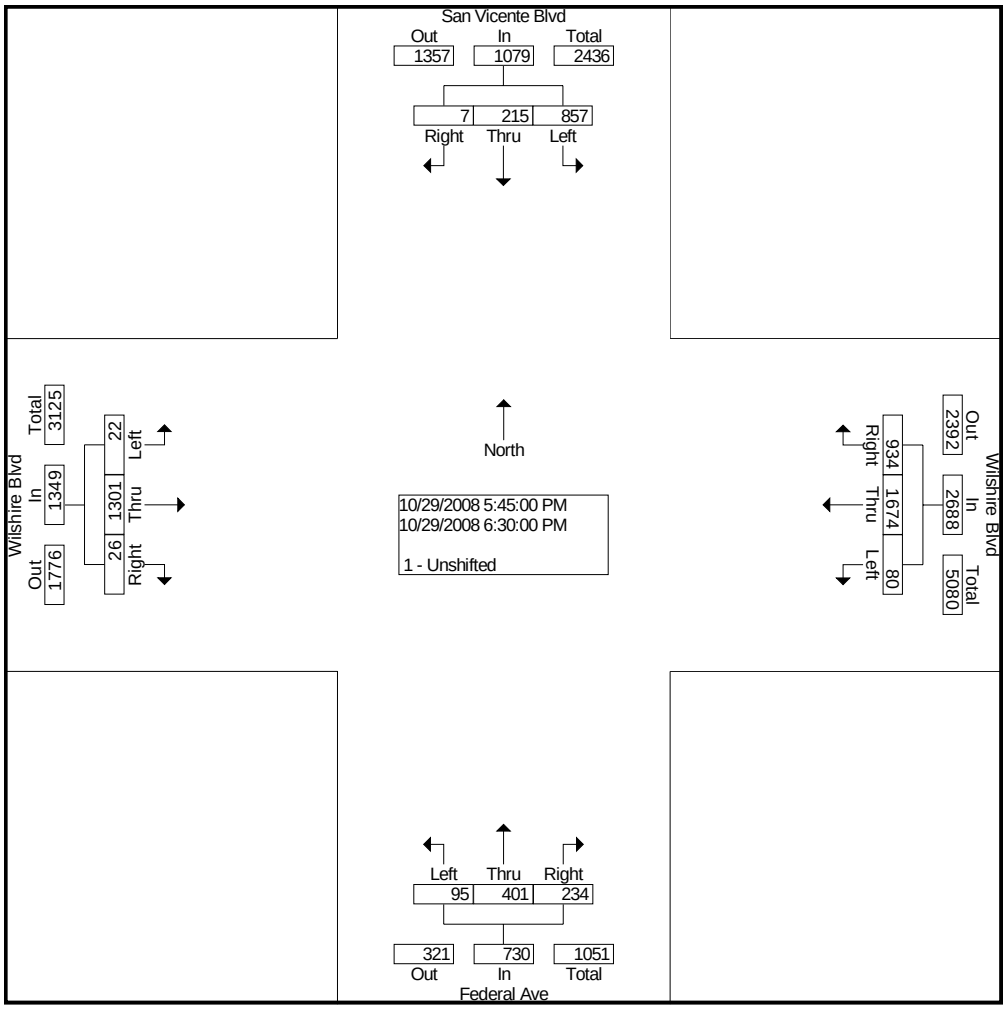
	San Vicente Blvd Southbound				Wilshire Blvd Westbound				Federal Ave Northbound				Wilshire Blvd Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 12:00 PM to 06:45 PM - Peak 1 of 1																	
Intersection	05:45 PM																
Volume	857	215	7	1079	80	1674	934	2688	95	401	234	730	22	1301	26	1349	5846
Percent	79.4	19.9	0.6		3.0	62.3	34.7		13.0	54.9	32.1		1.6	96.4	1.9		
06:00 Volume	224	61	2	287	24	427	237	688	19	93	56	168	4	342	4	350	1493
Peak Factor																	0.979
High Int.	05:45 PM				06:30 PM				05:45 PM				06:30 PM				
Volume	230	63	4	297	20	443	233	696	27	113	76	216	9	353	5	367	
Peak Factor				0.908				0.966				0.845				0.919	



City Traffic Counters
626.256.4171

File Name : BarrWil
Site Code : 00000000
Start Date : 10/29/2008
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Groups Printed- 1 - Unshifted

	Barrington Ave Southbound			Wilshire Blvd Westbound			Barrington Ave Northbound			Wilshire Blvd Eastbound			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
07:00 AM	49	37	3	10	283	8	22	57	17	9	207	6	708
07:15 AM	41	55	9	17	329	14	11	52	27	8	303	12	878
07:30 AM	47	79	14	29	341	15	15	92	34	12	285	18	981
07:45 AM	46	75	14	15	363	17	23	68	42	10	375	9	1057
Total	183	246	40	71	1316	54	71	269	120	39	1170	45	3624
08:00 AM	43	84	13	14	356	13	28	93	19	10	345	8	1026
08:15 AM	44	112	20	5	395	18	31	108	38	8	330	7	1116
08:30 AM	48	135	17	16	389	20	28	93	34	22	359	5	1166
08:45 AM	40	125	16	15	373	28	21	97	21	19	262	11	1028
Total	175	456	66	50	1513	79	108	391	112	59	1296	31	4336
09:00 AM	43	111	15	14	397	19	24	90	22	18	289	10	1052
09:15 AM	45	98	10	16	391	21	29	86	21	19	269	8	1013
09:30 AM	38	85	24	7	406	22	27	76	21	16	257	6	985
09:45 AM	50	67	8	6	392	23	28	71	22	14	254	9	944
Total	176	361	57	43	1586	85	108	323	86	67	1069	33	3994
04:00 PM	15	123	14	15	312	17	15	83	6	5	223	6	834
04:15 PM	19	112	10	19	302	13	16	57	4	10	237	10	809
04:30 PM	25	117	16	26	311	17	15	70	4	8	277	16	902
04:45 PM	21	94	17	17	308	13	24	78	11	8	260	30	881
Total	80	446	57	77	1233	60	70	288	25	31	997	62	3426
05:00 PM	24	119	23	19	364	16	22	76	6	7	233	21	930
05:15 PM	24	143	14	26	377	19	15	76	12	5	220	18	949
05:30 PM	20	125	28	28	368	20	23	78	8	8	238	16	960
05:45 PM	17	107	12	27	351	15	21	86	2	8	269	18	933
Total	85	494	77	100	1460	70	81	316	28	28	960	73	3772
06:00 PM	15	119	14	22	404	15	18	84	5	6	310	12	1024
06:15 PM	5	110	7	19	414	11	15	72	3	2	309	14	981
06:30 PM	12	86	8	16	427	12	16	58	1	5	346	11	998
06:45 PM	5	79	10	16	412	8	10	61	2	1	324	10	938
Total	37	394	39	73	1657	46	59	275	11	14	1289	47	3941
Grand Total	736	2397	336	414	8765	394	497	1862	382	238	6781	291	23093
Apprch %	21.2	69.1	9.7	4.3	91.6	4.1	18.1	67.9	13.9	3.3	92.8	4.0	
Total %	3.2	10.4	1.5	1.8	38.0	1.7	2.2	8.1	1.7	1.0	29.4	1.3	

City Traffic Counters
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File Name : BarrWil
Site Code : 00000000
Start Date : 10/29/2008
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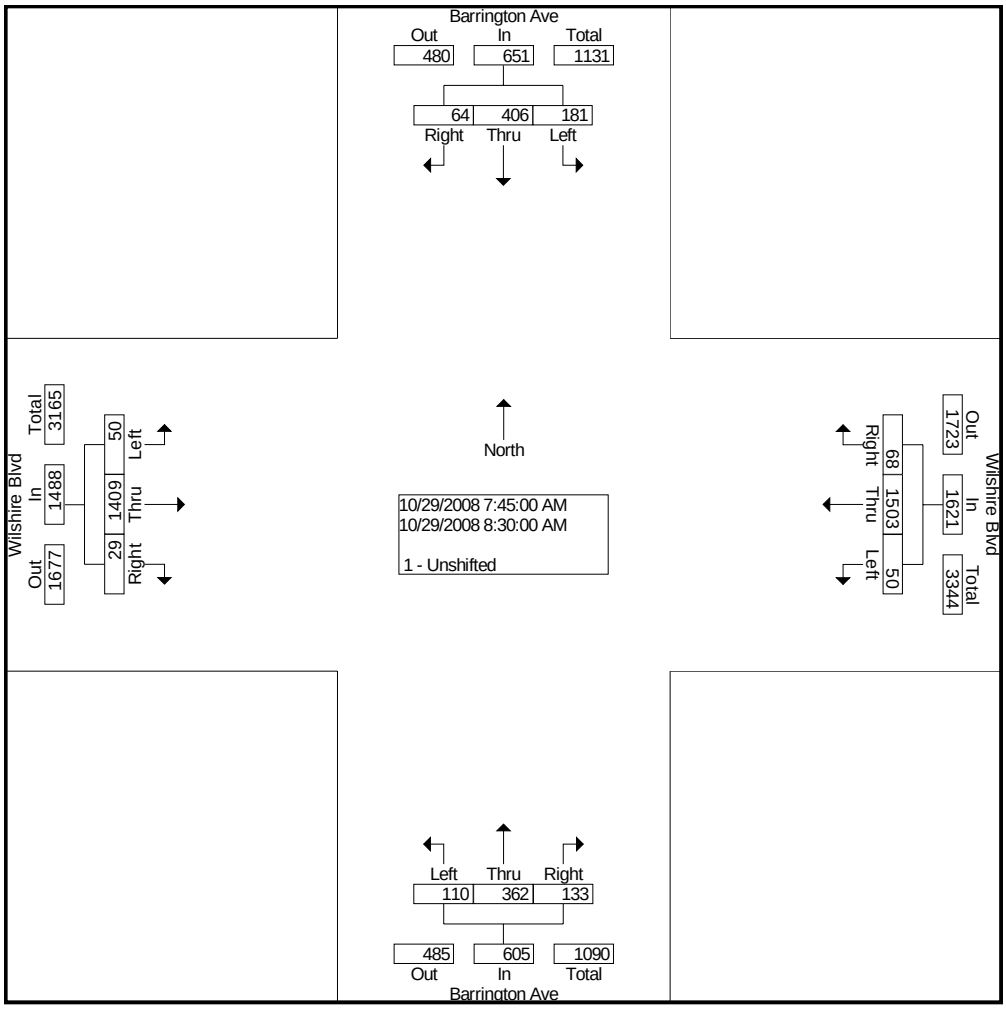
	Barrington Ave Southbound				Wilshire Blvd Westbound				Barrington Ave Northbound				Wilshire Blvd Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Intersection	07:45 AM																
Volume	181	406	64	651	50	1503	68	1621	110	362	133	605	50	1409	29	1488	4365
Percent	27.8	62.4	9.8		3.1	92.7	4.2		18.2	59.8	22.0		3.4	94.7	1.9		
08:30 Volume	48	135	17	200	16	389	20	425	28	93	34	155	22	359	5	386	1166
Peak Factor																	0.936
High Int.	08:30 AM				08:30 AM				08:15 AM				07:45 AM				
Volume	48	135	17	200	16	389	20	425	31	108	38	177	10	375	9	394	
Peak Factor				0.814				0.954				0.855				0.944	



City Traffic Counters
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File Name : BarrWil
Site Code : 00000000
Start Date : 10/29/2008
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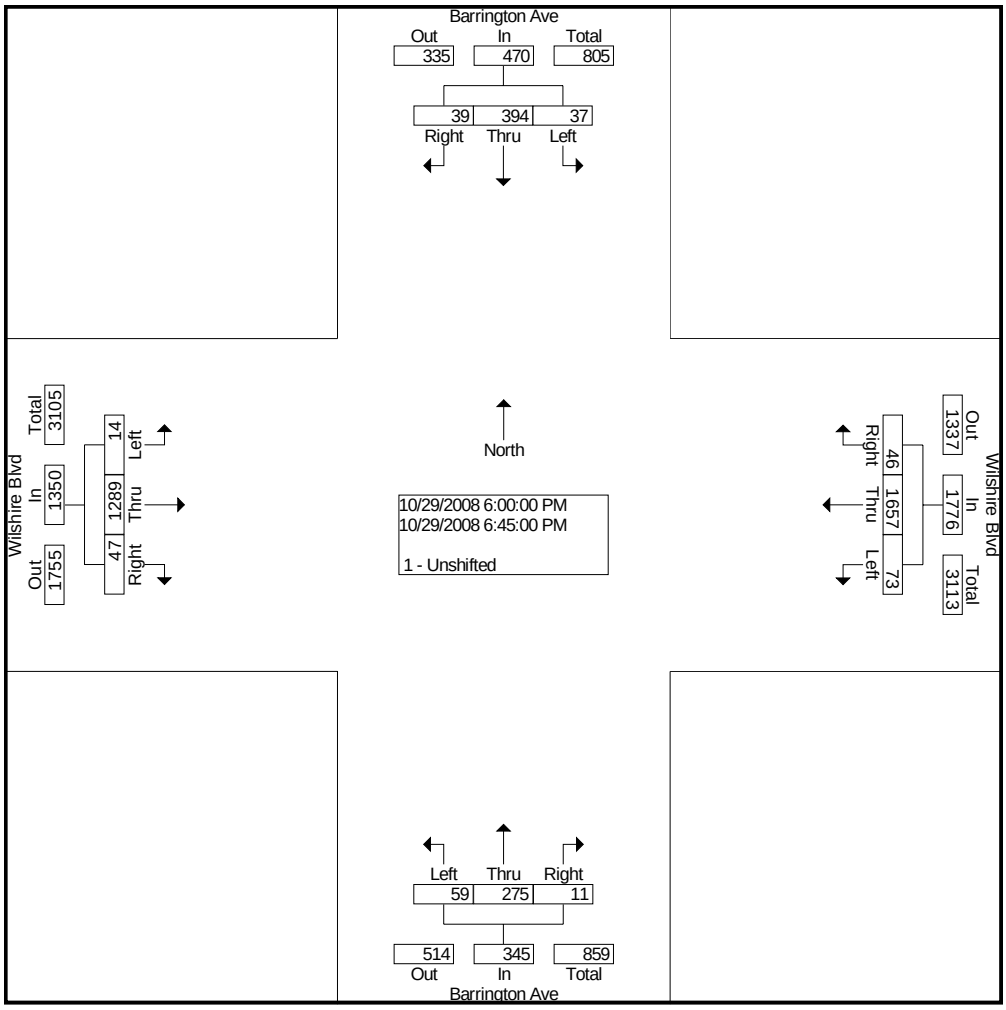
	Barrington Ave Southbound				Wilshire Blvd Westbound				Barrington Ave Northbound				Wilshire Blvd Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 12:00 PM to 06:45 PM - Peak 1 of 1																	
Intersection	06:00 PM																
Volume	37	394	39	470	73	1657	46	1776	59	275	11	345	14	1289	47	1350	3941
Percent	7.9	83.8	8.3		4.1	93.3	2.6		17.1	79.7	3.2		1.0	95.5	3.5		
06:00 Volume	15	119	14	148	22	404	15	441	18	84	5	107	6	310	12	328	1024
Peak Factor																	0.962
High Int.	06:00 PM				06:30 PM				06:00 PM				06:30 PM				
Volume	15	119	14	148	16	427	12	455	18	84	5	107	5	346	11	362	
Peak Factor				0.794				0.976				0.806				0.932	



AM Peak Hour Growth Factor Calculation

YEAR	INTID	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum	Δ	years	total rate	rate/yr
2009	5	101	222	163	1285	238	28	32	1666	56	79	1561	913	6344	Calculation			
2009	6	110	362	133	181	406	64	50	1409	29	50	1503	68	4365				
2035	5	138	159	193	1452	237	28	32	1797	42	87	1729	1268	7162	818	26	12.89%	0.50%
2035	6	113	381	161	188	468	122	222	1550	37	49	1807	78	5176	811	26	18.58%	0.71%

PM Peak Hour Growth Factor Calculation

YEAR	INTID	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum	Δ	years	total rate	rate/yr
2009	5	95	401	234	857	215	7	22	1301	26	80	1674	934	5846	Calculation			
2009	6	59	275	11	37	394	39	14	1289	47	73	1657	46	3941				
2035	5	139	297	257	989	220	7	22	1583	10	44	1791	1260	6619	773	26	13.22%	0.51%
2035	6	93	205	0	37	585	74	594	1542	32	79	1865	10	5116	1175	26	29.81%	1.15%

APPENDIX E SYNCHRO CALCULATION SHEETS

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APPENDIX E EXISTING CONDITIONS

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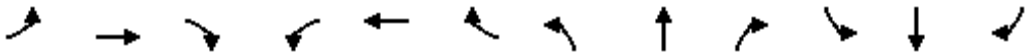
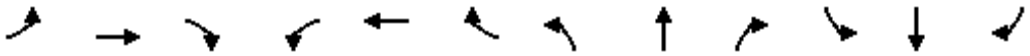


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	0	0	217	0	144	6	194	0	0	437	38
Future Volume (vph)	0	0	0	217	0	144	6	194	0	0	437	38
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	236	0	157	7	211	0	0	475	41

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	236	157	7	211	516
Volume Left (vph)	236	0	7	0	0
Volume Right (vph)	0	157	0	0	41
Hadj (s)	0.53	-0.67	0.53	0.03	-0.01
Departure Headway (s)	7.2	6.0	7.1	6.6	6.1
Degree Utilization, x	0.47	0.26	0.01	0.39	0.87
Capacity (veh/h)	474	565	479	517	516
Control Delay (s)	15.3	9.9	9.0	12.5	37.2
Approach Delay (s)	13.2		12.4		37.2
Approach LOS	B		B		E

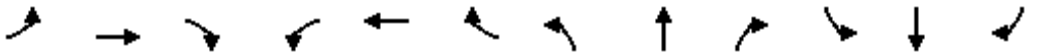
Intersection Summary				
Delay	24.0			
Level of Service	C			
Intersection Capacity Utilization	56.7%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	0	75	0	0	0	0	99	68	309	390	0
Future Volume (vph)	25	0	75	0	0	0	0	99	68	309	390	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	0	82	0	0	0	0	108	74	336	424	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total (vph)	27	82	182	336	424
Volume Left (vph)	27	0	0	336	0
Volume Right (vph)	0	82	74	0	0
Hadj (s)	0.53	-0.67	-0.21	0.53	0.03
Departure Headway (s)	7.1	5.9	5.3	5.6	5.1
Degree Utilization, x	0.05	0.13	0.27	0.52	0.60
Capacity (veh/h)	467	556	654	636	703
Control Delay (s)	9.3	8.6	10.3	13.2	14.0
Approach Delay (s)	8.8		10.3	13.7	
Approach LOS	A		B	B	

Intersection Summary				
Delay	12.6			
Level of Service	B			
Intersection Capacity Utilization	56.7%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	2522	109	118	2665	74	105	299	299	142	376	214
Future Volume (vph)	65	2522	109	118	2665	74	105	299	299	142	376	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6368		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6368		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	2741	118	128	2897	80	114	325	325	154	409	233
RTOR Reduction (vph)	0	7	0	0	0	40	0	0	49	0	0	50
Lane Group Flow (vph)	71	2852	0	128	2897	40	114	325	276	154	409	183
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	2 3	1	6	7
Permitted Phases						8						6
Actuated Green, G (s)	6.4	41.5		5.1	40.2	45.7	4.1	20.8	30.4	5.5	22.2	28.6
Effective Green, g (s)	6.4	41.5		5.1	40.2	45.7	4.1	20.8	30.4	5.5	22.2	28.6
Actuated g/C Ratio	0.07	0.46		0.06	0.44	0.50	0.05	0.23	0.33	0.06	0.24	0.31
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	124	2907		192	3336	874	154	809	529	207	864	576
v/s Ratio Prot	0.04	c0.45		0.04	0.38	0.00	0.03	0.09	c0.17	c0.04	0.12	0.02
v/s Ratio Perm						0.02						0.09
v/c Ratio	0.57	0.98		0.67	0.87	0.05	0.74	0.40	0.52	0.74	0.47	0.32
Uniform Delay, d1	40.9	24.3		42.1	23.0	11.5	42.9	29.8	24.4	42.0	29.4	23.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.3	12.6		8.4	2.6	0.0	17.3	1.5	0.9	13.5	1.9	0.3
Delay (s)	47.2	36.9		50.5	25.6	11.5	60.2	31.3	25.3	55.5	31.2	24.0
Level of Service	D	D		D	C	B	E	C	C	E	C	C
Approach Delay (s)		37.2			26.3			33.0			33.8	
Approach LOS		D			C			C			C	

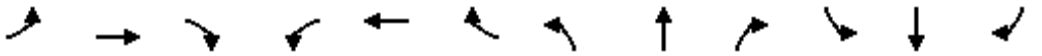
Intersection Summary			
HCM 2000 Control Delay	31.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	167	0	0	465
Future Volume (Veh/h)	0	0	167	0	0	465
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	182	0	0	505
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	687	182			182	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	687	182			182	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	413	861			1393	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	0	182	0	505
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.11	0.00	0.30
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS	A			

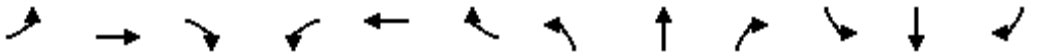
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1691	57	80	1584	927	103	225	165	1304	242	28
Future Volume (vph)	32	1691	57	80	1584	927	103	225	165	1304	242	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.86	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3105	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3105	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1838	62	87	1722	1008	112	245	179	1417	263	30
RTOR Reduction (vph)	0	0	40	0	0	455	0	0	40	0	0	21
Lane Group Flow (vph)	35	1838	22	87	1722	553	112	245	139	949	731	9
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	4.0	47.4	47.4	7.1	50.5	50.5	18.9	18.9	26.0	39.5	39.5	39.5
Effective Green, g (s)	4.0	47.4	47.4	7.1	50.5	50.5	18.9	18.9	26.0	39.5	39.5	39.5
Actuated g/C Ratio	0.03	0.36	0.36	0.05	0.39	0.39	0.14	0.14	0.20	0.30	0.30	0.30
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	54	1841	573	96	1961	610	255	510	314	918	936	477
v/s Ratio Prot	0.02	c0.36		c0.05	0.34		0.06	c0.07	0.09	c0.31	0.24	
v/s Ratio Perm			0.01			c0.35						0.01
v/c Ratio	0.65	1.00	0.04	0.91	0.88	0.91	0.44	0.48	0.44	1.03	0.96dl	0.02
Uniform Delay, d1	62.8	41.7	27.0	61.6	37.3	38.0	51.2	51.5	46.1	45.7	41.7	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	23.7	20.4	0.0	61.8	4.8	17.1	5.4	3.2	1.0	38.7	4.3	0.0
Delay (s)	86.5	62.1	27.0	123.3	42.2	55.0	56.6	54.7	47.1	84.4	46.0	32.1
Level of Service	F	E	C	F	D	E	E	D	D	F	D	C
Approach Delay (s)		61.5			49.3			52.5			67.1	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	57.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	130.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

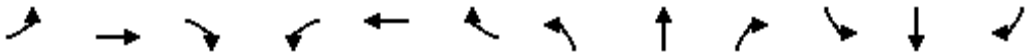
dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	1439	30	51	1535	69	112	370	136	185	415	65
Future Volume (vph)	51	1439	30	51	1535	69	112	370	136	185	415	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3467	
Flt Permitted	0.12	1.00	1.00	0.12	1.00	1.00	0.39	1.00	1.00	0.49	1.00	
Satd. Flow (perm)	231	3539	1583	231	3539	1583	720	3539	1583	909	3467	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	1564	33	55	1668	75	122	402	148	201	451	71
RTOR Reduction (vph)	0	0	15	0	0	35	0	0	19	0	11	0
Lane Group Flow (vph)	55	1564	18	55	1668	40	122	402	129	201	511	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	32.2	32.2	32.2	32.2	32.2	32.2	18.5	18.5	18.5	18.5	18.5	
Effective Green, g (s)	32.2	32.2	32.2	32.2	32.2	32.2	18.5	18.5	18.5	18.5	18.5	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.54	0.31	0.31	0.31	0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	124	1908	853	124	1908	853	223	1096	490	281	1074	
v/s Ratio Prot		0.44			c0.47			0.11			0.15	
v/s Ratio Perm	0.24		0.01	0.24		0.03	0.17		0.08	c0.22		
v/c Ratio	0.44	0.82	0.02	0.44	0.87	0.05	0.55	0.37	0.26	0.72	0.48	
Uniform Delay, d1	8.3	11.4	6.4	8.3	12.0	6.5	17.1	16.0	15.5	18.3	16.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.5	2.9	0.0	2.5	4.8	0.0	9.3	0.9	1.3	14.5	1.5	
Delay (s)	10.8	14.2	6.4	10.8	16.8	6.5	26.4	17.0	16.8	32.7	18.2	
Level of Service	B	B	A	B	B	A	C	B	B	C	B	
Approach Delay (s)		14.0			16.2			18.7			22.2	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

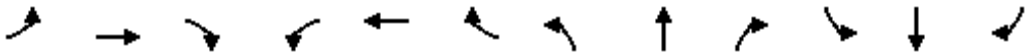
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	0	0	44	0	37	16	178	0	0	471	38
Future Volume (vph)	0	0	0	44	0	37	16	178	0	0	471	38
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	48	0	40	17	193	0	0	512	41

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	48	40	17	193	553
Volume Left (vph)	48	0	17	0	0
Volume Right (vph)	0	40	0	0	41
Hadj (s)	0.53	-0.67	0.53	0.03	-0.01
Departure Headway (s)	6.9	5.7	5.8	5.3	5.0
Degree Utilization, x	0.09	0.06	0.03	0.29	0.77
Capacity (veh/h)	479	571	596	654	706
Control Delay (s)	9.4	7.9	7.8	9.2	23.1
Approach Delay (s)	8.7		9.1		23.1
Approach LOS	A		A		C

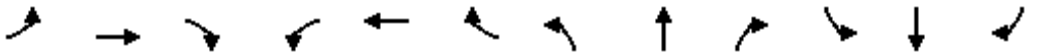
Intersection Summary				
Delay	18.1			
Level of Service	C			
Intersection Capacity Utilization	44.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	0	44	0	0	0	0	66	111	381	173	0
Future Volume (vph)	23	0	44	0	0	0	0	66	111	381	173	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	0	48	0	0	0	0	72	121	414	188	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total (vph)	25	48	193	414	188
Volume Left (vph)	25	0	0	414	0
Volume Right (vph)	0	48	121	0	0
Hadj (s)	0.53	-0.67	-0.34	0.53	0.03
Departure Headway (s)	6.9	5.7	5.0	5.4	4.9
Degree Utilization, x	0.05	0.08	0.27	0.62	0.26
Capacity (veh/h)	479	573	700	653	717
Control Delay (s)	9.0	7.9	9.8	15.8	8.4
Approach Delay (s)	8.3		9.8	13.5	
Approach LOS	A		A	B	

Intersection Summary				
Delay	12.3			
Level of Service	B			
Intersection Capacity Utilization	44.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	2053	84	172	2663	138	293	355	153	84	250	173
Future Volume (vph)	143	2053	84	172	2663	138	293	355	153	84	250	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6370		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6370		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	155	2232	91	187	2895	150	318	386	166	91	272	188
RTOR Reduction (vph)	0	6	0	0	0	73	0	0	49	0	0	51
Lane Group Flow (vph)	155	2317	0	187	2895	77	318	386	117	91	272	137
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	3	1	6	7
Permitted Phases						8			2			6
Actuated Green, G (s)	8.9	36.9		7.5	35.5	41.3	9.3	21.8	29.3	5.8	18.3	27.2
Effective Green, g (s)	8.9	36.9		7.5	35.5	41.3	9.3	21.8	29.3	5.8	18.3	27.2
Actuated g/C Ratio	0.10	0.41		0.08	0.39	0.46	0.10	0.24	0.33	0.06	0.20	0.30
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	175	2611		286	2975	805	354	857	594	221	719	557
v/s Ratio Prot	c0.09	0.36		0.05	c0.38	0.01	c0.09	c0.11	0.02	0.03	0.08	0.02
v/s Ratio Perm						0.04			0.06			0.06
v/c Ratio	0.89	0.89		0.65	0.97	0.10	0.90	0.45	0.20	0.41	0.38	0.25
Uniform Delay, d1	40.0	24.6		40.0	26.8	13.8	39.9	29.0	21.9	40.5	30.9	23.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	37.3	4.1		5.3	10.9	0.1	24.2	1.7	0.2	1.2	1.5	0.2
Delay (s)	77.4	28.7		45.3	37.7	13.8	64.1	30.7	22.0	41.7	32.5	23.9
Level of Service	E	C		D	D	B	E	C	C	D	C	C
Approach Delay (s)		31.7			37.1			41.3			31.1	
Approach LOS		C			D			D			C	

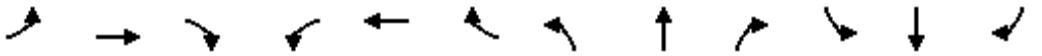
Intersection Summary			
HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	177	0	0	217
Future Volume (Veh/h)	0	0	177	0	0	217
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	192	0	0	236
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	428	192			192	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	428	192			192	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	584	850			1381	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	0	192	0	236
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.11	0.00	0.14
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS	A			

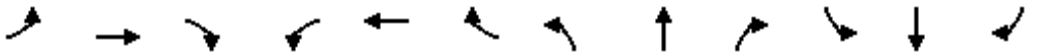
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	14.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	1321	26	81	1700	948	96	407	238	870	218	7
Future Volume (vph)	22	1321	26	81	1700	948	96	407	238	870	218	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.86	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3115	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3115	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	1436	28	88	1848	1030	104	442	259	946	237	8
RTOR Reduction (vph)	0	0	18	0	0	349	0	0	45	0	0	6
Lane Group Flow (vph)	24	1436	10	88	1848	681	104	442	214	634	549	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	2.9	40.8	40.8	8.3	46.2	46.2	19.4	19.4	27.7	23.1	23.1	23.1
Effective Green, g (s)	2.9	40.8	40.8	8.3	46.2	46.2	19.4	19.4	27.7	23.1	23.1	23.1
Actuated g/C Ratio	0.03	0.37	0.37	0.08	0.42	0.42	0.18	0.18	0.25	0.21	0.21	0.21
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	46	1892	589	134	2143	667	313	626	400	641	656	333
v/s Ratio Prot	0.01	0.28		c0.05	0.36		0.06	c0.12	0.14	c0.21	0.18	
v/s Ratio Perm			0.01			c0.43						0.00
v/c Ratio	0.52	0.76	0.02	0.66	0.86	1.02	0.33	0.71	0.54	0.99	0.90dl	0.01
Uniform Delay, d1	52.7	30.1	21.7	49.3	28.8	31.7	39.4	42.4	35.4	43.1	41.4	34.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.3	1.8	0.0	11.0	3.8	40.1	2.8	6.6	1.4	32.4	9.1	0.0
Delay (s)	62.9	31.9	21.7	60.3	32.7	71.8	42.3	49.0	36.8	75.5	50.6	34.2
Level of Service	E	C	C	E	C	E	D	D	D	E	D	C
Approach Delay (s)		32.2			47.1			44.2			63.7	
Approach LOS		C			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	46.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	109.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1333	49	76	1714	48	61	284	11	38	408	40
Future Volume (vph)	14	1333	49	76	1714	48	61	284	11	38	408	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3492	
Flt Permitted	0.11	1.00	1.00	0.11	1.00	1.00	0.39	1.00	1.00	0.56	1.00	
Satd. Flow (perm)	199	3539	1583	199	3539	1583	732	3539	1583	1044	3492	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	1449	53	83	1863	52	66	309	12	41	443	43
RTOR Reduction (vph)	0	0	22	0	0	22	0	0	9	0	9	0
Lane Group Flow (vph)	15	1449	31	83	1863	30	66	309	3	41	477	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	37.5	37.5	37.5	37.5	37.5	37.5	18.5	18.5	18.5	18.5	18.5	
Effective Green, g (s)	37.5	37.5	37.5	37.5	37.5	37.5	18.5	18.5	18.5	18.5	18.5	
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.58	0.58	0.28	0.28	0.28	0.28	0.28	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	114	2041	913	114	2041	913	208	1007	450	297	993	
v/s Ratio Prot		0.41			c0.53			0.09			c0.14	
v/s Ratio Perm	0.08		0.02	0.42		0.02	0.09		0.00	0.04		
v/c Ratio	0.13	0.71	0.03	0.73	0.91	0.03	0.32	0.31	0.01	0.14	0.48	
Uniform Delay, d1	6.3	9.9	5.9	10.0	12.3	5.9	18.3	18.2	16.7	17.3	19.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	1.2	0.0	20.6	6.7	0.0	4.0	0.8	0.0	1.0	1.7	
Delay (s)	6.8	11.0	5.9	30.6	19.0	5.9	22.3	19.0	16.7	18.3	20.9	
Level of Service	A	B	A	C	B	A	C	B	B	B	C	
Approach Delay (s)		10.8			19.2			19.5			20.7	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX E 2025 NO BUILD CONDITIONS

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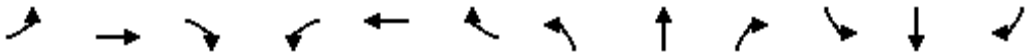
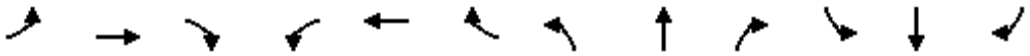


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	0	0	222	0	148	7	199	0	0	487	42
Future Volume (vph)	0	0	0	222	0	148	7	199	0	0	487	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	241	0	161	8	216	0	0	529	46

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	241	161	8	216	575
Volume Left (vph)	241	0	8	0	0
Volume Right (vph)	0	161	0	0	46
Hadj (s)	0.53	-0.67	0.53	0.03	-0.01
Departure Headway (s)	7.4	6.2	7.3	6.8	6.2
Degree Utilization, x	0.50	0.28	0.02	0.41	0.99
Capacity (veh/h)	480	569	484	524	573
Control Delay (s)	16.3	10.4	9.2	13.2	58.2
Approach Delay (s)	14.0		13.0		58.2
Approach LOS	B		B		F

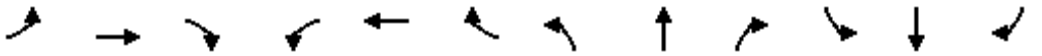
Intersection Summary				
Delay	35.0			
Level of Service	D			
Intersection Capacity Utilization	66.6%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	26	0	77	0	0	0	0	171	117	316	400	0
Future Volume (vph)	26	0	77	0	0	0	0	171	117	316	400	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	0	84	0	0	0	0	186	127	343	435	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total (vph)	28	84	313	343	435
Volume Left (vph)	28	0	0	343	0
Volume Right (vph)	0	84	127	0	0
Hadj (s)	0.53	-0.67	-0.21	0.53	0.03
Departure Headway (s)	7.4	6.2	5.4	5.7	5.2
Degree Utilization, x	0.06	0.14	0.47	0.55	0.63
Capacity (veh/h)	445	527	653	618	680
Control Delay (s)	9.7	9.1	13.1	14.2	15.5
Approach Delay (s)	9.2		13.1	14.9	
Approach LOS	A		B	B	

Intersection Summary				
Delay	13.9			
Level of Service	B			
Intersection Capacity Utilization	66.6%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	2582	112	121	2728	76	108	306	306	146	385	219
Future Volume (vph)	67	2582	112	121	2728	76	108	306	306	146	385	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6368		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6368		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	2807	122	132	2965	83	117	333	333	159	418	238
RTOR Reduction (vph)	0	7	0	0	0	40	0	0	50	0	0	52
Lane Group Flow (vph)	73	2922	0	132	2965	43	117	333	283	159	418	186
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	2 3	1	6	7
Permitted Phases						8						6
Actuated Green, G (s)	6.4	42.5		5.1	41.2	46.7	5.1	18.9	28.5	5.5	19.3	25.7
Effective Green, g (s)	6.4	42.5		5.1	41.2	46.7	5.1	18.9	28.5	5.5	19.3	25.7
Actuated g/C Ratio	0.07	0.47		0.06	0.46	0.52	0.06	0.21	0.32	0.06	0.21	0.29
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	125	3007		194	3453	900	194	743	501	209	758	531
v/s Ratio Prot	0.04	c0.46		0.04	0.39	0.00	0.03	0.09	c0.18	c0.05	0.12	0.02
v/s Ratio Perm						0.02						0.09
v/c Ratio	0.58	0.97		0.68	0.86	0.05	0.60	0.45	0.57	0.76	0.55	0.35
Uniform Delay, d1	40.5	23.2		41.7	21.8	10.7	41.5	31.0	25.6	41.6	31.5	25.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.8	10.7		9.4	2.3	0.0	5.2	2.0	1.5	15.0	2.9	0.4
Delay (s)	47.3	33.8		51.1	24.1	10.7	46.7	33.0	27.1	56.6	34.4	25.9
Level of Service	D	C		D	C	B	D	C	C	E	C	C
Approach Delay (s)		34.2			24.9			32.5			36.2	
Approach LOS		C			C			C			D	

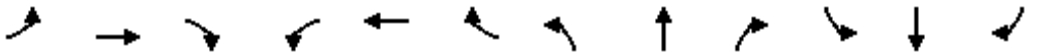
Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	288	0	0	477
Future Volume (Veh/h)	0	0	288	0	0	477
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	313	0	0	518
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	831	313			313	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	831	313			313	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	340	727			1247	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	0	313	0	518
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.18	0.00	0.30
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS	A			

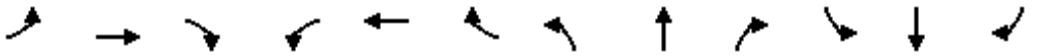
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	1825	62	86	1710	1001	111	243	178	1407	261	30
Future Volume (vph)	35	1825	62	86	1710	1001	111	243	178	1407	261	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.86	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3105	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3105	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	1984	67	93	1859	1088	121	264	193	1529	284	33
RTOR Reduction (vph)	0	0	41	0	0	415	0	0	36	0	0	22
Lane Group Flow (vph)	38	1984	26	93	1859	673	121	264	157	1024	789	11
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	4.0	57.5	57.5	8.5	62.0	62.0	18.0	18.0	26.5	48.9	48.9	48.9
Effective Green, g (s)	4.0	57.5	57.5	8.5	62.0	62.0	18.0	18.0	26.5	48.9	48.9	48.9
Actuated g/C Ratio	0.03	0.38	0.38	0.06	0.41	0.41	0.12	0.12	0.18	0.32	0.32	0.32
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	46	1937	603	99	2089	650	211	422	277	986	1006	512
v/s Ratio Prot	0.02	0.39		c0.05	0.37		0.07	c0.07	0.10	c0.34	0.25	
v/s Ratio Perm			0.02			c0.43						0.01
v/c Ratio	0.83	1.02	0.04	0.94	0.89	1.04	0.57	0.63	0.57	1.04	0.96dl	0.02
Uniform Delay, d1	73.1	46.7	29.4	70.9	41.3	44.5	62.8	63.2	56.9	51.0	46.2	34.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	69.9	26.9	0.0	70.1	5.1	44.9	10.9	6.8	2.6	39.1	4.1	0.0
Delay (s)	143.0	73.6	29.4	141.0	46.4	89.3	73.7	70.1	59.6	90.1	50.3	34.7
Level of Service	F	E	C	F	D	F	E	E	E	F	D	C
Approach Delay (s)		73.4			64.6			67.3			72.1	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM 2000 Control Delay	69.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	150.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	88.5%	ICU Level of Service	E
Analysis Period (min)	15		

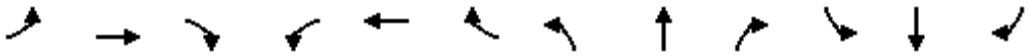
dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	1604	33	57	1711	77	125	412	152	206	462	72
Future Volume (vph)	57	1604	33	57	1711	77	125	412	152	206	462	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3468	
Flt Permitted	0.12	1.00	1.00	0.12	1.00	1.00	0.34	1.00	1.00	0.45	1.00	
Satd. Flow (perm)	229	3539	1583	229	3539	1583	634	3539	1583	831	3468	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	1743	36	62	1860	84	136	448	165	224	502	78
RTOR Reduction (vph)	0	0	17	0	0	39	0	0	19	0	7	0
Lane Group Flow (vph)	62	1743	20	62	1860	46	136	448	146	224	573	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	32.5	32.5	32.5	32.5	32.5	32.5	18.5	18.5	18.5	18.5	18.5	
Effective Green, g (s)	32.5	32.5	32.5	32.5	32.5	32.5	18.5	18.5	18.5	18.5	18.5	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.54	0.31	0.31	0.31	0.31	0.31	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	124	1916	857	124	1916	857	195	1091	488	256	1069	
v/s Ratio Prot		0.49			c0.53			0.13			0.17	
v/s Ratio Perm	0.27		0.01	0.27		0.03	0.21		0.09	c0.27		
v/c Ratio	0.50	0.91	0.02	0.50	0.97	0.05	0.70	0.41	0.30	0.88	0.54	
Uniform Delay, d1	8.6	12.4	6.4	8.6	13.3	6.5	18.3	16.4	15.8	19.7	17.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.1	6.8	0.0	3.1	14.3	0.0	18.7	1.1	1.6	31.5	1.9	
Delay (s)	11.8	19.2	6.4	11.8	27.5	6.5	37.0	17.6	17.4	51.2	19.1	
Level of Service	B	B	A	B	C	A	D	B	B	D	B	
Approach Delay (s)		18.7			26.2			21.1			28.1	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

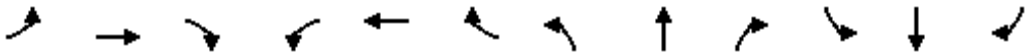
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	0	0	45	0	38	17	180	0	0	513	41
Future Volume (vph)	0	0	0	45	0	38	17	180	0	0	513	41
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	49	0	41	18	196	0	0	558	45

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	49	41	18	196	603
Volume Left (vph)	49	0	18	0	0
Volume Right (vph)	0	41	0	0	45
Hadj (s)	0.53	-0.67	0.53	0.03	-0.01
Departure Headway (s)	7.0	5.8	5.9	5.4	5.1
Degree Utilization, x	0.10	0.07	0.03	0.29	0.85
Capacity (veh/h)	479	571	589	646	704
Control Delay (s)	9.6	8.1	7.9	9.4	29.4
Approach Delay (s)	8.9		9.3		29.4
Approach LOS	A		A		D

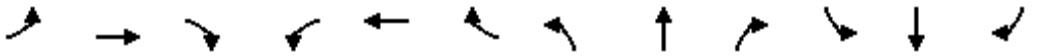
Intersection Summary				
Delay	22.6			
Level of Service	C			
Intersection Capacity Utilization	62.4%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	24	0	45	0	0	0	0	179	301	383	175	0
Future Volume (vph)	24	0	45	0	0	0	0	179	301	383	175	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	0	49	0	0	0	0	195	327	416	190	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total (vph)	26	49	522	416	190
Volume Left (vph)	26	0	0	416	0
Volume Right (vph)	0	49	327	0	0
Hadj (s)	0.53	-0.67	-0.34	0.53	0.03
Departure Headway (s)	7.6	6.4	5.1	5.8	5.3
Degree Utilization, x	0.05	0.09	0.74	0.67	0.28
Capacity (veh/h)	436	512	695	616	670
Control Delay (s)	9.9	8.8	20.8	18.3	9.1
Approach Delay (s)	9.2		20.8	15.4	
Approach LOS	A		C	C	

Intersection Summary				
Delay	17.4			
Level of Service	C			
Intersection Capacity Utilization	62.4%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	2064	85	174	2677	139	154	357	295	85	252	175
Future Volume (vph)	144	2064	85	174	2677	139	154	357	295	85	252	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6370		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6370		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	2243	92	189	2910	151	167	388	321	92	274	190
RTOR Reduction (vph)	0	6	0	0	0	67	0	0	50	0	0	49
Lane Group Flow (vph)	157	2329	0	189	2910	84	167	388	271	92	274	141
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	3	1	6	7
Permitted Phases						8			2			6
Actuated Green, G (s)	9.5	37.7		8.3	36.5	42.0	5.5	20.5	28.8	5.5	20.5	30.0
Effective Green, g (s)	9.5	37.7		8.3	36.5	42.0	5.5	20.5	28.8	5.5	20.5	30.0
Actuated g/C Ratio	0.11	0.42		0.09	0.41	0.47	0.06	0.23	0.32	0.06	0.23	0.33
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	186	2668		316	3059	817	209	806	585	209	806	606
v/s Ratio Prot	c0.09	0.37		0.06	c0.39	0.01	c0.05	0.11	c0.04	0.03	0.08	0.02
v/s Ratio Perm						0.05			0.13			0.06
v/c Ratio	0.84	0.87		0.60	0.95	0.10	0.80	0.48	0.46	0.44	0.34	0.23
Uniform Delay, d1	39.5	24.0		39.2	25.9	13.4	41.7	30.1	24.4	40.8	29.1	21.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	27.9	3.5		3.0	7.8	0.1	18.9	2.1	0.6	1.5	1.1	0.2
Delay (s)	67.4	27.4		42.3	33.7	13.5	60.6	32.2	25.0	42.2	30.2	21.9
Level of Service	E	C		D	C	B	E	C	C	D	C	C
Approach Delay (s)		29.9			33.2			35.0			29.4	
Approach LOS		C			C			C			C	

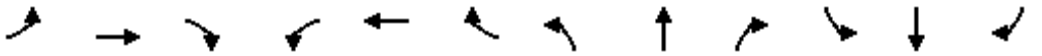
Intersection Summary			
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	480	0	0	220
Future Volume (Veh/h)	0	0	480	0	0	220
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	522	0	0	239
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	761	522			522	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	761	522			522	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	373	555			1044	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	0	522	0	239
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.31	0.00	0.14
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS	A			

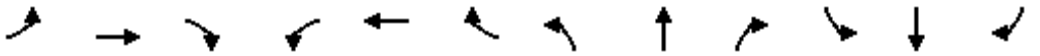
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1428	28	88	1838	1025	104	440	257	941	236	8
Future Volume (vph)	24	1428	28	88	1838	1025	104	440	257	941	236	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.86	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3115	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3115	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	1552	30	96	1998	1114	113	478	279	1023	257	9
RTOR Reduction (vph)	0	0	18	0	0	345	0	0	38	0	0	7
Lane Group Flow (vph)	26	1552	12	96	1998	769	113	478	241	685	595	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	2.9	51.1	51.1	11.3	59.5	59.5	19.4	19.4	30.7	29.1	29.1	29.1
Effective Green, g (s)	2.9	51.1	51.1	11.3	59.5	59.5	19.4	19.4	30.7	29.1	29.1	29.1
Actuated g/C Ratio	0.02	0.40	0.40	0.09	0.46	0.46	0.15	0.15	0.24	0.23	0.23	0.23
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	39	2015	627	155	2347	730	266	532	377	687	703	357
v/s Ratio Prot	0.01	0.31		0.05	0.39		0.06	c0.14	c0.15	c0.23	0.19	
v/s Ratio Perm			0.01			c0.49						0.00
v/c Ratio	0.67	0.77	0.02	0.62	0.85	1.05	0.42	0.90	0.64	1.00	0.92dl	0.01
Uniform Delay, d1	62.5	33.8	23.7	56.7	30.8	34.7	49.7	53.8	44.1	49.9	47.8	38.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.5	1.9	0.0	7.2	3.2	48.2	4.9	20.6	3.5	33.4	9.3	0.0
Delay (s)	98.0	35.7	23.7	63.9	34.0	82.9	54.6	74.4	47.7	83.2	57.0	38.7
Level of Service	F	D	C	E	C	F	D	E	D	F	E	D
Approach Delay (s)		36.5			51.9			63.3			70.8	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	53.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	128.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	1578	58	90	2028	57	72	336	13	45	483	47
Future Volume (vph)	17	1578	58	90	2028	57	72	336	13	45	483	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3492	
Flt Permitted	0.07	1.00	1.00	0.08	1.00	1.00	0.23	1.00	1.00	0.44	1.00	
Satd. Flow (perm)	123	3539	1583	151	3539	1583	432	3539	1583	810	3492	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	1715	63	98	2204	62	78	365	14	49	525	51
RTOR Reduction (vph)	0	0	16	0	0	20	0	0	11	0	8	0
Lane Group Flow (vph)	18	1715	47	98	2204	42	78	365	3	49	568	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	60.5	60.5	60.5	60.5	60.5	60.5	20.5	20.5	20.5	20.5	20.5	
Effective Green, g (s)	60.5	60.5	60.5	60.5	60.5	60.5	20.5	20.5	20.5	20.5	20.5	
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.67	0.67	0.23	0.23	0.23	0.23	0.23	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	82	2378	1064	101	2378	1064	98	806	360	184	795	
v/s Ratio Prot		0.48			0.62			0.10			0.16	
v/s Ratio Perm	0.15		0.03	c0.65		0.03	c0.18		0.00	0.06		
v/c Ratio	0.22	0.72	0.04	0.97	0.93	0.04	0.80	0.45	0.01	0.27	0.71	
Uniform Delay, d1	5.7	9.4	5.0	13.9	12.8	5.0	32.8	29.9	26.9	28.6	32.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	1.1	0.0	79.6	6.9	0.0	47.3	1.8	0.0	3.5	5.4	
Delay (s)	7.0	10.5	5.0	93.5	19.7	5.0	80.1	31.8	26.9	32.1	37.5	
Level of Service	A	B	A	F	B	A	F	C	C	C	D	
Approach Delay (s)		10.3			22.4			39.9			37.1	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	21.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX E 2025 BUILD CONDITIONS

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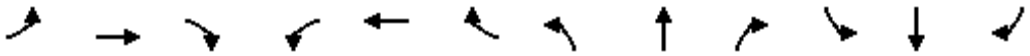
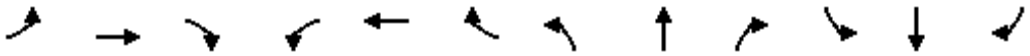


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	234	0	148	50	199	0	0	487	42
Future Volume (vph)	0	0	0	234	0	148	50	199	0	0	487	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5		4.5	4.5	4.5			4.5	
Lane Util. Factor				1.00		1.00	1.00	1.00			1.00	
Frt				1.00		0.85	1.00	1.00			0.99	
Flt Protected				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1770		1583	1770	1863			1843	
Flt Permitted				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1770		1583	1770	1863			1843	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	254	0	161	54	216	0	0	529	46
RTOR Reduction (vph)	0	0	0	0	0	121	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	0	254	0	40	54	216	0	0	570	0
Turn Type				Perm		Perm	Prot	NA			NA	
Protected Phases							5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				12.8		12.8	2.7	29.5			22.3	
Effective Green, g (s)				12.8		12.8	2.7	29.5			22.3	
Actuated g/C Ratio				0.25		0.25	0.05	0.58			0.43	
Clearance Time (s)				4.5		4.5	4.5	4.5			4.5	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				441		394	93	1071			801	
v/s Ratio Prot							c0.03	0.12			c0.31	
v/s Ratio Perm				c0.14		0.03						
v/c Ratio				0.58		0.10	0.58	0.20			0.71	
Uniform Delay, d1				16.9		14.8	23.7	5.2			11.9	
Progression Factor				1.00		1.00	1.00	1.00			1.00	
Incremental Delay, d2				1.8		0.1	8.9	0.1			3.0	
Delay (s)				18.7		14.9	32.7	5.3			14.9	
Level of Service				B		B	C	A			B	
Approach Delay (s)		0.0			17.2			10.8			14.9	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	51.3	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		

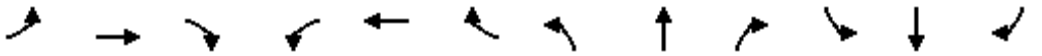
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	0	120	0	0	0	0	214	129	316	412	0
Future Volume (vph)	26	0	120	0	0	0	0	214	129	316	412	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5					4.5		4.5	4.5	
Lane Util. Factor	1.00		1.00					1.00		1.00	1.00	
Frt	1.00		0.85					0.95		1.00	1.00	
Flt Protected	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (prot)	1770		1583					1768		1770	1863	
Flt Permitted	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (perm)	1770		1583					1768		1770	1863	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	0	130	0	0	0	0	233	140	343	448	0
RTOR Reduction (vph)	0	0	116	0	0	0	0	31	0	0	0	0
Lane Group Flow (vph)	28	0	14	0	0	0	0	342	0	343	448	0
Turn Type	Perm		Perm					NA		Prot	NA	
Protected Phases								2		1	6	
Permitted Phases	4		4									
Actuated Green, G (s)	5.1		5.1					15.0		13.9	33.4	
Effective Green, g (s)	5.1		5.1					15.0		13.9	33.4	
Actuated g/C Ratio	0.11		0.11					0.32		0.29	0.70	
Clearance Time (s)	4.5		4.5					4.5		4.5	4.5	
Vehicle Extension (s)	3.0		3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)	190		169					558		517	1309	
v/s Ratio Prot								c0.19		c0.19	0.24	
v/s Ratio Perm	c0.02		0.01									
v/c Ratio	0.15		0.08					0.61		0.66	0.34	
Uniform Delay, d1	19.2		19.1					13.8		14.7	2.8	
Progression Factor	1.00		1.00					1.00		1.00	1.00	
Incremental Delay, d2	0.4		0.2					2.0		3.2	0.2	
Delay (s)	19.6		19.3					15.8		17.9	2.9	
Level of Service	B		B					B		B	A	
Approach Delay (s)		19.4			0.0			15.8			9.4	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	2593	112	121	2734	76	108	306	306	146	385	219
Future Volume (vph)	67	2593	112	121	2734	76	108	306	306	146	385	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6368		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6368		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	2818	122	132	2972	83	117	333	333	159	418	238
RTOR Reduction (vph)	0	7	0	0	0	40	0	0	50	0	0	52
Lane Group Flow (vph)	73	2933	0	132	2972	43	117	333	283	159	418	186
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	2 3	1	6	7
Permitted Phases						8						6
Actuated Green, G (s)	6.4	42.5		5.1	41.2	46.7	5.1	18.9	28.5	5.5	19.3	25.7
Effective Green, g (s)	6.4	42.5		5.1	41.2	46.7	5.1	18.9	28.5	5.5	19.3	25.7
Actuated g/C Ratio	0.07	0.47		0.06	0.46	0.52	0.06	0.21	0.32	0.06	0.21	0.29
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	125	3007		194	3453	900	194	743	501	209	758	531
v/s Ratio Prot	0.04	c0.46		0.04	0.39	0.00	0.03	0.09	c0.18	c0.05	0.12	0.02
v/s Ratio Perm						0.02						0.09
v/c Ratio	0.58	0.98		0.68	0.86	0.05	0.60	0.45	0.57	0.76	0.55	0.35
Uniform Delay, d1	40.5	23.2		41.7	21.8	10.7	41.5	31.0	25.6	41.6	31.5	25.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.8	11.2		9.4	2.4	0.0	5.2	2.0	1.5	15.0	2.9	0.4
Delay (s)	47.3	34.5		51.1	24.2	10.7	46.7	33.0	27.1	56.6	34.4	25.9
Level of Service	D	C		D	C	B	D	C	C	E	C	C
Approach Delay (s)		34.8			25.0			32.5			36.2	
Approach LOS		C			C			C			D	

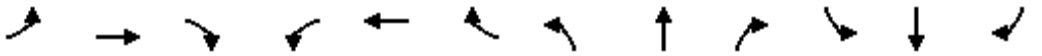
Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	55	288	0	55	477
Future Volume (Veh/h)	0	55	288	0	55	477
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	60	313	0	60	518
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						226
pX, platoon unblocked	0.92					
vC, conflicting volume	951	313			313	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	902	313			313	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	92			95	
cM capacity (veh/h)	269	727			1247	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	60	313	60	518
Volume Left	0	0	60	0
Volume Right	60	0	0	0
cSH	727	1700	1247	1700
Volume to Capacity	0.08	0.18	0.05	0.30
Queue Length 95th (ft)	7	0	4	0
Control Delay (s)	10.4	0.0	8.0	0.0
Lane LOS	B		A	
Approach Delay (s)	10.4	0.0	0.8	
Approach LOS	B			

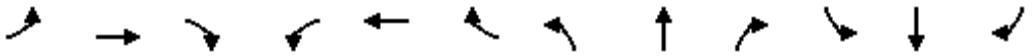
Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	1850	62	91	1735	1010	111	243	183	1416	261	30
Future Volume (vph)	35	1850	62	91	1735	1010	111	243	183	1416	261	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.86	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3104	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3104	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	2011	67	99	1886	1098	121	264	199	1539	284	33
RTOR Reduction (vph)	0	0	41	0	0	412	0	0	37	0	0	22
Lane Group Flow (vph)	38	2011	26	99	1886	686	121	264	162	1031	792	11
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	4.0	59.5	59.5	6.5	62.0	62.0	18.4	18.4	24.9	48.5	48.5	48.5
Effective Green, g (s)	4.0	59.5	59.5	6.5	62.0	62.0	18.4	18.4	24.9	48.5	48.5	48.5
Actuated g/C Ratio	0.03	0.39	0.39	0.04	0.41	0.41	0.12	0.12	0.17	0.32	0.32	0.32
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	46	2005	624	76	2089	650	215	431	261	978	997	508
v/s Ratio Prot	0.02	0.40		c0.06	0.37		0.07	0.07	c0.10	c0.34	0.26	
v/s Ratio Perm			0.02			c0.43						0.01
v/c Ratio	0.83	1.00	0.04	1.30	0.90	1.05	0.56	0.61	0.62	1.05	0.98dl	0.02
Uniform Delay, d1	73.1	45.7	28.2	72.2	41.6	44.5	62.5	62.9	58.6	51.2	46.7	35.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	69.9	20.8	0.0	204.2	5.9	50.6	10.2	6.4	4.5	44.2	4.4	0.0
Delay (s)	143.0	66.5	28.2	276.4	47.6	95.1	72.7	69.2	63.2	95.4	51.1	35.0
Level of Service	F	E	C	F	D	F	E	E	E	F	D	C
Approach Delay (s)		66.7			71.8			67.9			75.4	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM 2000 Control Delay	71.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	150.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		

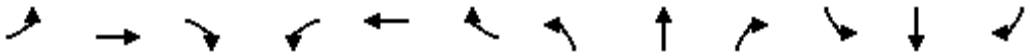
dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	1627	33	59	1734	79	125	412	154	208	462	72
Future Volume (vph)	57	1627	33	59	1734	79	125	412	154	208	462	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3468	
Flt Permitted	0.12	1.00	1.00	0.12	1.00	1.00	0.34	1.00	1.00	0.44	1.00	
Satd. Flow (perm)	226	3539	1583	226	3539	1583	625	3539	1583	825	3468	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	1768	36	64	1885	86	136	448	167	226	502	78
RTOR Reduction (vph)	0	0	16	0	0	39	0	0	19	0	7	0
Lane Group Flow (vph)	62	1768	20	64	1885	47	136	448	148	226	573	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	33.0	33.0	33.0	33.0	33.0	33.0	18.0	18.0	18.0	18.0	18.0	
Effective Green, g (s)	33.0	33.0	33.0	33.0	33.0	33.0	18.0	18.0	18.0	18.0	18.0	
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.55	0.55	0.30	0.30	0.30	0.30	0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	124	1946	870	124	1946	870	187	1061	474	247	1040	
v/s Ratio Prot		0.50			c0.53			0.13			0.17	
v/s Ratio Perm	0.27		0.01	0.28		0.03	0.22		0.09	c0.27		
v/c Ratio	0.50	0.91	0.02	0.52	0.97	0.05	0.73	0.42	0.31	0.91	0.55	
Uniform Delay, d1	8.4	12.1	6.2	8.5	13.0	6.3	18.8	16.8	16.2	20.3	17.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.1	6.6	0.0	3.6	13.6	0.0	21.8	1.2	1.7	38.9	2.1	
Delay (s)	11.5	18.8	6.2	12.1	26.6	6.3	40.6	18.1	17.9	59.2	19.7	
Level of Service	B	B	A	B	C	A	D	B	B	E	B	
Approach Delay (s)		18.3			25.3			22.1			30.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		

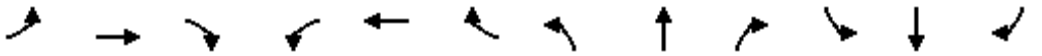
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	57	0	38	60	180	0	0	513	41
Future Volume (vph)	0	0	0	57	0	38	60	180	0	0	513	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5		4.5	4.5	4.5			4.5	
Lane Util. Factor				1.00		1.00	1.00	1.00			1.00	
Frt				1.00		0.85	1.00	1.00			0.99	
Flt Protected				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1770		1583	1770	1863			1844	
Flt Permitted				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1770		1583	1770	1863			1844	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	62	0	41	65	196	0	0	558	45
RTOR Reduction (vph)	0	0	0	0	0	37	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	62	0	4	65	196	0	0	600	0
Turn Type				Perm		Perm	Prot	NA			NA	
Protected Phases							5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				4.1		4.1	2.7	33.7			26.5	
Effective Green, g (s)				4.1		4.1	2.7	33.7			26.5	
Actuated g/C Ratio				0.09		0.09	0.06	0.72			0.57	
Clearance Time (s)				4.5		4.5	4.5	4.5			4.5	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				155		138	102	1341			1044	
v/s Ratio Prot							c0.04	0.11			c0.33	
v/s Ratio Perm				c0.04		0.00						
v/c Ratio				0.40		0.03	0.64	0.15			0.57	
Uniform Delay, d1				20.2		19.5	21.6	2.0			6.5	
Progression Factor				1.00		1.00	1.00	1.00			1.00	
Incremental Delay, d2				1.7		0.1	12.3	0.1			0.8	
Delay (s)				21.9		19.6	33.9	2.1			7.3	
Level of Service				C		B	C	A			A	
Approach Delay (s)		0.0			21.0			10.0			7.3	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	46.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

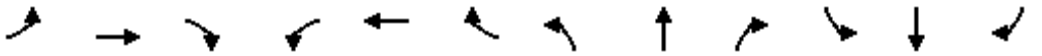
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	0	88	0	0	0	0	222	313	383	187	0
Future Volume (vph)	24	0	88	0	0	0	0	222	313	383	187	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5					4.5		4.5	4.5	
Lane Util. Factor	1.00		1.00					1.00		1.00	1.00	
Frt	1.00		0.85					0.92		1.00	1.00	
Flt Protected	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (prot)	1770		1583					1716		1770	1863	
Flt Permitted	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (perm)	1770		1583					1716		1770	1863	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	0	96	0	0	0	0	241	340	416	203	0
RTOR Reduction (vph)	0	0	89	0	0	0	0	53	0	0	0	0
Lane Group Flow (vph)	26	0	7	0	0	0	0	528	0	416	203	0
Turn Type	Perm		Perm					NA		Prot	NA	
Protected Phases								2		1	6	
Permitted Phases	4		4									
Actuated Green, G (s)	5.2		5.2					26.8		21.3	52.6	
Effective Green, g (s)	5.2		5.2					26.8		21.3	52.6	
Actuated g/C Ratio	0.08		0.08					0.40		0.32	0.79	
Clearance Time (s)	4.5		4.5					4.5		4.5	4.5	
Vehicle Extension (s)	3.0		3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)	137		123					688		564	1466	
v/s Ratio Prot								c0.31		c0.24	0.11	
v/s Ratio Perm	c0.01		0.00									
v/c Ratio	0.19		0.06					0.77		0.74	0.14	
Uniform Delay, d1	28.8		28.5					17.3		20.3	1.7	
Progression Factor	1.00		1.00					1.00		1.00	1.00	
Incremental Delay, d2	0.7		0.2					5.1		5.0	0.0	
Delay (s)	29.5		28.7					22.4		25.3	1.7	
Level of Service	C		C					C		C	A	
Approach Delay (s)		28.9			0.0			22.4			17.6	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	66.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	2075	85	174	2683	139	154	357	295	85	252	175
Future Volume (vph)	144	2075	85	174	2683	139	154	357	295	85	252	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6370		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6370		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	2255	92	189	2916	151	167	388	321	92	274	190
RTOR Reduction (vph)	0	6	0	0	0	67	0	0	50	0	0	49
Lane Group Flow (vph)	157	2341	0	189	2916	84	167	388	271	92	274	141
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	3	1	6	7
Permitted Phases						8			2			6
Actuated Green, G (s)	9.5	37.7		8.3	36.5	42.0	5.5	20.5	28.8	5.5	20.5	30.0
Effective Green, g (s)	9.5	37.7		8.3	36.5	42.0	5.5	20.5	28.8	5.5	20.5	30.0
Actuated g/C Ratio	0.11	0.42		0.09	0.41	0.47	0.06	0.23	0.32	0.06	0.23	0.33
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	186	2668		316	3059	817	209	806	585	209	806	606
v/s Ratio Prot	c0.09	0.37		0.06	c0.39	0.01	c0.05	0.11	c0.04	0.03	0.08	0.02
v/s Ratio Perm						0.05			0.13			0.06
v/c Ratio	0.84	0.88		0.60	0.95	0.10	0.80	0.48	0.46	0.44	0.34	0.23
Uniform Delay, d1	39.5	24.0		39.2	25.9	13.4	41.7	30.1	24.4	40.8	29.1	21.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	27.9	3.6		3.0	8.0	0.1	18.9	2.1	0.6	1.5	1.1	0.2
Delay (s)	67.4	27.6		42.3	33.9	13.5	60.6	32.2	25.0	42.2	30.2	21.9
Level of Service	E	C		D	C	B	E	C	C	D	C	C
Approach Delay (s)		30.1			33.5			35.0			29.4	
Approach LOS		C			C			C			C	

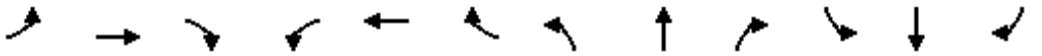
Intersection Summary			
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	55	480	0	55	220
Future Volume (Veh/h)	0	55	480	0	55	220
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	60	522	0	60	239
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						226
pX, platoon unblocked						
vC, conflicting volume	881	522			522	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	881	522			522	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	89			94	
cM capacity (veh/h)	299	555			1044	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	60	522	60	239
Volume Left	0	0	60	0
Volume Right	60	0	0	0
cSH	555	1700	1044	1700
Volume to Capacity	0.11	0.31	0.06	0.14
Queue Length 95th (ft)	9	0	5	0
Control Delay (s)	12.3	0.0	8.7	0.0
Lane LOS	B		A	
Approach Delay (s)	12.3	0.0	1.7	
Approach LOS	B			

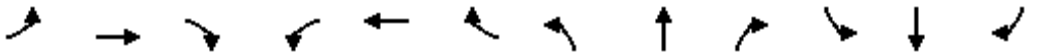
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1453	28	93	1863	1034	104	440	262	950	236	8
Future Volume (vph)	24	1453	28	93	1863	1034	104	440	262	950	236	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.86	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3115	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3115	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	1579	30	101	2025	1124	113	478	285	1033	257	9
RTOR Reduction (vph)	0	0	18	0	0	347	0	0	39	0	0	7
Lane Group Flow (vph)	26	1579	12	101	2025	777	113	478	246	692	598	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	2.9	52.6	52.6	10.4	60.1	60.1	18.9	18.9	29.3	29.3	29.3	29.3
Effective Green, g (s)	2.9	52.6	52.6	10.4	60.1	60.1	18.9	18.9	29.3	29.3	29.3	29.3
Actuated g/C Ratio	0.02	0.41	0.41	0.08	0.47	0.47	0.15	0.15	0.23	0.23	0.23	0.23
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	39	2070	644	142	2365	736	258	517	358	690	706	358
v/s Ratio Prot	0.01	0.31		c0.06	0.40		0.06	c0.14	0.16	c0.23	0.19	
v/s Ratio Perm			0.01			c0.49						0.00
v/c Ratio	0.67	0.76	0.02	0.71	0.86	1.06	0.44	0.92	0.69	1.00	0.92dl	0.01
Uniform Delay, d1	62.7	32.9	22.9	57.9	30.7	34.5	50.3	54.4	45.8	49.9	47.8	38.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.5	1.7	0.0	15.5	3.3	49.0	5.3	24.7	5.4	35.0	9.3	0.0
Delay (s)	98.2	34.7	22.9	73.4	34.0	83.6	55.6	79.1	51.2	84.9	57.1	38.7
Level of Service	F	C	C	E	C	F	E	E	D	F	E	D
Approach Delay (s)		35.4			52.4			67.0			71.8	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	53.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	129.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	91.6%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	1601	58	92	2051	59	72	336	15	47	483	47
Future Volume (vph)	17	1601	58	92	2051	59	72	336	15	47	483	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3492	
Flt Permitted	0.07	1.00	1.00	0.08	1.00	1.00	0.22	1.00	1.00	0.43	1.00	
Satd. Flow (perm)	121	3539	1583	150	3539	1583	404	3539	1583	795	3492	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	1740	63	100	2229	64	78	365	16	51	525	51
RTOR Reduction (vph)	0	0	13	0	0	20	0	0	13	0	8	0
Lane Group Flow (vph)	18	1740	50	100	2229	44	78	365	3	51	568	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	61.5	61.5	61.5	61.5	61.5	61.5	19.5	19.5	19.5	19.5	19.5	
Effective Green, g (s)	61.5	61.5	61.5	61.5	61.5	61.5	19.5	19.5	19.5	19.5	19.5	
Actuated g/C Ratio	0.68	0.68	0.68	0.68	0.68	0.68	0.22	0.22	0.22	0.22	0.22	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	82	2418	1081	102	2418	1081	87	766	342	172	756	
v/s Ratio Prot		0.49			0.63			0.10			0.16	
v/s Ratio Perm	0.15		0.03	c0.67		0.03	c0.19		0.00	0.06		
v/c Ratio	0.22	0.72	0.05	0.98	0.92	0.04	0.90	0.48	0.01	0.30	0.75	
Uniform Delay, d1	5.3	8.9	4.7	13.7	12.2	4.6	34.3	30.8	27.7	29.5	33.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	1.0	0.0	82.5	6.5	0.0	71.0	2.1	0.1	4.4	6.8	
Delay (s)	6.7	9.9	4.7	96.2	18.7	4.7	105.3	32.9	27.7	33.9	39.8	
Level of Service	A	A	A	F	B	A	F	C	C	C	D	
Approach Delay (s)		9.7			21.5			45.0			39.3	
Approach LOS		A			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX E 2045 NO BUILD CONDITIONS

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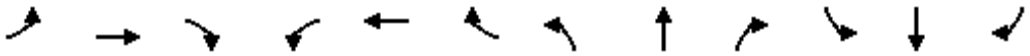
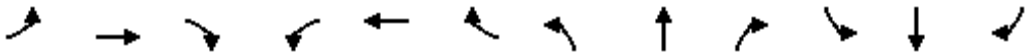


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	0	0	492	0	241	38	377	0	0	456	90
Future Volume (vph)	0	0	0	492	0	241	38	377	0	0	456	90
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	535	0	262	41	410	0	0	496	98

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	535	262	41	410	594
Volume Left (vph)	535	0	41	0	0
Volume Right (vph)	0	262	0	0	98
Hadj (s)	0.53	-0.67	0.53	0.03	-0.06
Departure Headway (s)	8.0	6.8	8.2	7.7	7.3
Degree Utilization, x	1.19	0.49	0.09	0.88	1.21
Capacity (veh/h)	457	526	433	464	496
Control Delay (s)	128.8	15.0	10.8	43.5	135.8
Approach Delay (s)	91.4		40.5		135.8
Approach LOS	F		E		F

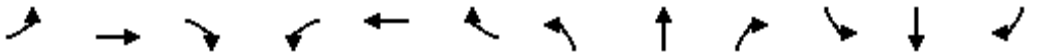
Intersection Summary				
Delay	93.2			
Level of Service	F			
Intersection Capacity Utilization	88.4%	ICU Level of Service	E	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	88	0	36	0	0	0	0	327	73	594	336	0
Future Volume (vph)	88	0	36	0	0	0	0	327	73	594	336	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	96	0	39	0	0	0	0	355	79	646	365	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total (vph)	96	39	434	646	365
Volume Left (vph)	96	0	0	646	0
Volume Right (vph)	0	39	79	0	0
Hadj (s)	0.53	-0.67	-0.08	0.53	0.03
Departure Headway (s)	8.0	6.8	5.8	6.1	5.6
Degree Utilization, x	0.21	0.07	0.70	1.09	0.57
Capacity (veh/h)	435	509	607	589	639
Control Delay (s)	11.9	9.1	21.3	87.0	14.4
Approach Delay (s)	11.1		21.3	60.8	
Approach LOS	B		C	F	

Intersection Summary				
Delay	45.7			
Level of Service	E			
Intersection Capacity Utilization	88.4%	ICU Level of Service	E	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	3614	157	115	2575	72	117	331	331	128	416	238
Future Volume (vph)	93	3614	157	115	2575	72	117	331	331	128	416	238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6368		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6368		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	3928	171	125	2799	78	127	360	360	139	452	259
RTOR Reduction (vph)	0	5	0	0	0	30	0	0	68	0	0	38
Lane Group Flow (vph)	101	4094	0	125	2799	48	127	360	292	139	452	221
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	2 3	1	6	7
Permitted Phases						8						6
Actuated Green, G (s)	12.2	80.5		5.7	74.0	80.3	6.1	19.5	29.7	6.3	19.7	31.9
Effective Green, g (s)	12.2	80.5		5.7	74.0	80.3	6.1	19.5	29.7	6.3	19.7	31.9
Actuated g/C Ratio	0.09	0.62		0.04	0.57	0.62	0.05	0.15	0.23	0.05	0.15	0.25
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	166	3943		150	4294	1032	161	530	361	166	536	443
v/s Ratio Prot	0.06	c0.64		0.04	0.37	0.00	0.04	0.10	c0.18	c0.04	0.13	0.05
v/s Ratio Perm						0.03						0.09
v/c Ratio	0.61	1.04		0.83	0.65	0.05	0.79	0.68	0.81	0.84	0.84	0.50
Uniform Delay, d1	56.6	24.8		61.7	19.2	9.8	61.3	52.3	47.5	61.3	53.6	42.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.2	25.6		30.9	0.4	0.0	22.1	6.9	12.5	29.1	14.9	0.9
Delay (s)	62.8	50.4		92.6	19.5	9.8	83.4	59.2	60.0	90.4	68.6	43.1
Level of Service	E	D		F	B	A	F	E	E	F	E	D
Approach Delay (s)		50.7			22.3			63.2			64.4	
Approach LOS		D			C			E			E	

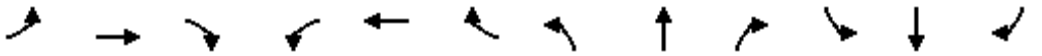
Intersection Summary			
HCM 2000 Control Delay	43.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	400	0	0	372
Future Volume (Veh/h)	0	0	400	0	0	372
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	435	0	0	404
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	839	435			435	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	839	435			435	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	336	621			1125	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	0	435	0	404
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.26	0.00	0.24
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS	A			

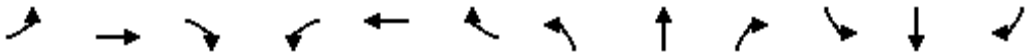
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	24.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	1993	67	94	1867	1093	121	265	194	1537	285	33
Future Volume (vph)	38	1993	67	94	1867	1093	121	265	194	1537	285	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.86	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3105	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3105	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	2166	73	102	2029	1188	132	288	211	1671	310	36
RTOR Reduction (vph)	0	0	46	0	0	415	0	0	36	0	0	24
Lane Group Flow (vph)	41	2166	27	102	2029	773	132	288	175	1120	861	12
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	4.0	56.4	56.4	8.5	60.9	60.9	19.5	19.5	28.0	48.5	48.5	48.5
Effective Green, g (s)	4.0	56.4	56.4	8.5	60.9	60.9	19.5	19.5	28.0	48.5	48.5	48.5
Actuated g/C Ratio	0.03	0.37	0.37	0.06	0.40	0.40	0.13	0.13	0.19	0.32	0.32	0.32
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	46	1900	591	99	2052	638	228	457	293	978	997	508
v/s Ratio Prot	0.02	0.43		c0.06	0.40		0.07	c0.08	0.11	c0.37	0.28	
v/s Ratio Perm			0.02			c0.49						0.01
v/c Ratio	0.89	1.14	0.05	1.03	0.99	1.21	0.58	0.63	0.60	1.15	1.06dl	0.02
Uniform Delay, d1	73.2	47.2	30.1	71.2	44.7	45.0	61.8	62.3	56.3	51.2	48.1	35.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	91.9	69.9	0.0	98.9	17.1	109.2	10.3	6.5	3.3	77.6	7.9	0.0
Delay (s)	165.1	117.2	30.1	170.1	61.7	154.2	72.1	68.7	59.6	128.8	56.0	35.0
Level of Service	F	F	C	F	E	F	E	E	E	F	E	D
Approach Delay (s)		115.3			98.2			66.4			96.0	
Approach LOS		F			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	99.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	150.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		

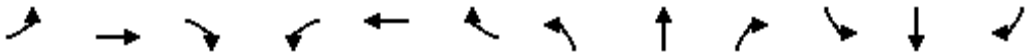
dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	1809	38	64	1930	87	141	465	171	233	522	82
Future Volume (vph)	64	1809	38	64	1930	87	141	465	171	233	522	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3467	
Flt Permitted	0.05	1.00	1.00	0.05	1.00	1.00	0.25	1.00	1.00	0.35	1.00	
Satd. Flow (perm)	96	3539	1583	96	3539	1583	473	3539	1583	659	3467	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	1966	41	70	2098	95	153	505	186	253	567	89
RTOR Reduction (vph)	0	0	12	0	0	26	0	0	9	0	6	0
Lane Group Flow (vph)	70	1966	29	70	2098	69	153	505	177	253	650	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	77.5	77.5	77.5	77.5	77.5	77.5	43.5	43.5	43.5	43.5	43.5	
Effective Green, g (s)	77.5	77.5	77.5	77.5	77.5	77.5	43.5	43.5	43.5	43.5	43.5	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60	0.60	0.33	0.33	0.33	0.33	0.33	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	57	2109	943	57	2109	943	158	1184	529	220	1160	
v/s Ratio Prot		0.56			0.59			0.14			0.19	
v/s Ratio Perm	c0.73		0.02	0.73		0.04	0.32		0.11	c0.38		
v/c Ratio	1.23	0.93	0.03	1.23	0.99	0.07	0.97	0.43	0.34	1.15	0.56	
Uniform Delay, d1	26.2	23.9	10.8	26.2	26.0	11.1	42.6	33.6	32.4	43.2	35.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	193.0	8.2	0.0	193.0	18.3	0.0	63.7	1.1	1.7	107.1	2.0	
Delay (s)	219.3	32.1	10.8	219.3	44.3	11.1	106.3	34.7	34.1	150.3	37.4	
Level of Service	F	C	B	F	D	B	F	C	C	F	D	
Approach Delay (s)		38.0			48.3			47.5			68.8	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	47.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

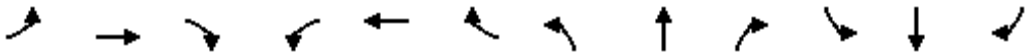
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	0	0	71	0	28	263	738	0	0	603	88
Future Volume (vph)	0	0	0	71	0	28	263	738	0	0	603	88
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	77	0	30	286	802	0	0	655	96

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	77	30	286	802	751
Volume Left (vph)	77	0	286	0	0
Volume Right (vph)	0	30	0	0	96
Hadj (s)	0.53	-0.67	0.53	0.03	-0.04
Departure Headway (s)	8.2	7.0	6.1	5.6	5.7
Degree Utilization, x	0.18	0.06	0.48	1.25	1.20
Capacity (veh/h)	432	505	585	653	635
Control Delay (s)	11.7	9.2	13.5	142.1	124.0
Approach Delay (s)	11.0		108.3		124.0
Approach LOS	B		F		F

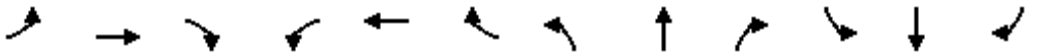
Intersection Summary				
Delay	109.0			
Level of Service	F			
Intersection Capacity Utilization	124.2%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	180	0	118	0	0	0	0	836	380	426	247	0
Future Volume (vph)	180	0	118	0	0	0	0	836	380	426	247	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	196	0	128	0	0	0	0	909	413	463	268	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total (vph)	196	128	1322	463	268
Volume Left (vph)	196	0	0	463	0
Volume Right (vph)	0	128	413	0	0
Hadj (s)	0.53	-0.67	-0.15	0.53	0.03
Departure Headway (s)	8.1	6.9	6.5	7.0	6.5
Degree Utilization, x	0.44	0.25	2.38	0.91	0.49
Capacity (veh/h)	435	507	567	499	545
Control Delay (s)	16.2	11.0	642.8	45.3	14.4
Approach Delay (s)	14.1		642.8	34.0	
Approach LOS	B		F	D	

Intersection Summary				
Delay	369.9			
Level of Service	F			
Intersection Capacity Utilization	124.2%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	3177	131	235	3631	189	222	514	423	122	361	250
Future Volume (vph)	222	3177	131	235	3631	189	222	514	423	122	361	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6370		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6370		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	241	3453	142	255	3947	205	241	559	460	133	392	272
RTOR Reduction (vph)	0	4	0	0	0	32	0	0	32	0	0	55
Lane Group Flow (vph)	241	3591	0	255	3947	173	241	559	428	133	392	217
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	3	1	6	7
Permitted Phases						8			2			6
Actuated Green, G (s)	20.5	82.7		17.3	79.5	86.2	11.5	25.3	42.6	6.7	20.5	41.0
Effective Green, g (s)	20.5	82.7		17.3	79.5	86.2	11.5	25.3	42.6	6.7	20.5	41.0
Actuated g/C Ratio	0.14	0.55		0.12	0.53	0.57	0.08	0.17	0.28	0.04	0.14	0.27
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	241	3511		395	3998	957	263	596	497	153	483	480
v/s Ratio Prot	c0.14	c0.56		0.07	0.52	0.01	c0.07	0.16	c0.10	0.04	0.11	0.06
v/s Ratio Perm						0.10			0.17			0.08
v/c Ratio	1.00	1.02		0.65	0.99	0.18	0.92	0.94	0.86	0.87	0.81	0.45
Uniform Delay, d1	64.8	33.6		63.4	34.8	15.1	68.8	61.6	50.9	71.2	62.9	45.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	58.0	21.4		3.6	11.3	0.1	33.8	24.4	14.3	37.2	13.8	0.7
Delay (s)	122.7	55.0		67.0	46.1	15.2	102.6	85.9	65.2	108.4	76.7	45.9
Level of Service	F	E		E	D	B	F	F	E	F	E	D
Approach Delay (s)		59.3			45.9			81.6			71.5	
Approach LOS		E			D			F			E	

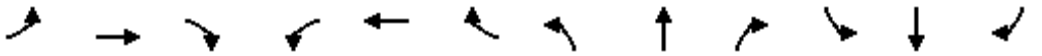
Intersection Summary			
HCM 2000 Control Delay	57.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	1216	0	0	365
Future Volume (Veh/h)	0	0	1216	0	0	365
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1322	0	0	397
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1719	1322			1322	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1719	1322			1322	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	99	191			523	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	0	1322	0	397
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.00	0.78	0.00	0.23
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS	A			

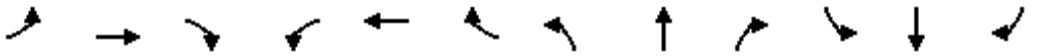
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	1563	31	96	2011	1122	114	482	282	1029	258	8
Future Volume (vph)	26	1563	31	96	2011	1122	114	482	282	1029	258	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.86	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3115	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3115	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	1699	34	104	2186	1220	124	524	307	1118	280	9
RTOR Reduction (vph)	0	0	20	0	0	334	0	0	36	0	0	7
Lane Group Flow (vph)	28	1699	14	104	2186	886	124	524	271	749	649	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	3.0	58.0	58.0	11.4	66.4	66.4	21.0	21.0	32.4	31.5	31.5	31.5
Effective Green, g (s)	3.0	58.0	58.0	11.4	66.4	66.4	21.0	21.0	32.4	31.5	31.5	31.5
Actuated g/C Ratio	0.02	0.41	0.41	0.08	0.47	0.47	0.15	0.15	0.23	0.23	0.23	0.23
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	37	2108	656	144	2413	751	265	531	366	685	701	356
v/s Ratio Prot	0.02	0.33		0.06	0.43		0.07	c0.15	c0.17	c0.25	0.21	
v/s Ratio Perm			0.01			c0.56						0.00
v/c Ratio	0.76	0.81	0.02	0.72	0.91	1.18	0.47	0.99	0.74	1.09	1.01dl	0.01
Uniform Delay, d1	68.1	36.0	24.2	62.7	33.9	36.8	54.3	59.3	49.8	54.2	53.1	42.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	59.7	2.3	0.0	16.3	5.4	94.6	5.8	35.9	7.8	62.7	18.1	0.0
Delay (s)	127.8	38.4	24.2	79.0	39.2	131.3	60.2	95.3	57.7	116.9	71.2	42.1
Level of Service	F	D	C	E	D	F	E	F	E	F	E	D
Approach Delay (s)		39.5			72.4			78.6			95.3	
Approach LOS		D			E			E			F	

Intersection Summary			
HCM 2000 Control Delay	69.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	139.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	1883	69	107	2422	68	86	401	16	54	576	57
Future Volume (vph)	20	1883	69	107	2422	68	86	401	16	54	576	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3491	
Flt Permitted	0.08	1.00	1.00	0.08	1.00	1.00	0.22	1.00	1.00	0.38	1.00	
Satd. Flow (perm)	142	3539	1583	142	3539	1583	403	3539	1583	704	3491	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	2047	75	116	2633	74	93	436	17	59	626	62
RTOR Reduction (vph)	0	0	10	0	0	25	0	0	13	0	3	0
Lane Group Flow (vph)	22	2047	65	116	2633	49	93	436	4	59	685	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	52.5	52.5	52.5	52.5	52.5	52.5	18.5	18.5	18.5	18.5	18.5	
Effective Green, g (s)	52.5	52.5	52.5	52.5	52.5	52.5	18.5	18.5	18.5	18.5	18.5	
Actuated g/C Ratio	0.66	0.66	0.66	0.66	0.66	0.66	0.23	0.23	0.23	0.23	0.23	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	93	2322	1038	93	2322	1038	93	818	366	162	807	
v/s Ratio Prot		0.58			0.74			0.12			0.20	
v/s Ratio Perm	0.16		0.04	c0.82		0.03	c0.23		0.00	0.08		
v/c Ratio	0.24	0.88	0.06	1.25	1.13	0.05	1.00	0.53	0.01	0.36	0.85	
Uniform Delay, d1	5.6	11.2	4.9	13.8	13.8	4.9	30.8	27.0	23.7	25.8	29.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	4.3	0.0	173.8	66.2	0.0	93.3	2.5	0.1	6.2	10.8	
Delay (s)	6.9	15.5	5.0	187.5	80.0	4.9	124.1	29.4	23.8	32.0	40.2	
Level of Service	A	B	A	F	E	A	F	C	C	C	D	
Approach Delay (s)		15.1			82.4			45.4			39.6	
Approach LOS		B			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	51.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	108.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX E 2045 BUILD CONDITIONS

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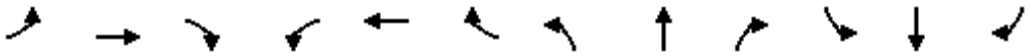
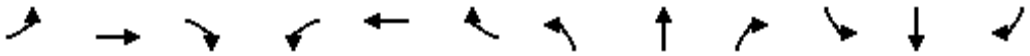


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	506	0	241	89	377	0	0	456	90
Future Volume (vph)	0	0	0	506	0	241	89	377	0	0	456	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5		4.5	4.5	4.5			4.5	
Lane Util. Factor				1.00		1.00	1.00	1.00			1.00	
Frt				1.00		0.85	1.00	1.00			0.98	
Flt Protected				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1770		1583	1770	1863			1821	
Flt Permitted				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1770		1583	1770	1863			1821	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	550	0	262	97	410	0	0	496	98
RTOR Reduction (vph)	0	0	0	0	0	158	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	550	0	104	97	410	0	0	586	0
Turn Type				Perm		Perm	Prot	NA			NA	
Protected Phases							5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				28.7		28.7	5.7	39.7			29.5	
Effective Green, g (s)				28.7		28.7	5.7	39.7			29.5	
Actuated g/C Ratio				0.37		0.37	0.07	0.51			0.38	
Clearance Time (s)				4.5		4.5	4.5	4.5			4.5	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				656		586	130	955			694	
v/s Ratio Prot							c0.05	0.22			c0.32	
v/s Ratio Perm				c0.31		0.07						
v/c Ratio				0.84		0.18	0.75	0.43			0.84	
Uniform Delay, d1				22.2		16.4	35.1	11.8			21.9	
Progression Factor				1.00		1.00	1.00	1.00			1.00	
Incremental Delay, d2				9.2		0.1	20.6	0.3			9.2	
Delay (s)				31.4		16.5	55.7	12.1			31.1	
Level of Service				C		B	E	B			C	
Approach Delay (s)		0.0			26.6			20.4			31.1	
Approach LOS		A			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	77.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	93.9%	ICU Level of Service	F
Analysis Period (min)	15		

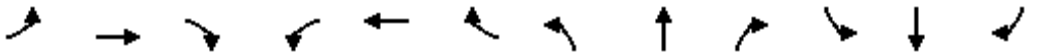
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	0	87	0	0	0	0	378	87	594	350	0
Future Volume (vph)	88	0	87	0	0	0	0	378	87	594	350	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5					4.5		4.5	4.5	
Lane Util. Factor	1.00		1.00					1.00		1.00	1.00	
Frt	1.00		0.85					0.97		1.00	1.00	
Flt Protected	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (prot)	1770		1583					1816		1770	1863	
Flt Permitted	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (perm)	1770		1583					1816		1770	1863	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	0	95	0	0	0	0	411	95	646	380	0
RTOR Reduction (vph)	0	0	85	0	0	0	0	9	0	0	0	0
Lane Group Flow (vph)	96	0	10	0	0	0	0	497	0	646	380	0
Turn Type	Perm		Perm					NA		Prot	NA	
Protected Phases								2		1	6	
Permitted Phases	4		4									
Actuated Green, G (s)	8.1		8.1					24.9		33.0	62.4	
Effective Green, g (s)	8.1		8.1					24.9		33.0	62.4	
Actuated g/C Ratio	0.10		0.10					0.31		0.42	0.78	
Clearance Time (s)	4.5		4.5					4.5		4.5	4.5	
Vehicle Extension (s)	3.0		3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)	180		161					568		734	1462	
v/s Ratio Prot								c0.27		c0.37	0.20	
v/s Ratio Perm	c0.05		0.01									
v/c Ratio	0.53		0.06					0.88		0.88	0.26	
Uniform Delay, d1	33.9		32.3					25.8		21.4	2.3	
Progression Factor	1.00		1.00					1.00		1.00	1.00	
Incremental Delay, d2	3.0		0.2					14.1		11.9	0.1	
Delay (s)	36.9		32.4					39.9		33.3	2.4	
Level of Service	D		C					D		C	A	
Approach Delay (s)		34.7			0.0			39.9			21.9	
Approach LOS		C			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	28.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	93.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	3627	157	115	2582	72	117	331	331	128	416	238
Future Volume (vph)	93	3627	157	115	2582	72	117	331	331	128	416	238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6368		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6368		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	3942	171	125	2807	78	127	360	360	139	452	259
RTOR Reduction (vph)	0	4	0	0	0	29	0	0	64	0	0	36
Lane Group Flow (vph)	101	4109	0	125	2807	49	127	360	296	139	452	223
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	2 3	1	6	7
Permitted Phases						8						6
Actuated Green, G (s)	13.0	88.5		6.1	81.6	88.3	6.3	20.7	31.3	6.7	21.1	34.1
Effective Green, g (s)	13.0	88.5		6.1	81.6	88.3	6.3	20.7	31.3	6.7	21.1	34.1
Actuated g/C Ratio	0.09	0.63		0.04	0.58	0.63	0.04	0.15	0.22	0.05	0.15	0.24
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	164	4025		149	4397	1049	154	523	353	164	533	436
v/s Ratio Prot	0.06	c0.65		0.04	0.37	0.00	0.04	0.10	c0.19	c0.04	0.13	0.05
v/s Ratio Perm						0.03						0.09
v/c Ratio	0.62	1.02		0.84	0.64	0.05	0.82	0.69	0.84	0.85	0.85	0.51
Uniform Delay, d1	61.1	25.8		66.5	19.4	9.8	66.3	56.6	51.9	66.1	57.9	45.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.7	19.7		31.8	0.3	0.0	28.7	7.2	15.9	31.2	15.4	1.0
Delay (s)	67.8	45.5		98.3	19.7	9.9	95.0	63.8	67.9	97.3	73.3	46.8
Level of Service	E	D		F	B	A	F	E	E	F	E	D
Approach Delay (s)		46.0			22.7			70.2			69.1	
Approach LOS		D			C			E			E	

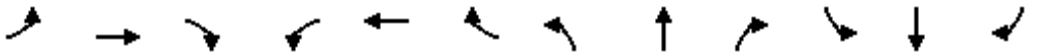
Intersection Summary			
HCM 2000 Control Delay	42.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	66	400	0	66	372
Future Volume (Veh/h)	0	66	400	0	66	372
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	72	435	0	72	404
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						226
pX, platoon unblocked	0.96					
vC, conflicting volume	983	435			435	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	960	435			435	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	88			94	
cM capacity (veh/h)	255	621			1125	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	72	435	72	404
Volume Left	0	0	72	0
Volume Right	72	0	0	0
cSH	621	1700	1125	1700
Volume to Capacity	0.12	0.26	0.06	0.24
Queue Length 95th (ft)	10	0	5	0
Control Delay (s)	11.6	0.0	8.4	0.0
Lane LOS	B		A	
Approach Delay (s)	11.6	0.0	1.3	
Approach LOS	B			

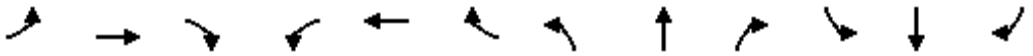
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	2023	67	100	1897	1104	121	265	200	1548	285	33
Future Volume (vph)	38	2023	67	100	1897	1104	121	265	200	1548	285	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.86	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3104	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3104	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	2199	73	109	2062	1200	132	288	217	1683	310	36
RTOR Reduction (vph)	0	0	45	0	0	411	0	0	36	0	0	25
Lane Group Flow (vph)	41	2199	28	109	2062	789	132	288	181	1128	865	11
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	5.2	58.4	58.4	9.5	62.7	62.7	19.5	19.5	29.0	45.5	45.5	45.5
Effective Green, g (s)	5.2	58.4	58.4	9.5	62.7	62.7	19.5	19.5	29.0	45.5	45.5	45.5
Actuated g/C Ratio	0.03	0.39	0.39	0.06	0.42	0.42	0.13	0.13	0.19	0.30	0.30	0.30
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	60	1967	612	111	2112	657	228	457	304	917	935	477
v/s Ratio Prot	0.02	0.43		c0.06	0.41		0.07	c0.08	0.11	c0.37	0.28	
v/s Ratio Perm			0.02			c0.50						0.01
v/c Ratio	0.68	1.12	0.05	0.98	0.98	1.20	0.58	0.63	0.60	1.23	1.14dl	0.02
Uniform Delay, d1	72.0	46.3	28.9	70.6	43.4	44.1	61.8	62.3	55.6	52.7	51.1	37.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	27.6	60.7	0.0	79.3	14.3	104.6	10.3	6.5	3.1	113.1	14.5	0.0
Delay (s)	99.6	106.9	28.9	149.9	57.7	148.7	72.1	68.7	58.8	165.8	65.6	37.1
Level of Service	F	F	C	F	E	F	E	E	E	F	E	D
Approach Delay (s)		104.3			93.1			66.0			120.8	
Approach LOS		F			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	100.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	150.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

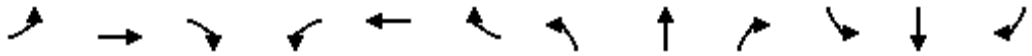
dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	1837	38	66	1958	89	141	465	173	235	522	82
Future Volume (vph)	64	1837	38	66	1958	89	141	465	173	235	522	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3467	
Flt Permitted	0.06	1.00	1.00	0.06	1.00	1.00	0.26	1.00	1.00	0.36	1.00	
Satd. Flow (perm)	106	3539	1583	106	3539	1583	484	3539	1583	670	3467	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	1997	41	72	2128	97	153	505	188	255	567	89
RTOR Reduction (vph)	0	0	13	0	0	28	0	0	9	0	5	0
Lane Group Flow (vph)	70	1997	28	72	2128	69	153	505	179	255	651	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	70.5	70.5	70.5	70.5	70.5	70.5	40.5	40.5	40.5	40.5	40.5	
Effective Green, g (s)	70.5	70.5	70.5	70.5	70.5	70.5	40.5	40.5	40.5	40.5	40.5	
Actuated g/C Ratio	0.59	0.59	0.59	0.59	0.59	0.59	0.34	0.34	0.34	0.34	0.34	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	62	2079	930	62	2079	930	163	1194	534	226	1170	
v/s Ratio Prot		0.56			0.60			0.14			0.19	
v/s Ratio Perm	0.66		0.02	c0.68		0.04	0.32		0.11	c0.38		
v/c Ratio	1.13	0.96	0.03	1.16	1.02	0.07	0.94	0.42	0.33	1.13	0.56	
Uniform Delay, d1	24.8	23.4	10.4	24.8	24.8	10.7	38.5	30.7	29.7	39.8	32.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	153.9	11.8	0.0	164.7	26.0	0.0	55.9	1.1	1.7	98.7	1.9	
Delay (s)	178.7	35.3	10.4	189.4	50.7	10.7	94.4	31.8	31.4	138.5	34.3	
Level of Service	F	D	B	F	D	B	F	C	C	F	C	
Approach Delay (s)		39.6			53.4			43.0			63.5	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	48.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		

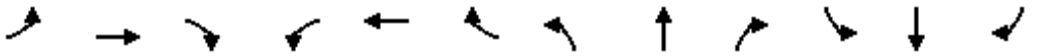
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	85	0	28	314	738	0	0	603	88
Future Volume (vph)	0	0	0	85	0	28	314	738	0	0	603	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5		4.5	4.5	4.5			4.5	
Lane Util. Factor				1.00		1.00	1.00	1.00			1.00	
Frt				1.00		0.85	1.00	1.00			0.98	
Flt Protected				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1770		1583	1770	1863			1831	
Flt Permitted				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1770		1583	1770	1863			1831	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	92	0	30	341	802	0	0	655	96
RTOR Reduction (vph)	0	0	0	0	0	27	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	92	0	3	341	802	0	0	748	0
Turn Type				Perm		Perm	Prot	NA			NA	
Protected Phases							5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				9.3		9.3	27.4	83.9			52.0	
Effective Green, g (s)				9.3		9.3	27.4	83.9			52.0	
Actuated g/C Ratio				0.09		0.09	0.27	0.82			0.51	
Clearance Time (s)				4.5		4.5	4.5	4.5			4.5	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				161		144	474	1529			931	
v/s Ratio Prot							c0.19	0.43			c0.41	
v/s Ratio Perm				c0.05		0.00						
v/c Ratio				0.57		0.02	0.72	0.52			0.80	
Uniform Delay, d1				44.5		42.3	33.9	2.9			20.8	
Progression Factor				1.00		1.00	1.00	1.00			1.00	
Incremental Delay, d2				4.8		0.1	5.2	0.3			5.1	
Delay (s)				49.4		42.3	39.1	3.2			25.9	
Level of Service				D		D	D	A			C	
Approach Delay (s)		0.0			47.6			13.9			25.9	
Approach LOS		A			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	102.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	129.5%	ICU Level of Service	H
Analysis Period (min)	15		

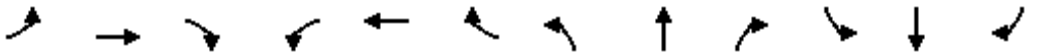
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	0	169	0	0	0	0	887	394	426	261	0
Future Volume (vph)	180	0	169	0	0	0	0	887	394	426	261	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5					4.5		4.5	4.5	
Lane Util. Factor	1.00		1.00					1.00		1.00	1.00	
Frt	1.00		0.85					0.96		1.00	1.00	
Flt Protected	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (prot)	1770		1583					1785		1770	1863	
Flt Permitted	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (perm)	1770		1583					1785		1770	1863	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	0	184	0	0	0	0	964	428	463	284	0
RTOR Reduction (vph)	0	0	162	0	0	0	0	11	0	0	0	0
Lane Group Flow (vph)	196	0	22	0	0	0	0	1381	0	463	284	0
Turn Type	Perm		Perm					NA		Prot	NA	
Protected Phases								2		1	6	
Permitted Phases	4		4									
Actuated Green, G (s)	17.9		17.9					89.0		29.5	123.0	
Effective Green, g (s)	17.9		17.9					89.0		29.5	123.0	
Actuated g/C Ratio	0.12		0.12					0.59		0.20	0.82	
Clearance Time (s)	4.5		4.5					4.5		4.5	4.5	
Vehicle Extension (s)	3.0		3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)	211		189					1059		348	1528	
v/s Ratio Prot								c0.77		c0.26	0.15	
v/s Ratio Perm	c0.11		0.01									
v/c Ratio	0.93		0.12					1.30		1.33	0.19	
Uniform Delay, d1	65.4		58.9					30.5		60.2	2.8	
Progression Factor	1.00		1.00					1.00		1.00	1.00	
Incremental Delay, d2	42.0		0.3					143.9		167.2	0.1	
Delay (s)	107.4		59.2					174.4		227.4	2.9	
Level of Service	F		E					F		F	A	
Approach Delay (s)		84.1			0.0			174.4			142.1	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM 2000 Control Delay	151.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	149.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	129.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	3190	131	235	3638	189	222	514	423	122	361	250
Future Volume (vph)	222	3190	131	235	3638	189	222	514	423	122	361	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6370		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6370		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	241	3467	142	255	3954	205	241	559	460	133	392	272
RTOR Reduction (vph)	0	4	0	0	0	32	0	0	32	0	0	55
Lane Group Flow (vph)	241	3605	0	255	3954	173	241	559	428	133	392	217
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	3	1	6	7
Permitted Phases						8			2			6
Actuated Green, G (s)	20.5	82.7		17.3	79.5	86.2	11.5	25.3	42.6	6.7	20.5	41.0
Effective Green, g (s)	20.5	82.7		17.3	79.5	86.2	11.5	25.3	42.6	6.7	20.5	41.0
Actuated g/C Ratio	0.14	0.55		0.12	0.53	0.57	0.08	0.17	0.28	0.04	0.14	0.27
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	241	3511		395	3998	957	263	596	497	153	483	480
v/s Ratio Prot	c0.14	c0.57		0.07	0.52	0.01	c0.07	0.16	c0.10	0.04	0.11	0.06
v/s Ratio Perm						0.10			0.17			0.08
v/c Ratio	1.00	1.03		0.65	0.99	0.18	0.92	0.94	0.86	0.87	0.81	0.45
Uniform Delay, d1	64.8	33.6		63.4	34.8	15.1	68.8	61.6	50.9	71.2	62.9	45.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	58.0	22.6		3.6	11.7	0.1	33.8	24.4	14.3	37.2	13.8	0.7
Delay (s)	122.7	56.2		67.0	46.5	15.2	102.6	85.9	65.2	108.4	76.7	45.9
Level of Service	F	E		E	D	B	F	F	E	F	E	D
Approach Delay (s)		60.4			46.2			81.6			71.5	
Approach LOS		E			D			F			E	

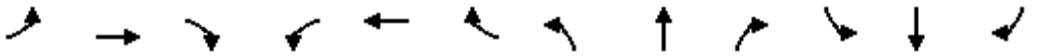
Intersection Summary			
HCM 2000 Control Delay	57.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	66	1216	0	66	365
Future Volume (Veh/h)	0	66	1216	0	66	365
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	72	1322	0	72	397
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						226
pX, platoon unblocked	0.97					
vC, conflicting volume	1863	1322			1322	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1872	1322			1322	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	62			86	
cM capacity (veh/h)	66	191			523	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	72	1322	72	397
Volume Left	0	0	72	0
Volume Right	72	0	0	0
cSH	191	1700	523	1700
Volume to Capacity	0.38	0.78	0.14	0.23
Queue Length 95th (ft)	41	0	12	0
Control Delay (s)	34.8	0.0	13.0	0.0
Lane LOS	D		B	
Approach Delay (s)	34.8	0.0	2.0	
Approach LOS	D			

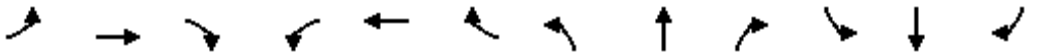
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	1593	31	102	2041	1133	114	482	288	1040	258	8
Future Volume (vph)	26	1593	31	102	2041	1133	114	482	288	1040	258	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.86	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3115	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	3539	1583	3044	3115	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	1732	34	111	2218	1232	124	524	313	1130	280	9
RTOR Reduction (vph)	0	0	20	0	0	333	0	0	36	0	0	7
Lane Group Flow (vph)	28	1732	14	111	2218	899	124	524	277	757	653	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	3.0	57.7	57.7	11.8	66.5	66.5	21.0	21.0	32.8	31.5	31.5	31.5
Effective Green, g (s)	3.0	57.7	57.7	11.8	66.5	66.5	21.0	21.0	32.8	31.5	31.5	31.5
Actuated g/C Ratio	0.02	0.41	0.41	0.08	0.48	0.48	0.15	0.15	0.23	0.22	0.22	0.22
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	37	2095	652	149	2415	751	265	530	370	684	700	356
v/s Ratio Prot	0.02	0.34		0.06	0.44		0.07	c0.15	c0.17	c0.25	0.21	
v/s Ratio Perm			0.01			c0.57						0.00
v/c Ratio	0.76	0.83	0.02	0.74	0.92	1.20	0.47	0.99	0.75	1.11	1.02dl	0.01
Uniform Delay, d1	68.1	36.7	24.4	62.6	34.2	36.8	54.4	59.4	49.8	54.2	53.2	42.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	59.7	2.8	0.0	18.2	6.2	101.2	5.8	36.4	8.1	67.5	19.3	0.0
Delay (s)	127.9	39.5	24.4	80.8	40.4	138.0	60.2	95.8	57.8	121.7	72.6	42.1
Level of Service	F	D	C	F	D	F	E	F	E	F	E	D
Approach Delay (s)		40.6			75.4			78.8			98.6	
Approach LOS		D			E			E			F	

Intersection Summary			
HCM 2000 Control Delay	72.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	98.9%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	1911	69	109	2450	70	86	401	18	56	576	57
Future Volume (vph)	20	1911	69	109	2450	70	86	401	18	56	576	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3491	
Flt Permitted	0.08	1.00	1.00	0.08	1.00	1.00	0.22	1.00	1.00	0.38	1.00	
Satd. Flow (perm)	142	3539	1583	142	3539	1583	403	3539	1583	704	3491	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	2077	75	118	2663	76	93	436	20	61	626	62
RTOR Reduction (vph)	0	0	10	0	0	26	0	0	15	0	3	0
Lane Group Flow (vph)	22	2077	65	118	2663	50	93	436	5	61	685	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	52.5	52.5	52.5	52.5	52.5	52.5	18.5	18.5	18.5	18.5	18.5	
Effective Green, g (s)	52.5	52.5	52.5	52.5	52.5	52.5	18.5	18.5	18.5	18.5	18.5	
Actuated g/C Ratio	0.66	0.66	0.66	0.66	0.66	0.66	0.23	0.23	0.23	0.23	0.23	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	93	2322	1038	93	2322	1038	93	818	366	162	807	
v/s Ratio Prot		0.59			0.75			0.12			0.20	
v/s Ratio Perm	0.16		0.04	c0.83		0.03	c0.23		0.00	0.09		
v/c Ratio	0.24	0.89	0.06	1.27	1.15	0.05	1.00	0.53	0.01	0.38	0.85	
Uniform Delay, d1	5.6	11.4	4.9	13.8	13.8	4.9	30.8	27.0	23.7	25.9	29.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	4.9	0.0	181.8	71.7	0.0	93.3	2.5	0.1	6.6	10.8	
Delay (s)	6.9	16.4	5.0	195.5	85.4	4.9	124.1	29.4	23.8	32.5	40.2	
Level of Service	A	B	A	F	F	A	F	C	C	C	D	
Approach Delay (s)		15.9			87.8			45.3			39.6	
Approach LOS		B			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	53.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	109.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX E 2045 BUILD CONDITIONS – SENSITIVITY ANALYSIS

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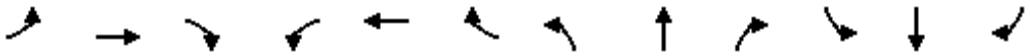
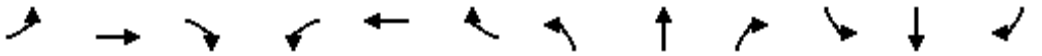


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1056	0	241	89	377	0	0	456	90
Future Volume (vph)	0	0	0	1056	0	241	89	377	0	0	456	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5		4.5	4.5	4.5			4.5	
Lane Util. Factor				1.00		1.00	1.00	1.00			1.00	
Frt				1.00		0.85	1.00	1.00			0.98	
Flt Protected				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1770		1583	1770	1863			1821	
Flt Permitted				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1770		1583	1770	1863			1821	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1148	0	262	97	410	0	0	496	98
RTOR Reduction (vph)	0	0	0	0	0	45	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	0	1148	0	217	97	410	0	0	589	0
Turn Type				Perm		Perm	Prot	NA			NA	
Protected Phases							5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				84.5		84.5	7.5	56.5			44.5	
Effective Green, g (s)				84.5		84.5	7.5	56.5			44.5	
Actuated g/C Ratio				0.56		0.56	0.05	0.38			0.30	
Clearance Time (s)				4.5		4.5	4.5	4.5			4.5	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				997		891	88	701			540	
v/s Ratio Prot							c0.05	0.22			c0.32	
v/s Ratio Perm				c0.65		0.14						
v/c Ratio				1.15		0.24	1.10	0.58			1.09	
Uniform Delay, d1				32.8		16.6	71.2	37.4			52.8	
Progression Factor				1.00		1.00	1.00	1.00			1.00	
Incremental Delay, d2				79.9		0.1	126.3	1.3			65.8	
Delay (s)				112.6		16.7	197.6	38.6			118.5	
Level of Service				F		B	F	D			F	
Approach Delay (s)		0.0			94.8			69.0			118.5	
Approach LOS		A			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	95.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	142.8%	ICU Level of Service	H
Analysis Period (min)	15		

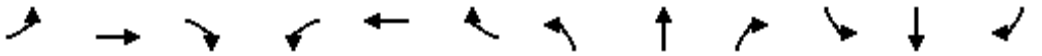
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	0	87	0	0	0	0	378	387	594	650	0
Future Volume (vph)	88	0	87	0	0	0	0	378	387	594	650	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5					4.5		4.5	4.5	
Lane Util. Factor	1.00		1.00					1.00		1.00	1.00	
Frt	1.00		0.85					0.93		1.00	1.00	
Flt Protected	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (prot)	1770		1583					1735		1770	1863	
Flt Permitted	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (perm)	1770		1583					1735		1770	1863	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	0	95	0	0	0	0	411	421	646	707	0
RTOR Reduction (vph)	0	0	86	0	0	0	0	24	0	0	0	0
Lane Group Flow (vph)	96	0	9	0	0	0	0	808	0	646	707	0
Turn Type	Perm		Perm					NA		Prot	NA	
Protected Phases								2		1	6	
Permitted Phases	4		4									
Actuated Green, G (s)	13.1		13.1					66.1		52.5	123.1	
Effective Green, g (s)	13.1		13.1					66.1		52.5	123.1	
Actuated g/C Ratio	0.09		0.09					0.46		0.36	0.85	
Clearance Time (s)	4.5		4.5					4.5		4.5	4.5	
Vehicle Extension (s)	3.0		3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)	159		142					789		639	1579	
v/s Ratio Prot								c0.47		c0.37	0.38	
v/s Ratio Perm	c0.05		0.01									
v/c Ratio	0.60		0.06					1.02		1.01	0.45	
Uniform Delay, d1	63.6		60.4					39.5		46.3	2.7	
Progression Factor	1.00		1.00					1.00		1.00	1.00	
Incremental Delay, d2	6.3		0.2					38.3		38.3	0.2	
Delay (s)	69.9		60.6					77.9		84.7	2.9	
Level of Service	E		E					E		F	A	
Approach Delay (s)		65.3			0.0			77.9			42.0	
Approach LOS		E			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	56.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	145.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	142.8%	ICU Level of Service	H
Analysis Period (min)	15		

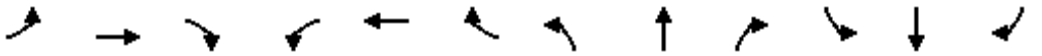
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	3902	157	115	2857	72	117	331	331	128	416	238
Future Volume (vph)	93	3902	157	115	2857	72	117	331	331	128	416	238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6371		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6371		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	4241	171	125	3105	78	127	360	360	139	452	259
RTOR Reduction (vph)	0	4	0	0	0	27	0	0	60	0	0	34
Lane Group Flow (vph)	101	4408	0	125	3105	51	127	360	300	139	452	225
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	2 3	1	6	7
Permitted Phases						8						6
Actuated Green, G (s)	13.6	98.1		6.3	90.8	97.7	6.4	20.7	31.5	6.9	21.2	34.8
Effective Green, g (s)	13.6	98.1		6.3	90.8	97.7	6.4	20.7	31.5	6.9	21.2	34.8
Actuated g/C Ratio	0.09	0.65		0.04	0.61	0.65	0.04	0.14	0.21	0.05	0.14	0.23
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	160	4166		144	4566	1078	146	488	332	157	500	414
v/s Ratio Prot	0.06	c0.69		0.04	0.41	0.00	0.04	0.10	c0.19	c0.04	0.13	0.05
v/s Ratio Perm						0.03						0.09
v/c Ratio	0.63	1.06		0.87	0.68	0.05	0.87	0.74	0.90	0.89	0.90	0.54
Uniform Delay, d1	65.8	26.0		71.4	19.9	9.4	71.4	62.0	57.8	71.2	63.4	50.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.9	32.5		38.7	0.4	0.0	38.6	9.6	26.5	40.2	22.3	1.5
Delay (s)	73.7	58.4		110.1	20.3	9.4	109.9	71.6	84.3	111.4	85.7	52.1
Level of Service	E	E		F	C	A	F	E	F	F	F	D
Approach Delay (s)		58.8			23.4			82.7			79.7	
Approach LOS		E			C			F			E	

Intersection Summary			
HCM 2000 Control Delay	50.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	95.1%	ICU Level of Service	F
Analysis Period (min)	15		

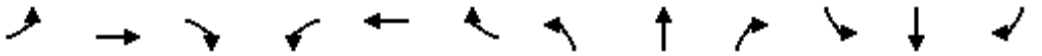
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	785	0	28	314	738	0	0	603	88
Future Volume (vph)	0	0	0	785	0	28	314	738	0	0	603	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5		4.5	4.5	4.5			4.5	
Lane Util. Factor				1.00		1.00	1.00	1.00			1.00	
Frt				1.00		0.85	1.00	1.00			0.98	
Flt Protected				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1770		1583	1770	1863			1831	
Flt Permitted				0.95		1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1770		1583	1770	1863			1831	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	853	0	30	341	802	0	0	655	96
RTOR Reduction (vph)	0	0	0	0	0	18	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	853	0	12	341	802	0	0	748	0
Turn Type				Perm		Perm	Prot	NA			NA	
Protected Phases							5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				59.5		59.5	23.5	81.5			53.5	
Effective Green, g (s)				59.5		59.5	23.5	81.5			53.5	
Actuated g/C Ratio				0.40		0.40	0.16	0.54			0.36	
Clearance Time (s)				4.5		4.5	4.5	4.5			4.5	
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				702		627	277	1012			653	
v/s Ratio Prot							c0.19	0.43			c0.41	
v/s Ratio Perm				c0.48		0.01						
v/c Ratio				1.22		0.02	1.23	0.79			1.15	
Uniform Delay, d1				45.2		27.5	63.2	27.5			48.2	
Progression Factor				1.00		1.00	1.00	1.00			1.00	
Incremental Delay, d2				109.6		0.0	131.4	4.3			82.5	
Delay (s)				154.8		27.5	194.6	31.8			130.8	
Level of Service				F		C	F	C			F	
Approach Delay (s)		0.0			150.5			80.4			130.8	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	116.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	231.5%	ICU Level of Service	H
Analysis Period (min)	15		

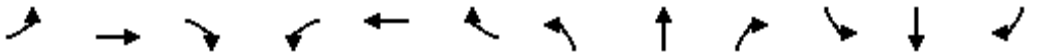
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	0	169	0	0	0	0	887	1444	426	1311	0
Future Volume (vph)	180	0	169	0	0	0	0	887	1444	426	1311	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5					4.5		4.5	4.5	
Lane Util. Factor	1.00		1.00					1.00		1.00	1.00	
Frt	1.00		0.85					0.92		1.00	1.00	
Flt Protected	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (prot)	1770		1583					1707		1770	1863	
Flt Permitted	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (perm)	1770		1583					1707		1770	1863	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	0	184	0	0	0	0	964	1570	463	1425	0
RTOR Reduction (vph)	0	0	96	0	0	0	0	39	0	0	0	0
Lane Group Flow (vph)	196	0	88	0	0	0	0	2495	0	463	1425	0
Turn Type	Perm		Perm					NA		Prot	NA	
Protected Phases								2		1	6	
Permitted Phases	4		4									
Actuated Green, G (s)	17.9		17.9					95.0		23.5	123.0	
Effective Green, g (s)	17.9		17.9					95.0		23.5	123.0	
Actuated g/C Ratio	0.12		0.12					0.63		0.16	0.82	
Clearance Time (s)	4.5		4.5					4.5		4.5	4.5	
Vehicle Extension (s)	3.0		3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)	211		189					1081		277	1528	
v/s Ratio Prot								c1.46		c0.26	0.77	
v/s Ratio Perm	c0.11		0.06									
v/c Ratio	0.93		0.47					2.31		1.67	0.93	
Uniform Delay, d1	65.4		61.5					27.5		63.2	10.3	
Progression Factor	1.00		1.00					1.00		1.00	1.00	
Incremental Delay, d2	42.0		1.8					591.5		317.6	10.7	
Delay (s)	107.4		63.4					618.9		380.8	21.0	
Level of Service	F		E					F		F	C	
Approach Delay (s)		86.1			0.0			618.9			109.2	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM 2000 Control Delay	376.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.02		
Actuated Cycle Length (s)	149.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	231.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	3290	131	235	3738	189	222	514	423	122	361	250
Future Volume (vph)	222	3290	131	235	3738	189	222	514	423	122	361	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.86		0.97	0.81	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	6371		3433	7544	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	6371		3433	7544	1583	3433	3539	1583	3433	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	241	3576	142	255	4063	205	241	559	460	133	392	272
RTOR Reduction (vph)	0	4	0	0	0	32	0	0	32	0	0	56
Lane Group Flow (vph)	241	3714	0	255	4063	173	241	559	428	133	392	216
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	3	1	6	7
Permitted Phases						8			2			6
Actuated Green, G (s)	20.4	83.6		17.3	80.5	87.1	11.3	24.5	41.8	6.6	19.8	40.2
Effective Green, g (s)	20.4	83.6		17.3	80.5	87.1	11.3	24.5	41.8	6.6	19.8	40.2
Actuated g/C Ratio	0.14	0.56		0.12	0.54	0.58	0.08	0.16	0.28	0.04	0.13	0.27
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	240	3550		395	4048	966	258	578	488	151	467	471
v/s Ratio Prot	c0.14	c0.58		0.07	0.54	0.01	c0.07	c0.16	0.10	0.04	0.11	0.06
v/s Ratio Perm						0.10			0.17			0.07
v/c Ratio	1.00	1.05		0.65	1.00	0.18	0.93	0.97	0.88	0.88	0.84	0.46
Uniform Delay, d1	64.8	33.2		63.4	34.8	14.7	69.0	62.3	51.7	71.3	63.5	45.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	59.2	29.1		3.6	15.0	0.1	38.3	30.2	16.2	40.5	16.4	0.7
Delay (s)	124.0	62.3		67.0	49.8	14.8	107.3	92.5	67.8	111.8	80.0	46.5
Level of Service	F	E		E	D	B	F	F	E	F	E	D
Approach Delay (s)		66.0			49.2			86.3			73.9	
Approach LOS		E			D			F			E	

Intersection Summary			
HCM 2000 Control Delay	61.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX F HCS CALCULATION SHEETS

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APPENDIX F EXISTING CONDITIONS

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2012

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Site Information

Inputs

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

Number of Lanes, N	5
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	1500
Freeway Volume, V_F	5178
Ramp Volume, V_R	1962
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 2340 ft
V_D = 1140 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5178	0.92	Level	5	2	0.972	1.00	5791
Ramp	1962	0.92	Level	5	2	0.972	1.00	2194
UpStream								
DownStream	1140	0.92	Level	5	2	0.972	1.00	1275

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R = mph (Exhibit 13-11)
S_0 = mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 0.436 using Equation (Exhibit 13-7)
V_{12} = 3384 pc/h
V_3 or V_{av34} 769 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4923	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	2729	Exhibit 13-8	9400	No
V_R	2194	Exhibit 13-10	2000	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3384	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = 19.9 (pc/mi/ln)
LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.625 (Exhibit 13-12)
S_R = 50.6 mph (Exhibit 13-12)
S_0 = 71.3 mph (Exhibit 13-12)
S = 55.7 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2012

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Number of Lanes, N: 5	☐ Yes ☐ On
☐ No ☑ Off	Acceleration Lane Length, L_A: 150	☑ No ☐ Off
L_{up} = 2340 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 1962 veh/h	Freeway Volume, V_F: 4130	V_D = veh/h
	Ramp Volume, V_R: 1140	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4130	0.92	Level	5	2	0.972	1.00	4619
Ramp	1140	0.92	Level	5	2	0.972	1.00	1275
UpStream	1962	0.92	Level	5	2	0.972	1.00	2194
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.058 using Equation (Exhibit 13-6)

V_{12} = 211 pc/h

V_3 or V_{av34} = 1696 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 1441 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4878	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2716	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 25.1 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.369 (Exibit 13-11)

S_R = 56.5 mph (Exhibit 13-11)

S_0 = 62.9 mph (Exhibit 13-11)

S = 59.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2012

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Site Information

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☑ Yes	☑ On
☑ No	☐ Off	Deceleration Lane Length L_D	1000	☐ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	8777	L_{down} =	1125 ft
V_u =	veh/h	Ramp Volume, V_R	843	V_D =	760 veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	8777	0.92	Level	5	2	0.972	1.00	9817
Ramp	843	0.92	Level	5	2	0.972	1.00	943
UpStream								
DownStream	760	0.92	Level	5	2	0.972	1.00	850

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 3956 pc/h

V_3 or V_{av34} 1949 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	7854	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	6911	Exhibit 13-8	9400	No
V_R	943	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3956	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

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

D_R = 29.3 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.513 (Exhibit 13-12)

S_R = 53.2 mph (Exhibit 13-12)

S_0 = 67.6 mph (Exhibit 13-12)

S = 59.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2012

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp: ☑ Yes ☐ On ☐ No ☑ Off; L_{up} = 1125 ft; V_u = 843 veh/h

Number of Lanes, N	5
Acceleration Lane Length, L_A	250
Deceleration Lane Length L_D	
Freeway Volume, V_F	10128
Ramp Volume, V_R	760
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

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

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	10128	0.92	Level	5	2	0.972	1.00	11328
Ramp	760	0.92	Level	5	2	0.972	1.00	850
UpStream	843	0.92	Level	5	2	0.972	1.00	943
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.112 using Equation (Exhibit 13-6)

V_{12} = 985 pc/h

V_3 or V_{av34} = 3921 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3531 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	9678	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4381	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 37.7 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.615 (Exibit 13-11)

S_R = 50.9 mph (Exhibit 13-11)

S_0 = 56.4 mph (Exhibit 13-11)

S = 53.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2012

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☑ On	Number of Lanes, N: 5	☐ Yes ☐ On
☐ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = 550 ft	Deceleration Lane Length L_D: 250	L_{down} = ft
V_u = 760 veh/h	Freeway Volume, V_F: 10888	V_D = veh/h
	Ramp Volume, V_R: 650	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	10888	0.92	Level	5	2	0.972	1.00	12178
Ramp	650	0.92	Level	5	2	0.972	1.00	727
UpStream	760	0.92	Level	5	2	0.972	1.00	850
DownStream								

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 4658 pc/h

V_3 or V_{av34} 2542 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	9743	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	9016	Exhibit 13-8	9400	No
V_R	727	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4658	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 42.1 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.493 (Exhibit 13-12)

S_R = 53.7 mph (Exhibit 13-12)

S_0 = 65.3 mph (Exhibit 13-12)

S = 59.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2012

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{up} = 820 ft
V_u = 650 veh/h

Number of Lanes, N	5
Acceleration Lane Length, L_A	1000
Deceleration Lane Length L_D	
Freeway Volume, V_F	10238
Ramp Volume, V_R	831
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

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

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	10238	0.92	Level	5	2	0.972	1.00	11451
Ramp	831	0.92	Level	5	2	0.972	1.00	929
UpStream	650	0.92	Level	5	2	0.972	1.00	727
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 0.102 using Equation (Exhibit 13-6)
V_{12} = 910 pc/h
V_3 or V_{av34} 4020 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☑ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No
If Yes,V_{12a} = 3580 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	9880	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4509	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$
D_R = 33.9 (pc/mi/ln)
LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.605 (Exibit 13-11)
S_R= 51.1 mph (Exhibit 13-11)
S_0= 56.2 mph (Exhibit 13-11)
S = 53.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R= mph (Exhibit 13-12)
S_0= mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2012

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☑ Yes	☑ On
☑ No	☐ Off	Deceleration Lane Length L_D	1500	☐ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	3977	L_{down} =	2340 ft
V_u =	veh/h	Ramp Volume, V_R	723	V_D =	1041 veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3977	0.92	Level	5	2	0.972	1.00	4448
Ramp	723	0.92	Level	5	2	0.972	1.00	809
UpStream								
DownStream	1041	0.92	Level	5	2	0.972	1.00	1164

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 2202 pc/h

V_3 or V_{av34} 901 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4004	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	3195	Exhibit 13-8	9400	No
V_R	809	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2202	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

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

D_R = 9.7 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

D_s = 0.501 (Exhibit 13-12)

S_R = 53.5 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 60.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2012

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Number of Lanes, N: 5	☐ Yes ☐ On
☐ No ☑ Off	Acceleration Lane Length, L_A: 150	☑ No ☐ Off
L_{up} = 2340 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 723 veh/h	Freeway Volume, V_F: 3696	V_D = veh/h
	Ramp Volume, V_R: 1041	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3696	0.92	Level	5	2	0.972	1.00	4134
Ramp	1041	0.92	Level	5	2	0.972	1.00	1164
UpStream	723	0.92	Level	5	2	0.972	1.00	809
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.072 using Equation (Exhibit 13-6)

V_{12} = 233 pc/h

V_3 or V_{av34} = 1496 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 1290 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4389	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2454	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 23.1 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.356 (Exibit 13-11)

S_R = 56.8 mph (Exhibit 13-11)

S_0 = 63.3 mph (Exhibit 13-11)

S = 59.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2012

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 5	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 1000	L_{down} = 1125 ft
V_u = veh/h	Freeway Volume, V_F: 7385	V_D = 951 veh/h
	Ramp Volume, V_R: 798	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	7385	0.92	Level	5	2	0.972	1.00	8260
Ramp	798	0.92	Level	5	2	0.972	1.00	893
UpStream								
DownStream	951	0.92	Level	5	2	0.972	1.00	1064

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 3385 pc/h

V_3 or V_{av34} 1611 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6608	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	5715	Exhibit 13-8	9400	No
V_R	893	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3385	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

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

D_R = 24.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.508 (Exhibit 13-12)

S_R = 53.3 mph (Exhibit 13-12)

S_0 = 68.9 mph (Exhibit 13-12)

S = 59.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2012

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	250	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	1125 ft	Freeway Volume, V_F	8433	L_{down} =	ft
V_u =	798 veh/h	Ramp Volume, V_R	951	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	8433	0.92	Level	5	2	0.972	1.00	9432
Ramp	951	0.92	Level	5	2	0.972	1.00	1064
UpStream	798	0.92	Level	5	2	0.972	1.00	893
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.085 using Equation (Exhibit 13-6)

V_{12} = 588 pc/h

V_3 or V_{av34} = 3172 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 2772 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	7996	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3836	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 33.3 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.484 (Exibit 13-11)

S_R = 53.9 mph (Exhibit 13-11)

S_0 = 59.3 mph (Exhibit 13-11)

S = 56.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2012

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Site Information

Inputs

Upstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{up} = 550 ft
V_u = 951 veh/h

Number of Lanes, N	5
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	250
Freeway Volume, V_F	9384
Ramp Volume, V_R	468
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

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

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	9384	0.92	Level	5	2	0.972	1.00	10496
Ramp	468	0.92	Level	5	2	0.972	1.00	523
UpStream	951	0.92	Level	5	2	0.972	1.00	1064
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R= mph (Exhibit 13-11)
S_0= mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 0.436 using Equation (Exhibit 13-7)
V_{12} = 3956 pc/h
V_3 or V_{av34} 2220 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	8397	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	7874	Exhibit 13-8	9400	No
V_R	523	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3956	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = 36.0 (pc/mi/ln)
LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.475 (Exhibit 13-12)
S_R= 54.1 mph (Exhibit 13-12)
S_0= 66.5 mph (Exhibit 13-12)
S = 60.0 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2012

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	1000	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	820 ft	Freeway Volume, V_F	8916	L_{down} =	ft
V_u =	468 veh/h	Ramp Volume, V_R	617	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	8916	0.92	Level	5	2	0.972	1.00	9972
Ramp	617	0.92	Level	5	2	0.972	1.00	690
UpStream	468	0.92	Level	5	2	0.972	1.00	523
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.132 using Equation (Exhibit 13-6)

V_{12} = 983 pc/h

V_3 or V_{av34} = 3244 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 2988 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	8162	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3678	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 27.6 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.405 (Exibit 13-11)

S_R = 55.7 mph (Exhibit 13-11)

S_0 = 58.7 mph (Exhibit 13-11)

S = 57.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

APPENDIX F 2025 NO BUILD CONDITIONS

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2025 No Build

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Site Information

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 5	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 2800 ft
V_u = veh/h	Freeway Volume, V_F: 6235	V_D = 1168 veh/h
	Ramp Volume, V_R: 2009	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	6235	0.92	Level	5	2	0.972	1.00	6974
Ramp	2009	0.92	Level	5	2	0.972	1.00	2247
UpStream								
DownStream	1168	0.92	Level	5	2	0.972	1.00	1306

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 3852 pc/h

V_3 or V_{av34} 1038 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5928	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	3681	Exhibit 13-8	9400	No
V_R	2247	Exhibit 13-10	2000	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3852	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

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

D_R = 32.9 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.630 (Exhibit 13-12)

S_R = 50.5 mph (Exhibit 13-12)

S_0 = 71.2 mph (Exhibit 13-12)

S = 56.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2025 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{up} = 2800 ft
V_u = 2009 veh/h

Number of Lanes, N	5
Acceleration Lane Length, L_A	235
Deceleration Lane Length L_D	
Freeway Volume, V_F	4227
Ramp Volume, V_R	1168
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

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

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4227	0.92	Level	5	2	0.972	1.00	4728
Ramp	1168	0.92	Level	5	2	0.972	1.00	1306
UpStream	2009	0.92	Level	5	2	0.972	1.00	2247
DownStream								

Merge Areas

Estimation of v_{12}

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

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 0.055 using Equation (Exhibit 13-6)
V_{12} = 201 pc/h
V_3 or V_{av34} = 1743 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No
If Yes, V_{12a} = 1475 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4994	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2781	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 25.1 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.367 (Exibit 13-11)
S_R = 56.5 mph (Exhibit 13-11)
S_0 = 62.8 mph (Exhibit 13-11)
S = 59.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple
Agency or Company	WSP
Date Performed	11/2/2017
Analysis Time Period	AM

Site Information

Freeway/Dir of Travel	I-405 SB
Junction	WB Wilshire Off-Ramp
Jurisdiction	Caltrans
Analysis Year	2025 No Build

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☑ Yes	☑ On
☑ No	☐ Off	Deceleration Lane Length L_D	360	☐ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	11229	L_{down} =	2060 ft
V_u =	veh/h	Ramp Volume, V_R	1528	V_D =	778 veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	11229	0.92	Level	5	2	0.972	1.00	12559
Ramp	1528	0.92	Level	5	2	0.972	1.00	1709
UpStream								
DownStream	778	0.92	Level	5	2	0.972	1.00	870

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 5345 pc/h

V_3 or V_{av34} 2351 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	10048	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	8339	Exhibit 13-8	9400	No
V_R	1709	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5345	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 47.0 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.582 (Exhibit 13-12)

S_R = 51.6 mph (Exhibit 13-12)

S_0 = 66.0 mph (Exhibit 13-12)

S = 57.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2025 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	250	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2060 ft	Freeway Volume, V_F	10366	L_{down} =	ft
V_u =	1528 veh/h	Ramp Volume, V_R	778	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	10366	0.92	Level	5	2	0.972	1.00	11594
Ramp	778	0.92	Level	5	2	0.972	1.00	870
UpStream	1528	0.92	Level	5	2	0.972	1.00	1709
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.109 using Equation (Exhibit 13-6)

V_{12} = 992 pc/h

V_3 or V_{av34} = 4051 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3637 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	9964	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4507	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 38.7 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.657 (Exibit 13-11)

S_R = 49.9 mph (Exhibit 13-11)

S_0 = 55.9 mph (Exhibit 13-11)

S = 53.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2025 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☑ On	Acceleration Lane Length, L_A	200	☐ Yes	☐ On
☐ No	☐ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2800 ft	Freeway Volume, V_F	10479	L_{down} =	ft
V_u =	778 veh/h	Ramp Volume, V_R	851	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	10479	0.92	Level	5	2	0.972	1.00	11721
Ramp	851	0.92	Level	5	2	0.972	1.00	952
UpStream	778	0.92	Level	5	2	0.972	1.00	870
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.099 using Equation (Exhibit 13-6)

V_{12} = 911 pc/h

V_3 or V_{av34} = 4155 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3688 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	10173	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4640	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 40.0 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.711 (Exibit 13-11)

S_R = 48.7 mph (Exhibit 13-11)

S_0 = 55.7 mph (Exhibit 13-11)

S = 52.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple
Agency or Company	WSP
Date Performed	11/2/2017
Analysis Time Period	PM

Site Information

Freeway/Dir of Travel	I-405 NB
Junction	Wilshire Off-Ramp
Jurisdiction	Caltrans
Analysis Year	2025 NB

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

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

Number of Lanes, N	5
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	500
Freeway Volume, V_F	4442
Ramp Volume, V_R	728
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 2800 ft
V_D = 1048 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4442	0.92	Level	5	2	0.972	1.00	4968
Ramp	728	0.92	Level	5	2	0.972	1.00	814
UpStream								
DownStream	1048	0.92	Level	5	2	0.972	1.00	1172

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R = mph (Exhibit 13-11)
S_0 = mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 0.436 using Equation (Exhibit 13-7)
V_{12} = 2409 pc/h
V_3 or V_{av34} 1031 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4472	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	3658	Exhibit 13-8	9400	No
V_R	814	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2409	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = 20.5 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.501 (Exhibit 13-12)
S_R = 53.5 mph (Exhibit 13-12)
S_0 = 71.2 mph (Exhibit 13-12)
S = 60.4 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2025 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	235	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2800 ft	Freeway Volume, V_F	3716	L_{down} =	ft
V_u =	728 veh/h	Ramp Volume, V_R	1048	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3716	0.92	Level	5	2	0.972	1.00	4156
Ramp	1048	0.92	Level	5	2	0.972	1.00	1172
UpStream	728	0.92	Level	5	2	0.972	1.00	814
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.071 using Equation (Exhibit 13-6)

V_{12} = 231 pc/h

V_3 or V_{av34} = 1505 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 1296 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4414	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2468	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 22.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.351 (Exibit 13-11)

S_R = 56.9 mph (Exhibit 13-11)

S_0 = 63.3 mph (Exhibit 13-11)

S = 59.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple
Agency or Company	WSP
Date Performed	11/2/2017
Analysis Time Period	PM

Site Information

Freeway/Dir of Travel	I-405 SB
Junction	WB Wilshire Off-Ramp
Jurisdiction	Caltrans
Analysis Year	2025 No Build

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

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

Number of Lanes, N	5
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	360
Freeway Volume, V_F	9279
Ramp Volume, V_R	1273
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 2060 ft
V_D = 956 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	9279	0.92	Level	5	2	0.972	1.00	10378
Ramp	1273	0.92	Level	5	2	0.972	1.00	1424
UpStream								
DownStream	956	0.92	Level	5	2	0.972	1.00	1069

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R= mph (Exhibit 13-11)
S_0= mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 0.436 using Equation (Exhibit 13-7)
V_{12} = 4423 pc/h
V_3 or V_{av34} 1940 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	8303	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	6879	Exhibit 13-8	9400	No
V_R	1424	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4423	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R = 39.0 (pc/mi/ln)
LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.556 (Exhibit 13-12)
S_R= 52.2 mph (Exhibit 13-12)
S_0= 67.6 mph (Exhibit 13-12)
S = 58.4 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2025 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	250	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2060 ft	Freeway Volume, V_F	8476	L_{down} =	ft
V_u =	1273 veh/h	Ramp Volume, V_R	956	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	8476	0.92	Level	5	2	0.972	1.00	9480
Ramp	956	0.92	Level	5	2	0.972	1.00	1069
UpStream	1273	0.92	Level	5	2	0.972	1.00	1424
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.084 using Equation (Exhibit 13-6)

V_{12} = 588 pc/h

V_3 or V_{av34} = 3196 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 2792 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	8049	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3861	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 33.5 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.489 (Exibit 13-11)

S_R = 53.8 mph (Exhibit 13-11)

S_0 = 59.3 mph (Exhibit 13-11)

S = 56.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2025 No Build

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☑ On	Acceleration Lane Length, L_A	200	☐ Yes	☐ On
☐ No	☐ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2800 ft	Freeway Volume, V_F	8962	L_{down} =	ft
V_u =	956 veh/h	Ramp Volume, V_R	621	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	8962	0.92	Level	5	2	0.972	1.00	10024
Ramp	621	0.92	Level	5	2	0.972	1.00	695
UpStream	956	0.92	Level	5	2	0.972	1.00	1069
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.131 using Equation (Exhibit 13-6)

V_{12} = 985 pc/h

V_3 or V_{av34} = 3269 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3009 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	8219	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3704	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 32.8 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.465 (Exibit 13-11)

S_R = 54.3 mph (Exhibit 13-11)

S_0 = 58.7 mph (Exhibit 13-11)

S = 56.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

APPENDIX F 2025 BUILD CONDITIONS

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2025 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☑ Yes	☑ On
☑ No	☐ Off	Deceleration Lane Length L_D	500	☐ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	6235	L_{down} =	2800 ft
V_u =	veh/h	Ramp Volume, V_R	2010	V_D =	1174 veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	6235	0.92	Level	5	2	0.972	1.00	6974
Ramp	2010	0.92	Level	5	2	0.972	1.00	2248
UpStream								
DownStream	1174	0.92	Level	5	2	0.972	1.00	1313

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 3852 pc/h

V_3 or V_{av34} 1038 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5928	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	3680	Exhibit 13-8	9400	No
V_R	2248	Exhibit 13-10	2000	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3852	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

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

D_R = 32.9 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.630 (Exhibit 13-12)

S_R = 50.5 mph (Exhibit 13-12)

S_0 = 71.2 mph (Exhibit 13-12)

S = 56.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2025 Build

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 5	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 2800 ft
V_u = veh/h	Freeway Volume, V_F: 4442	V_D = 1054 veh/h
	Ramp Volume, V_R: 729	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4442	0.92	Level	5	2	0.972	1.00	4968
Ramp	729	0.92	Level	5	2	0.972	1.00	815
UpStream								
DownStream	1054	0.92	Level	5	2	0.972	1.00	1179

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 2409 pc/h

V_3 or V_{av34} 1031 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4472	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	3657	Exhibit 13-8	9400	No
V_R	815	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2409	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

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

D_R = 20.5 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.501 (Exhibit 13-12)

S_R = 53.5 mph (Exhibit 13-12)

S_0 = 71.2 mph (Exhibit 13-12)

S = 60.4 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2025 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	235	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2800 ft	Freeway Volume, V_F	4227	L_{down} =	ft
V_u =	2010 veh/h	Ramp Volume, V_R	1174	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4227	0.92	Level	5	2	0.972	1.00	4728
Ramp	1174	0.92	Level	5	2	0.972	1.00	1313
UpStream	2010	0.92	Level	5	2	0.972	1.00	2248
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.054 using Equation (Exhibit 13-6)

V_{12} = 198 pc/h

V_3 or V_{av34} = 1745 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 1475 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5001	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2788	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 25.1 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.368 (Exibit 13-11)

S_R = 56.5 mph (Exhibit 13-11)

S_0 = 62.8 mph (Exhibit 13-11)

S = 59.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2025 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp
- ☑ Yes ☐ On
- ☐ No ☑ Off
- L_{up} = 2800 ft
- V_u = 729 veh/h

Number of Lanes, N	5
Acceleration Lane Length, L_A	235
Deceleration Lane Length L_D	
Freeway Volume, V_F	3716
Ramp Volume, V_R	1054
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

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

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3716	0.92	Level	5	2	0.972	1.00	4156
Ramp	1054	0.92	Level	5	2	0.972	1.00	1179
UpStream	729	0.92	Level	5	2	0.972	1.00	815
DownStream								

Merge Areas

Estimation of v_{12}

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

- L_{EQ} = (Equation 13-6 or 13-7)
- P_{FM} = 0.070 using Equation (Exhibit 13-6)
- V_{12} = 228 pc/h
- V_3 or V_{av34} = 1507 pc/h (Equation 13-14 or 13-17)
- Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
- Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No
- If Yes, V_{12a} = 1296 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4421	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2475	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

- D_R = 22.8 (pc/mi/ln)
- LOS = C (Exhibit 13-2)

Speed Determination

- M_S = 0.351 (Exibit 13-11)
- S_R = 56.9 mph (Exhibit 13-11)
- S_0 = 63.3 mph (Exhibit 13-11)
- S = 59.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

- L_{EQ} = (Equation 13-12 or 13-13)
- P_{FD} = using Equation (Exhibit 13-7)
- V_{12} = pc/h
- V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)
- Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
- Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
- If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

- D_R = (pc/mi/ln)
- LOS = (Exhibit 13-2)

Speed Determination

- D_s = (Exhibit 13-12)
- S_R = mph (Exhibit 13-12)
- S_0 = mph (Exhibit 13-12)
- S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2025 Build

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Site Information

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☑ Yes	☑ On
☑ No	☐ Off	Deceleration Lane Length L_D	360	☐ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	11229	L_{down} =	2060 ft
V_u =	veh/h	Ramp Volume, V_R	1534	V_D =	778 veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	11229	0.92	Level	5	2	0.972	1.00	12559
Ramp	1534	0.92	Level	5	2	0.972	1.00	1716
UpStream								
DownStream	778	0.92	Level	5	2	0.972	1.00	870

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 5349 pc/h

V_3 or V_{av34} 2349 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	10048	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	8332	Exhibit 13-8	9400	No
V_R	1716	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5349	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 47.0 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.582 (Exhibit 13-12)

S_R = 51.6 mph (Exhibit 13-12)

S_0 = 66.0 mph (Exhibit 13-12)

S = 57.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2025 Build

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 5	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 360	L_{down} = 2060 ft
V_u = veh/h	Freeway Volume, V_F: 9279	V_D = 956 veh/h
	Ramp Volume, V_R: 1279	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	9279	0.92	Level	5	2	0.972	1.00	10378
Ramp	1279	0.92	Level	5	2	0.972	1.00	1431
UpStream								
DownStream	956	0.92	Level	5	2	0.972	1.00	1069

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 4427 pc/h

V_3 or V_{av34} 1938 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	8303	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	6872	Exhibit 13-8	9400	No
V_R	1431	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4427	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 39.1 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.557 (Exhibit 13-12)

S_R = 52.2 mph (Exhibit 13-12)

S_0 = 67.6 mph (Exhibit 13-12)

S = 58.4 mph (Exhibit 13-13)

HCS2010™ Version 6.1 Generated: 11/16/2017 4:17 PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2025 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	250	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2060 ft	Freeway Volume, V_F	10366	L_{down} =	ft
V_u =	1534 veh/h	Ramp Volume, V_R	778	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	10366	0.92	Level	5	2	0.972	1.00	11594
Ramp	778	0.92	Level	5	2	0.972	1.00	870
UpStream	1534	0.92	Level	5	2	0.972	1.00	1716
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.109 using Equation (Exhibit 13-6)

V_{12} = 992 pc/h

V_3 or V_{av34} = 4051 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3637 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	9964	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4507	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 38.7 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.657 (Exibit 13-11)

S_R = 49.9 mph (Exhibit 13-11)

S_0 = 55.9 mph (Exhibit 13-11)

S = 53.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2025 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	250	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2060 ft	Freeway Volume, V_F	8476	L_{down} =	ft
V_u =	1279 veh/h	Ramp Volume, V_R	956	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	8476	0.92	Level	5	2	0.972	1.00	9480
Ramp	956	0.92	Level	5	2	0.972	1.00	1069
UpStream	1279	0.92	Level	5	2	0.972	1.00	1431
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.084 using Equation (Exhibit 13-6)

V_{12} = 588 pc/h

V_3 or V_{av34} = 3196 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 2792 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	8049	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3861	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 33.5 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.489 (Exibit 13-11)

S_R = 53.8 mph (Exhibit 13-11)

S_0 = 59.3 mph (Exhibit 13-11)

S = 56.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2025 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☑ On	Acceleration Lane Length, L_A	200	☐ Yes	☐ On
☐ No	☐ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2800 ft	Freeway Volume, V_F	10479	L_{down} =	ft
V_u =	778 veh/h	Ramp Volume, V_R	852	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	10479	0.92	Level	5	2	0.972	1.00	11721
Ramp	852	0.92	Level	5	2	0.972	1.00	953
UpStream	778	0.92	Level	5	2	0.972	1.00	870
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.099 using Equation (Exhibit 13-6)

V_{12} = 910 pc/h

V_3 or V_{av34} = 4155 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3688 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	10174	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4641	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 40.0 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.711 (Exibit 13-11)

S_R = 48.6 mph (Exhibit 13-11)

S_0 = 55.7 mph (Exhibit 13-11)

S = 52.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2025 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☑ On	Acceleration Lane Length, L_A	200	☐ Yes	☐ On
☐ No	☐ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2800 ft	Freeway Volume, V_F	8962	L_{down} =	ft
V_u =	956 veh/h	Ramp Volume, V_R	622	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	8962	0.92	Level	5	2	0.972	1.00	10024
Ramp	622	0.92	Level	5	2	0.972	1.00	696
UpStream	956	0.92	Level	5	2	0.972	1.00	1069
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.131 using Equation (Exhibit 13-6)

V_{12} = 984 pc/h

V_3 or V_{av34} = 3270 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3009 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	8220	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3705	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 32.8 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.466 (Exibit 13-11)

S_R = 54.3 mph (Exhibit 13-11)

S_0 = 58.7 mph (Exhibit 13-11)

S = 56.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

APPENDIX F 2045 NO BUILD CONDITIONS

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2045 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 5	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 2800 ft
V_u = veh/h	Freeway Volume, V_F: 11122	V_D = 847 veh/h
	Ramp Volume, V_R: 1759	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	11122	0.92	Level	5	2	0.972	1.00	12440
Ramp	1759	0.92	Level	5	2	0.972	1.00	1967
UpStream								
DownStream	847	0.92	Level	5	2	0.972	1.00	947

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 5448 pc/h

V_3 or V_{av34} 2252 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	9952	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	7985	Exhibit 13-8	9400	No
V_R	1967	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5448	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 46.6 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.605 (Exhibit 13-12)

S_R = 51.1 mph (Exhibit 13-12)

S_0 = 66.4 mph (Exhibit 13-12)

S = 57.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2045 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{up} = 2800 ft
V_u = 1759 veh/h

Number of Lanes, N	5
Acceleration Lane Length, L_A	235
Deceleration Lane Length L_D	
Freeway Volume, V_F	9364
Ramp Volume, V_R	847
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

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

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	9364	0.92	Level	5	2	0.972	1.00	10473
Ramp	847	0.92	Level	5	2	0.972	1.00	947
UpStream	1759	0.92	Level	5	2	0.972	1.00	1967
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 0.099 using Equation (Exhibit 13-6)
V_{12} = 793 pc/h
V_3 or V_{av34} = 3590 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☑ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No
If Yes, V_{12a} = 3189 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	8920	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4136	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$
D_R = 35.8 (pc/mi/ln)
LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.549 (Exibit 13-11)
S_R = 52.4 mph (Exhibit 13-11)
S_0 = 57.9 mph (Exhibit 13-11)
S = 55.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple
Agency or Company	WSP
Date Performed	11/2/2017
Analysis Time Period	AM

Site Information

Freeway/Dir of Travel	I-405 SB
Junction	WB Wilshire Off-Ramp
Jurisdiction	Caltrans
Analysis Year	2045 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp	
☐ Yes	☐ On	☑ Yes	☑ On
☑ No	☐ Off	☐ No	☐ Off
L_{up} =	ft	L_{down} =	2060 ft
V_u =	veh/h	V_D =	759 veh/h

Number of Lanes, N	5
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	360
Freeway Volume, V_F	13207
Ramp Volume, V_R	2067
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	13207	0.92	Level	5	2	0.972	1.00	14772
Ramp	2067	0.92	Level	5	2	0.972	1.00	2312
UpStream								
DownStream	759	0.92	Level	5	2	0.972	1.00	849

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 6457 pc/h

V_3 or V_{av34} 2680 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	11818	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	9506	Exhibit 13-8	9400	Yes
V_R	2312	Exhibit 13-10	2000	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	6457	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 56.5 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.636 (Exhibit 13-12)

S_R = 50.4 mph (Exhibit 13-12)

S_0 = 64.8 mph (Exhibit 13-12)

S = 56.0 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2045 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	250	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2060 ft	Freeway Volume, V_F	12173	L_{down} =	ft
V_u =	2067 veh/h	Ramp Volume, V_R	759	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	12173	0.92	Level	5	2	0.972	1.00	13615
Ramp	759	0.92	Level	5	2	0.972	1.00	849
UpStream	2067	0.92	Level	5	2	0.972	1.00	2312
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.112 using Equation (Exhibit 13-6)

V_{12} = 1241 pc/h

V_3 or V_{av34} = 4937 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 4446 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	11964	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	5295	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 44.8 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 1.081 (Exibit 13-11)

S_R = 40.1 mph (Exhibit 13-11)

S_0 = 52.3 mph (Exhibit 13-11)

S = 46.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2045 No Build

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☑ On	Number of Lanes, N: 5	☐ Yes ☐ On
☐ No ☐ Off	Acceleration Lane Length, L_A: 200	☑ No ☐ Off
L_{up} = 2800 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 759 veh/h	Freeway Volume, V_F: 11901	V_D = veh/h
	Ramp Volume, V_R: 853	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	11901	0.92	Level	5	2	0.972	1.00	13311
Ramp	853	0.92	Level	5	2	0.972	1.00	954
UpStream	759	0.92	Level	5	2	0.972	1.00	849
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.099 using Equation (Exhibit 13-6)

V_{12} = 1065 pc/h

V_3 or V_{av34} = 4873 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 4324 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	11765	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	5278	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 45.0 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 1.071 (Exibit 13-11)

S_R = 40.4 mph (Exhibit 13-11)

S_0 = 52.8 mph (Exhibit 13-11)

S = 46.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2045 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☑ Yes	☑ On
☑ No	☐ Off	Deceleration Lane Length L_D	500	☐ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	13829	L_{down} =	2800 ft
V_u =	veh/h	Ramp Volume, V_R	910	V_D =	1414 veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	13829	0.92	Level	5	2	0.972	1.00	15467
Ramp	910	0.92	Level	5	2	0.972	1.00	1018
UpStream								
DownStream	1414	0.92	Level	5	2	0.972	1.00	1582

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 5969 pc/h

V_3 or V_{av34} 3202 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 6974 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	12374	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	11356	Exhibit 13-8	9400	Yes
V_R	1018	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5969	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 59.7 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_S = 0.520 (Exhibit 13-12)

S_R = 53.0 mph (Exhibit 13-12)

S_0 = 64.7 mph (Exhibit 13-12)

S = 57.6 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2045 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{up} = 2800 ft
V_u = 910 veh/h

Number of Lanes, N	5
Acceleration Lane Length, L_A	235
Deceleration Lane Length L_D	
Freeway Volume, V_F	12920
Ramp Volume, V_R	1414
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	35.0

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

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	12920	0.92	Level	5	2	0.972	1.00	14451
Ramp	1414	0.92	Level	5	2	0.972	1.00	1582
UpStream	910	0.92	Level	5	2	0.972	1.00	1018
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 0.020 using Equation (Exhibit 13-6)
V_{12} = 240 pc/h
V_3 or V_{av34} = 5855 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☑ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No
If Yes, V_{12a} = 4780 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	13533	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	6362	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$
D_R = 52.9 (pc/mi/ln)
LOS = F (Exhibit 13-2)

Speed Determination

M_S = 2.564 (Exibit 13-11)
S_R = 6.0 mph (Exhibit 13-11)
S_0 = 50.8 mph (Exhibit 13-11)
S = 11.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2045 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☑ Yes	☑ On
☑ No	☐ Off	Deceleration Lane Length L_D	360	☐ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	11098	L_{down} =	2060 ft
V_u =	veh/h	Ramp Volume, V_R	1137	V_D =	1072 veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	11098	0.92	Level	5	2	0.972	1.00	12413
Ramp	1137	0.92	Level	5	2	0.972	1.00	1272
UpStream								
DownStream	1072	0.92	Level	5	2	0.972	1.00	1199

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 5047 pc/h

V_3 or V_{av34} 2442 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	9931	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	8659	Exhibit 13-8	9400	No
V_R	1272	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5047	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 44.4 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.542 (Exhibit 13-12)

S_R = 52.5 mph (Exhibit 13-12)

S_0 = 65.7 mph (Exhibit 13-12)

S = 58.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2045 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp	
☑ Yes ☐ On	Number of Lanes, N: 5	☐ Yes ☐ On	
☐ No ☑ Off	Acceleration Lane Length, L_A: 250	☑ No ☐ Off	
L_{up} = 2060 ft	Deceleration Lane Length L_D:	L_{down} = ft	
V_u = 1137 veh/h	Freeway Volume, V_F: 10432	V_D = veh/h	
	Ramp Volume, V_R: 1072		
	Freeway Free-Flow Speed, S_{FF}: 65.0		
	Ramp Free-Flow Speed, S_{FR}: 35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	10432	0.92	Level	5	2	0.972	1.00	11668
Ramp	1072	0.92	Level	5	2	0.972	1.00	1199
UpStream	1137	0.92	Level	5	2	0.972	1.00	1272
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.068 using Equation (Exhibit 13-6)

V_{12} = 623 pc/h

V_3 or V_{av34} = 4272 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3667 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	10367	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4866	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 41.3 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.810 (Exibit 13-11)

S_R = 46.4 mph (Exhibit 13-11)

S_0 = 55.8 mph (Exhibit 13-11)

S = 50.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2045 No Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☑ On	Number of Lanes, N: 5	☐ Yes ☐ On
☐ No ☐ Off	Acceleration Lane Length, L_A: 200	☑ No ☐ Off
L_{up} = 2800 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 1072 veh/h	Freeway Volume, V_F: 11032	V_D = veh/h
	Ramp Volume, V_R: 800	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	11032	0.92	Level	5	2	0.972	1.00	12339
Ramp	800	0.92	Level	5	2	0.972	1.00	895
UpStream	1072	0.92	Level	5	2	0.972	1.00	1199
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.106 using Equation (Exhibit 13-6)

V_{12} = 1042 pc/h

V_3 or V_{av34} = 4398 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3935 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	10734	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4830	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 41.5 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.795 (Exibit 13-11)

S_R = 46.7 mph (Exhibit 13-11)

S_0 = 54.6 mph (Exhibit 13-11)

S = 50.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

APPENDIX F 2045 BUILD CONDITIONS

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2045 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Site Information

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 5	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 2800 ft
V_u = veh/h	Freeway Volume, V_F: 11122	V_D = 854 veh/h
	Ramp Volume, V_R: 1760	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	11122	0.92	Level	5	2	0.972	1.00	12440
Ramp	1760	0.92	Level	5	2	0.972	1.00	1969
UpStream								
DownStream	854	0.92	Level	5	2	0.972	1.00	955

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 5450 pc/h

V_3 or V_{av34} 2251 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	9952	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	7983	Exhibit 13-8	9400	No
V_R	1969	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5450	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 46.6 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.605 (Exhibit 13-12)

S_R = 51.1 mph (Exhibit 13-12)

S_0 = 66.4 mph (Exhibit 13-12)

S = 57.0 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2045 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	235	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2800 ft	Freeway Volume, V_F	9364	L_{down} =	ft
V_u =	1760 veh/h	Ramp Volume, V_R	854	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	9364	0.92	Level	5	2	0.972	1.00	10473
Ramp	854	0.92	Level	5	2	0.972	1.00	955
UpStream	1760	0.92	Level	5	2	0.972	1.00	1969
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.098 using Equation (Exhibit 13-6)

V_{12} = 785 pc/h

V_3 or V_{av34} = 3594 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3189 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	8928	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4144	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

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

D_R = 35.9 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.550 (Exibit 13-11)

S_R = 52.3 mph (Exhibit 13-11)

S_0 = 57.9 mph (Exhibit 13-11)

S = 55.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2045 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☑ Yes	☑ On
☑ No	☐ Off	Deceleration Lane Length L_D	360	☐ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	13207	L_{down} =	2060 ft
V_u =	veh/h	Ramp Volume, V_R	2074	V_D =	759 veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	13207	0.92	Level	5	2	0.972	1.00	14772
Ramp	2074	0.92	Level	5	2	0.972	1.00	2320
UpStream								
DownStream	759	0.92	Level	5	2	0.972	1.00	849

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 6461 pc/h

V_3 or V_{av34} 2678 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	11818	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	9498	Exhibit 13-8	9400	Yes
V_R	2320	Exhibit 13-10	2000	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	6461	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 56.6 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.637 (Exhibit 13-12)

S_R = 50.4 mph (Exhibit 13-12)

S_0 = 64.8 mph (Exhibit 13-12)

S = 56.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2045 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	250	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2060 ft	Freeway Volume, V_F	12173	L_{down} =	ft
V_u =	2074 veh/h	Ramp Volume, V_R	759	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	12173	0.92	Level	5	2	0.972	1.00	13615
Ramp	759	0.92	Level	5	2	0.972	1.00	849
UpStream	2074	0.92	Level	5	2	0.972	1.00	2320
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.112 using Equation (Exhibit 13-6)

V_{12} = 1241 pc/h

V_3 or V_{av34} = 4937 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 4446 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	11964	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	5295	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 44.8 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 1.081 (Exibit 13-11)

S_R = 40.1 mph (Exhibit 13-11)

S_0 = 52.3 mph (Exhibit 13-11)

S = 46.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	AM	Analysis Year	2045 Build

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☑ On	Number of Lanes, N: 5	☐ Yes ☐ On
☐ No ☐ Off	Acceleration Lane Length, L_A: 200	☑ No ☐ Off
L_{up} = 2800 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 759 veh/h	Freeway Volume, V_F: 11901	V_D = veh/h
	Ramp Volume, V_R: 854	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	11901	0.92	Level	5	2	0.972	1.00	13311
Ramp	854	0.92	Level	5	2	0.972	1.00	955
UpStream	759	0.92	Level	5	2	0.972	1.00	849
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.098 using Equation (Exhibit 13-6)

V_{12} = 1064 pc/h

V_3 or V_{av34} 4873 pc/h (Equation 13-14 or 13-17)

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

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

If Yes,V_{12a} = 4324 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	11766	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	5279	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 45.0 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 1.072 (Exibit 13-11)

S_R= 40.3 mph (Exhibit 13-11)

S_0= 52.8 mph (Exhibit 13-11)

S = 46.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2045 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 5	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 2800 ft
V_u = veh/h	Freeway Volume, V_F: 13829	V_D = 1421 veh/h
	Ramp Volume, V_R: 911	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	13829	0.92	Level	5	2	0.972	1.00	15467
Ramp	911	0.92	Level	5	2	0.972	1.00	1019
UpStream								
DownStream	1421	0.92	Level	5	2	0.972	1.00	1589

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 5970 pc/h

V_3 or V_{av34} 3202 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 6974 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	12374	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	11355	Exhibit 13-8	9400	Yes
V_R	1019	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5970	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 59.7 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_S = 0.520 (Exhibit 13-12)

S_R = 53.0 mph (Exhibit 13-12)

S_0 = 64.7 mph (Exhibit 13-12)

S = 57.6 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 NB
Agency or Company	WSP	Junction	Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2045 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	235	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2800 ft	Freeway Volume, V_F	12920	L_{down} =	ft
V_u =	911 veh/h	Ramp Volume, V_R	1421	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	12920	0.92	Level	5	2	0.972	1.00	14451
Ramp	1421	0.92	Level	5	2	0.972	1.00	1589
UpStream	911	0.92	Level	5	2	0.972	1.00	1019
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.019 using Equation (Exhibit 13-6)

V_{12} = 229 pc/h

V_3 or V_{av34} = 5861 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 4780 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	13540	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	6369	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 52.9 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 2.580 (Exibit 13-11)

S_R = 5.7 mph (Exhibit 13-11)

S_0 = 50.8 mph (Exhibit 13-11)

S = 10.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire Off-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2045 Build

Project Description Westside Subway Extension - I-405 / Wilshire Blvd

Site Information

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 5	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 360	L_{down} = 2060 ft
V_u = veh/h	Freeway Volume, V_F: 11098	V_D = 1072 veh/h
	Ramp Volume, V_R: 1144	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	11098	0.92	Level	5	2	0.972	1.00	12413
Ramp	1144	0.92	Level	5	2	0.972	1.00	1280
UpStream								
DownStream	1072	0.92	Level	5	2	0.972	1.00	1199

Merge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Merge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 5052 pc/h

V_3 or V_{av34} 2439 pc/h (Equation 13-14 or 13-17)

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

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

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

Capacity Checks

	Actual	Capacity		LOS F?
V_F	9931	Exhibit 13-8	9400	Yes
$V_{FO} = V_F - V_R$	8651	Exhibit 13-8	9400	No
V_R	1280	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5052	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

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

D_R = 44.5 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.543 (Exhibit 13-12)

S_R = 52.5 mph (Exhibit 13-12)

S_0 = 65.7 mph (Exhibit 13-12)

S = 58.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	WB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2045 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☐ On	Acceleration Lane Length, L_A	250	☐ Yes	☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2060 ft	Freeway Volume, V_F	10432	L_{down} =	ft
V_u =	1144 veh/h	Ramp Volume, V_R	1072	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	10432	0.92	Level	5	2	0.972	1.00	11668
Ramp	1072	0.92	Level	5	2	0.972	1.00	1199
UpStream	1144	0.92	Level	5	2	0.972	1.00	1280
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.068 using Equation (Exhibit 13-6)

V_{12} = 623 pc/h

V_3 or V_{av34} = 4272 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3667 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	10367	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4866	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 41.3 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.810 (Exibit 13-11)

S_R = 46.4 mph (Exhibit 13-11)

S_0 = 55.8 mph (Exhibit 13-11)

S = 50.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Ryan Whipple	Freeway/Dir of Travel	I-405 SB
Agency or Company	WSP	Junction	EB Wilshire On-Ramp
Date Performed	11/2/2017	Jurisdiction	Caltrans
Analysis Time Period	PM	Analysis Year	2045 Build

Project Description: Westside Subway Extension - I-405 / Wilshire Blvd

Inputs

Upstream Adj Ramp		Number of Lanes, N	5	Downstream Adj Ramp	
☑ Yes	☑ On	Acceleration Lane Length, L_A	200	☐ Yes	☐ On
☐ No	☐ Off	Deceleration Lane Length L_D		☑ No	☐ Off
L_{up} =	2800 ft	Freeway Volume, V_F	11032	L_{down} =	ft
V_u =	1072 veh/h	Ramp Volume, V_R	801	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	11032	0.92	Level	5	2	0.972	1.00	12339
Ramp	801	0.92	Level	5	2	0.972	1.00	896
UpStream	1072	0.92	Level	5	2	0.972	1.00	1199
DownStream								

Merge Areas

Estimation of v_{12}

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

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

P_{FM} = 0.106 using Equation (Exhibit 13-6)

V_{12} = 1041 pc/h

V_3 or V_{av34} = 4399 pc/h (Equation 13-14 or 13-17)

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

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

If Yes, V_{12a} = 3935 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	10735	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4831	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

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

D_R = 41.5 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.796 (Exibit 13-11)

S_R = 46.7 mph (Exhibit 13-11)

S_0 = 54.6 mph (Exhibit 13-11)

S = 50.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

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

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

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

V_{12} = pc/h

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

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

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

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

Capacity Checks

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

Flow Entering Diverge Influence Area

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

Level of Service Determination (if not F)

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

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)