

Appendix D

Traffic Study

DRAFT

**TRAFFIC IMPACT STUDY
FOR PROPOSED STAYBRIDGE SUITES - LONG BEACH AIRPORT,
CITY OF LONG BEACH**

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EXECUTIVE SUMMARY

The proposed project (the “Project”) is the construction of a new 125-room hotel, Staybridge Suites - Long Beach Airport, on the northeast corner of Lakewood Boulevard and Willow Street in the City of Long Beach. As part of the Project, the existing 222-room Holiday Inn hotel that consists of two buildings would be reduced by 50 rooms to 172 rooms. The larger, 13-story building with 172 hotel rooms will remain, while the smaller, two-story building with 50 hotel rooms will be removed to allow for construction of the six-story hotel -- Staybridge Suites - Long Beach Airport. Combined, the two hotels would have a total of 297 rooms. Currently, there are 349 parking spaces on-site. Construction of a parking deck, also part of the Project, would result in total of approximately 385 parking spaces on-site. Estimated Project completion is sometime in 2019.

The Project would generate an estimated 490 net vehicle trips per day, including 31 AM and 36 PM peak-hour trips. The impacts of these trips were analyzed at five study intersections. These intersections are where the large majority of Project trips would likely be focused. New traffic counts were conducted in November 2015 at all of these intersections. Existing (2015) and Future (2019) conditions, without and with the Project, were analyzed. The analyses determined that the Project would not result in a significant traffic impact at any of the study locations under Existing or Future conditions.

Project impacts were also analyzed according to the County of Los Angeles 2010 Congestion Management Program guidelines. No significant arterial, freeway or transit impacts due to the Project were identified. Therefore, no traffic mitigation measures would be necessary for the Project.

The parking supply of approximately 385 spaces would be deficient according to the “stand alone” parking requirements of the Long Beach Municipal Code. However, when shared parking is considered, this supply would be sufficient to satisfy the peak parking demand, which would range from approximately 323 to 375 spaces. The collision history at the intersection of Lakewood Boulevard/ Willow Street was reviewed and evaluated. While the “Total” intersection accident rate is higher than the State accepted average, the “Fatal + Injury”-related accident rate is significantly lower than the accepted average at this location. The most prevalent reason for these collisions was attributed to unsafe speed.

The driveways were determined to be adequate for the site with the Project. A driveway assessment was conducted to evaluate the Future (2019) With Project conditions for potential level of service and queuing issues. The analysis determined the Project should not experience operations or queueing issues at any of the three driveways during the peak periods. Sight distance at the Project driveway on Willow Street relative to the I-405 off-ramp was evaluated under two methods and determined to be sufficient.

A supplemental construction traffic analysis was conducted to evaluate the peak construction period traffic for Existing (2015) and Future (2019) conditions, without and with the construction.

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INTRODUCTION

The proposed project (the “Project”) is the construction of a new 125-room hotel, Staybridge Suites - Long Beach Airport, on the northeast corner of Lakewood Boulevard and Willow Street in the City of Long Beach. As part of the Project, the existing 222-room Holiday Inn hotel that consists of two buildings would be reduced by 50 rooms to 172 rooms. The larger, 13-story building with 172 hotel rooms will remain, while the smaller, two-story building with 50 hotel rooms will be removed to allow for construction of the six-story hotel -- Staybridge Suites - Long Beach Airport. Combined, the two hotels would have a total of 297 rooms. Currently, there are 349 parking spaces on-site. Construction of a parking deck, also part of the Project, would result in total of approximately 385 parking spaces. Figure 1 shows the Project site location and surrounding area. It is estimated that the Project would be completed in 2019.

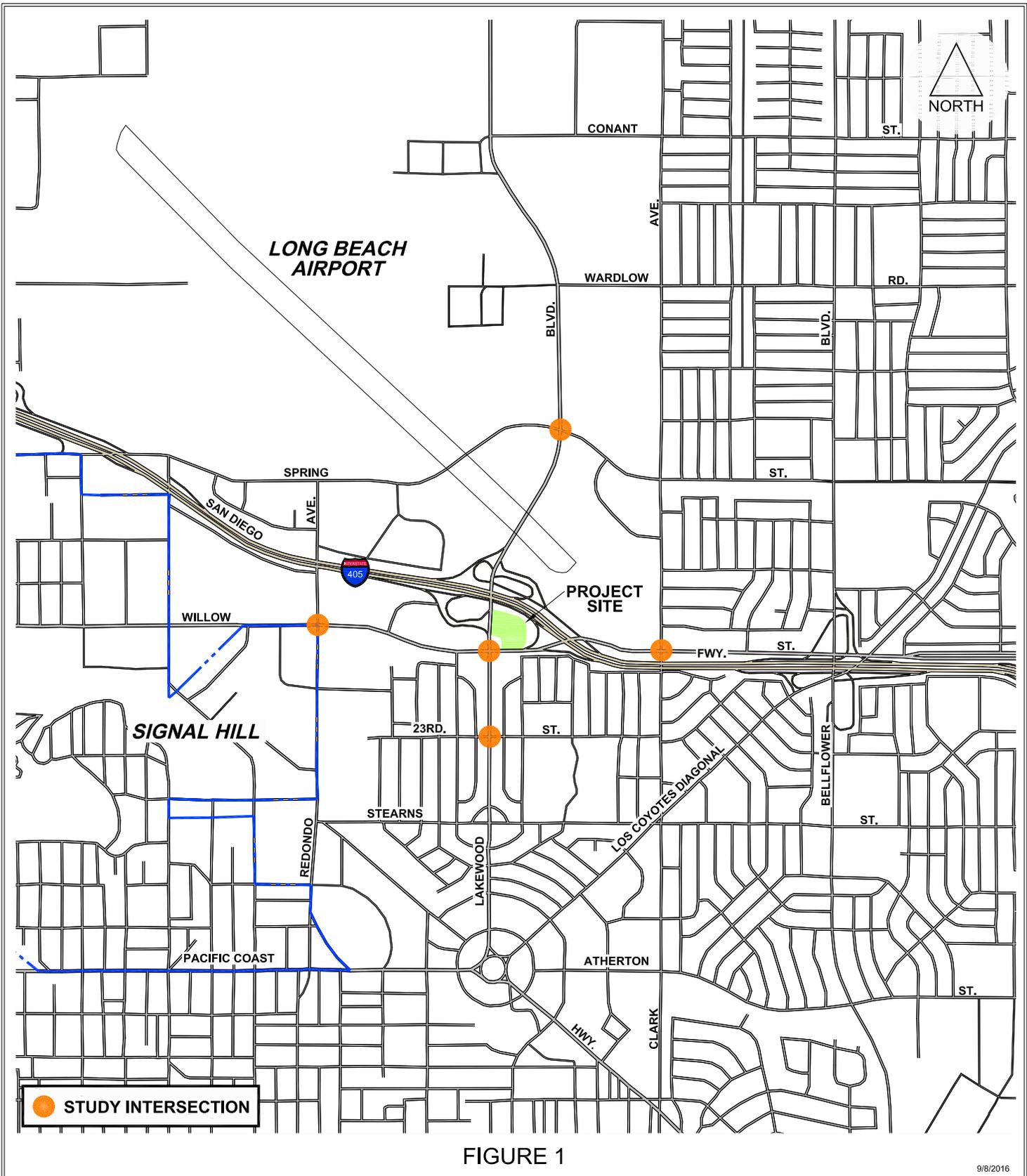
This report presents and documents the traffic impact study prepared for the Project by Crain & Associates. The study analyzes and addresses the potential traffic impacts of the Project on the surrounding roadway system. The analysis is in accordance with the assumptions, methodology and procedures agreed to by the City of Long Beach Traffic & Transportation Bureau (LBTTB). This report describes the analysis of Existing (2015) and Future (2019) traffic conditions without and with the Project. The analysis provides a detailed evaluation of traffic conditions during typical weekday AM and PM peak hours at the following five study intersections:

1. Lakewood Boulevard / Spring Street
2. Redondo Avenue / Willow Street
3. Lakewood Boulevard / Willow Street
4. Clark Avenue / Willow Street
5. Lakewood Boulevard / 23rd Street

The locations of the study intersections relative to the Project site are also shown in Figure 1. These intersections include those expected to be the most directly impacted by Project traffic.

Potential Project impacts in accordance with the Los Angeles County Congestion Management Program are also addressed.

In addition, the collision history at the intersection of Lakewood Boulevard / Willow Street, the driveway level of service and the sight distance at the Project’s Willow Street driveway are evaluated. A supplemental construction traffic analysis was conducted to determine potential impacts to the study roadways during construction. (The construction traffic analysis is provided in Appendix E).



9/8/2016

FN: StaybridgeSuitesLongBchSTUDY-INTS

PROJECT SITE VICINITY & STUDY INTERSECTIONS MAP



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PROJECT DESCRIPTION

The Project site is located on the northeast corner of Lakewood Boulevard and Willow Street in the City of Long Beach, and has an address of 2640 Lakewood Boulevard. The existing gas station, which is directly on this corner, is not part of the Project. The existing Holiday Inn on the site consists of two buildings. The larger, 13-story building has 172 hotel rooms. The smaller, two-story building has 50 hotel rooms and ancillary uses that include a 10,633 square-foot conference center, of which 5,000 square feet is actual assembly area, and a 3,500 square-foot restaurant. The 50 hotel rooms in the smaller building will be removed to allow construction of a six-story hotel -- Staybridge Suites - Long Beach Airport -- with 125 rooms and 2,496 square feet of conference/meeting assembly area. With the completion of the Project, there would be a net increase of 75 rooms, for a total of 297 rooms on-site.

Parking for both hotels will be surface parking and within a new parking deck. The existing parking lot, which has a total of approximately 349 spaces, will be modified with the construction of Staybridge Suites - Long Beach Airport and the parking deck. At Project completion, there would a total of approximately 385 parking spaces, consisting of 253 surface spaces and 132 spaces within the parking deck. Access to parking will continue to be provided by the two existing driveways on Lakewood Boulevard and one existing driveway on Willow Street. An existing driveway on Willow Street, which closer to the I-405 southbound off-ramp, will be closed. The active driveways will continue to be restricted to right-turn-only movements due to the raised medians on Lakewood Boulevard and Willow Street.

The Project site plan is presented in Figure 2. It is estimated that the Project would be completed in 2019.

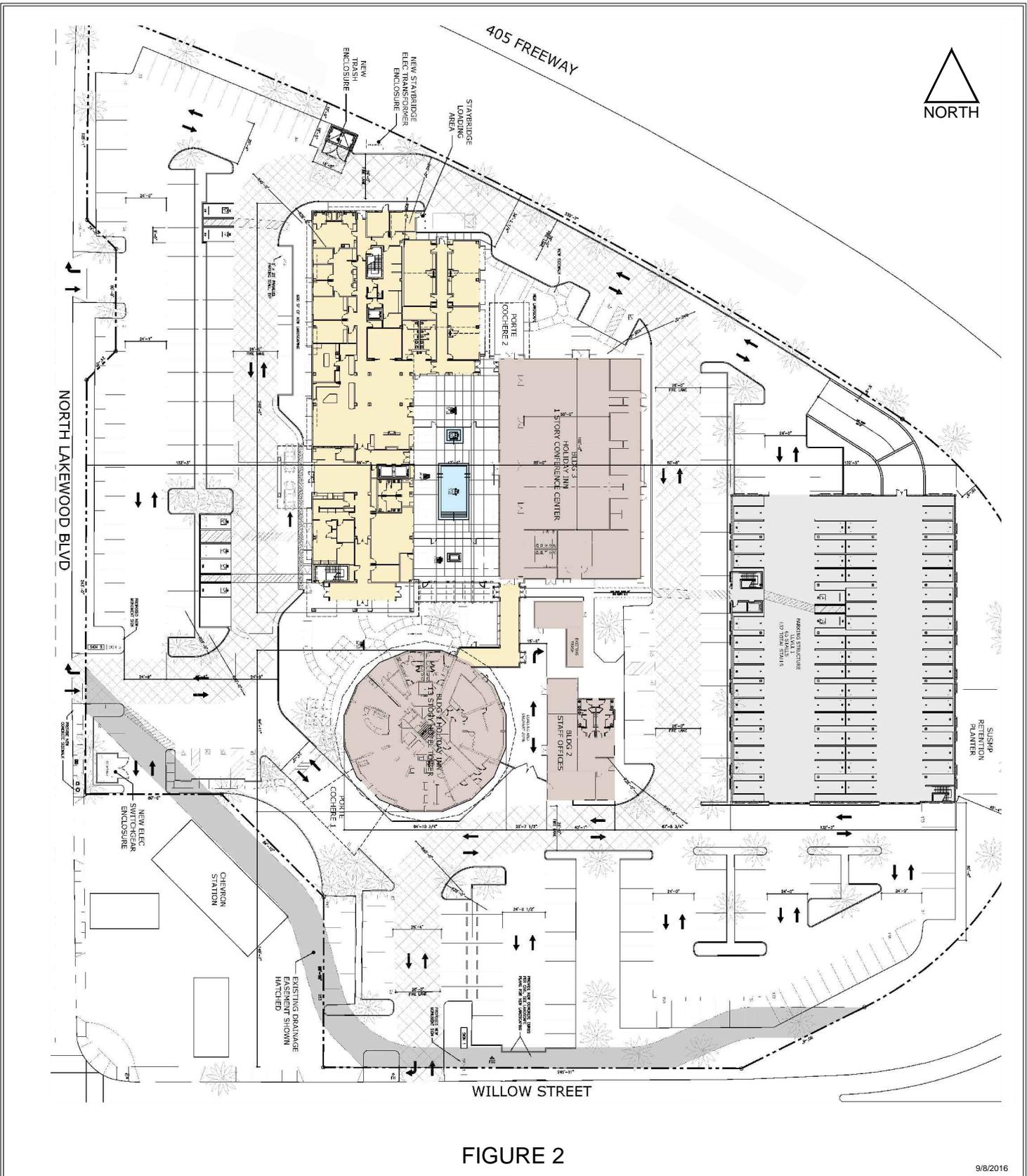


FIGURE 2

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FN: StaybridgeSuitesLongBchSITEPLAN

PROJECT SITE PLAN

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ENVIRONMENTAL SETTING

The Project site is along the east side of Lakewood Boulevard and the north side of Willow Street in the City of Long Beach. It is bounded by I-405 / San Diego Freeway to the north and east, commercial and residential uses to the south, and commercial uses to the west. The Long Beach Airport is located approximately two miles north of the site. Regional site access is provided by I-405 / San Diego Freeway, SR-605 / San Gabriel River Freeway, I-710 / Long beach Freeway, and SR-1, Pacific Coast Highway. The site is also served by a network of arterial and local streets. These and other transportation facilities are described below.

Freeways

The I-405 / San Diego Freeway is directly north and east of the Project site, forming its northern and northeastern boundaries. This freeway provides primary north-south regional access, although in the immediate study area, its alignment is generally east-west. It is a major travel corridor between the City of Los Angeles to the north and Orange County to the south. I-405 generally has four mainline travel lanes in each direction, plus auxiliary lanes and high-occupancy vehicle (HOV) lanes. Access is provided via on- and off-ramps at Lakewood Boulevard and at Willow Street. I-405 has a full interchange with I-710 and SR-605.

The SR-605 / San Gabriel River Freeway is approximately 3.5 miles east of the Project site and runs largely north-south between the City of Duarte and the City of Los Alamitos in Orange County. SR-605 generally has four travel lanes in each direction, along with auxiliary lanes between some ramp locations, and HOV lanes. Access is available via on- and off-ramps at Willow Street / Katella Avenue. SR-605 has a full interchange with the I-405.

The I-710 / Long Beach Freeway is a primary north-south freeway in Los Angeles County. Located approximately four miles west of the Project site, it is a continuous route from the City of Alhambra to Port of Long Beach. I-710 generally has three travel lanes in each direction, along with auxiliary lanes between some ramp locations. Access is available via on- and off-ramps at Willow Street. I-710 has a full interchange with the I-405.

Streets and Highways

North-South Roadways

Redondo Avenue is a designated a Major Avenue from Spring Street to 4th Street and a Minor Avenue/Neighborhood Connector south of 4th Street. It has two to three travel lanes and left-turn lanes, including dual left turn lanes at some intersections. At the intersection with Willow Street, Redondo Avenue has a northbound right-turn-only lane in addition to dual left-turn lanes.

Lakewood Boulevard extends southerly from the City of Lakewood boundary to the Los Alamitos Traffic Circle. It forms the western boundary of the Project site. A designated

Regional Corridor, Lakewood Boulevard is striped with three travel lanes in each direction, along with left-turn lanes. At its intersections with Spring Street and Willow Street, it has dual left-turn lanes, plus right-turn-only lanes at Willow Street.

Clark Avenue extends southerly from the City of Lakewood boundary to Anaheim Street. This roadway is designated a Minor Avenue and has two to three travel lanes and left-turn lanes, including southbound dual-left turn lanes at Willow Street.

East-West Roadways

Spring Street extends in an east-west direction from Magnolia Avenue to the City of Los Alamitos boundary. The roadway is a designated Neighborhood Connector between Magnolia Avenue and Pacific Avenue, a Minor Avenue between Pacific Avenue and Long Beach Boulevard, and a Major Avenue between Long Beach Boulevard and the City of Los Alamitos boundary. In the Project vicinity, there are two to three travel lanes per direction and left-turn lanes at key intersections. Spring Street also has dual left-turn lanes, and a westbound right-turn-only lane at Lakewood Boulevard.

Willow Street, a designated Boulevard, extends from the City of Los Angeles boundary on the west to the City of Los Alamitos boundary on the east. It generally provides three travel lanes and one to two left-turn lanes in each direction at the study intersections. Right-turn-only lanes are also provided on Willow Street at Redondo Avenue and at Lakewood Boulevard.

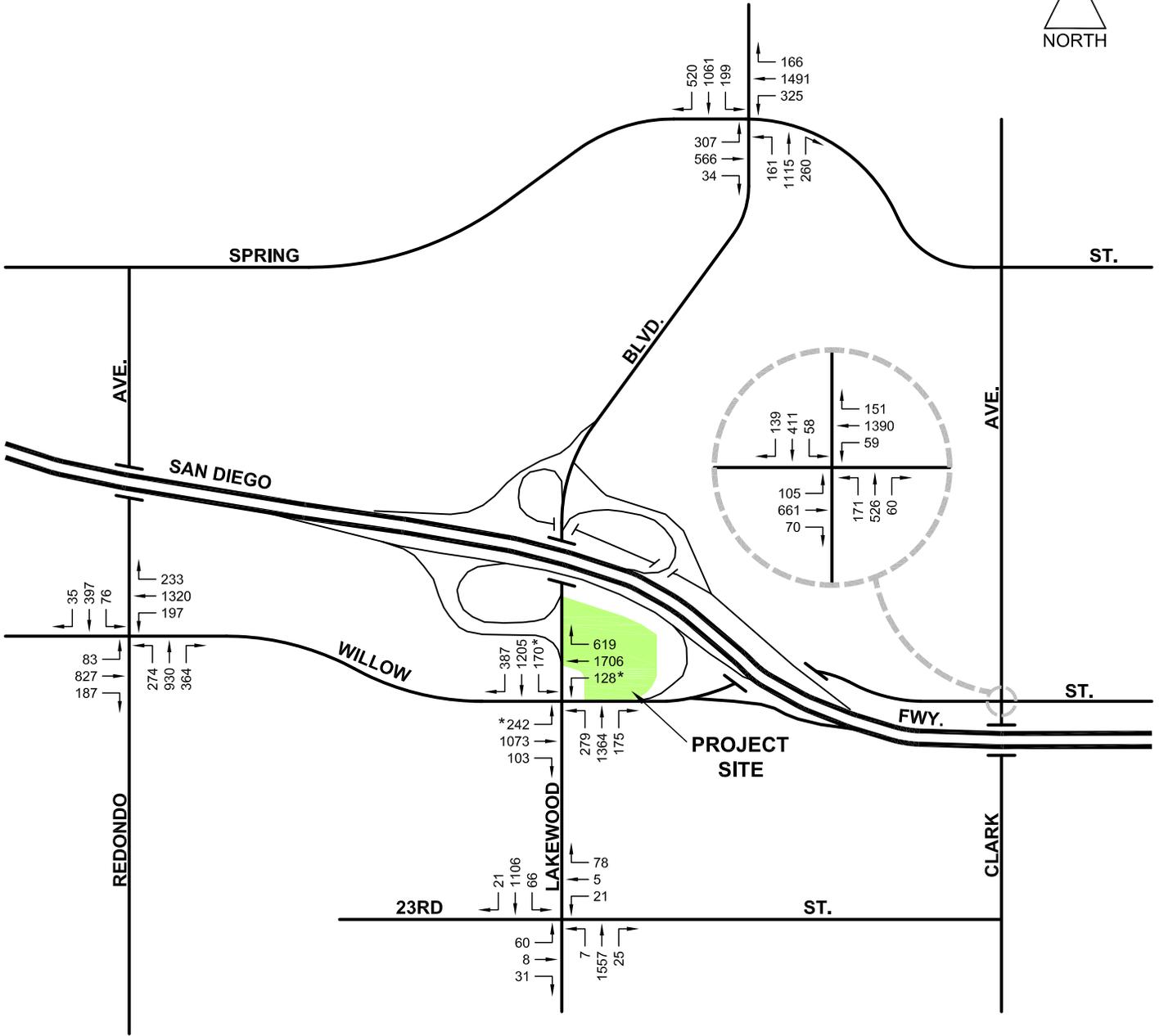
23rd Street, a local street, extends in an east-west direction. It is less than one mile, running from just west of Euclid Avenue easterly to Clark Avenue. 23rd Street has one travel lane in each direction.

Existing Traffic Volumes

Traffic volumes for existing weekday conditions at the five study intersections were obtained from manual traffic counts conducted on November 17, 2015, in accordance with City of Long Beach requirements. The traffic counts covered the 7:00-9:00 AM and 4:00-6:00 PM peak-hour periods. The peak-hour volumes for each study intersection were determined on the basis of the combined four highest consecutive 15-minute traffic counts for all vehicular movements entering the intersection. The existing peak-hour volumes are depicted in Figures 3(a) and 3(b). (The traffic count data sheets are provided in Appendix A.)

Existing Public Transit

There are several bus lines serving the Project site and study area, all of which are operated by Long Beach Transit. These bus lines are illustrated on the map in Figure 4. Table 1 is a summary of the routes and service provided by these lines. This table also shows the distances of the bus stops closest to the site. When transfer opportunities are considered, these lines provide transit access not only to the site and vicinity, but also the greater Southern California region.



NOTE:
 * - U-TURNS ARE INCLUDED IN LEFT-TURN VOLUMES

FIGURE 3(a)

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FN: StaybridgeSuitesLongBchVAM2015

EXISTING (2015) TRAFFIC VOLUMES
 AM PEAK HOUR



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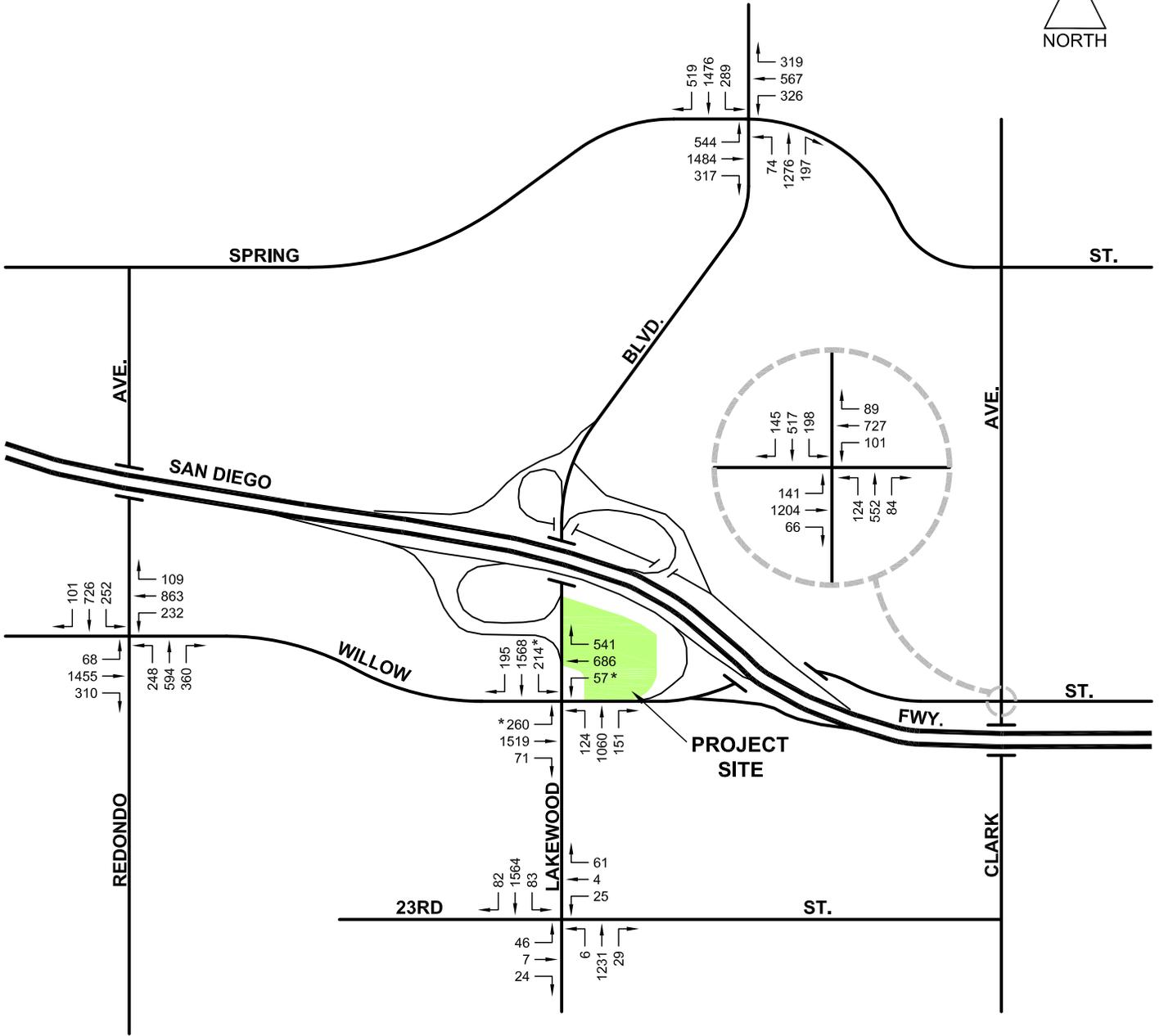


FIGURE 3(b)

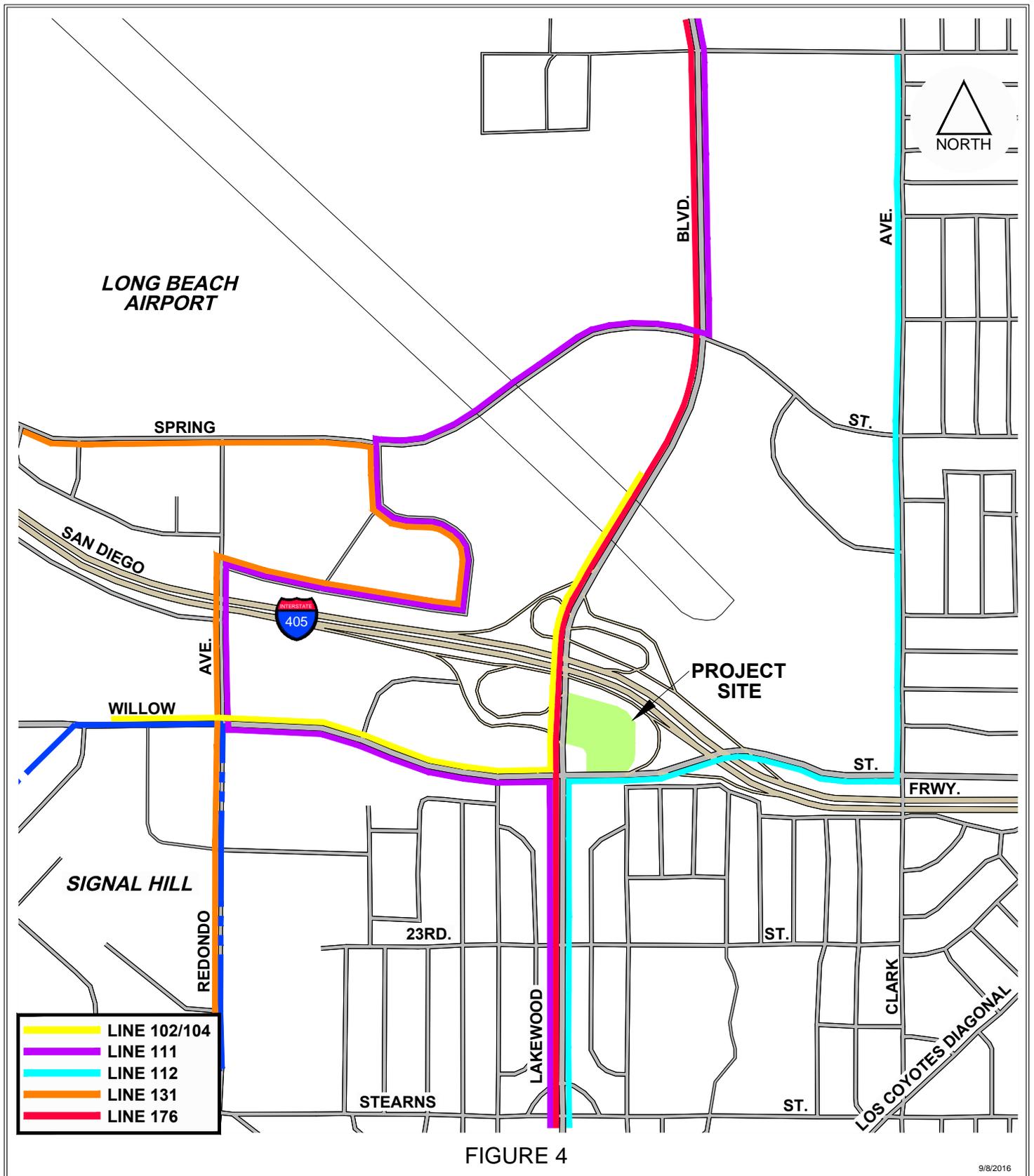
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FN: StaybridgeSuitesLongBch/PM2015

EXISTING (2015) TRAFFIC VOLUMES
PM PEAK HOUR



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FN: StaybridgeSuitesLongBch/TRANSIT

AREA TRANSIT MAP

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**Table 1
Area Transit Service Summary**

Line	Dir	Service Type	Regional Connection	Route	Nearest Bus Stop	Distance to Stop (miles)	Weekday Peak-Hour Headways	Weekend Peak-Hour Headways
Long Beach Transit								
102	E/W	Regular	West Side Long Beach to Long Beach Town Ctr	Willow St, Spring St, Wardlow Rd	Lakewood Blvd at Willow St	Adjacent to site	60-80 mins	N/A
104	E/W	Regular	West Side Long Beach to Long Beach Town Ctr	Willow St, Nature Center	Lakewood Blvd at Willow St	Adjacent to site	60-80 mins	60 min
111	N/S	Regular	Lakewood Reg Med Ctr to Downtown Long Beach	Broadway, Lakewood Blvd	Lakewood Blvd at Willow St	Adjacent to site	35-60 mins	60 min
112	N/S	Regular	Lakewood Reg Med Ctr to Downtown Long Beach	Broadway, Clark Ave	Lakewood Blvd at Willow St	Adjacent to site	30-60 mins	60 min
131	N/S	Regular	Metro Blue Line Wardlow Station to Lakewood Mall	Spring St, Redondo Ave	Redondo Ave at Willow St	0.6	30-60 mins	60 min
176	N/S	Regular	ZAP PCH - Tech Park to Lakewood Mall	PCH, Lakewood Blvd, Clark Ave	Lakewood Blvd at Willow St	Adjacent to site	30 min	N/A

Note:

N/A - Not applicable

Analysis of Existing Traffic Conditions

Detailed traffic analyses of Existing conditions were performed at the following five study intersections:

1. Lakewood Boulevard / Spring Street
2. Redondo Avenue / Willow Street
3. Lakewood Boulevard / Willow Street
4. Clark Avenue / Willow Street
5. Lakewood Boulevard / 23rd Street

These study intersections were determined in consultation with LBTTB. They are the locations expected to experience the large majority of Project trips and, therefore, where potential Project impacts would most likely occur. All of the study intersections are signalized.

Signalized intersections in the City of Long Beach are analyzed using the Intersection Capacity Utilization (ICU) methodology. This methodology determines the operating characteristics of an intersection in terms of the "Level of Service" based on different levels of traffic volume and lane capacities. The generally accepted lane capacities are 1,600 vehicles per lane for all through and left- and right-turn lanes, and a capacity of 2,880 for dual turn lanes. The City has adopted clearance interval adjustments that incorporate the number of signal phases and phasing type. Table 2 shows these clearance intervals.

**Table 2
City of Long Beach
Clearance Intervals**

<u>Number of Signal Phases</u>	<u>Left-turn Phasing Type</u>	<u>Clearance Interval</u>
2	Permitted	10%
3	Protected and Permitted	12%
3	Fully Protected	15%
4	Protected and Permitted	14%
4	Fully Protected	18%

Source: City of Long Beach Guidelines and Signalized Intersection Analysis.

The term "Level of Service" (LOS) describes the quality of traffic flow, ranging from excellent conditions at LOS A to failure conditions at LOS F. The City recognizes LOS D as the minimum acceptable service level.

The volume-to-capacity (V/C) ratios used in this study were calculated by dividing the sum of critical movement volumes by the appropriate capacity value, then including the clearance interval, as discussed earlier. Table 3 presents the LOS corresponding to a range of V/C ratios.

Information pertaining to intersection traffic lane configurations and signal operations were obtained from on-line aerial photographs and other sources. This information, together with the study intersection volumes in Figures 3(a) and 3(b) were analyzed using the above procedures and established traffic engineering techniques. The V/C ratios and the corresponding service levels for existing traffic conditions at the study intersections were thus determined. (The study intersection lane configurations and signal controls are provided in Appendix B.)

Table 3
Level of Service
As a Function of V/C Ratios

<u>Level of Service</u>	<u>Description of Operating Characteristics</u>	<u>Range of V/C Ratios</u>
A	Excellent. No vehicle waits longer than one red light.	0.000 - 0.600
B	Very Good. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.	0.601 - 0.700
C	Good. Occasionally, drivers may have to wait through more than one red light; backups may develop behind turning vehicles.	0.701 - 0.800
D	Fair. Delays may be substantial during portions of the rush hour, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.	0.801 - 0.900
E	Poor. Represents the most vehicles that intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.	0.901 - 1.000
F	Failure. Backups from nearby intersections or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.	> 1.000

The LOS and V/C determined for Existing conditions are included in Table 9, page 40. Two of the five study intersections are experiencing very good to good service levels, i.e., LOS A, B or C, during both peak hours. The study intersection of Redondo Avenue / Willow Street is at LOS C during the AM peak hour and LOS D, a fair service level, during the PM peak hour. The remaining two study intersections have fair to very poor service levels. Lakewood Boulevard / Spring Street, is shown to be at LOS D during the AM peak hour and LOS F during the PM peak hour. Lakewood Boulevard / Willow Street, is experiencing LOS F during the AM peak hour and LOS E during the PM peak hour. (The LOS analysis worksheets for Existing conditions are provided in Appendix C).

Collision History Analysis

LBTTB requested that the collision history at the intersection of Lakewood Boulevard / Willow Street be evaluated. For this evaluation, LBTTB provided collision data for the three-year period from July 2012 to June 2015. There were a total of 38 reported collisions, of which five involved injuries. No fatal collisions were reported.

Of the 38 collisions, eight collisions were due to unsafe speed; six collisions were due to improper turning; four collisions were due to issues with the traffic signals/signs; and nine collisions were due to one of the following: unsafe lane change, improper passing, following closely, pedestrian violation, or auto right-of-way violation. For the remaining 11 collisions, no primary reason was given. As for the type of collision, the majority of the accidents were classified as rear-ends, with a total of 16. This was followed by broadsides and sideswipes, each with a total of nine collisions. The remaining four collisions were classified as head-on, hit object or unknown/other.

The estimated "Total" intersection accident rate is 0.50, the "Fatal + Injury"-related accident rate is 0.07, and the "Fatal" accident rate is 0.00. Compared to the Statewide average accepted rate of 0.30 for "Total" intersection, the Lakewood / Willow rate is higher for that category. However, for the "Fatal + Injury"-related category, the Lakewood / Willow rate is significantly less than the Statewide average accepted rate of 0.13

The most prevalent reason for these collisions was attributed to unsafe speed. The posted speed limit on both Lakewood Boulevard and Willow Street is 40 MPH. Lakewood Boulevard and Willow Street are classified as a Regional Corridor and Boulevard, respectively. The function of these roadways is to move traffic on a local and regional scale. Per the *City of Long Beach Mobility Plan*, traffic calming measures are not a consideration for these roadways. However, if a speed survey shows that drivers are exceeding the posted speed limits, installing radar speed signs with electronic displays and/or posting additional speed limit signs may be considered to increase driver speed awareness and potentially reduce the number of speed-related accidents.

PROJECT TRAFFIC

The following section describes the methodology used to determine the trip generation, distribution and assignment of the Project.

Trip Generation

Trip generation estimates of the proposed and existing Project site uses were calculated using daily, AM and PM peak-hour trip generation rates from the current Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition manual. Table 4 presents the trip generation rates applied to the Project site uses.

Table 4
Trip Generation Rates for Proposed & Existing Project Site Uses

Hotel (ITE Code 310)

Daily:	T = 8.17 R
AM Peak Hour:	T = 0.53 (R); 59% I/B, 41% O/B
PM Peak Hour:	T = 0.60 (R); 51% I/B, 49% O/B

Where: T = Trip ends
R = Rooms

I/B = Inbound
O/B = Outbound

Applying the above trip rates provided the baseline daily, AM peak-hour and PM peak-hour trip generations for the proposed and existing uses. As these trip rates do not account for above average shuttle usage (due to the proximity of Long Beach Airport) or other mode trips (such as the increasing use of ride share trips via Uber, Lyft, etc.), the baseline trips were adjusted to account for these factors. An adjustment of 20 percent was estimated, based on conversations with the Holiday Inn management staff as to their observations of shuttle and other modes usage. It should be noted that for consistency, the 20 percent adjustment was applied to both the proposed use and the portion of existing use being removed. As shown in Table 5, the Project, without the transit and shuttle service, would be expected to generate 612 net daily trips, including 39 net trips during the AM peak hour and 45 net trips during the PM peak hour; with the adjustment for the transit and shuttle service at the Project site, the Project is estimated to generate 490 net daily trips, including 31 net trips during the AM peak hour and 36 net trips during the PM peak hour.

**Table 5
Project Trip Generation**

	<u>Size</u>	<u>AM Peak Hour</u>			<u>Total</u>	<u>PM Peak Hour</u>			
		<u>Daily</u>	<u>I/B</u>	<u>O/B</u>		<u>I/B</u>	<u>O/B</u>	<u>Total</u>	
<u>PROPOSED USES</u>									
StayBridge Suites	125 rms	1,021	39	27	66	38	37	75	
<i>Shuttle/Other Modes</i>									
StayBridge Suites	20%	(204)	(8)	(5)	(13)	(8)	(7)	(15)	
Subtotal Trips (A)		817	31	22	53	30	30	60	
<u>EXISTING USES</u>									
Holiday Inn, remove 50 rms	50 rms	409	16	11	27	15	15	30	
<i>Shuttle/Other Modes</i>									
Holiday Inn	20%	(82)	(3)	(2)	(5)	(3)	(3)	(6)	
Subtotal Trips (B)		327	13	9	22	12	12	24	
<u>NET TRIPS, (A) - (B)</u>		<u>490</u>	<u>18</u>	<u>13</u>	<u>31</u>	<u>18</u>	<u>18</u>	<u>36</u>	

Notes:

ITE Trip Generation, 9th Edition trip generation rates applied.

Trip Distribution

Estimation of the geographic distribution of Project trips was the next step in the analytical process. This trip distribution considered the nature of the Project uses, current traffic patterns, characteristics of the surrounding roadway system, location of the Project site and its proximity to freeways and major travel routes, and areas from which employees, guests and visitors would likely be drawn. Based on these factors, estimates were made of the overall geographic trip distribution percentages, which are shown in Table 6. These distribution percentages were reviewed and accepted by LBTTB.

**Table 6
Project Geographic Trip Distribution Percentages**

North	20 %	East	26 %
South	17 %	West	37 %

Trip Assignment

The estimated Project trip assignment percentages for the streets and intersections expected to be used to access the site were developed from the distribution percentages in Table 6. These percentages, inbound and outbound, were reviewed and approved by LBTTB, and are illustrated in Figures 5(a) and 5(b). Applying these percentages to the net Project trips in

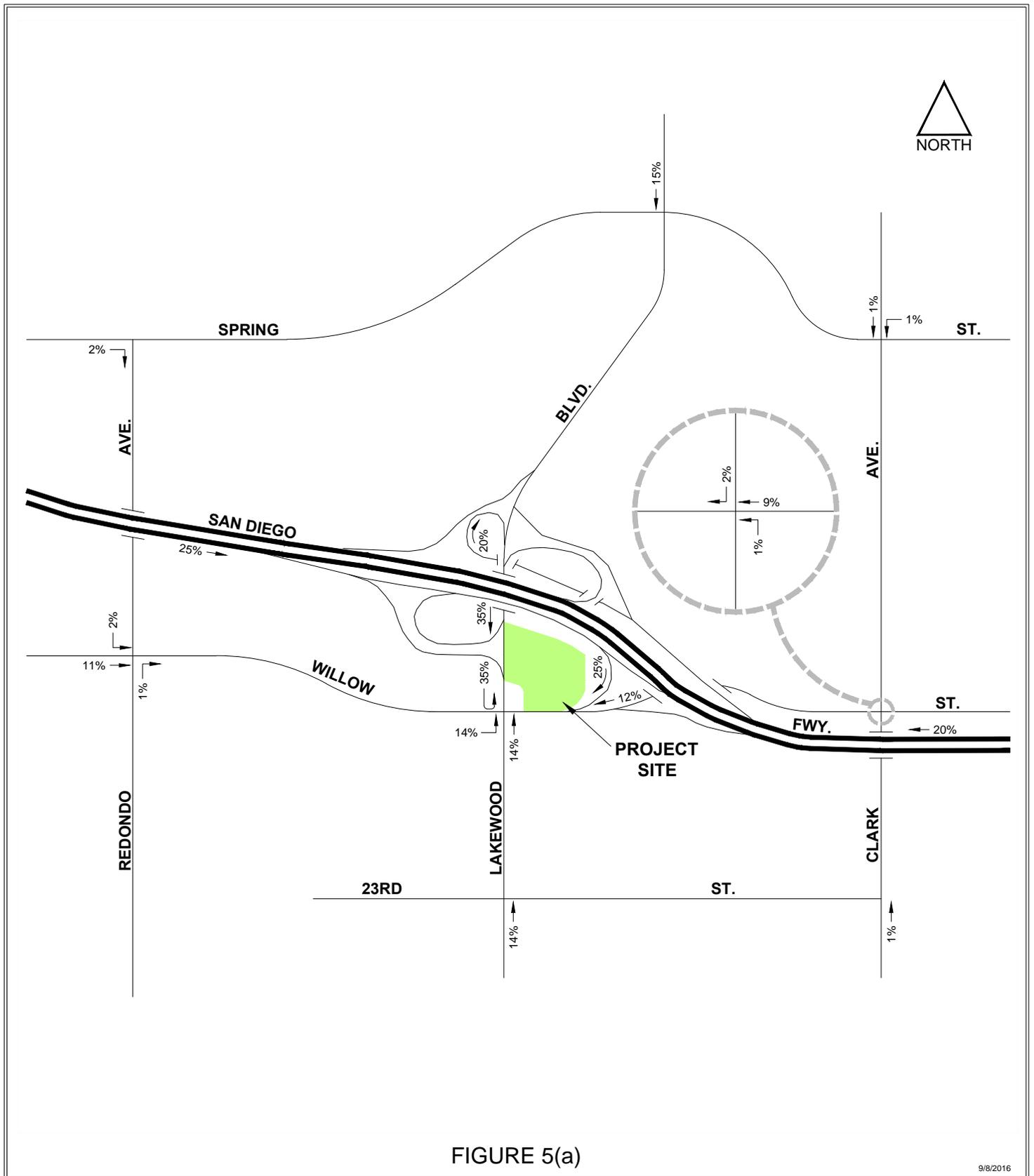


FIGURE 5(a)

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FN: StaybridgeSuitesLongBch\PROJ-DIST(INBOUND)

PROJECT TRIP PERCENTAGES
INBOUND



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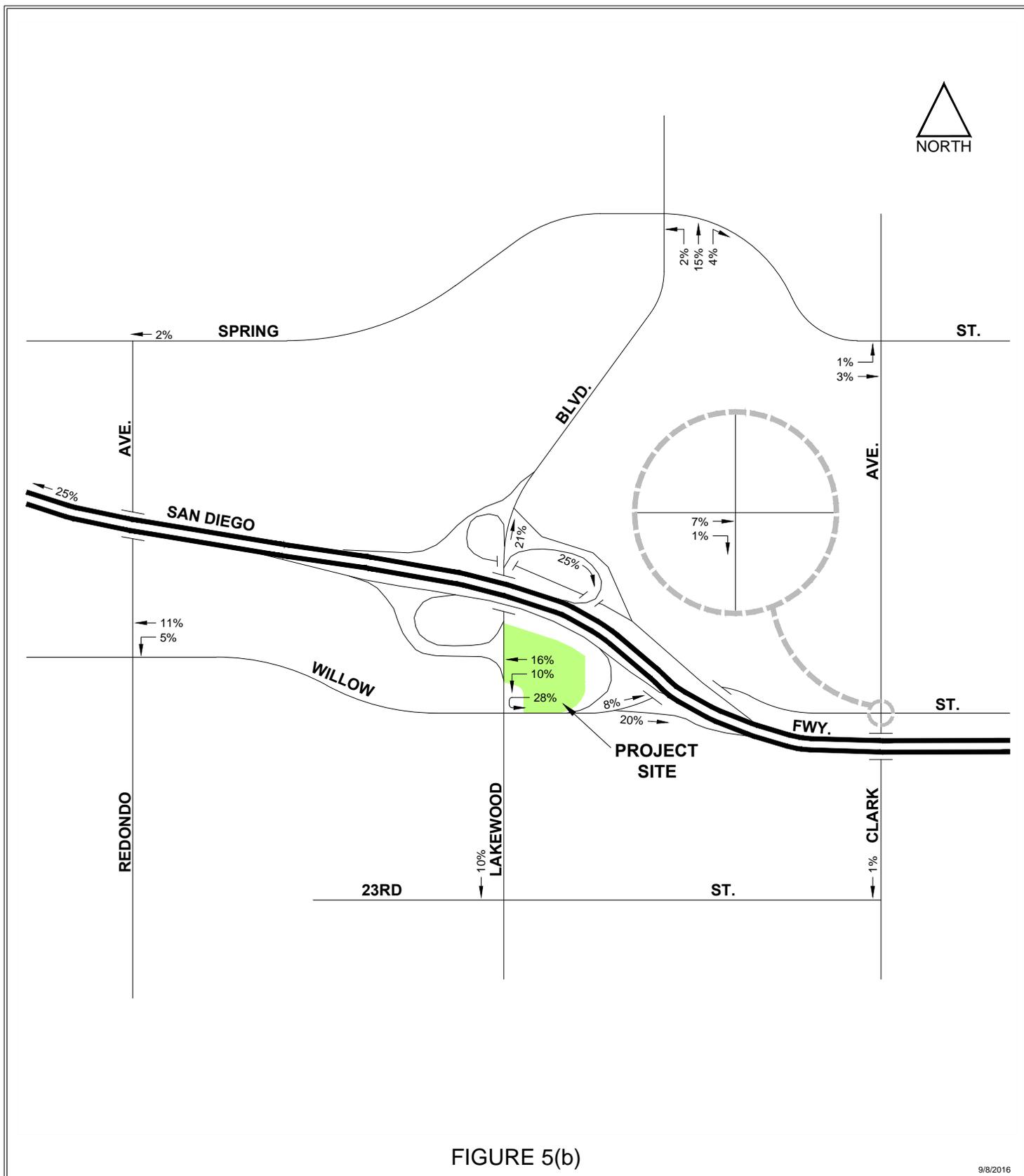


FIGURE 5(b)

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FN: StaybridgeSuitesLongBch\PROJ-DIST(OUTBOUND)

PROJECT TRIP PERCENTAGES
OUTBOUND



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Table 5, Project traffic volumes at the five study intersections were determined for the AM and PM peak hours, and are shown in Figures 6(a) and 6(b).

On-Site Parking

The existing on-site parking lot, which has a total of approximately 349 spaces, will be modified with the construction of Staybridge Suites - Long Beach Airport and the new parking deck. With the completed Project, there would a parking supply of approximately 385 spaces, consisting of 253 surface spaces and 132 spaces within the parking deck. This parking supply would serve Staybridge Suites - Long Beach Airport, the existing Holiday Inn, and their ancillary facilities.

The City of Long Beach Municipal Code requires one parking space per room for a hotel use, 20 parking spaces per 1,000 square feet for a public assembly area (e.g., meeting / banquet hall) without fixed seats, and 10 parking spaces per 1,000 square feet for a restaurant use. It should be noted that although the size of the existing conference center is 10,633 square feet, only 5,000 square feet is actual assembly area. Combined with the 2,496 square feet of additional assembly area proposed by the Project, there would a total of 7,496 square feet of assembly area. On a “stand alone” basis, the code-required parking for the component uses of the site would be a follows: Hotel, 297 spaces; assembly area, 150 spaces; and restaurant, 35 spaces. Therefore, the total “stand alone” parking requirement for the site would be 482 spaces.

Based on the above parking requirements, the proposed parking supply of 385 spaces would be deficient by approximately 100 spaces. However, this parking supply may be sufficient when the parking demands of the site uses are analyzed interactively with each other. To assess whether such might be the case, a shared parking analysis was conducted for two scenarios for the weekday and weekend periods, based on the methodology in the Urban Land Institute’s (ULI) current Shared Parking, 2nd Edition manual. The first scenario was analyzed without any adjustments. The second scenario was analyzed with adjustments, which accounted for increased shuttle usage and usage of other transportation modes (e.g., Uber, Lyft, etc.), as discussed regarding Project trip generation (page 14), and internal capture. With no adjustments, it is estimated that the peak parking demand would be 375 spaces, occurring from 12:00 PM to 2:00 PM for both weekday and weekend periods. With the inclusion of the adjustments, the peak parking demand would also occur between 12:00 PM and 2:00 PM, but it would decrease to 323 spaces for both weekday and weekend periods. The results of the analyses for the weekday parking utilization are shown in Tables 7(a) and 7(b) and the weekend parking utilization are shown in Tables 7(c) and 7(d). (The ULI hourly parking utilization percentages for the component uses are provided in Appendix D.)

Therefore, from a shared parking standpoint, the peak parking demand for the site uses would be expected to range from approximately 323 to 375 spaces. As 385 parking spaces are proposed to be provided on-site, no parking deficiency is anticipated and there could be a surplus of approximately 10 to 62 spaces.

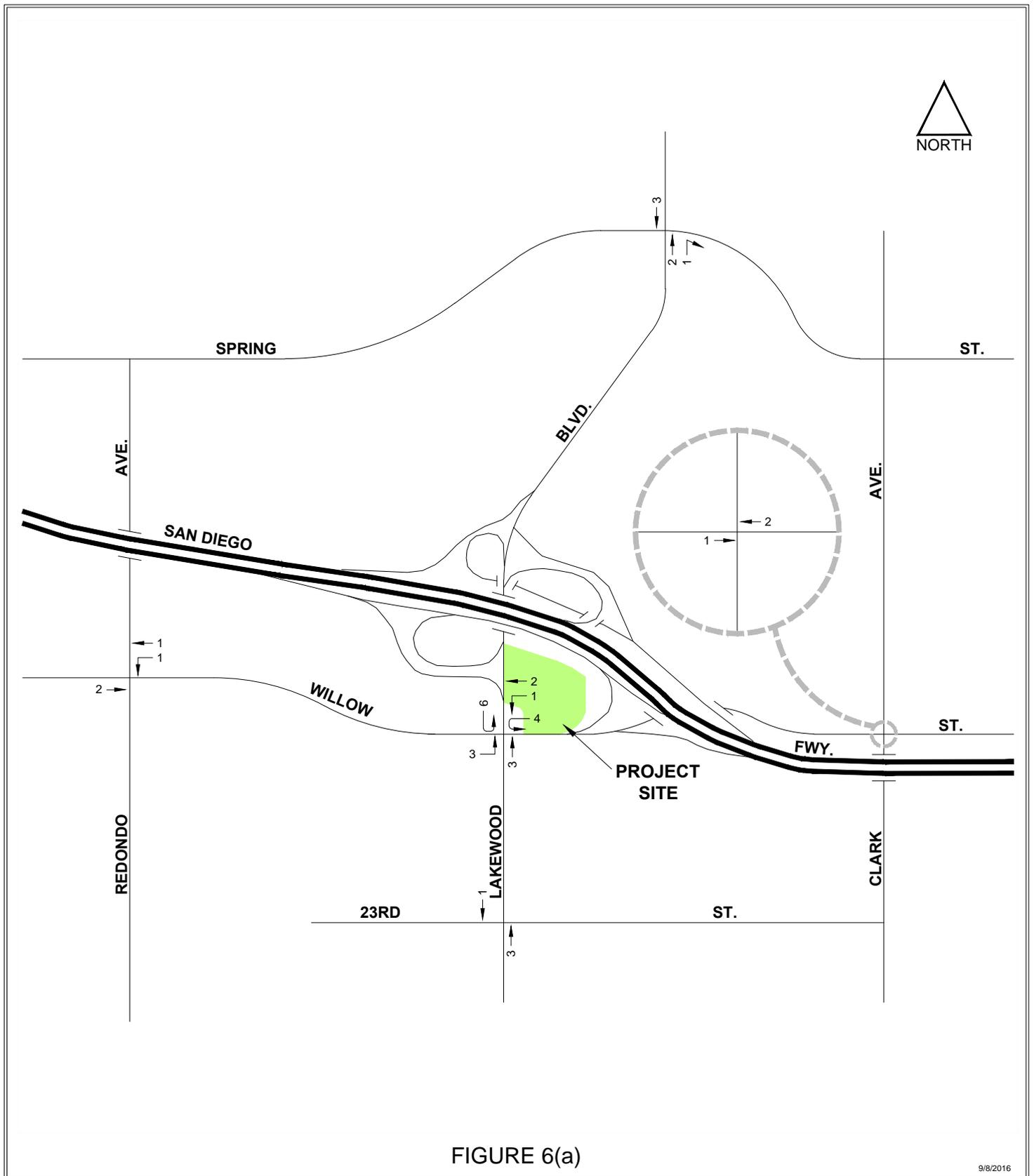


FIGURE 6(a)

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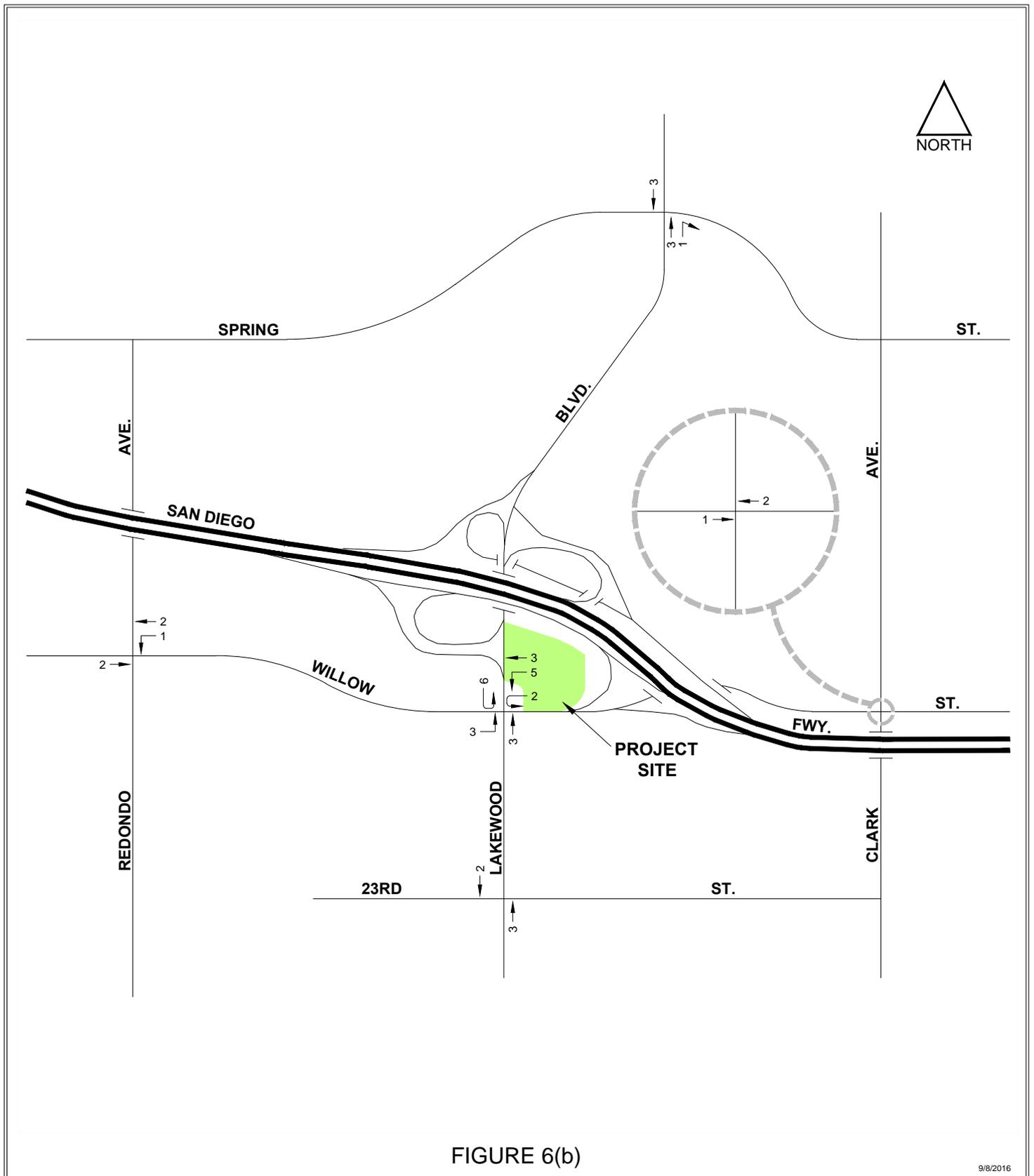


FIGURE 6(b)

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**Table 7(a)
Shared Parking Analysis
Without Adjustments - Weekday**

Use	Development Size	Long Beach Municipal Code Parking Ratio	Parking Requirement
Hotel			
<i>Existing</i>	172 rooms		
Visitor		0.80 / room	138 sp
Employee		0.20 / room	34 sp
<i>Proposed</i>	125 rooms		
Visitor		0.80 / room	100 sp
Employee		0.20 / room	25 sp
			297
Assembly Area			
Existing	5,000 sf	20.00 / 1,000 sf	100 sp
Proposed	2,496 sf	20.00 / 1,000 sf	50 sp
			150
Restaurant			
Existing	3,500 sf	10.00 / 1,000 sf	35 sp
			35
Total:			482 sp

WEEKDAY PARKING ACCUMULATIONS							
Time of Day	VISITOR			EMPLOYEE	Total Parking Accumulation	Proposed Parking Supply	Parking Surplus
	Hotel Room	Conference/ Meeting Room	Hotel Restaurant				
6:00 AM	226	0	0	3	229	385	156
7:00 AM	214	0	4	18	236	385	149
8:00 AM	190	75	11	54	330	385	55
9:00 AM	166	150	4	54	374	385	11
10:00 AM	143	150	4	59	356	385	29
11:00 AM	143	150	2	59	354	385	31
12:00 PM	131	150	35	59	375	385	10
1:00 PM	131	150	35	59	375	385	10
2:00 PM	143	150	12	59	364	385	21
3:00 PM	143	150	4	59	356	385	29
4:00 PM	154	150	4	54	362	385	23
5:00 PM	166	150	11	42	369	385	16
6:00 PM	178	75	19	24	296	385	89
7:00 PM	178	45	21	12	256	385	129
8:00 PM	190	45	25	12	272	385	113
9:00 PM	202	15	23	12	252	385	133
10:00 PM	226	0	21	12	259	385	126
11:00 PM	238	0	14	6	258	385	127
12:00 AM	238	0	11	3	252	385	133

* Indicates peak parking demand.

Table 7(b)
Shared Parking Analysis
With Shuttle/Other Modes & Internal Capture Adjustments - Weekday

Use	Development Size	Long Beach Municipal Code Parking Ratio	Parking Requirement
Hotel			
<i>Existing</i>	172 rooms		
Visitor		0.80 / room	138 sp
Employee		0.20 / room	34 sp
<i>Proposed</i>	125 rooms		
Visitor		0.80 / room	100 sp
Employee		0.20 / room	25 sp
20% Shuttle/ride share reduction (Hotel, Existing & Proposed) - Visitor			(48)
20% Shuttle/ride share reduction (Hotel, Existing & Proposed) - Employee			(12)
			238
Assembly Area			
Existing	5,000 sf	20.00 / 1,000 sf	100 sp
Proposed	2,496 sf	20.00 / 1,000 sf	50 sp
10% Shuttle/ride share reduction (Conference/Meeting Rooms, Existing & Proposed)			(15)
			135
Restaurant			
Existing	3,500 sf	10.00 / 1,000 sf	35 sp
25% Internal capture			(9)
			26
Total:			399 sp

WEEKDAY PARKING ACCUMULATIONS							
Time of Day	VISITOR			EMPLOYEE	Total Parking Accumulation	Proposed Parking Supply	Parking Surplus
	Hotel Room	Conference/ Meeting Room	Hotel Restaurant				
6:00 AM	181	0	0	2	183	385	202
7:00 AM	171	0	4	14	189	385	196
8:00 AM	152	68	11	43	274	385	111
9:00 AM	133	135	4	43	315	385	70
10:00 AM	114	135	4	48	301	385	84
11:00 AM	114	135	2	48	299	385	86
12:00 PM	105	135	35	48	323	385	62
1:00 PM	105	135	35	48	323	385	62
2:00 PM	114	135	12	48	309	385	76
3:00 PM	114	135	4	48	301	385	84
4:00 PM	124	135	4	43	306	385	79
5:00 PM	133	135	11	33	312	385	73
6:00 PM	143	68	19	19	249	385	136
7:00 PM	143	41	21	10	215	385	170
8:00 PM	152	41	25	10	228	385	157
9:00 PM	162	14	23	10	209	385	176
10:00 PM	181	0	21	10	212	385	173
11:00 PM	190	0	14	5	209	385	176
12:00 AM	190	0	11	2	203	385	182

* Indicates peak parking demand.

Table 7(c)
Shared Parking Analysis
Without Adjustments - Weekend

Use	Development Size	Municipal Code Parking Ratio	Parking Requirement
Hotel			
<i>Existing</i>			
	172 rooms		
Visitor		0.80 / room	138 sp
Employee		0.20 / room	34 sp
<i>Proposed</i>			
	125 rooms		
Visitor		0.80 / room	100 sp
Employee		0.20 / room	25 sp
			297
Assembly Area			
Existing	5,000 sf	20.00 / 1,000 sf	100 sp
Proposed	2,496 sf	20.00 / 1,000 sf	50 sp
			150
Restaurant			
Existing	3,500 sf	10.00 / 1,000 sf	35 sp
			35
Total:			482 sp

WEEKEND PARKING ACCUMULATIONS							
Time of Day	VISITOR			EMPLOYEE	Total Parking Accumulation	Proposed Parking Supply	Parking Surplus
	Hotel Room	Conference/ Meeting Room	Hotel Restaurant				
6:00 AM	226	0	0	3	229	385	156
7:00 AM	214	0	4	18	236	385	149
8:00 AM	190	75	11	54	330	385	55
9:00 AM	166	150	4	54	374	385	11
10:00 AM	143	150	4	59	356	385	29
11:00 AM	143	150	0	59	352	385	33
12:00 PM	131	150	35	59	375	385	10
1:00 PM	131	150	35	59	375	385	10
2:00 PM	143	150	12	59	364	385	21
3:00 PM	143	150	4	59	356	385	29
4:00 PM	154	150	4	54	362	385	23
5:00 PM	166	150	11	45	372	385	13
6:00 PM	178	75	19	36	308	385	77
7:00 PM	178	45	21	33	277	385	108
8:00 PM	190	45	25	33	293	385	92
9:00 PM	202	15	23	33	273	385	112
10:00 PM	226	0	21	26	273	385	112
11:00 PM	238	0	14	26	278	385	107
12:00 AM	238	0	11	18	267	385	118

* Indicates peak parking demand.

Table 7(d)
Shared Parking Analysis
With Shuttle/Other Modes & Internal Capture Adjustments - Weekend

<u>Use</u>	<u>Development Size</u>	<u>Long Beach Municipal Code Parking Ratio</u>	<u>Parking Requirement</u>
Hotel			
<i>Existing</i>	172 rooms		
Visitor		0.80 / room	138 sp
Employee		0.20 / room	34 sp
<i>Proposed</i>	125 rooms		
Visitor		0.80 / room	100 sp
Employee		0.20 / room	25 sp
		20% Shuttle/ride share reduction (Hotel, Existing & Proposed) - Visitor	(48)
		20% Shuttle/ride share reduction (Hotel, Existing & Proposed) - Employee	(12)
			238
Assembly Area			
Existing	5,000 sf	20.00 / 1,000 sf	100 sp
Proposed	2,496 sf	20.00 / 1,000 sf	50 sp
		10% Shuttle/ride share reduction (Conference/Meeting Rooms, Existing & Proposed)	(15)
			135
Restaurant			
Existing	3,500 sf	10.00 / 1,000 sf	35 sp
		25% Internal capture	(9)
			26
Total:			399 sp

WEEKEND PARKING ACCUMULATIONS							
Time of Day	VISITOR			EMPLOYEE	Total Parking Accumulation	Proposed Parking Supply	Parking Surplus
	Hotel Room	Conference/ Meeting Room	Hotel Restaurant				
6:00 AM	181	0	0	2	183	385	202
7:00 AM	171	0	4	14	189	385	196
8:00 AM	152	68	11	43	274	385	111
9:00 AM	133	135	4	43	315	385	70
10:00 AM	114	135	4	48	301	385	84
11:00 AM	114	135	2	48	299	385	86
12:00 PM	105	135	35	48	323	385	62
1:00 PM	105	135	35	48	323	385	62
2:00 PM	114	135	12	48	309	385	76
3:00 PM	114	135	4	48	301	385	84
4:00 PM	124	135	4	43	306	385	79
5:00 PM	133	135	11	36	315	385	70
6:00 PM	143	68	19	29	259	385	126
7:00 PM	143	41	21	26	231	385	154
8:00 PM	152	41	25	26	244	385	141
9:00 PM	162	14	23	26	225	385	160
10:00 PM	181	0	21	21	223	385	162
11:00 PM	190	0	14	21	225	385	160
12:00 AM	190	0	11	14	215	385	170

* Indicates peak parking demand.

Driveway Access

Access to parking will continue to be provided by the two existing driveways on Lakewood Boulevard and the west most existing driveway on Willow Street. The existing east most existing driveway on Willow Street, which is closer to the I-405 southbound off-ramp, will be closed. The active driveways will continue to be restricted to right-turn-only movements due to the raised medians on Lakewood Boulevard and Willow Street.

The operations of the Lakewood Boulevard and Willow Street driveways with the Project were analyzed utilizing Synchro 9. The evaluation included a review of driveway level of service along with an assessment of the outbound driveway movement queue. The results for each driveway are shown in Table 8.

**Table 8
Driveway Analysis**

DRIVEWAY	LEVEL OF SERVICE				95 TH PERCENTILE QUEUE LENGTH (ft.)	
	AM PEAK		PM PEAK		AM PEAK	PM PEAK
	Delay (sec.)	LOS	Delay (sec.)	LOS		
Driveway 1 – Lakewood North	9.4	A	9.0	A	1	1
Driveway 2 – Lakewood South	9.6	A	9.2	A	2	1
Driveway 3 – Willow Street	15.9	C	11.2	B	8	6

As Table 8 indicates, all Project driveway approaches would be operating at an acceptable level of service of LOS C or better. The 95th percentile queue length is included in Table 8. The 95 percent queue length is an estimate of the queue length which will only be exceeded five percent of the analysis time. The short lengths indicate that all three driveways would not experience queueing issues during the peak periods.

Sight Distance Analysis

Sight distance analyses were performed for the Project driveway at its intersection with Willow Street. A field check was also conducted for these analyses. All calculations were in accordance with the current 6th Edition of the Caltrans Highway Design Manual (HDM). Both stopping sight distance (SSD) and corner sight distance (CSD) requirements were calculated. In brief, SSD is the distance required by a vehicle traveling along an uncontrolled roadway at the roadway's design speed to stop prior to striking an object in its travel path. CSD is the sight distance required by a driver entering or crossing an uncontrolled roadway from an intersecting roadway / driveway to perceive an oncoming vehicle and complete a turning or crossing maneuver without oncoming traffic substantially slowing or stopping.

As shown in Figure 2, the Project driveway would intersect the north side of Willow Street approximately 260 feet east of Lakewood Boulevard (centerline to centerline). In the Project site vicinity, Willow Street is installed with a raised median barrier. This barrier restricts vehicles to right-turn-only movements along this segment of Willow Street, including those accessing the Project driveway. Therefore, the Project driveway was analyzed only for the right-turn access requirements. The results of these analyses are presented in Figure 5(a) and 5(b).

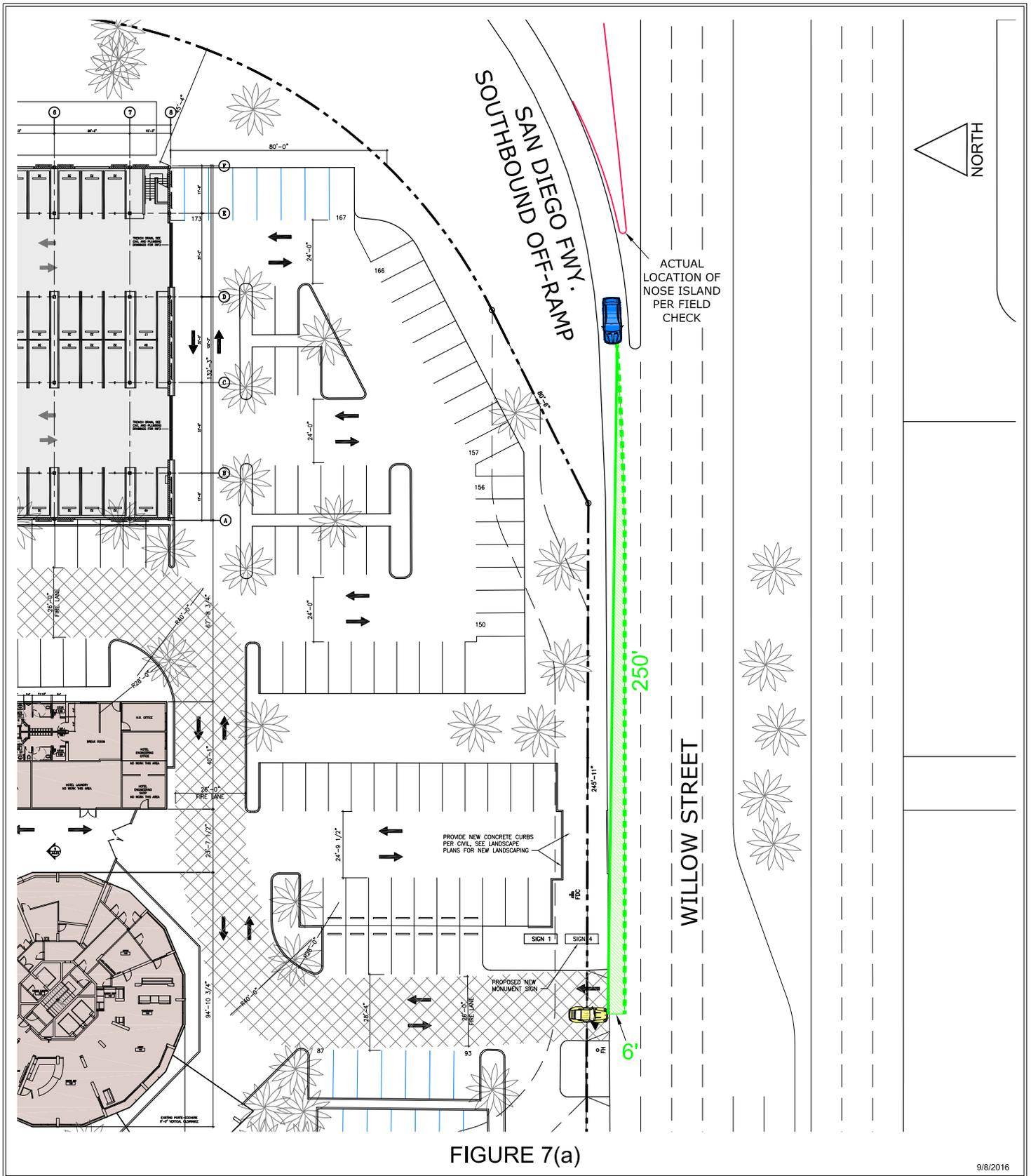
Stopping Sight Distance (SSD) Analysis

Per Index 201.1 of the HDM, at a minimum, SSD standards must be met on State facilities for motorists based on the design speed of the roadway. The I-405 Southbound Off-Ramp at Willow Street does not have a speed limit, but it does have a posted warning speed limit of 25 MPH. To estimate the design speed of this off-ramp, 10 MPH was added to the warning speed limit, resulting in an estimated design speed of 35 MPH. Based on a 35 MPH design speed, the required SSD for a westbound vehicle in the off-ramp / curb lane approaching the Project driveway is 250 feet. As can be seen in Figure 7(a), there is minimal horizontal curvature along the roadway segment between the off-ramp /curb lane merge and the Project driveway. Thus, the available SSD approaching this driveway from the east is approximately 295 feet, which exceeds the 250-foot requirement. Therefore, the SSD requirements would be satisfied per the HDM standards.

Corner Sight Distance (CSD) Analysis

The CSD requirements for motorists making turning movements from the Project driveway were also calculated, as depicted in Figure 7(b). The CSD standards for public and private roadway intersections are outlined in Index 405.1(2) of the HDM. For a private roadway intersection such as that involving the Project driveway, the minimum CSD shall be equal to the required SSD. Therefore, the CSD looking to the east from the Project driveway must be equal to or greater than 250 feet. This required distance is shown in Figure 7(b), along with the clear sight triangle that must be maintained in order to provide the required CSD.

In order to maintain the clear sight triangle shown in Figure 7(b), no line-of-sight obstructions should be located along the portions of the Project site and sidewalk included within the sight triangle. These obstructions include any object that would block the view of a driver in a vehicle on a driveway approach (with an assumed driver eye height of 3.5 feet) from seeing an approaching (westbound) vehicle (vehicle height assumed to be 4.25 feet) on Willow Street. These objects include parked vehicles, bushes, walls, fences, etc. An object such as a street light pole would not typically be considered an obstruction, as a driver on a driveway approach would comfortably see an approaching vehicle before, during, and after its passage behind a pole. While there is a hedge along Willow Street, it is less than 4.25 feet high. Thus, the clear sight triangle in Figure 7(b) is provided and the CSD requirements would be met according to the HDM standards.



9/8/2016

FN: StaybridgeSuitesLongBch\SightDistAnalysis20160128

STOPPING SIGHT DISTANCE ANALYSIS

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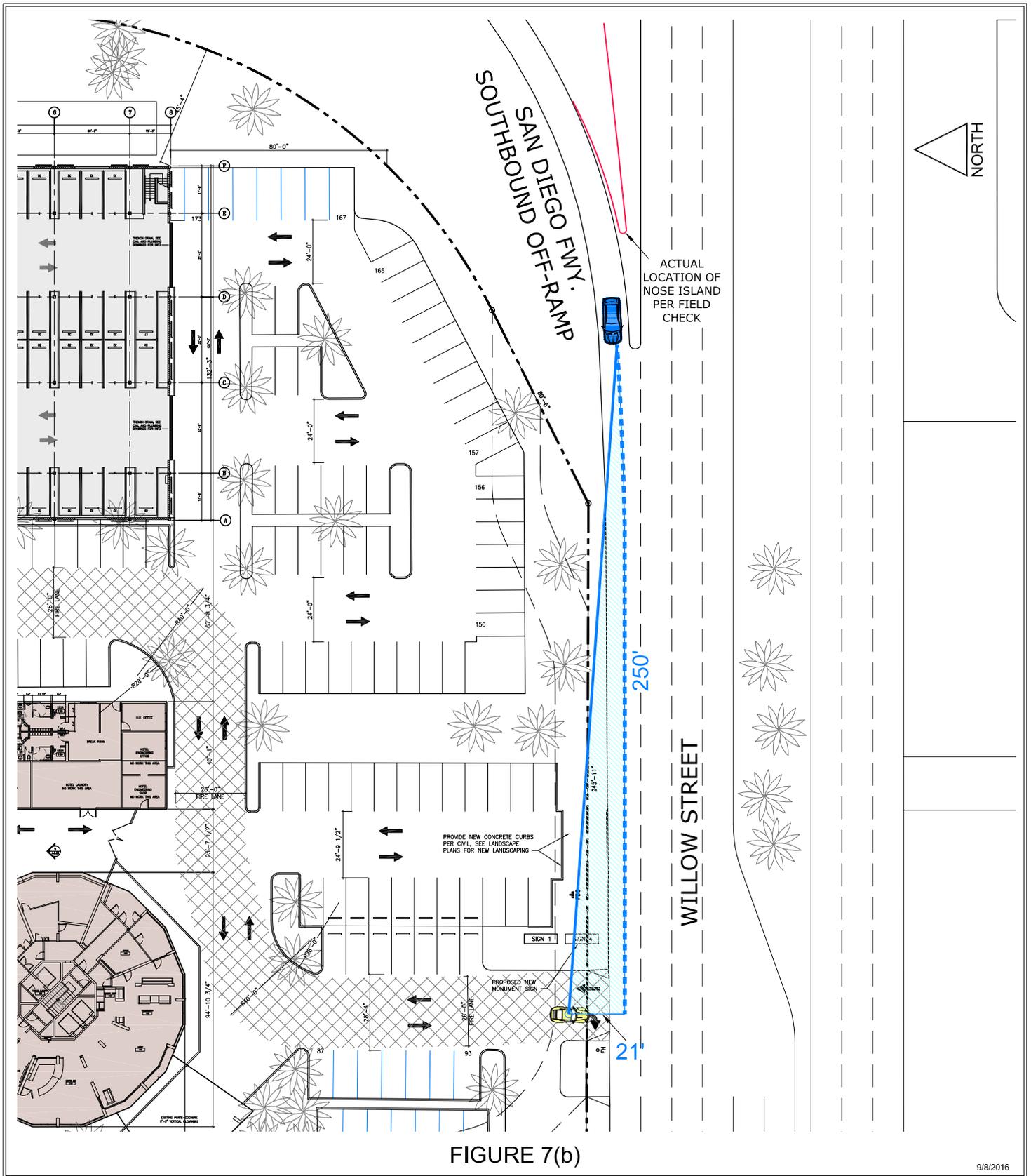


FIGURE 7(b)

9/8/2016

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CORNER SIGHT DISTANCE ANALYSIS



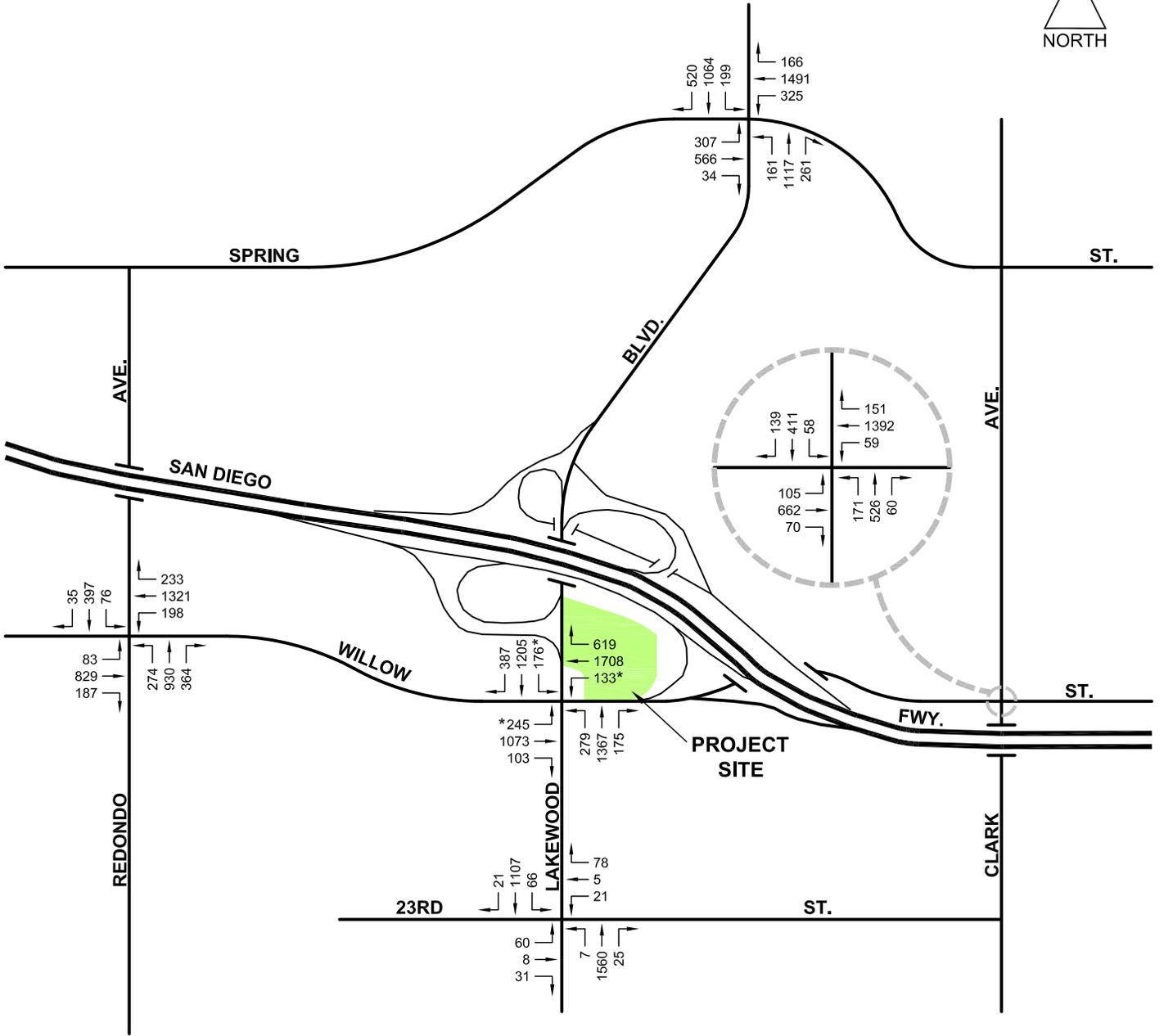
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EXISTING WITH PROJECT CONDITIONS

The “Existing With Project Traffic” conditions are defined by the traffic volumes, roadways, and intersection configurations and controls that currently exist in the year 2015, and the addition of traffic that would be generated by the completed Project. The Project-only traffic volumes that were described in the previous section, which are shown in Figures 6(a) and 6(b), were added to the Existing traffic volumes in Figures 3(a) and 3(b). This produced the Existing With Project peak-hour volumes shown in Figures 8(a) and 8(b). Ambient and Related Projects traffic growth, and any future roadways or infrastructure improvements, were not included in this analysis, as this analysis is of the existing condition for the year 2015.

The Existing With Project volumes in Figures 8(a) and 8(b) were analyzed according to the ICU procedures previously discussed. These volumes were used to determine the impacts attributable to the Project relative to Existing volumes. (The LOS analysis worksheets for Existing With Project conditions are provided in Appendix C.)

As shown in Table 9, page 40, the addition of Project volumes to Existing volumes would result in minor increases to the study intersection V/C ratios during the peak hours. However, there would be no change to the LOS designations and the impacts attributable to the Project would not be significant. (The definition of a significant traffic impact and its determination are described in Table 10, page 41.)



NOTE:
 * - U-TURNS ARE INCLUDED
 IN LEFT-TURN VOLUMES

FIGURE 8(a)

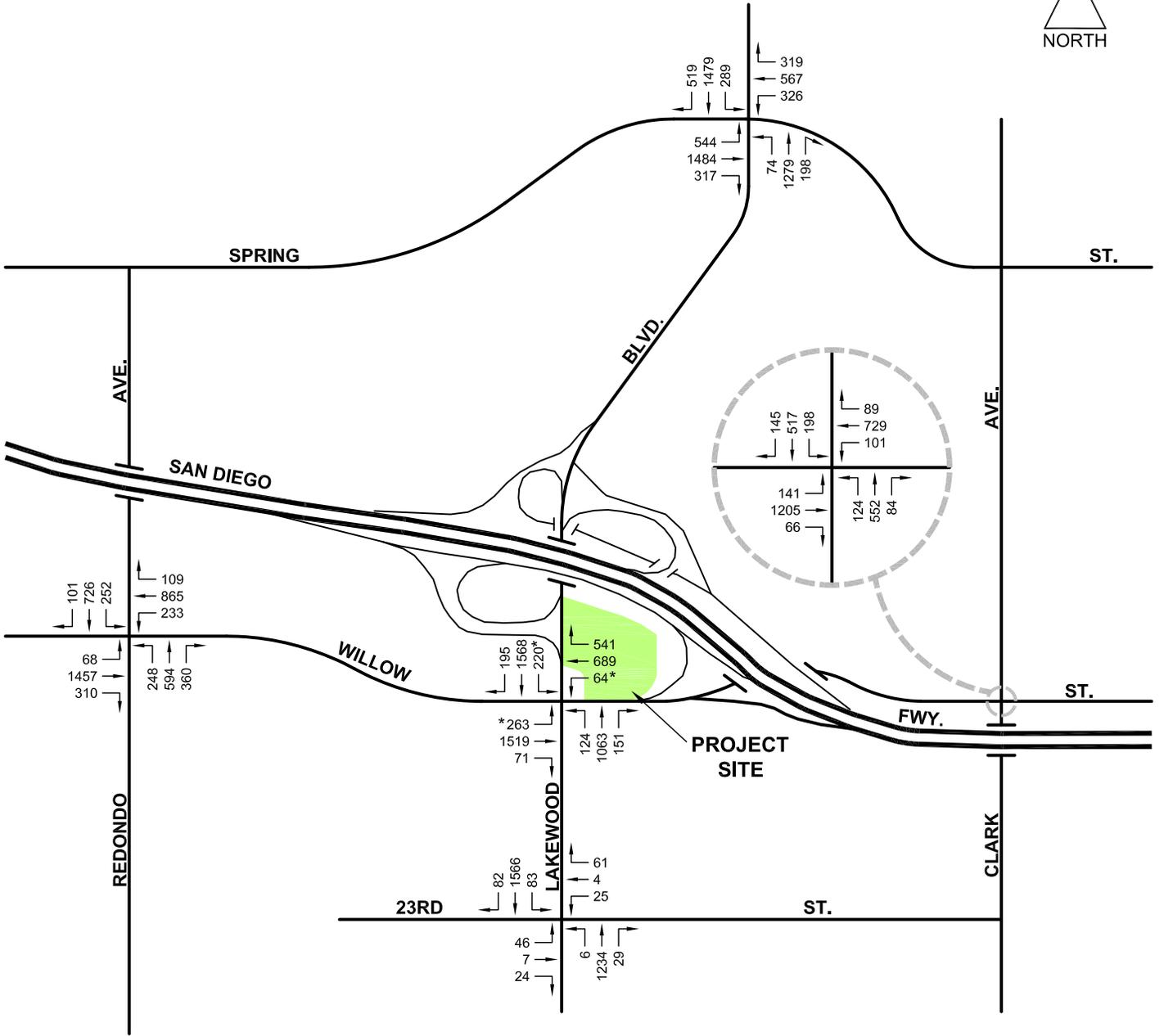
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EXISTING (2015) TRAFFIC VOLUMES
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NOTE:
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FIGURE 8(b)

9/8/2016

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EXISTING (2015) TRAFFIC VOLUMES
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FUTURE TRAFFIC CONDITIONS

Existing traffic is forecast to increase due to ambient growth, which reflects increases in traffic due to regional growth and development outside the study area. The other source is traffic attributable to projects in the vicinity of the study area that are entitled or under construction, commonly referred to as “Related Projects”. The combined traffic volume increases from these two sources provide the basis for the analysis of the “Future Without Project” condition. Project traffic is then analyzed as an incremental addition to the Future Without Project traffic volumes, forming the traffic volumes for the “Future With Project” condition.

Ambient Traffic Growth

As determined in consultation with the City, an ambient growth factor of 1.0 percent per year was applied to the existing (2015) traffic volumes to reflect the effects of regional growth and development over a four-year period through the study year of 2019. This is the year the Project is anticipated to be completed. This growth-factoring established the future baseline volumes for the analysis.

Related Projects Traffic

This study also considered the impacts of the Project relative to Related Projects proposed, approved or under construction in the study area that could contribute traffic volumes to the study intersections through the year 2019. A listing of current Related Projects within approximately 1.5 miles of the Project site was requested from the cities of Long Beach and Signal Hill. Based on the review of the information provided by both cities, a total of 11 Related Projects, all of which are located in the City of Long Beach, were included along with ambient growth to account for the effects of traffic growth in the study area. The locations of the Related Projects are illustrated in Figure 9.

Highway System Improvements

The analysis of Future conditions included a review of the City of Long Beach *Fiscal Years 2015-2019 Capital Improvement Program Plan* for potential street improvements that could affect capacity at the study intersections. No such improvements were identified. Therefore, the existing capacity conditions were assumed to prevail.

Analysis of Future Traffic Conditions, Without and With Project

The analysis of traffic conditions at the study intersections for the future study year of 2019 was performed using the analysis procedures previously described. The current traffic lane configurations and signal operations at the study intersections were assumed to prevail in the future year.

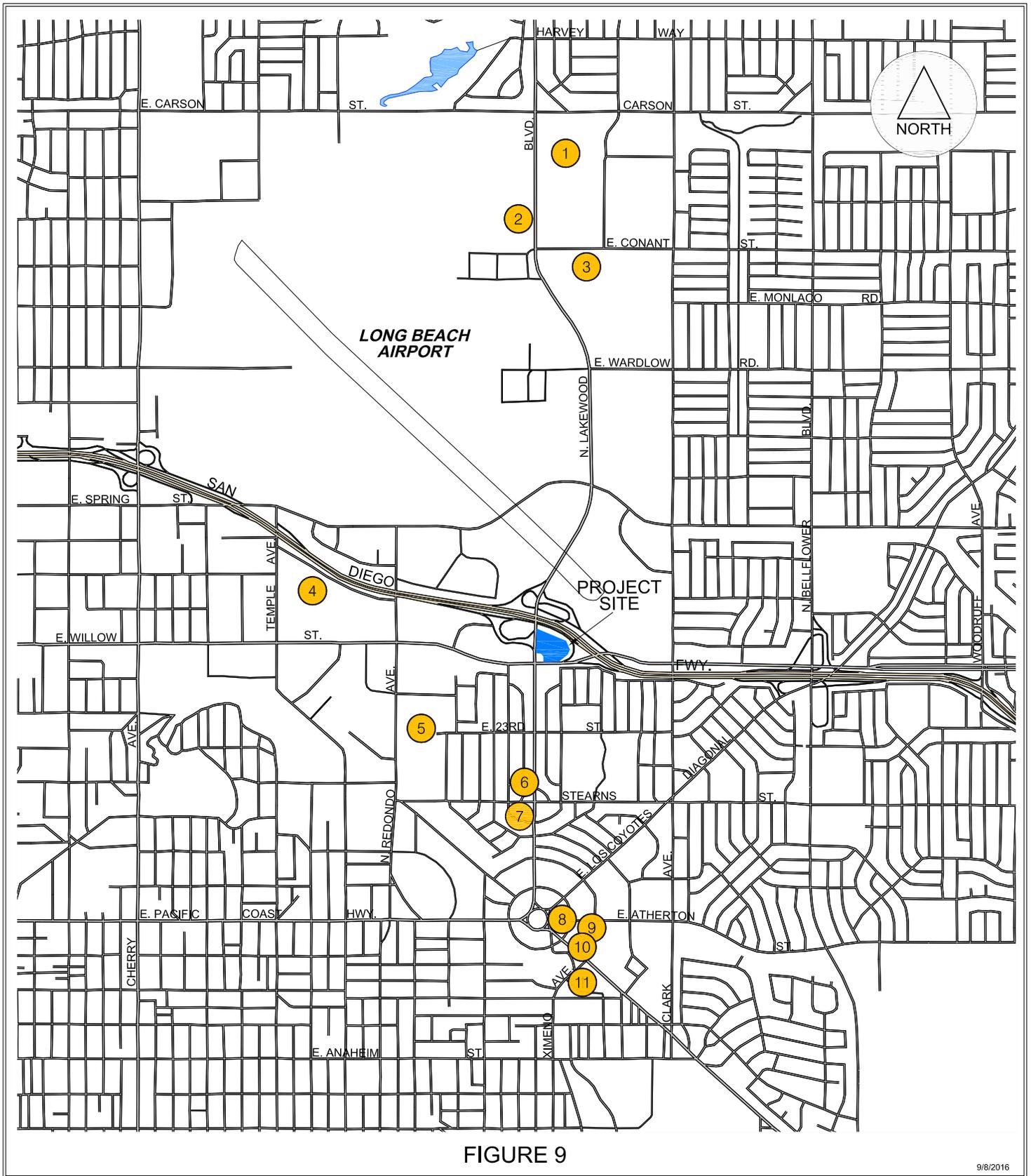


FIGURE 9

9/8/2016

FN: StaybridgeSuitesLongBch/RELPROJ5

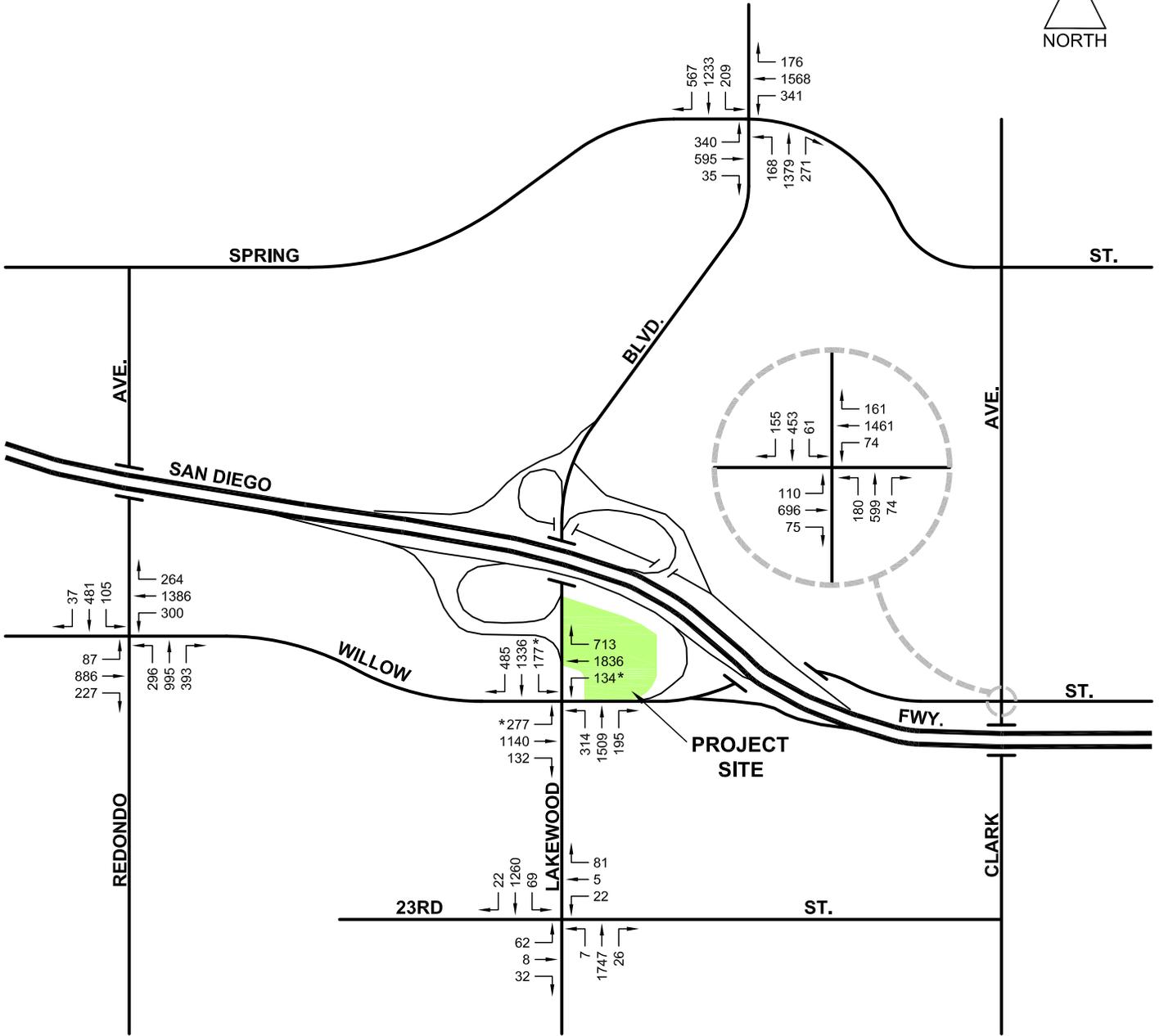
RELATED PROJECTS MAP



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Traffic volumes for the Future Without Project condition are shown in Figures 10(a) and 10(b). These volumes were determined by combining the ambient growth-factored volumes and Related Projects with the existing volumes. Project volumes, as determined earlier, were added to the above Future Without Project volumes, producing the Future With Project volumes, which are provided in Figures 11(a) and 11(b). The Future With Project volumes were the basis for calculating the traffic impacts attributable to the Project, relative to the Future Without Project volumes.

The results of the Future conditions analysis are presented in Table 9, page 40. As shown, service levels are forecast to worsen to varying degree at the study intersections. In terms of poor service levels, there would be three intersections in that category. Under both Future Without Project and Future With Project conditions, the intersections of Lakewood Boulevard / Spring Street would be at LOS E during the AM peak hour and LOS F during the PM peak hour; the intersection of Redondo Avenue / Willow Street would be at LOS C during the AM peak hour and LOS E during the PM peak hour; and the intersection of Lakewood Boulevard / Willow Street would be at LOS F during the AM and PM peak hours. The remaining intersections of Clark Avenue / Willow Street and Lakewood Boulevard / 23rd Street are forecast with good service levels ranging from LOS A to C. At all of the study intersection, the addition of Project traffic to Future conditions would increase V/C ratios, but the LOS designations would not change. (The LOS analysis worksheets for future conditions are provided in Appendix C.)



NOTE:
 * - U-TURNS ARE INCLUDED
 IN LEFT-TURN VOLUMES

FIGURE 10(a)

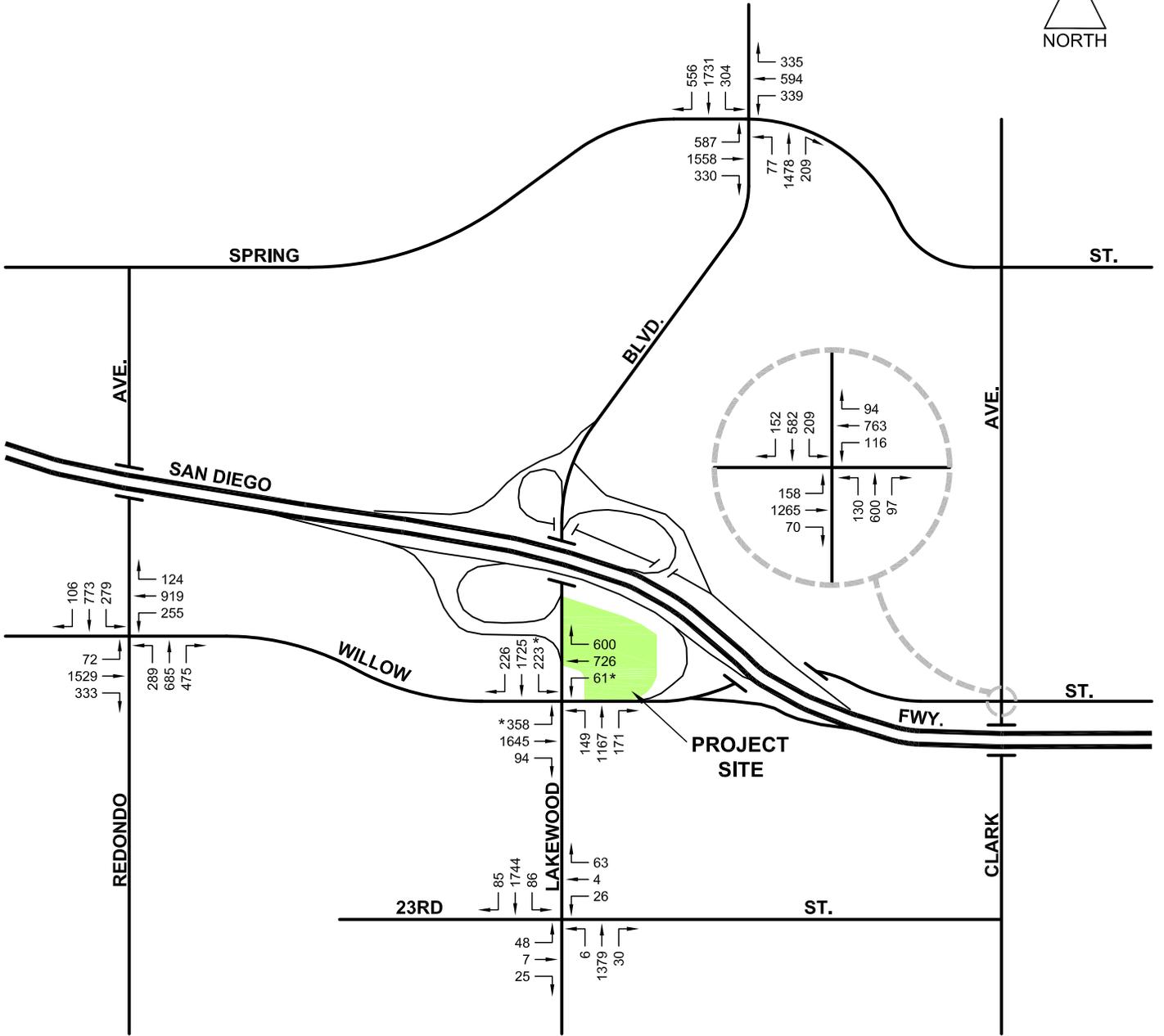
9/8/2016

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FUTURE (2019) TRAFFIC VOLUMES
 WITHOUT PROJECT
 AM PEAK HOUR



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NOTE:
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 IN LEFT-TURN VOLUMES

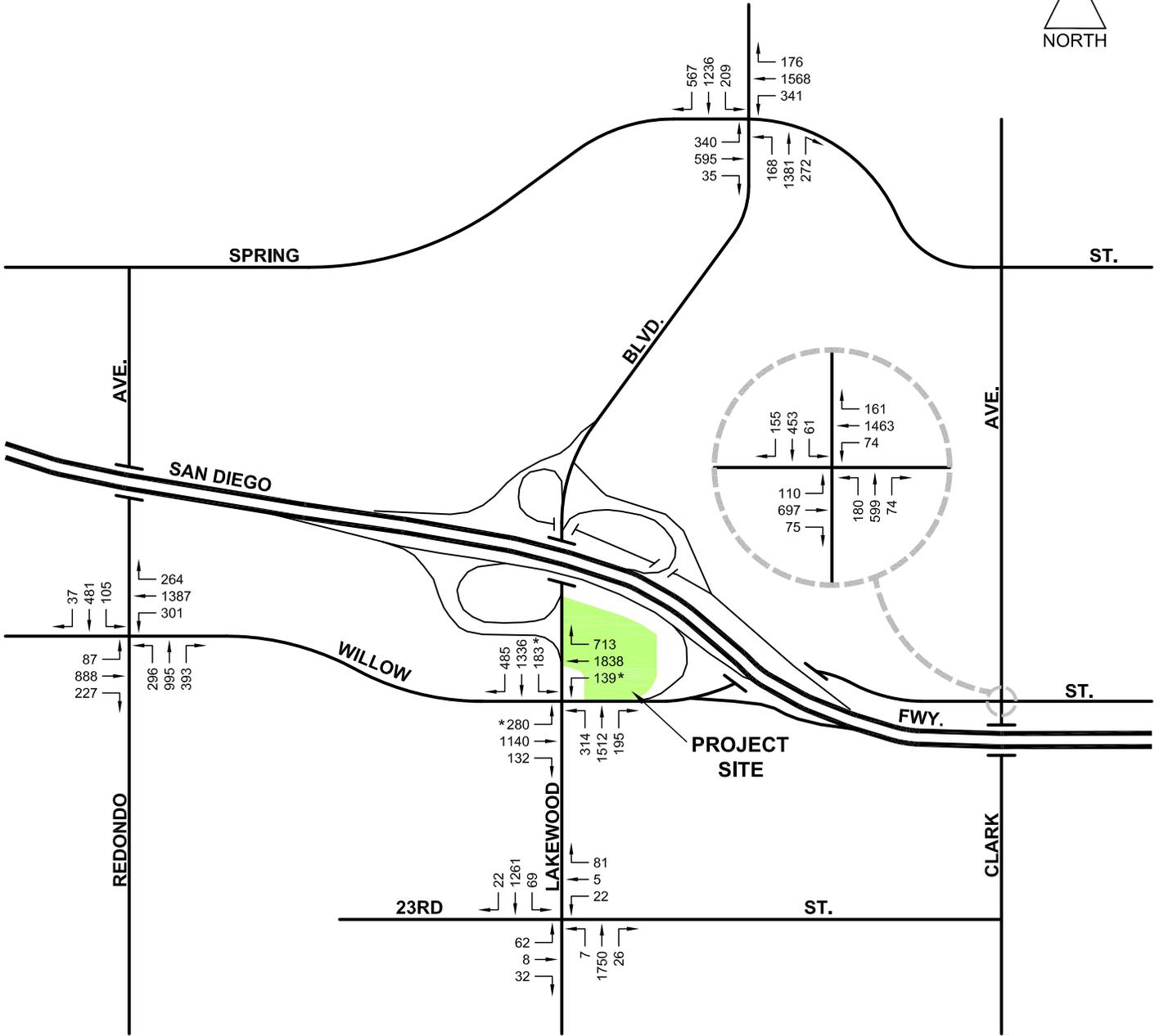
FIGURE 10(b)

9/8/2016

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FUTURE (2019) TRAFFIC VOLUMES
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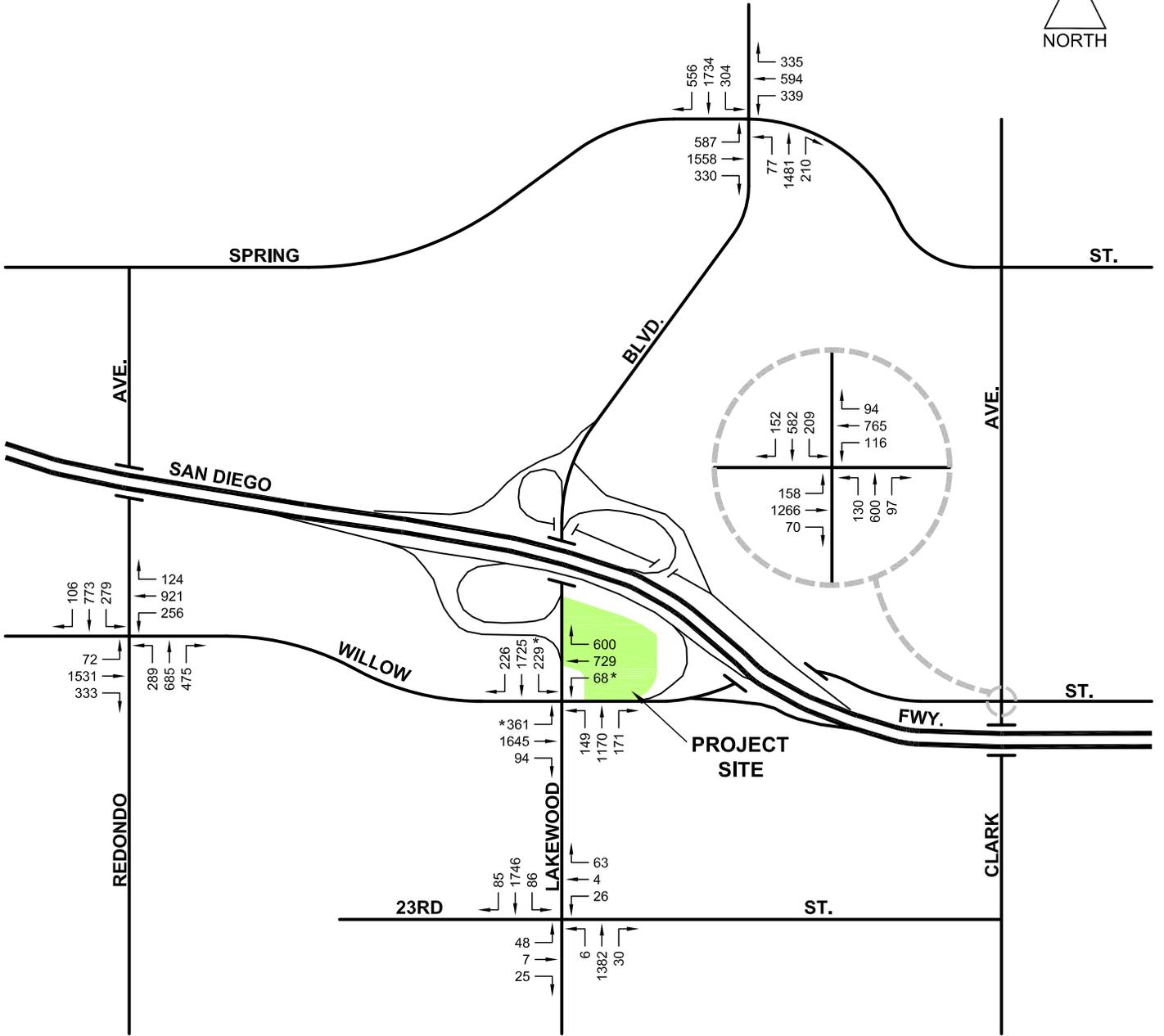
FIGURE 11(a)

9/8/2016

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FUTURE (2019) TRAFFIC VOLUMES
 WITH PROJECT
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NOTE:
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FIGURE 11(b)

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FUTURE (2019) TRAFFIC VOLUMES
 WITH PROJECT
 PM PEAK HOUR

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Table 9
Level of Service (LOS) Analysis Summary
Existing (2015) and Future (2019) Traffic Conditions, Without and With Project

No.	Intersection	Peak Hour	Existing (2015)		Existing (2015) With Project			Future (2019)				
			V/C	LOS	V/C	LOS	Impact	Without Project		With Project		
								V/C	LOS	V/C	LOS	Impact
1	Lakewood Boulevard / Spring Street	AM	0.874	D	0.875	D	0.001	0.940	E	0.941	E	0.001
		PM	1.001	F	1.002	F	0.001	1.078	F	1.079	F	0.001
2	Redondo Avenue / Willow Street	AM	0.727	C	0.727	C	0.000	0.767	C	0.767	C	0.000
		PM	0.822	D	0.823	D	0.001	0.902	E	0.902	E	0.000
3	Lakewood Boulevard / Willow Street	AM	1.049	F	1.049	F	0.000	1.147	F	1.149	F	0.002
		PM	0.926	E	0.929	E	0.003	1.001	F	1.004	F	0.003
4	Clark Avenue / Willow Street	AM	0.759	C	0.759	C	0.000	0.796	C	0.796	C	0.000
		PM	0.695	B	0.695	B	0.000	0.733	C	0.733	C	0.000
5	Lakewood Boulevard / 23rd Street	AM	0.593	A	0.593	A	0.000	0.638	B	0.639	B	0.001
		PM	0.552	A	0.552	A	0.000	0.593	A	0.593	A	0.000

Significant Intersection Traffic Impact Criteria

The City of Long Beach defines a significant project traffic impact when an intersection impact is operating at LOS E or F. The significant impact criteria are summarized in Table 10. No significant impacts are deemed to occur at LOS A to D, as these conditions exhibit sufficient surplus capacities to accommodate large traffic volumes with little effect on traffic delay.

Table 10
City of Long Beach Criteria for
Significant Intersection Traffic Impact

<u>LOS</u>	<u>Final V/C Ratio</u>	<u>Project-Related Increase in V/C Ratio</u>
E, F	> 0.900	equal to or greater than 0.020

Based on these criteria and the results in Table 9, the Project would not significantly impact any of the study intersections under Existing and Future conditions during the AM and PM peak hours.

Regional Transportation System Impact Analysis

The traffic impact guidelines of the Congestion Management Program (CMP) for Los Angeles County require analysis of all CMP arterial monitoring locations where a project could add a total of 50 or more trips during either peak hour. Additionally, all freeway monitoring locations where a project could add 150 or more trips in either direction during the peak hours are to be analyzed.

Arterial Monitoring Location Analysis

The nearest CMP arterial monitoring locations within the study area are the intersections of Lakewood Boulevard / Willow Street, Lakewood Boulevard / Carson Street, and Pacific Coast Highway (SR-1) / Ximeno Avenue. Based on a review of the net Project trip generations and Project trip distribution / assignment pattern, it is estimated that at most, the Project would contribute 22 peak-hour trips to the intersection of Lakewood Boulevard / Willow Street; two peak-hour trips to the intersection of Lakewood Boulevard / Carson Street; and two peak-hour trips to the intersection of SR-1 / Ximeno Avenue. Thus, these three CMP intersections above would not require additional impact analysis, as the contributed Project trips would be under the 50-trips threshold.

Freeway Segment Analysis

An assessment was also made of the potential for Project-related freeway impacts. The closest CMP freeway monitoring locations are I-405 at Santa Fe Avenue, I-405 north of SR-22, I-605 north of Carson Street, I-710 north of Pacific Coast Highway, Willow Street, and I-710 north of I-405 and south of Del Amo Boulevard. These locations are approximately four to seven miles

from the Project site. Based on a review of the Project's regional trip distribution pattern, it is estimated that approximately the following net Project peak-hour trips would be added: no more than six directional trips to I-405 at Santa Fe and north of SR-22, no more than two directional trips to SR-605 north of Carson Street, and no more than four directional trips to I-710 north of I-405 and south of Del Amo Boulevard. These volumes are substantially below the CMP freeway analysis threshold of 150 trips per direction. Therefore, no additional CMP freeway analysis is warranted.

Public Transit Analysis

Per the 2010 CMP guidelines, transit person trips can be estimated by multiplying the total trips generated by a conversion factor of 1.4 and then multiplying the person trips by 3.5 percent to determine the total person trips assigned to traffic. Therefore, the estimated net number of Project person trips using transit would be 24 person trips per day, two person trips during the AM peak hour and two person trips during the PM peak hour.

A review of the existing bus transit lines and service summarized in Table 1 indicates that an average of approximately 14 buses access the bus stop(s) at Lakewood Boulevard / Willow Street nearest the Project site during the AM and PM peak hours. This means that the net Project person trips added to transit at this bus stop would be approximately 0.1 persons per bus during the peak hours. This minor addition of Project person trips to transit would not be expected to result in a significant transit impact. Furthermore, the 0.1 ratio is likely an overestimation, considering that some Project transit users would likely use other modes of transportation like hotel shuttles and ride sharing services in the area.

As part of the public transit analysis, Long Beach Transit (LBT) was consulted regarding the Project and any potential impacts to the existing bus stop located on Lakewood Boulevard just north of Willow Street. Since there would be no changes to the footprint of the Chevron Gas Station located on the corner, LBT indicated that this bus stop would not be affected.

MITIGATION MEASURES

As indicated in the preceding analyses, the Project is not expected to significantly impact any study intersection or CMP monitoring location, or public transit. Therefore, no transportation-related mitigation measures are required of the Project.

APPENDIX A
TRAFFIC COUNT DATA SHEETS

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Spring Street
 Weather: Clear

File Name : LBCLWSPAM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 1

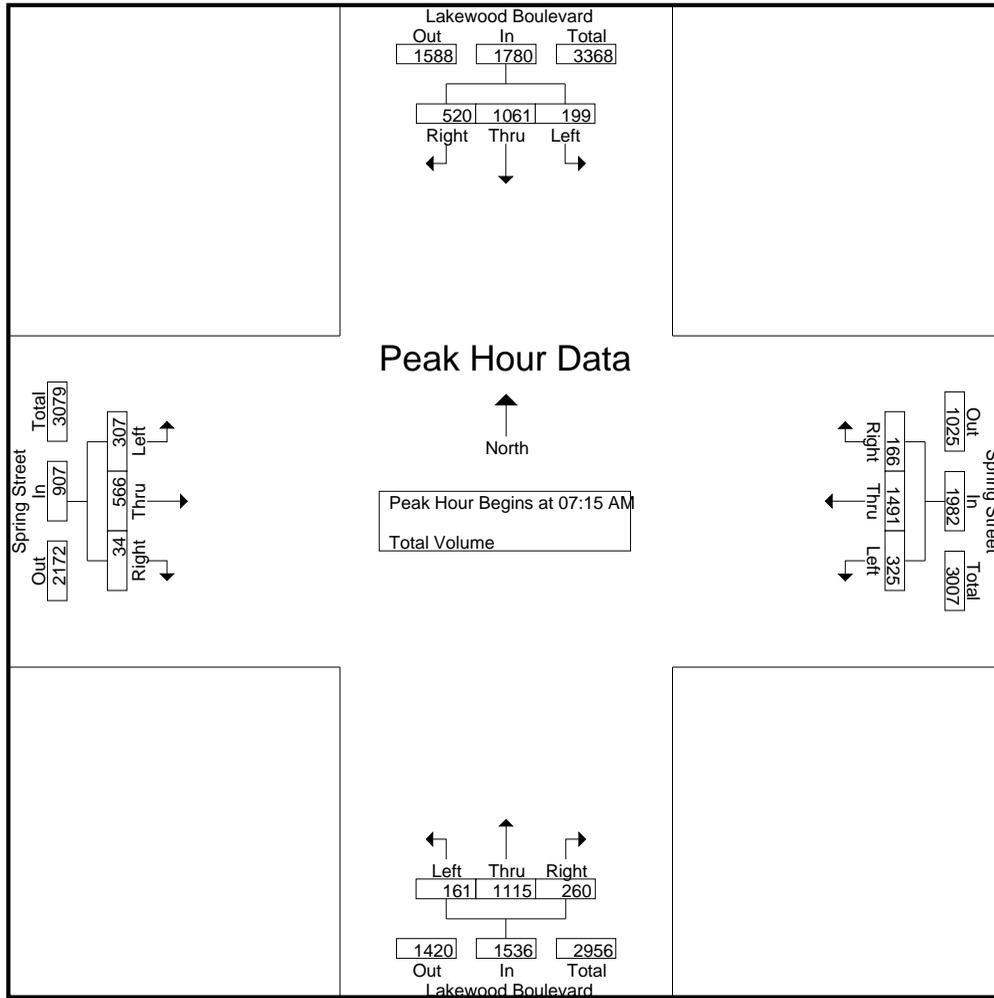
Groups Printed- Total Volume

Start Time	Lakewood Boulevard Southbound				Spring Street Westbound				Lakewood Boulevard Northbound				Spring Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	35	195	62	292	53	238	22	313	26	254	53	333	65	92	5	162	1100
07:15 AM	60	250	101	411	90	308	32	430	29	285	62	376	60	142	6	208	1425
07:30 AM	44	283	134	461	82	344	42	468	40	263	64	367	87	179	11	277	1573
07:45 AM	57	250	151	458	73	444	47	564	43	315	75	433	87	131	4	222	1677
Total	196	978	448	1622	298	1334	143	1775	138	1117	254	1509	299	544	26	869	5775
08:00 AM	38	278	134	450	80	395	45	520	49	252	59	360	73	114	13	200	1530
08:15 AM	35	281	114	430	74	306	37	417	27	271	65	363	73	109	6	188	1398
08:30 AM	40	226	102	368	66	277	28	371	50	268	53	371	91	125	11	227	1337
08:45 AM	46	243	112	401	44	282	34	360	55	275	61	391	77	99	14	190	1342
Total	159	1028	462	1649	264	1260	144	1668	181	1066	238	1485	314	447	44	805	5607
Grand Total	355	2006	910	3271	562	2594	287	3443	319	2183	492	2994	613	991	70	1674	11382
Apprch %	10.9	61.3	27.8		16.3	75.3	8.3		10.7	72.9	16.4		36.6	59.2	4.2		
Total %	3.1	17.6	8	28.7	4.9	22.8	2.5	30.2	2.8	19.2	4.3	26.3	5.4	8.7	0.6	14.7	

Start Time	Lakewood Boulevard Southbound				Spring Street Westbound				Lakewood Boulevard Northbound				Spring Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	60	250	101	411	90	308	32	430	29	285	62	376	60	142	6	208	1425
07:30 AM	44	283	134	461	82	344	42	468	40	263	64	367	87	179	11	277	1573
07:45 AM	57	250	151	458	73	444	47	564	43	315	75	433	87	131	4	222	1677
08:00 AM	38	278	134	450	80	395	45	520	49	252	59	360	73	114	13	200	1530
Total Volume	199	1061	520	1780	325	1491	166	1982	161	1115	260	1536	307	566	34	907	6205
% App. Total	11.2	59.6	29.2		16.4	75.2	8.4		10.5	72.6	16.9		33.8	62.4	3.7		
PHF	.829	.937	.861	.965	.903	.840	.883	.879	.821	.885	.867	.887	.882	.791	.654	.819	.925

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Spring Street
 Weather: Clear

File Name : LBCLWSPAM
 Site Code : 16615000
 Start Date : 11/17/2015
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Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:30 AM				07:15 AM				07:15 AM				07:15 AM			
+0 mins.	44	283	134	461	90	308	32	430	29	285	62	376	60	142	6	208
+15 mins.	57	250	151	458	82	344	42	468	40	263	64	367	87	179	11	277
+30 mins.	38	278	134	450	73	444	47	564	43	315	75	433	87	131	4	222
+45 mins.	35	281	114	430	80	395	45	520	49	252	59	360	73	114	13	200
Total Volume	174	1092	533	1799	325	1491	166	1982	161	1115	260	1536	307	566	34	907
% App. Total	9.7	60.7	29.6		16.4	75.2	8.4		10.5	72.6	16.9		33.8	62.4	3.7	
PHF	.763	.965	.882	.976	.903	.840	.883	.879	.821	.885	.867	.887	.882	.791	.654	.819

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Spring Street
 Weather: Clear

File Name : LBCLWSPPM
 Site Code : 16615000
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 Page No : 1

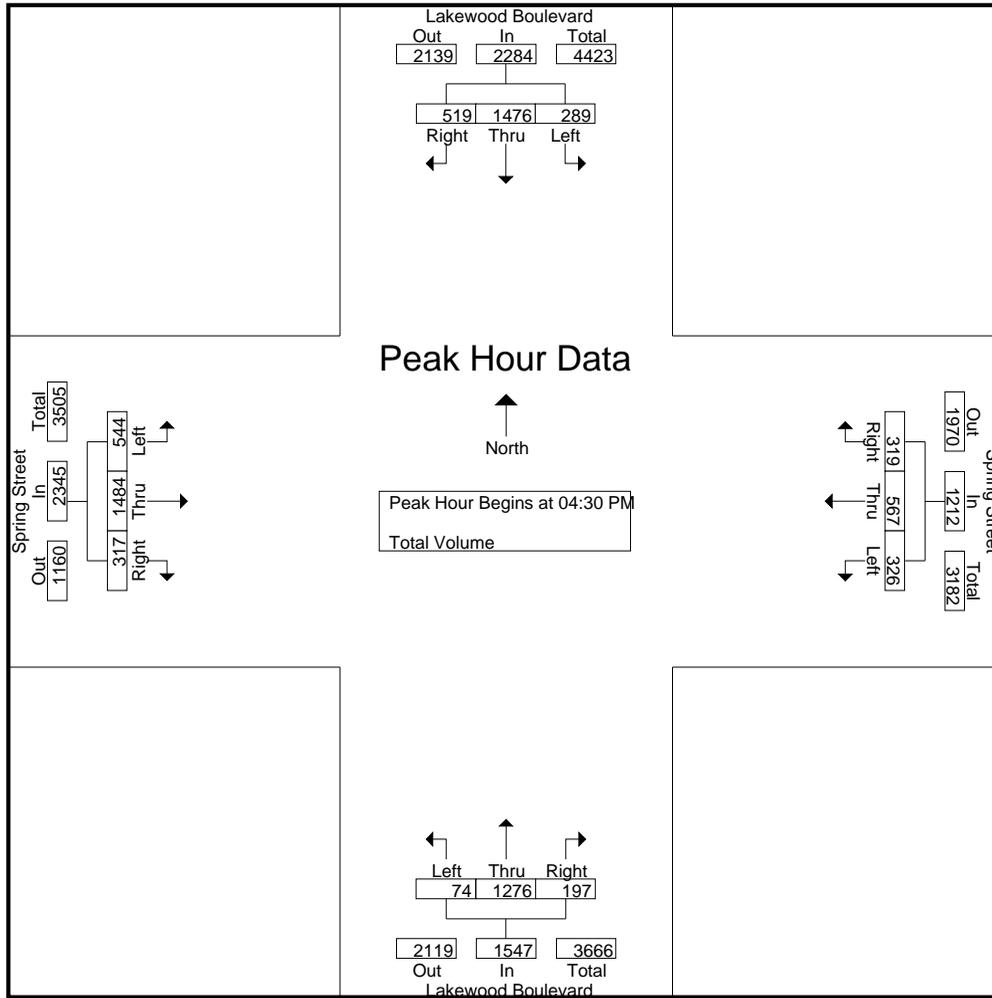
Groups Printed- Total Volume

Start Time	Lakewood Boulevard Southbound				Spring Street Westbound				Lakewood Boulevard Northbound				Spring Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	61	321	123	505	40	136	59	235	18	266	43	327	136	283	43	462	1529
04:15 PM	63	384	111	558	33	137	45	215	17	284	40	341	135	314	43	492	1606
04:30 PM	62	384	117	563	52	144	84	280	12	290	42	344	152	358	87	597	1784
04:45 PM	81	382	119	582	101	122	65	288	20	330	54	404	122	348	42	512	1786
Total	267	1471	470	2208	226	539	253	1018	67	1170	179	1416	545	1303	215	2063	6705
05:00 PM	63	326	141	530	103	136	71	310	18	319	48	385	141	408	97	646	1871
05:15 PM	83	384	142	609	70	165	99	334	24	337	53	414	129	370	91	590	1947
05:30 PM	54	327	143	524	63	162	61	286	24	296	58	378	150	355	84	589	1777
05:45 PM	56	332	114	502	49	136	71	256	21	312	59	392	111	307	58	476	1626
Total	256	1369	540	2165	285	599	302	1186	87	1264	218	1569	531	1440	330	2301	7221
Grand Total	523	2840	1010	4373	511	1138	555	2204	154	2434	397	2985	1076	2743	545	4364	13926
Apprch %	12	64.9	23.1		23.2	51.6	25.2		5.2	81.5	13.3		24.7	62.9	12.5		
Total %	3.8	20.4	7.3	31.4	3.7	8.2	4	15.8	1.1	17.5	2.9	21.4	7.7	19.7	3.9	31.3	

Start Time	Lakewood Boulevard Southbound				Spring Street Westbound				Lakewood Boulevard Northbound				Spring Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	62	384	117	563	52	144	84	280	12	290	42	344	152	358	87	597	1784
04:45 PM	81	382	119	582	101	122	65	288	20	330	54	404	122	348	42	512	1786
05:00 PM	63	326	141	530	103	136	71	310	18	319	48	385	141	408	97	646	1871
05:15 PM	83	384	142	609	70	165	99	334	24	337	53	414	129	370	91	590	1947
Total Volume	289	1476	519	2284	326	567	319	1212	74	1276	197	1547	544	1484	317	2345	7388
% App. Total	12.7	64.6	22.7		26.9	46.8	26.3		4.8	82.5	12.7		23.2	63.3	13.5		
PHF	.870	.961	.914	.938	.791	.859	.806	.907	.771	.947	.912	.934	.895	.909	.817	.908	.949

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Spring Street
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 Site Code : 16615000
 Start Date : 11/17/2015
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Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:30 PM				04:45 PM				04:45 PM				04:30 PM			
+0 mins.	62	384	117	563	101	122	65	288	20	330	54	404	152	358	87	597
+15 mins.	81	382	119	582	103	136	71	310	18	319	48	385	122	348	42	512
+30 mins.	63	326	141	530	70	165	99	334	24	337	53	414	141	408	97	646
+45 mins.	83	384	142	609	63	162	61	286	24	296	58	378	129	370	91	590
Total Volume	289	1476	519	2284	337	585	296	1218	86	1282	213	1581	544	1484	317	2345
% App. Total	12.7	64.6	22.7		27.7	48	24.3		5.4	81.1	13.5		23.2	63.3	13.5	
PHF	.870	.961	.914	.938	.818	.886	.747	.912	.896	.951	.918	.955	.895	.909	.817	.908

City of Long Beach
 N/S: Redondo Avenue
 E/W: Willow Street
 Weather: Clear

File Name : LBCREWIAM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 1

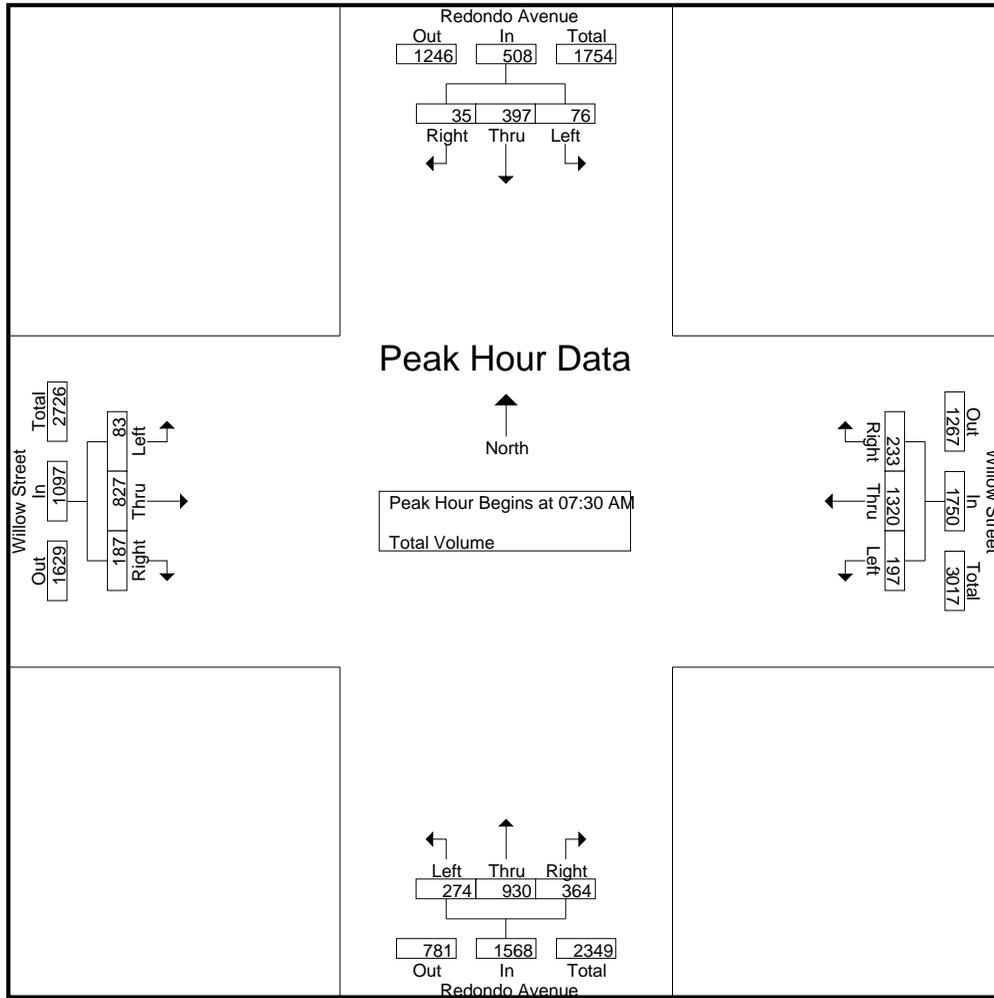
Groups Printed- Total Volume

Start Time	Redondo Avenue Southbound				Willow Street Westbound				Redondo Avenue Northbound				Willow Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	8	64	4	76	40	264	27	331	42	204	94	340	12	170	33	215	962
07:15 AM	17	68	13	98	40	313	37	390	60	196	113	369	17	246	48	311	1168
07:30 AM	12	93	9	114	33	328	59	420	61	249	117	427	15	240	41	296	1257
07:45 AM	21	103	8	132	52	348	54	454	79	241	93	413	23	202	49	274	1273
Total	58	328	34	420	165	1253	177	1595	242	890	417	1549	67	858	171	1096	4660
08:00 AM	26	110	9	145	53	330	73	456	60	235	77	372	22	175	49	246	1219
08:15 AM	17	91	9	117	59	314	47	420	74	205	77	356	23	210	48	281	1174
08:30 AM	19	87	8	114	54	262	52	368	44	238	74	356	22	200	46	268	1106
08:45 AM	17	98	9	124	44	257	40	341	69	206	95	370	22	168	38	228	1063
Total	79	386	35	500	210	1163	212	1585	247	884	323	1454	89	753	181	1023	4562
Grand Total	137	714	69	920	375	2416	389	3180	489	1774	740	3003	156	1611	352	2119	9222
Apprch %	14.9	77.6	7.5		11.8	76	12.2		16.3	59.1	24.6		7.4	76	16.6		
Total %	1.5	7.7	0.7	10	4.1	26.2	4.2	34.5	5.3	19.2	8	32.6	1.7	17.5	3.8	23	

Start Time	Redondo Avenue Southbound				Willow Street Westbound				Redondo Avenue Northbound				Willow Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	12	93	9	114	33	328	59	420	61	249	117	427	15	240	41	296	1257
07:45 AM	21	103	8	132	52	348	54	454	79	241	93	413	23	202	49	274	1273
08:00 AM	26	110	9	145	53	330	73	456	60	235	77	372	22	175	49	246	1219
08:15 AM	17	91	9	117	59	314	47	420	74	205	77	356	23	210	48	281	1174
Total Volume	76	397	35	508	197	1320	233	1750	274	930	364	1568	83	827	187	1097	4923
% App. Total	15	78.1	6.9		11.3	75.4	13.3		17.5	59.3	23.2		7.6	75.4	17		
PHF	.731	.902	.972	.876	.835	.948	.798	.959	.867	.934	.778	.918	.902	.861	.954	.927	.967

City of Long Beach
 N/S: Redondo Avenue
 E/W: Willow Street
 Weather: Clear

File Name : LBCREWIAM
 Site Code : 16615000
 Start Date : 11/17/2015
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Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:30 AM				07:30 AM				07:15 AM				07:15 AM			
+0 mins.	12	93	9	114	33	328	59	420	60	196	113	369	17	246	48	311
+15 mins.	21	103	8	132	52	348	54	454	61	249	117	427	15	240	41	296
+30 mins.	26	110	9	145	53	330	73	456	79	241	93	413	23	202	49	274
+45 mins.	17	91	9	117	59	314	47	420	60	235	77	372	22	175	49	246
Total Volume	76	397	35	508	197	1320	233	1750	260	921	400	1581	77	863	187	1127
% App. Total	15	78.1	6.9		11.3	75.4	13.3		16.4	58.3	25.3		6.8	76.6	16.6	
PHF	.731	.902	.972	.876	.835	.948	.798	.959	.823	.925	.855	.926	.837	.877	.954	.906

City of Long Beach
 N/S: Redondo Avenue
 E/W: Willow Street
 Weather: Clear

File Name : LBCREWIPM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 1

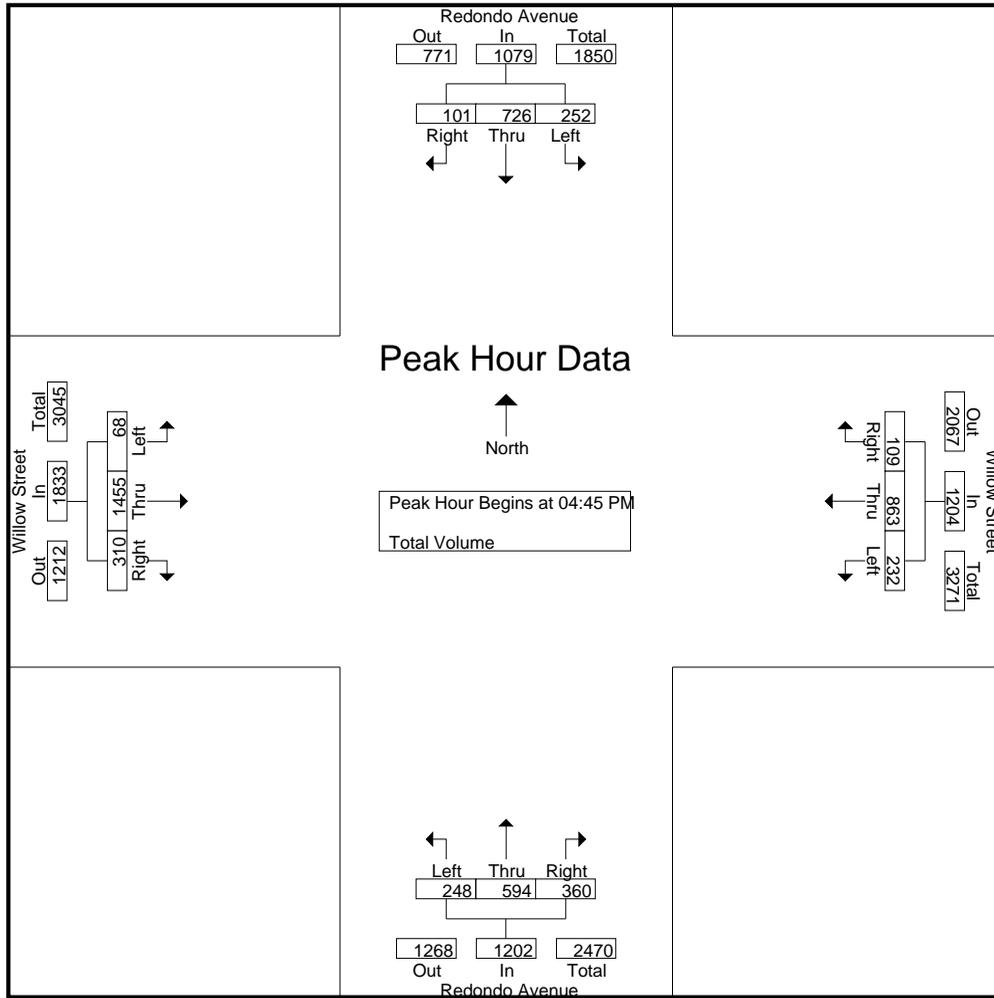
Groups Printed- Total Volume

Start Time	Redondo Avenue Southbound				Willow Street Westbound				Redondo Avenue Northbound				Willow Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	36	172	28	236	59	186	21	266	53	165	98	316	10	309	61	380	1198
04:15 PM	34	128	17	179	48	210	26	284	53	125	60	238	14	332	79	425	1126
04:30 PM	53	182	17	252	50	190	25	265	43	157	88	288	17	379	63	459	1264
04:45 PM	66	166	23	255	65	198	24	287	66	139	92	297	17	311	69	397	1236
Total	189	648	85	922	222	784	96	1102	215	586	338	1139	58	1331	272	1661	4824
05:00 PM	72	205	28	305	57	235	24	316	59	170	109	338	16	387	73	476	1435
05:15 PM	58	155	25	238	53	221	27	301	59	133	70	262	17	418	87	522	1323
05:30 PM	56	200	25	281	57	209	34	300	64	152	89	305	18	339	81	438	1324
05:45 PM	42	155	12	209	56	219	21	296	39	115	70	224	16	317	79	412	1141
Total	228	715	90	1033	223	884	106	1213	221	570	338	1129	67	1461	320	1848	5223
Grand Total	417	1363	175	1955	445	1668	202	2315	436	1156	676	2268	125	2792	592	3509	10047
Apprch %	21.3	69.7	9		19.2	72.1	8.7		19.2	51	29.8		3.6	79.6	16.9		
Total %	4.2	13.6	1.7	19.5	4.4	16.6	2	23	4.3	11.5	6.7	22.6	1.2	27.8	5.9	34.9	

Start Time	Redondo Avenue Southbound				Willow Street Westbound				Redondo Avenue Northbound				Willow Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	66	166	23	255	65	198	24	287	66	139	92	297	17	311	69	397	1236
05:00 PM	72	205	28	305	57	235	24	316	59	170	109	338	16	387	73	476	1435
05:15 PM	58	155	25	238	53	221	27	301	59	133	70	262	17	418	87	522	1323
05:30 PM	56	200	25	281	57	209	34	300	64	152	89	305	18	339	81	438	1324
Total Volume	252	726	101	1079	232	863	109	1204	248	594	360	1202	68	1455	310	1833	5318
% App. Total	23.4	67.3	9.4		19.3	71.7	9.1		20.6	49.4	30		3.7	79.4	16.9		
PHF	.875	.885	.902	.884	.892	.918	.801	.953	.939	.874	.826	.889	.944	.870	.891	.878	.926

City of Long Beach
 N/S: Redondo Avenue
 E/W: Willow Street
 Weather: Clear

File Name : LBCREWIPM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:45 PM				05:00 PM				04:45 PM				04:30 PM			
+0 mins.	66	166	23	255	57	235	24	316	66	139	92	297	17	379	63	459
+15 mins.	72	205	28	305	53	221	27	301	59	170	109	338	17	311	69	397
+30 mins.	58	155	25	238	57	209	34	300	59	133	70	262	16	387	73	476
+45 mins.	56	200	25	281	56	219	21	296	64	152	89	305	17	418	87	522
Total Volume	252	726	101	1079	223	884	106	1213	248	594	360	1202	67	1495	292	1854
% App. Total	23.4	67.3	9.4		18.4	72.9	8.7		20.6	49.4	30		3.6	80.6	15.7	
PHF	.875	.885	.902	.884	.978	.940	.779	.960	.939	.874	.826	.889	.985	.894	.839	.888

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Willow Street
 Weather: Clear

File Name : LBCLWWIAM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 1

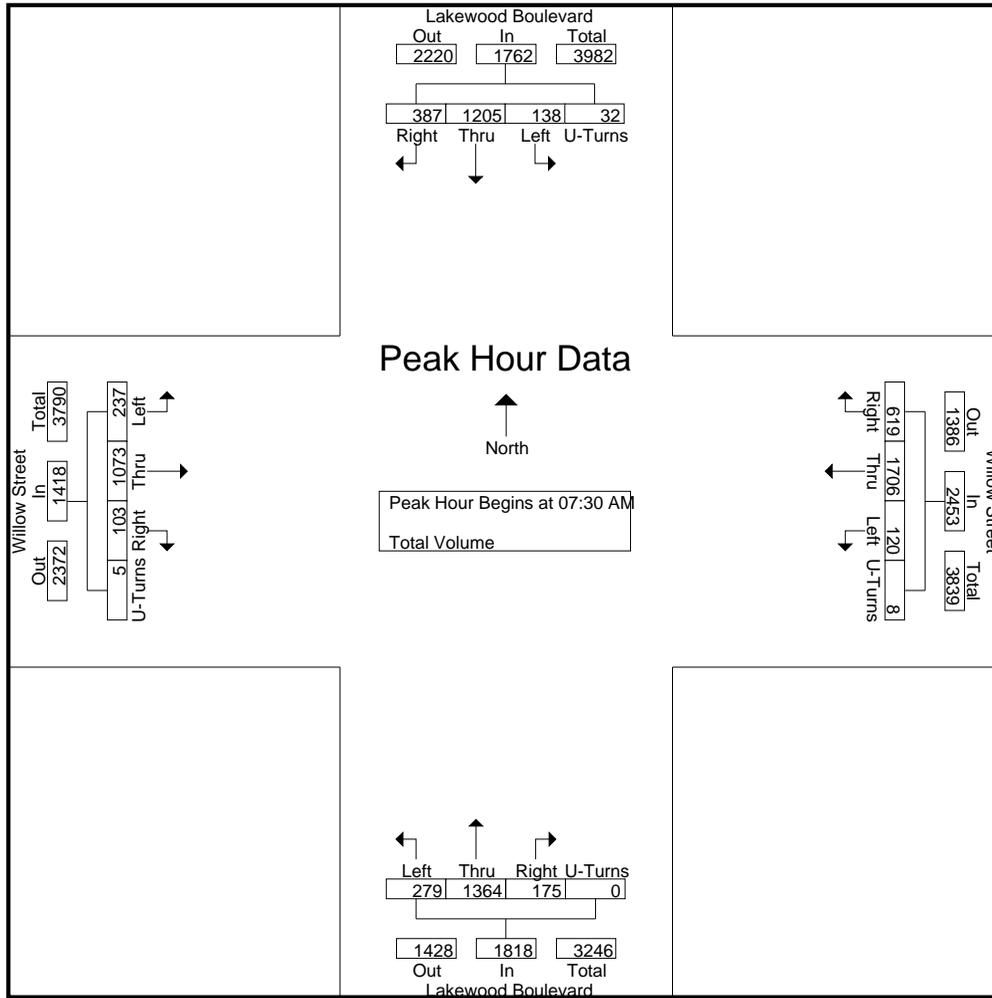
Groups Printed- Total Volume

Start Time	Lakewood Boulevard Southbound					Willow Street Westbound					Lakewood Boulevard Northbound					Willow Street Eastbound					Int. Total
	Left	Thru	Right	U-Turns	App. Total	Left	Thru	Right	U-Turns	App. Total	Left	Thru	Right	U-Turns	App. Total	Left	Thru	Right	U-Turns	App. Total	
07:00 AM	23	195	69	4	291	18	283	152	0	453	39	267	52	0	358	39	280	13	0	332	1434
07:15 AM	33	269	74	5	381	18	344	135	0	497	37	316	48	0	401	70	333	25	1	429	1708
07:30 AM	43	346	94	8	491	21	391	160	4	576	60	375	46	0	481	60	298	31	2	391	1939
07:45 AM	31	283	103	12	429	26	481	174	1	682	72	376	42	0	490	50	289	27	2	368	1969
Total	130	1093	340	29	1592	83	1499	621	5	2208	208	1334	188	0	1730	219	1200	96	5	1520	7050
08:00 AM	40	303	89	8	440	33	445	128	1	607	64	295	43	0	402	55	233	25	1	314	1763
08:15 AM	24	273	101	4	402	40	389	157	2	588	83	318	44	0	445	72	253	20	0	345	1780
08:30 AM	38	297	79	5	419	16	279	132	6	433	42	323	43	0	408	63	234	26	3	326	1586
08:45 AM	25	287	78	2	392	23	348	137	3	511	94	268	40	0	402	81	234	35	1	351	1656
Total	127	1160	347	19	1653	112	1461	554	12	2139	283	1204	170	0	1657	271	954	106	5	1336	6785
Grand Total	257	2253	687	48	3245	195	2960	1175	17	4347	491	2538	358	0	3387	490	2154	202	10	2856	13835
Apprch %	7.9	69.4	21.2	1.5		4.5	68.1	27	0.4		14.5	74.9	10.6	0		17.2	75.4	7.1	0.4		
Total %	1.9	16.3	5	0.3	23.5	1.4	21.4	8.5	0.1	31.4	3.5	18.3	2.6	0	24.5	3.5	15.6	1.5	0.1	20.6	

Start Time	Lakewood Boulevard Southbound					Willow Street Westbound					Lakewood Boulevard Northbound					Willow Street Eastbound					Int. Total
	Left	Thru	Right	U-Turns	App. Total	Thru	Right	U-Turns	App. Total	Thru	Right	U-Turns	App. Total	Thru	Right	U-Turns	App. Total				
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	43	346	94	8	491	21	391	160	4	576	60	375	46	0	481	60	298	31	2	391	1939
07:45 AM	31	283	103	12	429	26	481	174	1	682	72	376	42	0	490	50	289	27	2	368	1969
08:00 AM	40	303	89	8	440	33	445	128	1	607	64	295	43	0	402	55	233	25	1	314	1763
08:15 AM	24	273	101	4	402	40	389	157	2	588	83	318	44	0	445	72	253	20	0	345	1780
Total Volume	138	1205	387	32	1762	120	1706	619	8	2453	279	1364	175	0	1818	237	1073	103	5	1418	7451
% App. Total	7.8	68.4	22	1.8		4.9	69.5	25.2	0.3		15.3	75	9.6	0		16.7	75.7	7.3	0.4		
PHF	.802	.871	.939	.667	.897	.750	.887	.889	.500	.899	.840	.907	.951	.000	.928	.823	.900	.831	.625	.907	.946

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Willow Street
 Weather: Clear

File Name : LBCLWWIAM
 Site Code : 16615000
 Start Date : 11/17/2015
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Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:30 AM					07:30 AM					07:00 AM									
+0 mins.	43	346	94	8	491	21	391	160	4	576	60	375	46	0	481	39	280	13	0	332
+15 mins.	31	283	103	12	429	26	481	174	1	682	72	376	42	0	490	70	333	25	1	429
+30 mins.	40	303	89	8	440	33	445	128	1	607	64	295	43	0	402	60	298	31	2	391
+45 mins.	24	273	101	4	402	40	389	157	2	588	83	318	44	0	445	50	289	27	2	368
Total Volume	138	1205	387	32	1762	120	1706	619	8	2453	279	1364	175	0	1818	219	1200	96	5	1520
% App. Total	7.8	68.4	22	1.8		4.9	69.5	25.2	0.3		15.3	75	9.6	0		14.4	78.9	6.3	0.3	
PHF	.802	.871	.939	.667	.897	.750	.887	.889	.500	.899	.840	.907	.951	.000	.928	.782	.901	.774	.625	.886

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Willow Street
 Weather: Clear

File Name : LBCLWWIPM
 Site Code : 16615000
 Start Date : 11/17/2015
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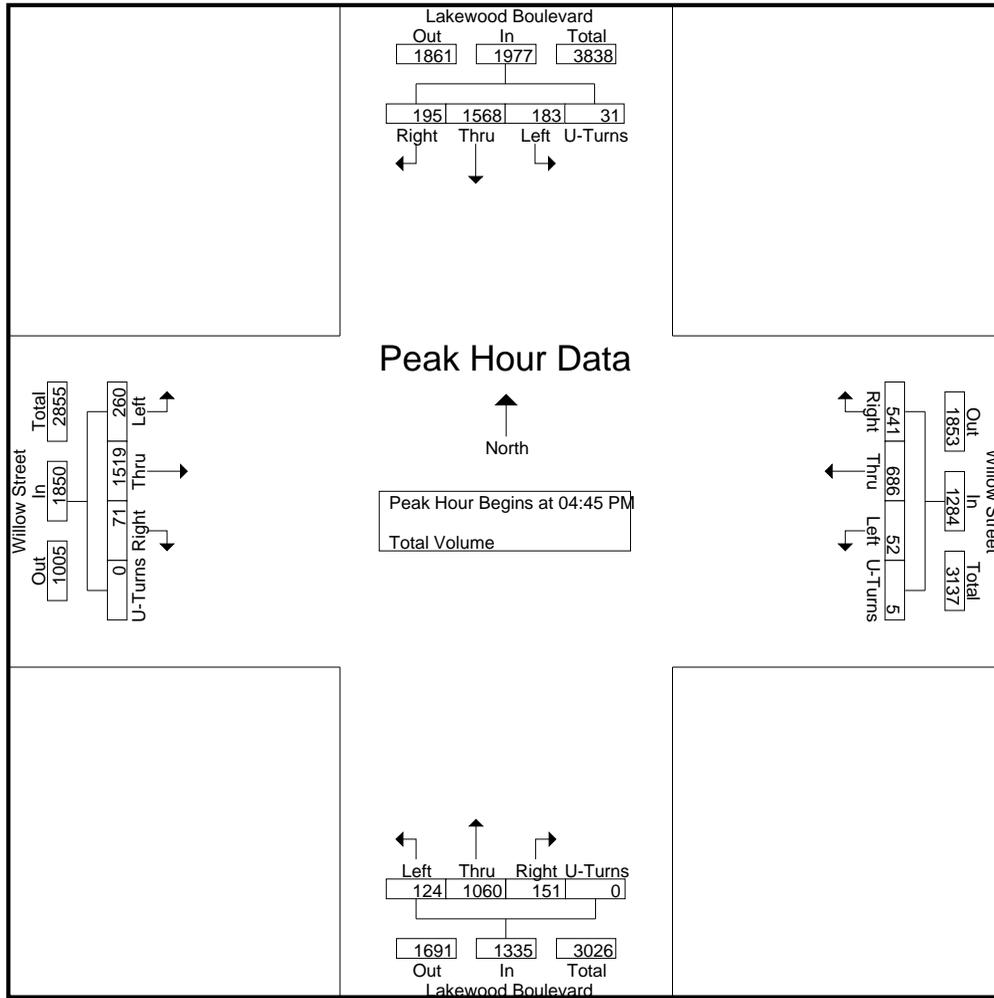
Groups Printed- Total Volume

Start Time	Lakewood Boulevard Southbound					Willow Street Westbound					Lakewood Boulevard Northbound					Willow Street Eastbound					Int. Total
	Left	Thru	Right	U-Turns	App. Total	Left	Thru	Right	U-Turns	App. Total	Left	Thru	Right	U-Turns	App. Total	Left	Thru	Right	U-Turns	App. Total	
04:00 PM	41	309	49	4	403	11	163	94	2	270	31	205	24	0	260	81	317	22	0	420	1353
04:15 PM	40	320	85	4	449	10	171	94	2	277	36	231	28	0	295	63	305	29	0	397	1418
04:30 PM	46	345	65	7	463	17	183	100	2	302	27	256	27	0	310	72	387	19	0	478	1553
04:45 PM	66	378	55	12	511	17	173	115	3	308	28	262	25	0	315	65	360	32	0	457	1591
Total	193	1352	254	27	1826	55	690	403	9	1157	122	954	104	0	1180	281	1369	102	0	1752	5915
05:00 PM	42	377	61	9	489	17	180	130	1	328	36	255	30	0	321	60	418	26	0	504	1642
05:15 PM	42	409	46	7	504	6	170	144	0	320	28	280	44	0	352	60	390	11	0	461	1637
05:30 PM	33	404	33	3	473	12	163	152	1	328	32	263	52	0	347	75	351	2	0	428	1576
05:45 PM	30	396	45	4	475	10	174	126	2	312	44	249	26	0	319	66	352	0	0	418	1524
Total	147	1586	185	23	1941	45	687	552	4	1288	140	1047	152	0	1339	261	1511	39	0	1811	6379
Grand Total	340	2938	439	50	3767	100	1377	955	13	2445	262	2001	256	0	2519	542	2880	141	0	3563	12294
Apprch %	9	78	11.7	1.3		4.1	56.3	39.1	0.5		10.4	79.4	10.2	0		15.2	80.8	4	0		
Total %	2.8	23.9	3.6	0.4	30.6	0.8	11.2	7.8	0.1	19.9	2.1	16.3	2.1	0	20.5	4.4	23.4	1.1	0	29	

Start Time	Lakewood Boulevard Southbound					Willow Street Westbound					Lakewood Boulevard Northbound					Willow Street Eastbound					Int. Total
	Left	Thru	Right	U-Turns	App. Total	Thru	Right	U-Turns	App. Total	Thru	Right	U-Turns	App. Total	Thru	Right	U-Turns	App. Total				
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	66	378	55	12	511	17	173	115	3	308	28	262	25	0	315	65	360	32	0	457	1591
05:00 PM	42	377	61	9	489	17	180	130	1	328	36	255	30	0	321	60	418	26	0	504	1642
05:15 PM	42	409	46	7	504	6	170	144	0	320	28	280	44	0	352	60	390	11	0	461	1637
05:30 PM	33	404	33	3	473	12	163	152	1	328	32	263	52	0	347	75	351	2	0	428	1576
Total Volume	183	1568	195	31	1977	52	686	541	5	1284	124	1060	151	0	1335	260	1519	71	0	1850	6446
% App. Total	9.3	79.3	9.9	1.6		4	53.4	42.1	0.4		9.3	79.4	11.3	0		14.1	82.1	3.8	0		
PHF	.693	.958	.799	.646	.967	.765	.953	.890	.417	.979	.861	.946	.726	.000	.948	.867	.908	.555	.000	.918	.981

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Willow Street
 Weather: Clear

File Name : LBCLWWIPM
 Site Code : 16615000
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Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:45 PM					05:00 PM					05:00 PM					04:30 PM				
+0 mins.	66	378	55	12	511	17	180	130	1	328	36	255	30	0	321	72	387	19	0	478
+15 mins.	42	377	61	9	489	6	170	144	0	320	28	280	44	0	352	65	360	32	0	457
+30 mins.	42	409	46	7	504	12	163	152	1	328	32	263	52	0	347	60	418	26	0	504
+45 mins.	33	404	33	3	473	10	174	126	2	312	44	249	26	0	319	60	390	11	0	461
Total Volume	183	1568	195	31	1977	45	687	552	4	1288	140	1047	152	0	1339	257	1555	88	0	1900
% App. Total	9.3	79.3	9.9	1.6		3.5	53.3	42.9	0.3		10.5	78.2	11.4	0		13.5	81.8	4.6	0	
PHF	.693	.958	.799	.646	.967	.662	.954	.908	.500	.982	.795	.935	.731	.000	.951	.892	.930	.688	.000	.942

City of Long Beach
 N/S: Clark Avenue
 E/W: Willow Street
 Weather: Clear

File Name : LBCCLWIAM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 1

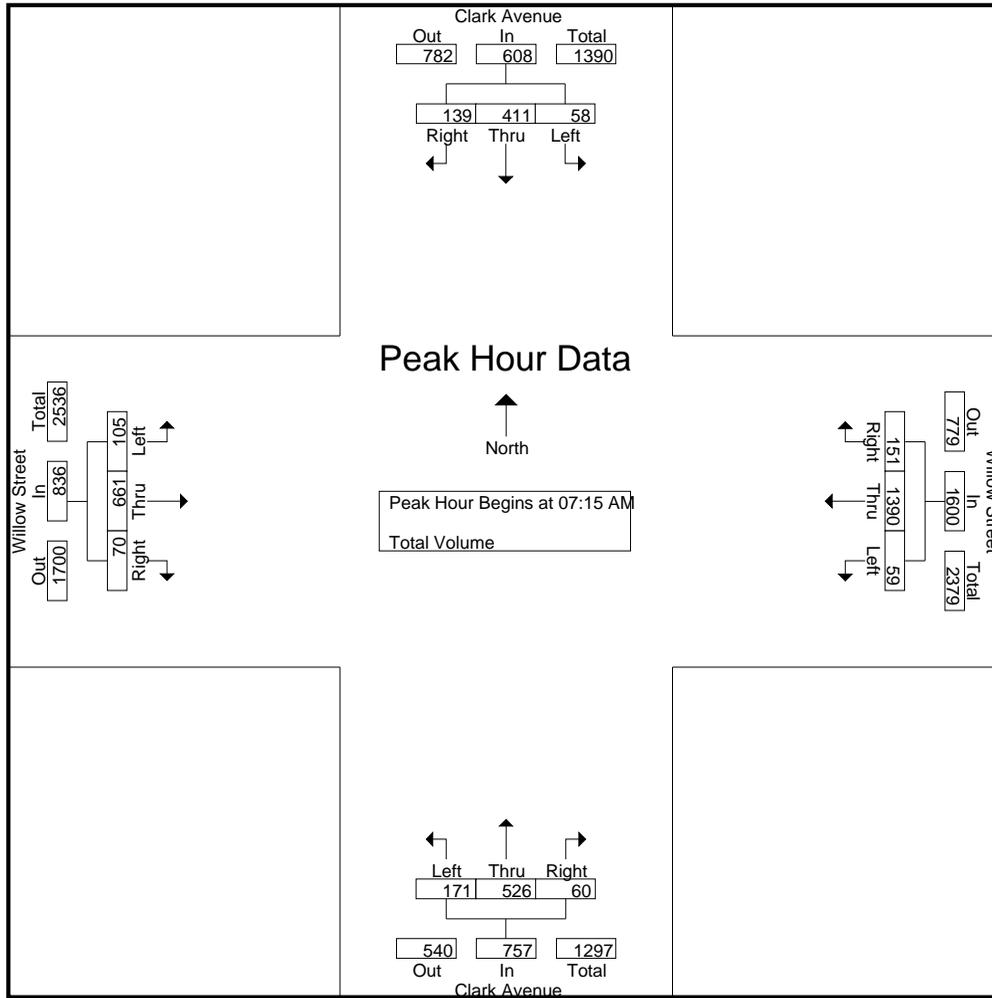
Groups Printed- Total Volume

Start Time	Clark Avenue Southbound				Willow Street Westbound				Clark Avenue Northbound				Willow Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	8	56	28	92	6	246	32	284	28	92	8	128	19	111	10	140	644
07:15 AM	13	97	35	145	11	283	26	320	31	121	15	167	22	213	10	245	877
07:30 AM	17	104	33	154	16	364	40	420	37	131	10	178	21	186	14	221	973
07:45 AM	15	118	38	171	18	390	38	446	60	146	14	220	44	147	22	213	1050
Total	53	375	134	562	51	1283	136	1470	156	490	47	693	106	657	56	819	3544
08:00 AM	13	92	33	138	14	353	47	414	43	128	21	192	18	115	24	157	901
08:15 AM	11	101	30	142	15	274	43	332	46	113	30	189	27	102	20	149	812
08:30 AM	11	112	30	153	17	272	42	331	35	123	27	185	21	139	16	176	845
08:45 AM	24	111	31	166	18	294	35	347	30	110	18	158	16	108	13	137	808
Total	59	416	124	599	64	1193	167	1424	154	474	96	724	82	464	73	619	3366
Grand Total	112	791	258	1161	115	2476	303	2894	310	964	143	1417	188	1121	129	1438	6910
Apprch %	9.6	68.1	22.2		4	85.6	10.5		21.9	68	10.1		13.1	78	9		
Total %	1.6	11.4	3.7	16.8	1.7	35.8	4.4	41.9	4.5	14	2.1	20.5	2.7	16.2	1.9	20.8	

Start Time	Clark Avenue Southbound				Willow Street Westbound				Clark Avenue Northbound				Willow Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	13	97	35	145	11	283	26	320	31	121	15	167	22	213	10	245	877
07:30 AM	17	104	33	154	16	364	40	420	37	131	10	178	21	186	14	221	973
07:45 AM	15	118	38	171	18	390	38	446	60	146	14	220	44	147	22	213	1050
08:00 AM	13	92	33	138	14	353	47	414	43	128	21	192	18	115	24	157	901
Total Volume	58	411	139	608	59	1390	151	1600	171	526	60	757	105	661	70	836	3801
% App. Total	9.5	67.6	22.9		3.7	86.9	9.4		22.6	69.5	7.9		12.6	79.1	8.4		
PHF	.853	.871	.914	.889	.819	.891	.803	.897	.713	.901	.714	.860	.597	.776	.729	.853	.905

City of Long Beach
 N/S: Clark Avenue
 E/W: Willow Street
 Weather: Clear

File Name : LBCCLWIAM
 Site Code : 16615000
 Start Date : 11/17/2015
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Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:15 AM				07:30 AM				07:45 AM				07:15 AM			
+0 mins.	13	97	35	145	16	364	40	420	60	146	14	220	22	213	10	245
+15 mins.	17	104	33	154	18	390	38	446	43	128	21	192	21	186	14	221
+30 mins.	15	118	38	171	14	353	47	414	46	113	30	189	44	147	22	213
+45 mins.	13	92	33	138	15	274	43	332	35	123	27	185	18	115	24	157
Total Volume	58	411	139	608	63	1381	168	1612	184	510	92	786	105	661	70	836
% App. Total	9.5	67.6	22.9		3.9	85.7	10.4		23.4	64.9	11.7		12.6	79.1	8.4	
PHF	.853	.871	.914	.889	.875	.885	.894	.904	.767	.873	.767	.893	.597	.776	.729	.853

City of Long Beach
 N/S: Clark Avenue
 E/W: Willow Street
 Weather: Clear

File Name : LBCCLWIPM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 1

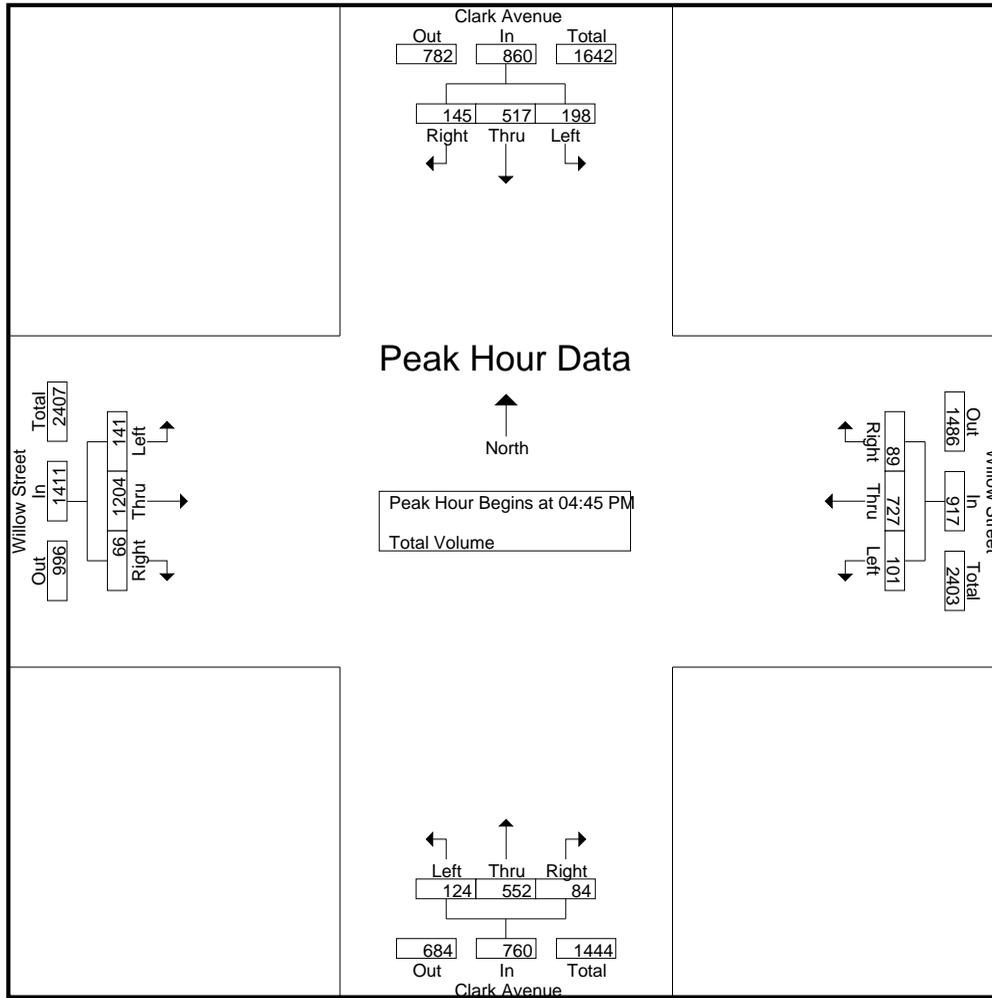
Groups Printed- Total Volume

Start Time	Clark Avenue Southbound				Willow Street Westbound				Clark Avenue Northbound				Willow Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	45	104	35	184	18	146	15	179	20	120	25	165	25	245	17	287	815
04:15 PM	55	133	20	208	15	154	14	183	38	128	14	180	29	221	22	272	843
04:30 PM	63	143	35	241	31	139	19	189	27	122	19	168	33	243	18	294	892
04:45 PM	49	127	41	217	25	167	17	209	31	154	22	207	31	283	14	328	961
Total	212	507	131	850	89	606	65	760	116	524	80	720	118	992	71	1181	3511
05:00 PM	64	146	41	251	20	169	26	215	27	125	19	171	33	337	25	395	1032
05:15 PM	47	105	33	185	24	183	23	230	32	154	17	203	34	263	15	312	930
05:30 PM	38	139	30	207	32	208	23	263	34	119	26	179	43	321	12	376	1025
05:45 PM	44	137	34	215	31	172	12	215	30	134	13	177	43	276	18	337	944
Total	193	527	138	858	107	732	84	923	123	532	75	730	153	1197	70	1420	3931
Grand Total	405	1034	269	1708	196	1338	149	1683	239	1056	155	1450	271	2189	141	2601	7442
Apprch %	23.7	60.5	15.7		11.6	79.5	8.9		16.5	72.8	10.7		10.4	84.2	5.4		
Total %	5.4	13.9	3.6	23	2.6	18	2	22.6	3.2	14.2	2.1	19.5	3.6	29.4	1.9	35	

Start Time	Clark Avenue Southbound				Willow Street Westbound				Clark Avenue Northbound				Willow Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	49	127	41	217	25	167	17	209	31	154	22	207	31	283	14	328	961
05:00 PM	64	146	41	251	20	169	26	215	27	125	19	171	33	337	25	395	1032
05:15 PM	47	105	33	185	24	183	23	230	32	154	17	203	34	263	15	312	930
05:30 PM	38	139	30	207	32	208	23	263	34	119	26	179	43	321	12	376	1025
Total Volume	198	517	145	860	101	727	89	917	124	552	84	760	141	1204	66	1411	3948
% App. Total	23	60.1	16.9		11	79.3	9.7		16.3	72.6	11.1		10	85.3	4.7		
PHF	.773	.885	.884	.857	.789	.874	.856	.872	.912	.896	.808	.918	.820	.893	.660	.893	.956

City of Long Beach
 N/S: Clark Avenue
 E/W: Willow Street
 Weather: Clear

File Name : LBCCLWIPM
 Site Code : 16615000
 Start Date : 11/17/2015
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Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	04:15 PM				05:00 PM				04:45 PM				05:00 PM			
+0 mins.	55	133	20	208	20	169	26	215	31	154	22	207	33	337	25	395
+15 mins.	63	143	35	241	24	183	23	230	27	125	19	171	34	263	15	312
+30 mins.	49	127	41	217	32	208	23	263	32	154	17	203	43	321	12	376
+45 mins.	64	146	41	251	31	172	12	215	34	119	26	179	43	276	18	337
Total Volume	231	549	137	917	107	732	84	923	124	552	84	760	153	1197	70	1420
% App. Total	25.2	59.9	14.9		11.6	79.3	9.1		16.3	72.6	11.1		10.8	84.3	4.9	
PHF	.902	.940	.835	.913	.836	.880	.808	.877	.912	.896	.808	.918	.890	.888	.700	.899

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: 23rd Street
 Weather: Clear

File Name : LBCLW23AM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 1

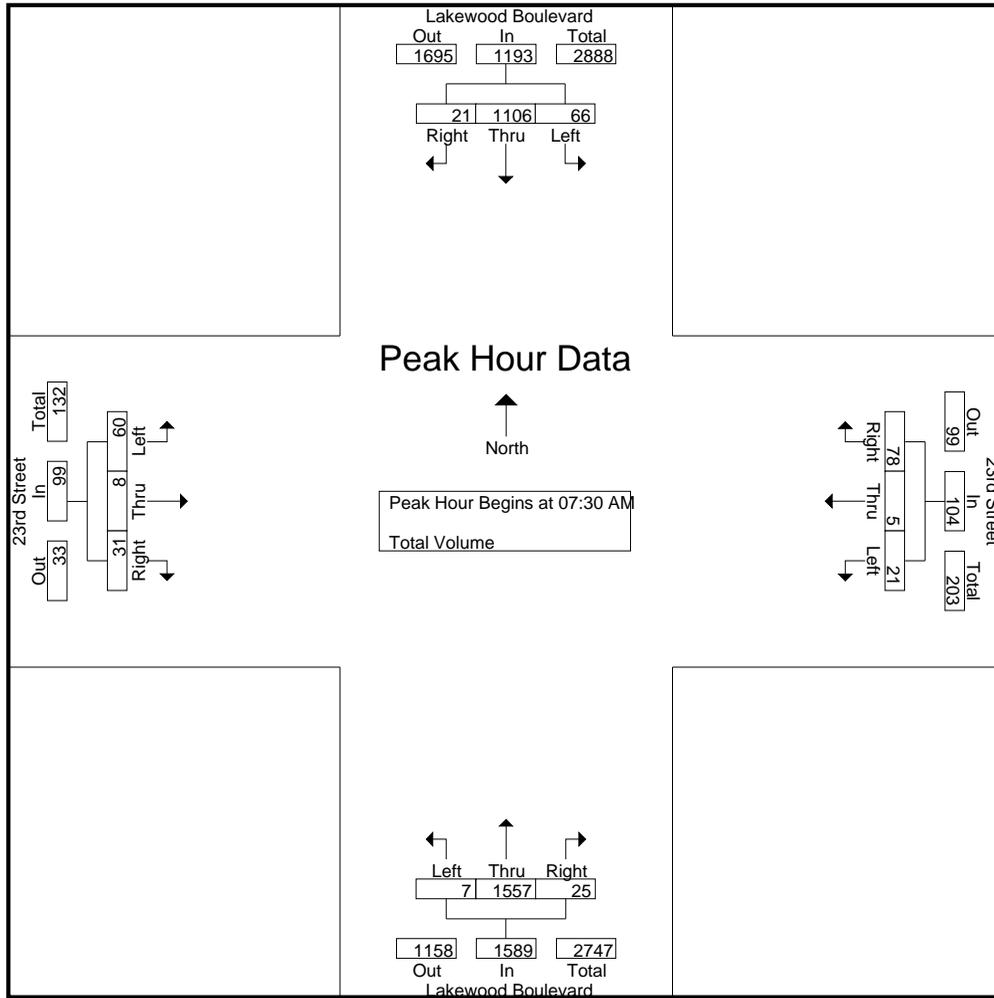
Groups Printed- Total Volume

Start Time	Lakewood Boulevard Southbound				23rd Street Westbound				Lakewood Boulevard Northbound				23rd Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	5	187	2	194	3	0	18	21	0	294	0	294	12	0	2	14	523
07:15 AM	12	274	5	291	9	0	16	25	0	366	6	372	22	1	9	32	720
07:30 AM	16	277	4	297	7	0	19	26	2	417	6	425	10	3	14	27	775
07:45 AM	16	272	7	295	8	3	22	33	3	395	14	412	20	2	12	34	774
Total	49	1010	18	1077	27	3	75	105	5	1472	26	1503	64	6	37	107	2792
08:00 AM	13	280	5	298	4	0	24	28	0	365	2	367	14	1	4	19	712
08:15 AM	21	277	5	303	2	2	13	17	2	380	3	385	16	2	1	19	724
08:30 AM	32	239	8	279	4	0	33	37	0	335	10	345	10	2	3	15	676
08:45 AM	25	263	3	291	9	1	25	35	0	370	10	380	14	0	4	18	724
Total	91	1059	21	1171	19	3	95	117	2	1450	25	1477	54	5	12	71	2836
Grand Total	140	2069	39	2248	46	6	170	222	7	2922	51	2980	118	11	49	178	5628
Apprch %	6.2	92	1.7		20.7	2.7	76.6		0.2	98.1	1.7		66.3	6.2	27.5		
Total %	2.5	36.8	0.7	39.9	0.8	0.1	3	3.9	0.1	51.9	0.9	52.9	2.1	0.2	0.9	3.2	

Start Time	Lakewood Boulevard Southbound				23rd Street Westbound				Lakewood Boulevard Northbound				23rd Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	16	277	4	297	7	0	19	26	2	417	6	425	10	3	14	27	775
07:45 AM	16	272	7	295	8	3	22	33	3	395	14	412	20	2	12	34	774
08:00 AM	13	280	5	298	4	0	24	28	0	365	2	367	14	1	4	19	712
08:15 AM	21	277	5	303	2	2	13	17	2	380	3	385	16	2	1	19	724
Total Volume	66	1106	21	1193	21	5	78	104	7	1557	25	1589	60	8	31	99	2985
% App. Total	5.5	92.7	1.8		20.2	4.8	75		0.4	98	1.6		60.6	8.1	31.3		
PHF	.786	.988	.750	.984	.656	.417	.813	.788	.583	.933	.446	.935	.750	.667	.554	.728	.963

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: 23rd Street
 Weather: Clear

File Name : LBCLW23AM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	07:30 AM				08:00 AM				07:30 AM				07:15 AM			
+0 mins.	16	277	4	297	4	0	24	28	2	417	6	425	22	1	9	32
+15 mins.	16	272	7	295	2	2	13	17	3	395	14	412	10	3	14	27
+30 mins.	13	280	5	298	4	0	33	37	0	365	2	367	20	2	12	34
+45 mins.	21	277	5	303	9	1	25	35	2	380	3	385	14	1	4	19
Total Volume	66	1106	21	1193	19	3	95	117	7	1557	25	1589	66	7	39	112
% App. Total	5.5	92.7	1.8		16.2	2.6	81.2		0.4	98	1.6		58.9	6.2	34.8	
PHF	.786	.988	.750	.984	.528	.375	.720	.791	.583	.933	.446	.935	.750	.583	.696	.824

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: 23rd Street
 Weather: Clear

File Name : LBCLW23PM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 1

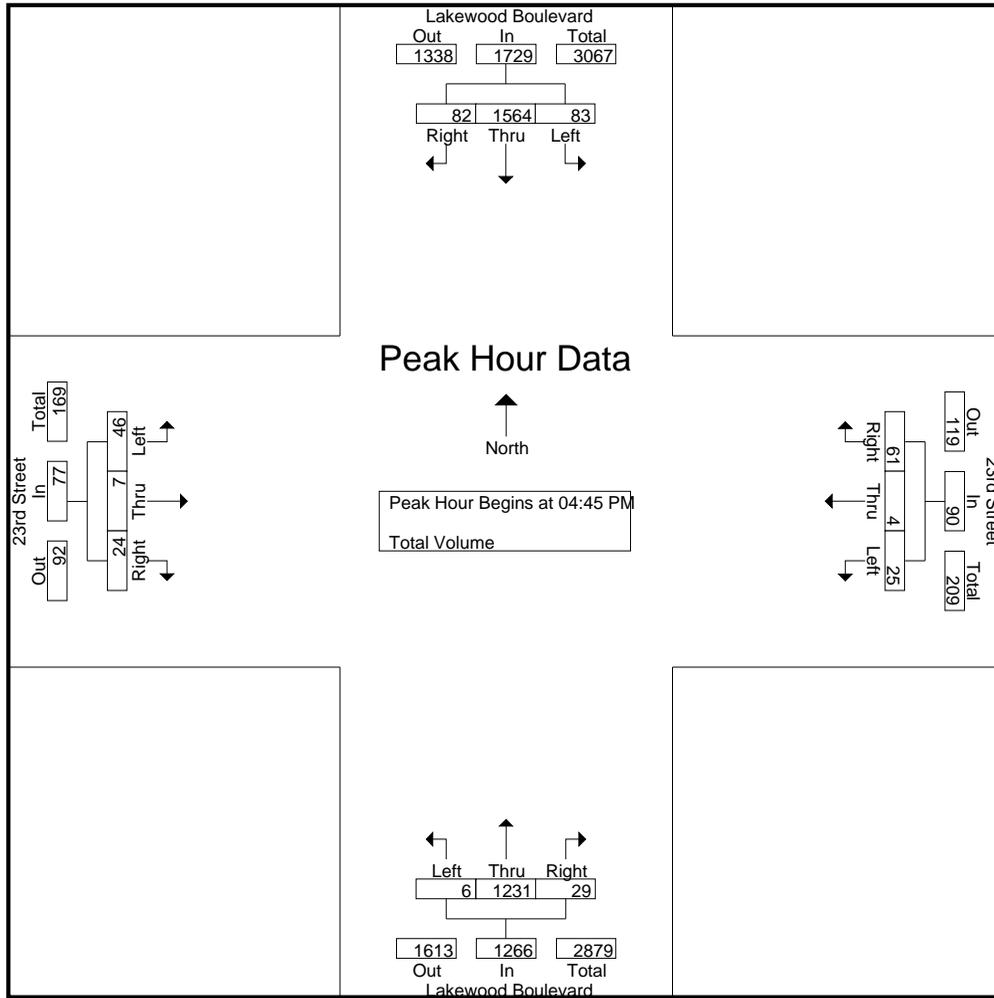
Groups Printed- Total Volume

Start Time	Lakewood Boulevard Southbound				23rd Street Westbound				Lakewood Boulevard Northbound				23rd Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	13	316	10	339	5	1	23	29	5	262	3	270	11	3	2	16	654
04:15 PM	16	361	10	387	7	2	23	32	1	264	4	269	9	0	2	11	699
04:30 PM	25	360	29	414	7	1	18	26	4	266	8	278	10	3	4	17	735
04:45 PM	18	361	23	402	10	1	13	24	1	291	6	298	5	2	7	14	738
Total	72	1398	72	1542	29	5	77	111	11	1083	21	1115	35	8	15	58	2826
05:00 PM	21	396	16	433	4	1	11	16	2	330	8	340	10	2	4	16	805
05:15 PM	17	412	17	446	3	0	15	18	2	319	7	328	14	2	8	24	816
05:30 PM	27	395	26	448	8	2	22	32	1	291	8	300	17	1	5	23	803
05:45 PM	22	386	25	433	8	1	11	20	5	249	7	261	10	0	5	15	729
Total	87	1589	84	1760	23	4	59	86	10	1189	30	1229	51	5	22	78	3153
Grand Total	159	2987	156	3302	52	9	136	197	21	2272	51	2344	86	13	37	136	5979
Apprch %	4.8	90.5	4.7		26.4	4.6	69		0.9	96.9	2.2		63.2	9.6	27.2		
Total %	2.7	50	2.6	55.2	0.9	0.2	2.3	3.3	0.4	38	0.9	39.2	1.4	0.2	0.6	2.3	

Start Time	Lakewood Boulevard Southbound				23rd Street Westbound				Lakewood Boulevard Northbound				23rd Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	18	361	23	402	10	1	13	24	1	291	6	298	5	2	7	14	738
05:00 PM	21	396	16	433	4	1	11	16	2	330	8	340	10	2	4	16	805
05:15 PM	17	412	17	446	3	0	15	18	2	319	7	328	14	2	8	24	816
05:30 PM	27	395	26	448	8	2	22	32	1	291	8	300	17	1	5	23	803
Total Volume	83	1564	82	1729	25	4	61	90	6	1231	29	1266	46	7	24	77	3162
% App. Total	4.8	90.5	4.7		27.8	4.4	67.8		0.5	97.2	2.3		59.7	9.1	31.2		
PHF	.769	.949	.788	.965	.625	.500	.693	.703	.750	.933	.906	.931	.676	.875	.750	.802	.969

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: 23rd Street
 Weather: Clear

File Name : LBCLW23PM
 Site Code : 16615000
 Start Date : 11/17/2015
 Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Each Approach Begins at:

	05:00 PM				04:00 PM				04:45 PM				05:00 PM			
+0 mins.	21	396	16	433	5	1	23	29	1	291	6	298	10	2	4	16
+15 mins.	17	412	17	446	7	2	23	32	2	330	8	340	14	2	8	24
+30 mins.	27	395	26	448	7	1	18	26	2	319	7	328	17	1	5	23
+45 mins.	22	386	25	433	10	1	13	24	1	291	8	300	10	0	5	15
Total Volume	87	1589	84	1760	29	5	77	111	6	1231	29	1266	51	5	22	78
% App. Total	4.9	90.3	4.8		26.1	4.5	69.4		0.5	97.2	2.3		65.4	6.4	28.2	
PHF	.806	.964	.808	.982	.725	.625	.837	.867	.750	.933	.906	.931	.750	.625	.688	.813

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Driveway 1
 Weather: Clear

File Name : LBCLAD1AM
 Site Code : 16616431
 Start Date : 9/13/2016
 Page No : 1

Groups Printed- Total Volume

Start Time	Lakewood Boulevard Southbound			Driveway 1 Westbound			Lakewood Boulevard Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
07:00 AM	0	0	0	0	1	1	0	1	1	2
07:15 AM	0	0	0	0	1	1	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	2	2	0	1	1	3
08:00 AM	0	0	0	0	3	3	0	0	0	3
08:15 AM	0	0	0	0	0	0	0	1	1	1
08:30 AM	0	0	0	0	1	1	0	1	1	2
08:45 AM	0	0	0	0	1	1	0	1	1	2
Total	0	0	0	0	5	5	0	3	3	8
Grand Total	0	0	0	0	7	7	0	4	4	11
Apprch %	0	0		0	100		0	100		
Total %	0	0		0	63.6	63.6	0	36.4	36.4	

Start Time	Lakewood Boulevard Southbound			Driveway 1 Westbound			Lakewood Boulevard Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
08:00 AM	0	0	0	0	3	3	0	0	0	3
08:15 AM	0	0	0	0	0	0	0	1	1	1
08:30 AM	0	0	0	0	1	1	0	1	1	2
08:45 AM	0	0	0	0	1	1	0	1	1	2
Total Volume	0	0	0	0	5	5	0	3	3	8
% App. Total	0	0		0	100		0	100		
PHF	.000	.000	.000	.000	.417	.417	.000	.750	.750	.667

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 08:00 AM

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Driveway 1
 Weather: Clear

File Name : LBCLAD1PM
 Site Code : 16616431
 Start Date : 9/13/2016
 Page No : 1

Groups Printed- Total Volume

Start Time	Lakewood Boulevard Southbound			Driveway 1 Westbound			Lakewood Boulevard Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
04:00 PM	0	0	0	0	3	3	0	1	1	4
04:15 PM	0	0	0	0	1	1	0	0	0	1
04:30 PM	0	0	0	0	3	3	0	0	0	3
04:45 PM	0	0	0	0	2	2	0	0	0	2
Total	0	0	0	0	9	9	0	1	1	10
05:00 PM	0	0	0	0	1	1	0	1	1	2
05:15 PM	0	0	0	0	1	1	0	1	1	2
05:30 PM	0	0	0	0	4	4	0	1	1	5
05:45 PM	0	0	0	0	2	2	0	0	0	2
Total	0	0	0	0	8	8	0	3	3	11
Grand Total	0	0	0	0	17	17	0	4	4	21
Apprch %	0	0		0	100		0	100		
Total %	0	0		0	81	81	0	19	19	

Start Time	Lakewood Boulevard Southbound			Driveway 1 Westbound			Lakewood Boulevard Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
04:45 PM	0	0	0	0	2	2	0	0	0	2
05:00 PM	0	0	0	0	1	1	0	1	1	2
05:15 PM	0	0	0	0	1	1	0	1	1	2
05:30 PM	0	0	0	0	4	4	0	1	1	5
Total Volume	0	0	0	0	8	8	0	3	3	11
% App. Total	0	0		0	100		0	100		
PHF	.000	.000	.000	.000	.500	.500	.000	.750	.750	.550

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 04:45 PM

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Driveway 2
 Weather: Clear

File Name : LBCLAD2AM
 Site Code : 16616431
 Start Date : 9/13/2016
 Page No : 1

Groups Printed- Total Volume

Start Time	Lakewood Boulevard Southbound			Driveway 2 Westbound			Lakewood Boulevard Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
07:00 AM	0	0	0	0	8	8	0	6	6	14
07:15 AM	0	0	0	0	1	1	0	2	2	3
07:30 AM	0	0	0	0	4	4	0	2	2	6
07:45 AM	0	0	0	0	3	3	0	2	2	5
Total	0	0	0	0	16	16	0	12	12	28
08:00 AM	0	0	0	0	2	2	0	5	5	7
08:15 AM	0	0	0	0	6	6	0	3	3	9
08:30 AM	0	0	0	0	1	1	0	4	4	5
08:45 AM	0	0	0	0	6	6	0	4	4	10
Total	0	0	0	0	15	15	0	16	16	31
Grand Total	0	0	0	0	31	31	0	28	28	59
Apprch %	0	0		0	100		0	100		
Total %	0	0		0	52.5	52.5	0	47.5	47.5	

Start Time	Lakewood Boulevard Southbound			Driveway 2 Westbound			Lakewood Boulevard Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
08:00 AM	0	0	0	0	2	2	0	5	5	7
08:15 AM	0	0	0	0	6	6	0	3	3	9
08:30 AM	0	0	0	0	1	1	0	4	4	5
08:45 AM	0	0	0	0	6	6	0	4	4	10
Total Volume	0	0	0	0	15	15	0	16	16	31
% App. Total	0	0		0	100		0	100		
PHF	.000	.000	.000	.000	.625	.625	.000	.800	.800	.775

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 08:00 AM

City of Long Beach
 N/S: Lakewood Boulevard
 E/W: Driveway 2
 Weather: Clear

File Name : LBCLAD2PM
 Site Code : 16616431
 Start Date : 9/13/2016
 Page No : 1

Groups Printed- Total Volume

Start Time	Lakewood Boulevard Southbound			Driveway 2 Westbound			Lakewood Boulevard Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
04:00 PM	0	0	0	0	1	1	0	8	8	9
04:15 PM	0	0	0	0	4	4	0	8	8	12
04:30 PM	0	0	0	0	3	3	0	5	5	8
04:45 PM	0	0	0	0	3	3	0	6	6	9
Total	0	0	0	0	11	11	0	27	27	38
05:00 PM	0	0	0	0	0	0	0	6	6	6
05:15 PM	0	0	0	0	1	1	0	5	5	6
05:30 PM	0	0	0	0	3	3	0	6	6	9
05:45 PM	0	0	0	0	2	2	0	8	8	10
Total	0	0	0	0	6	6	0	25	25	31
Grand Total	0	0	0	0	17	17	0	52	52	69
Apprch %	0	0		0	100		0	100		
Total %	0	0		0	24.6	24.6	0	75.4	75.4	

Start Time	Lakewood Boulevard Southbound			Driveway 2 Westbound			Lakewood Boulevard Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
04:00 PM	0	0	0	0	1	1	0	8	8	9
04:15 PM	0	0	0	0	4	4	0	8	8	12
04:30 PM	0	0	0	0	3	3	0	5	5	8
04:45 PM	0	0	0	0	3	3	0	6	6	9
Total Volume	0	0	0	0	11	11	0	27	27	38
% App. Total	0	0		0	100		0	100		
PHF	.000	.000	.000	.000	.688	.688	.000	.844	.844	.792

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 04:00 PM

City of Long Beach
 N/S: Driveway 3 East
 E/W: Willow Street
 Weather: Clear

File Name : LBC3EWIAM
 Site Code : 16616431
 Start Date : 9/13/2016
 Page No : 1

Groups Printed- Total Volume

Start Time	Driveway 3 East Southbound			Willow Street Westbound			Willow Street Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
07:00 AM	0	6	6	0	1	1	0	0	0	7
07:15 AM	0	5	5	0	1	1	0	0	0	6
07:30 AM	0	8	8	0	0	0	0	0	0	8
07:45 AM	0	3	3	0	3	3	0	0	0	6
Total	0	22	22	0	5	5	0	0	0	27
08:00 AM	0	7	7	0	11	11	0	0	0	18
08:15 AM	0	1	1	0	2	2	0	0	0	3
08:30 AM	0	2	2	0	10	10	0	0	0	12
08:45 AM	0	1	1	0	9	9	0	0	0	10
Total	0	11	11	0	32	32	0	0	0	43
Grand Total	0	33	33	0	37	37	0	0	0	70
Apprch %	0	100		0	100		0	0		
Total %	0	47.1	47.1	0	52.9	52.9	0	0	0	

Start Time	Driveway 3 East Southbound			Willow Street Westbound			Willow Street Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
08:00 AM	0	7	7	0	11	11	0	0	0	18
08:15 AM	0	1	1	0	2	2	0	0	0	3
08:30 AM	0	2	2	0	10	10	0	0	0	12
08:45 AM	0	1	1	0	9	9	0	0	0	10
Total Volume	0	11	11	0	32	32	0	0	0	43
% App. Total	0	100		0	100		0	0		
PHF	.000	.393	.393	.000	.727	.727	.000	.000	.000	.597

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

City of Long Beach
 N/S: Driveway 3 East
 E/W: Willow Street
 Weather: Clear

File Name : LBC3EWIPM
 Site Code : 16616431
 Start Date : 9/13/2016
 Page No : 1

Groups Printed- Total Volume

Start Time	Driveway 3 East Southbound			Willow Street Westbound			Willow Street Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
04:00 PM	0	2	2	0	5	5	0	0	0	7
04:15 PM	0	3	3	0	2	2	0	0	0	5
04:30 PM	0	5	5	0	3	3	0	0	0	8
04:45 PM	0	3	3	0	2	2	0	0	0	5
Total	0	13	13	0	12	12	0	0	0	25
05:00 PM	0	5	5	0	1	1	0	0	0	6
05:15 PM	0	8	8	0	2	2	0	0	0	10
05:30 PM	0	2	2	0	2	2	0	0	0	4
05:45 PM	0	1	1	0	0	0	0	0	0	1
Total	0	16	16	0	5	5	0	0	0	21
Grand Total	0	29	29	0	17	17	0	0	0	46
Apprch %	0	100		0	100		0	0		
Total %	0	63	63	0	37	37	0	0	0	

Start Time	Driveway 3 East Southbound			Willow Street Westbound			Willow Street Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
04:30 PM	0	5	5	0	3	3	0	0	0	8
04:45 PM	0	3	3	0	2	2	0	0	0	5
05:00 PM	0	5	5	0	1	1	0	0	0	6
05:15 PM	0	8	8	0	2	2	0	0	0	10
Total Volume	0	21	21	0	8	8	0	0	0	29
% App. Total	0	100		0	100		0	0		
PHF	.000	.656	.656	.000	.667	.667	.000	.000	.000	.725

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 04:30 PM

City of Long Beach
 N/S: Driveway 3 West
 E/W: Willow Street
 Weather: Clear

File Name : LBC3WWIAM
 Site Code : 16616431
 Start Date : 9/13/2016
 Page No : 1

Groups Printed- Total Volume

Start Time	Driveway 3 West Southbound				Willow Street Westbound				Spires Driveway Northbound				Willow Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	0	0	7	7	0	0	0	0	0	0	1	1	0	0	1	1	9
07:15 AM	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	3
07:30 AM	0	0	2	2	0	0	0	0	0	0	1	1	0	0	0	0	3
07:45 AM	0	0	1	1	0	0	1	1	0	0	0	0	0	0	2	2	4
Total	0	0	13	13	0	0	1	1	0	0	2	2	0	0	3	3	19
08:00 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
08:15 AM	0	0	3	3	0	0	0	0	0	0	2	2	0	0	0	0	5
08:30 AM	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	4
08:45 AM	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	10	10	0	0	0	0	0	0	3	3	0	0	0	0	13
Grand Total	0	0	23	23	0	0	1	1	0	0	5	5	0	0	3	3	32
Apprch %	0	0	100		0	0	100		0	0	100		0	0	100		
Total %	0	0	71.9	71.9	0	0	3.1	3.1	0	0	15.6	15.6	0	0	9.4	9.4	

Start Time	Driveway 3 West Southbound				Willow Street Westbound				Spires Driveway Northbound				Willow Street Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	7	7	0	0	0	0	0	0	1	1	0	0	1	1	9
07:15 AM	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	3
07:30 AM	0	0	2	2	0	0	0	0	0	0	1	1	0	0	0	0	3
07:45 AM	0	0	1	1	0	0	1	1	0	0	0	0	0	0	2	2	4
Total Volume	0	0	13	13	0	0	1	1	0	0	2	2	0	0	3	3	19
% App. Total	0	0	100		0	0	100		0	0	100		0	0	100		
PHF	.000	.000	.464	.464	.000	.000	.250	.250	.000	.000	.500	.500	.000	.000	.375	.375	.528

City of Long Beach
 N/S: Driveway 3 West
 E/W: Willow Street
 Weather: Clear

File Name : LBC3WWIPM
 Site Code : 16616431
 Start Date : 9/13/2016
 Page No : 1

Groups Printed- Total Volume

Start Time	Driveway 3 West Southbound				Willow Street Westbound				Spires Driveway Northbound				Willow Street Eastbound				Int. Total	
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total		
04:00 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:15 PM	0	0	2	2	0	0	1	1	0	0	0	0	0	0	0	0	0	3
04:30 PM	0	0	3	3	0	0	0	0	0	0	1	1	0	0	1	1	0	5
04:45 PM	0	0	4	4	0	0	1	1	0	0	0	0	0	0	0	0	0	5
Total	0	0	10	10	0	0	2	2	0	0	1	1	0	0	1	1	0	14
05:00 PM	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	2	2	0	0	1	1	0	0	0	0	0	0	0	0	0	3
05:30 PM	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5
05:45 PM	0	0	3	3	0	0	1	1	0	0	0	0	0	0	0	0	0	4
Total	0	0	12	12	0	0	2	2	0	0	0	0	0	0	0	0	0	14
Grand Total	0	0	22	22	0	0	4	4	0	0	1	1	0	0	1	1	0	28
Apprch %	0	0	100		0	0	100		0	0	100		0	0	100			
Total %	0	0	78.6	78.6	0	0	14.3	14.3	0	0	3.6	3.6	0	0	3.6	3.6		

Start Time	Driveway 3 West Southbound				Willow Street Westbound				Spires Driveway Northbound				Willow Street Eastbound				Int. Total	
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total		
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 04:15 PM																		
04:15 PM	0	0	2	2	0	0	1	1	0	0	0	0	0	0	0	0	0	3
04:30 PM	0	0	3	3	0	0	0	0	0	0	1	1	0	0	1	1	0	5
04:45 PM	0	0	4	4	0	0	1	1	0	0	0	0	0	0	0	0	0	5
05:00 PM	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	0	11	11	0	0	2	2	0	0	1	1	0	0	1	1	0	15
% App. Total	0	0	100		0	0	100		0	0	100		0	0	100			
PHF	.000	.000	.688	.688	.000	.000	.500	.500	.000	.000	.250	.250	.000	.000	.250	.250		.750

APPENDIX B
STUDY INTERSECTION
LANE CONFIGURATIONS & SIGNAL CONTROLS

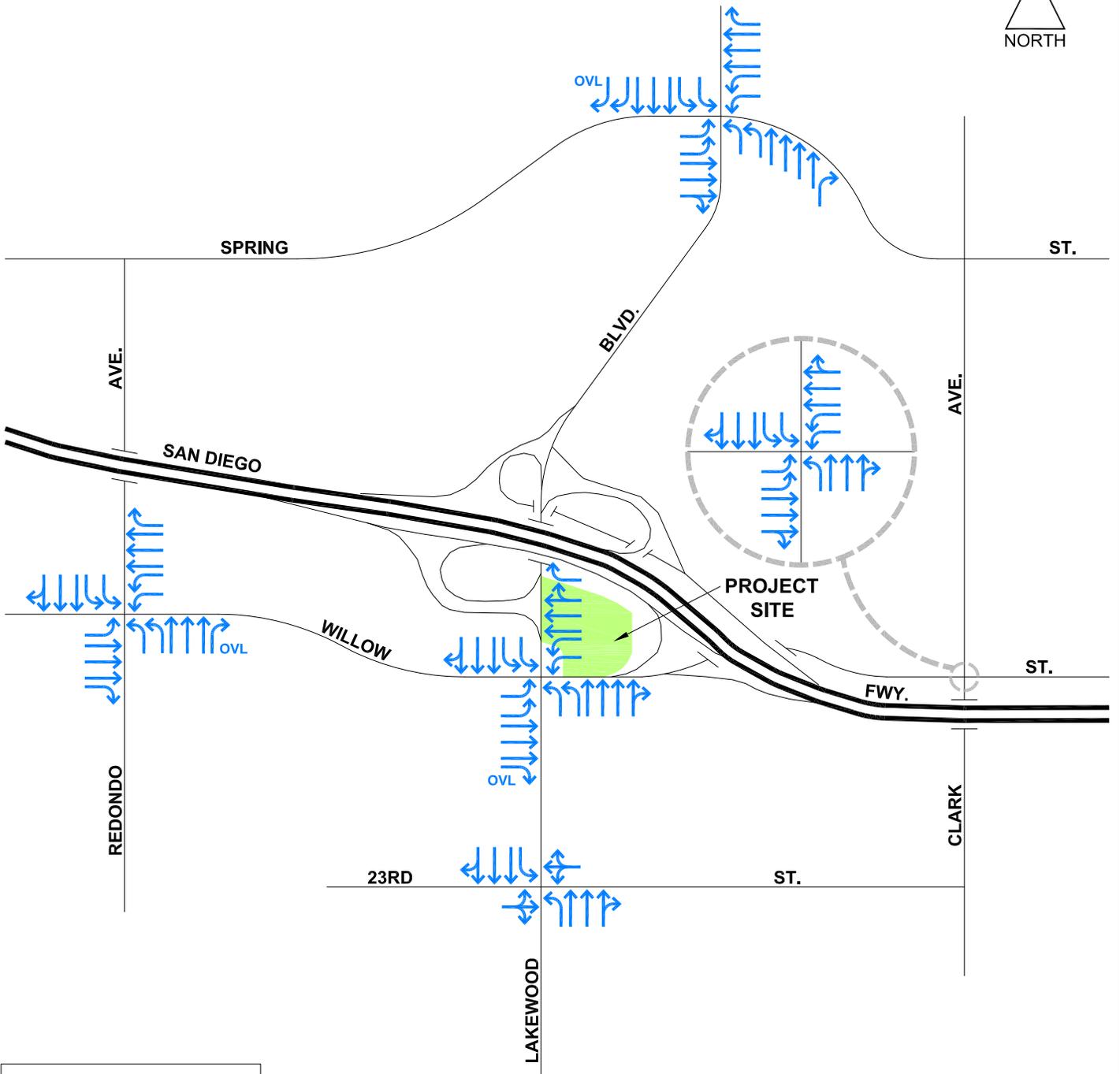


FIGURE B

8/15/2016

FN: StaybridgeSuitesLongBCH\Graphics20160815\LANE-CONFIGS

STUDY INTERSECTION LANE CONFIGURATIONS
& SIGNAL CONTROLS



Transportation Planning
Traffic Engineering
300 Corporate Pointe, Suite 470
Culver City, California 90230
PH (310) 473 6508 F (310) 444 9771
www.crainandassociates.com

APPENDIX C

LEVEL OF SERVICE (LOS) ANALYSIS WORKSHEETS

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	325	1491	88	78
EASTBOUND	307	566	34	0
NORTHBOUND	161	1115	34	226
SOUTHBOUND	199	1061	212	308

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.112	N/A	0.311	N/A	0.055	N/A
EASTBOUND	0.107	N/A	0.125	0.125	N/A	N/A
NORTHBOUND	0.056	N/A	0.174	N/A	0.021	N/A
SOUTHBOUND	0.069	N/A	0.221	N/A	0.074	N/A

EAST-WEST CRITICAL V/C RATIO 0.418
 NORTH-SOUTH CRITICAL V/C RATIO 0.277
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.874

LEVEL OF SERVICE D

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	197	1320	214	19
EASTBOUND	83	827	85	102
NORTHBOUND	274	930	266	98
SOUTHBOUND	76	397	35	0

** NUMBER OF LANES **

APPROACH	**		**		L/T/R	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED		
WESTBOUND	2	0	3	0	1	6
EASTBOUND	1	0	3	0	1	5
NORTHBOUND	2	0	3	0	1	6
SOUTHBOUND	2	0	2	1	0	5

** ASSIGNED CAPACITIES **

APPROACH	**		**		L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	
WESTBOUND	2880	N/A	4800	N/A	1600
EASTBOUND	1600	N/A	4800	N/A	1600
NORTHBOUND	2880	N/A	4800	N/A	1600
SOUTHBOUND	2880	N/A	3200	1600	N/A

** ASSIGNED V/C RATIOS **

APPROACH	**		**		L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	
WESTBOUND	0.068	N/A	0.275	N/A	0.134
EASTBOUND	0.052	N/A	0.172	N/A	0.053
NORTHBOUND	0.095	N/A	0.194	N/A	0.166
SOUTHBOUND	0.026	N/A	0.090	0.090	N/A

EAST-WEST CRITICAL V/C RATIO 0.327
 NORTH-SOUTH CRITICAL V/C RATIO 0.220
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.727

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	128	1706	476	143
EASTBOUND	242	1073	0	103
NORTHBOUND	279	1364	175	0
SOUTHBOUND	170	1205	387	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	ONLY	SHARED	
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	ONLY	SHARED
WESTBOUND	0.044	N/A	0.356	N/A	0.298	N/A
EASTBOUND	0.084	N/A	0.224	N/A	0.000	N/A
NORTHBOUND	0.097	N/A	0.241	0.241	N/A	N/A
SOUTHBOUND	0.059	N/A	0.332	0.332	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.440
 NORTH-SOUTH CRITICAL V/C RATIO 0.429
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.049

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	59	1390	151	0
EASTBOUND	105	661	70	0
NORTHBOUND	171	526	60	0
SOUTHBOUND	58	411	139	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.021	N/A	0.321	0.321	N/A	N/A
EASTBOUND	0.036	N/A	0.153	0.153	N/A	N/A
NORTHBOUND	0.107	N/A	0.122	0.122	N/A	N/A
SOUTHBOUND	0.020	N/A	0.114	0.114	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.357
 NORTH-SOUTH CRITICAL V/C RATIO 0.221
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.759

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	21	5	78	0
EASTBOUND	60	8	31	0
NORTHBOUND	7	1557	25	0
SOUTHBOUND	66	1106	21	0

** NUMBER OF LANES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R	TOTAL LANES
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED		
WESTBOUND	0	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	0	4
SOUTHBOUND	1	0	2	1	0	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	0.065
EASTBOUND	N/A	N/A	N/A	N/A	N/A	N/A	0.062
NORTHBOUND	0.004	N/A	0.329	0.329	N/A	N/A	N/A
SOUTHBOUND	0.041	N/A	0.235	0.235	N/A	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.102
 NORTH-SOUTH CRITICAL V/C RATIO 0.371
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.593

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	326	567	214	105
EASTBOUND	544	1484	317	0
NORTHBOUND	74	1276	115	82
SOUTHBOUND	289	1476	0	519

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.113	N/A	0.118	N/A	0.134	N/A
EASTBOUND	0.189	N/A	0.375	0.375	N/A	N/A
NORTHBOUND	0.026	N/A	0.199	N/A	0.072	N/A
SOUTHBOUND	0.100	N/A	0.308	N/A	0.000	N/A

EAST-WEST CRITICAL V/C RATIO 0.488
 NORTH-SOUTH CRITICAL V/C RATIO 0.333
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.001

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	232	863	31	78
EASTBOUND	68	1455	248	62
NORTHBOUND	248	594	244	116
SOUTHBOUND	252	726	101	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.081	N/A	0.180	N/A	0.019	N/A
EASTBOUND	0.043	N/A	0.303	N/A	0.155	N/A
NORTHBOUND	0.086	N/A	0.124	N/A	0.153	N/A
SOUTHBOUND	0.087	N/A	0.172	0.172	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.384
 NORTH-SOUTH CRITICAL V/C RATIO 0.259
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.822

LEVEL OF SERVICE D

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	57	686	367	174
EASTBOUND	260	1519	9	62
NORTHBOUND	124	1060	151	0
SOUTHBOUND	214	1568	195	0

** NUMBER OF LANES **

APPROACH	**		**		L/T/R	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED		
WESTBOUND	2	0	2	1	0	6
EASTBOUND	2	0	3	0	1	6
NORTHBOUND	2	0	3	1	0	6
SOUTHBOUND	2	0	2	1	0	5

** ASSIGNED CAPACITIES **

APPROACH	**		**		L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	
WESTBOUND	2880	N/A	3200	1600	1600
EASTBOUND	2880	N/A	4800	N/A	1600
NORTHBOUND	2880	N/A	4800	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A

** ASSIGNED V/C RATIOS **

APPROACH	**		**		L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	
WESTBOUND	0.019	N/A	0.164	0.164	0.164
EASTBOUND	0.090	N/A	0.316	N/A	0.006
NORTHBOUND	0.043	N/A	0.189	0.189	N/A
SOUTHBOUND	0.074	N/A	0.368	0.368	N/A

EAST-WEST CRITICAL V/C RATIO 0.336
 NORTH-SOUTH CRITICAL V/C RATIO 0.411
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.926

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	101	727	89	0
EASTBOUND	141	1204	66	0
NORTHBOUND	124	552	84	0
SOUTHBOUND	198	517	145	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.035	N/A	0.170	0.170	N/A	N/A
EASTBOUND	0.049	N/A	0.264	0.264	N/A	N/A
NORTHBOUND	0.078	N/A	0.132	0.132	N/A	N/A
SOUTHBOUND	0.069	N/A	0.138	0.138	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.299
 NORTH-SOUTH CRITICAL V/C RATIO 0.216
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.695

LEVEL OF SERVICE B

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	25	4	61	0
EASTBOUND	46	7	24	0
NORTHBOUND	6	1231	29	0
SOUTHBOUND	83	1564	82	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.056
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.048
NORTHBOUND	0.004	N/A	0.262	0.262	N/A	N/A
SOUTHBOUND	0.052	N/A	0.343	0.343	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.085
 NORTH-SOUTH CRITICAL V/C RATIO 0.347
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.552

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION:1, Lakewood Boulevard / Spring Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015) WITH PROJECT

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	325	1491	88	78
EASTBOUND	307	566	34	0
NORTHBOUND	161	1117	35	226
SOUTHBOUND	199	1064	212	308

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **					L/T/R SHARED	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY		
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					L/T/R SHARED
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					L/T/R SHARED
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	0.112	N/A	0.311	N/A	0.055	N/A
EASTBOUND	0.107	N/A	0.125	0.125	N/A	N/A
NORTHBOUND	0.056	N/A	0.174	N/A	0.022	N/A
SOUTHBOUND	0.069	N/A	0.222	N/A	0.074	N/A

EAST-WEST CRITICAL V/C RATIO 0.418
 NORTH-SOUTH CRITICAL V/C RATIO 0.277
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.875

LEVEL OF SERVICE D

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015) WITH PROJECT

** INPUT VOLUMES **

APPROACH	** INPUT VOLUMES **		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	198	1321	214	19
EASTBOUND	83	829	85	102
NORTHBOUND	274	930	265	99
SOUTHBOUND	76	397	35	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.069	N/A	0.275	N/A	0.134	N/A
EASTBOUND	0.052	N/A	0.172	N/A	0.053	N/A
NORTHBOUND	0.095	N/A	0.194	N/A	0.166	N/A
SOUTHBOUND	0.026	N/A	0.090	0.090	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.327
 NORTH-SOUTH CRITICAL V/C RATIO 0.220
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.727

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015) WITH PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	133	1708	477	142
EASTBOUND	245	1073	0	103
NORTHBOUND	279	1367	175	0
SOUTHBOUND	176	1205	387	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.046	N/A	0.356	N/A	0.298	N/A
EASTBOUND	0.085	N/A	0.224	N/A	0.000	N/A
NORTHBOUND	0.097	N/A	0.241	0.241	N/A	N/A
SOUTHBOUND	0.061	N/A	0.332	0.332	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.440
 NORTH-SOUTH CRITICAL V/C RATIO 0.429
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.049

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015) WITH PROJECT

APPROACH	** INPUT VOLUMES **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	59	1392	151	0
EASTBOUND	105	662	70	0
NORTHBOUND	171	526	60	0
SOUTHBOUND	58	411	139	0

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.021	N/A	0.321	0.321	N/A	N/A
EASTBOUND	0.036	N/A	0.153	0.153	N/A	N/A
NORTHBOUND	0.107	N/A	0.122	0.122	N/A	N/A
SOUTHBOUND	0.020	N/A	0.114	0.114	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.357
 NORTH-SOUTH CRITICAL V/C RATIO 0.221
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.759

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015) WITH PROJECT

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	21	5	78	0
EASTBOUND	60	8	31	0
NORTHBOUND	7	1560	25	0
SOUTHBOUND	66	1107	21	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					L/T/R SHARED
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					L/T/R SHARED
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.065
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.062
NORTHBOUND	0.004	N/A	0.330	0.330	N/A	N/A
SOUTHBOUND	0.041	N/A	0.235	0.235	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.102
 NORTH-SOUTH CRITICAL V/C RATIO 0.371
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.593

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION:1, Lakewood Boulevard / Spring Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015) WITH PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	326	567	214	105
EASTBOUND	544	1484	317	0
NORTHBOUND	74	1279	116	82
SOUTHBOUND	289	1479	0	519

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.113	N/A	0.118	N/A	0.134	N/A
EASTBOUND	0.189	N/A	0.375	0.375	N/A	N/A
NORTHBOUND	0.026	N/A	0.200	N/A	0.072	N/A
SOUTHBOUND	0.100	N/A	0.308	N/A	0.000	N/A

EAST-WEST CRITICAL V/C RATIO 0.488
 NORTH-SOUTH CRITICAL V/C RATIO 0.334
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.002

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015) WITH PROJECT

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	233	865	31	78
EASTBOUND	68	1457	248	62
NORTHBOUND	248	594	244	116
SOUTHBOUND	252	726	101	0

** NUMBER OF LANES **

APPROACH	**		**		L/T/R	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED		
WESTBOUND	2	0	3	0	1	6
EASTBOUND	1	0	3	0	1	5
NORTHBOUND	2	0	3	0	1	6
SOUTHBOUND	2	0	2	1	0	5

** ASSIGNED CAPACITIES **

APPROACH	**		**		RIGHT ONLY	L/T/R SHARED
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED		
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	**		**		RIGHT ONLY	L/T/R SHARED
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED		
WESTBOUND	0.081	N/A	0.180	N/A	0.019	N/A
EASTBOUND	0.043	N/A	0.304	N/A	0.155	N/A
NORTHBOUND	0.086	N/A	0.124	N/A	0.153	N/A
SOUTHBOUND	0.087	N/A	0.172	0.172	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.384
 NORTH-SOUTH CRITICAL V/C RATIO 0.259
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.823

LEVEL OF SERVICE D

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015) WITH PROJECT

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	64	689	368	173
EASTBOUND	263	1519	9	62
NORTHBOUND	124	1063	151	0
SOUTHBOUND	220	1568	195	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	ASSIGNED CAPACITIES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	3200	1600	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	ASSIGNED V/C RATIOS		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.022	N/A	0.165	0.165	0.165	N/A
EASTBOUND	0.092	N/A	0.316	N/A	0.006	N/A
NORTHBOUND	0.043	N/A	0.190	0.190	N/A	N/A
SOUTHBOUND	0.076	N/A	0.368	0.368	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.338
 NORTH-SOUTH CRITICAL V/C RATIO 0.411
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.929

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015) WITH PROJECT

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	101	729	89	0
EASTBOUND	141	1205	66	0
NORTHBOUND	124	552	84	0
SOUTHBOUND	198	517	145	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.035	N/A	0.171	0.171	N/A	N/A
EASTBOUND	0.049	N/A	0.265	0.265	N/A	N/A
NORTHBOUND	0.078	N/A	0.132	0.132	N/A	N/A
SOUTHBOUND	0.069	N/A	0.138	0.138	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.300
 NORTH-SOUTH CRITICAL V/C RATIO 0.216
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.695

LEVEL OF SERVICE B

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015) WITH PROJECT

** INPUT VOLUMES **

APPROACH	LEFT		THROUGH	RIGHT TURNS	
	MIN ON GREEN	MAX ON RED		MIN ON GREEN	MAX ON RED
WESTBOUND	25	4	61		0
EASTBOUND	46	7	24		0
NORTHBOUND	6	1234	29		0
SOUTHBOUND	83	1566	82		0

** NUMBER OF LANES **

APPROACH	LEFT		THROUGH	RIGHT		L/T/R SHARED	TOTAL LANES
	ONLY	SHARED	ONLY	SHARED	ONLY		
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT		THROUGH	RIGHT		L/T/R SHARED
	ONLY	SHARED	ONLY	SHARED	ONLY	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT		THROUGH	RIGHT		L/T/R SHARED
	ONLY	SHARED	ONLY	SHARED	ONLY	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.056
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.048
NORTHBOUND	0.004	N/A	0.263	0.263	N/A	N/A
SOUTHBOUND	0.052	N/A	0.343	0.343	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.085
 NORTH-SOUTH CRITICAL V/C RATIO 0.347
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.552

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	341	1568	101	75
EASTBOUND	340	595	35	0
NORTHBOUND	168	1379	29	242
SOUTHBOUND	209	1233	227	340

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	LEFT	ASSIGNED CAPACITIES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	ASSIGNED V/C RATIOS		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.118	N/A	0.327	N/A	0.063	N/A
EASTBOUND	0.118	N/A	0.131	0.131	N/A	N/A
NORTHBOUND	0.058	N/A	0.216	N/A	0.018	N/A
SOUTHBOUND	0.072	N/A	0.257	N/A	0.079	N/A

EAST-WEST CRITICAL V/C RATIO 0.445
 NORTH-SOUTH CRITICAL V/C RATIO 0.315
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.940

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	300	1386	238	26
EASTBOUND	87	886	121	106
NORTHBOUND	296	995	243	150
SOUTHBOUND	105	481	37	0

** NUMBER OF LANES **

APPROACH	**		**		L/T/R	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED		
WESTBOUND	2	0	3	0	0	6
EASTBOUND	1	0	3	0	0	5
NORTHBOUND	2	0	3	0	0	6
SOUTHBOUND	2	0	2	1	0	5

** ASSIGNED CAPACITIES **

APPROACH	**		**		L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	
WESTBOUND	2880	N/A	4800	N/A	N/A
EASTBOUND	1600	N/A	4800	N/A	N/A
NORTHBOUND	2880	N/A	4800	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A

** ASSIGNED V/C RATIOS **

APPROACH	**		**		L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	
WESTBOUND	0.104	N/A	0.289	N/A	N/A
EASTBOUND	0.054	N/A	0.184	N/A	N/A
NORTHBOUND	0.103	N/A	0.207	N/A	N/A
SOUTHBOUND	0.036	N/A	0.108	0.108	N/A

EAST-WEST CRITICAL V/C RATIO 0.343
 NORTH-SOUTH CRITICAL V/C RATIO 0.244
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.767

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	134	1836	544	169
EASTBOUND	277	1140	0	132
NORTHBOUND	314	1509	195	0
SOUTHBOUND	177	1336	485	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.047	N/A	0.382	N/A	0.340	N/A
EASTBOUND	0.096	N/A	0.237	N/A	0.000	N/A
NORTHBOUND	0.109	N/A	0.266	0.266	N/A	N/A
SOUTHBOUND	0.061	N/A	0.379	0.379	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.478
 NORTH-SOUTH CRITICAL V/C RATIO 0.488
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.147

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	74	1461	161	0
EASTBOUND	110	696	75	0
NORTHBOUND	180	599	74	0
SOUTHBOUND	61	453	155	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY		
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	
WESTBOUND	0.026	N/A	0.338	0.338	N/A	N/A
EASTBOUND	0.038	N/A	0.161	0.161	N/A	N/A
NORTHBOUND	0.112	N/A	0.140	0.140	N/A	N/A
SOUTHBOUND	0.021	N/A	0.127	0.127	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.376
 NORTH-SOUTH CRITICAL V/C RATIO 0.239
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.796

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	22	5	81	0
EASTBOUND	62	8	32	0
NORTHBOUND	7	1747	26	0
SOUTHBOUND	69	1260	22	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.068
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.064
NORTHBOUND	0.004	N/A	0.369	0.369	N/A	N/A
SOUTHBOUND	0.043	N/A	0.267	0.267	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.106
 NORTH-SOUTH CRITICAL V/C RATIO 0.412
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.638

LEVEL OF SERVICE B

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH	**			RIGHT TURNS		**
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED		
WESTBOUND	339	594	213	122		
EASTBOUND	587	1558	330	0		
NORTHBOUND	77	1478	124	85		
SOUTHBOUND	304	1731	0	556		

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	ONLY	SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	LEFT	ASSIGNED CAPACITIES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	ASSIGNED V/C RATIOS		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	ONLY	SHARED
WESTBOUND	0.118	N/A	0.124	N/A	0.133	N/A
EASTBOUND	0.204	N/A	0.393	0.393	N/A	N/A
NORTHBOUND	0.026	N/A	0.231	N/A	0.078	N/A
SOUTHBOUND	0.106	N/A	0.361	N/A	0.000	N/A

EAST-WEST CRITICAL V/C RATIO 0.511
 NORTH-SOUTH CRITICAL V/C RATIO 0.387
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.078

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT PROJECT

APPROACH	** INPUT VOLUMES **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	255	919	54	70
EASTBOUND	72	1529	236	97
NORTHBOUND	289	685	347	128
SOUTHBOUND	279	773	106	0

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.089	N/A	0.191	N/A	0.034	N/A
EASTBOUND	0.045	N/A	0.319	N/A	0.147	N/A
NORTHBOUND	0.100	N/A	0.142	N/A	0.217	N/A
SOUTHBOUND	0.097	N/A	0.183	0.183	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.408
 NORTH-SOUTH CRITICAL V/C RATIO 0.314
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.902

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT PROJECT

APPROACH	** INPUT VOLUMES **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	61	726	405	195
EASTBOUND	358	1645	20	74
NORTHBOUND	149	1167	171	0
SOUTHBOUND	223	1725	226	0

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.021	N/A	0.177	0.177	0.177	N/A
EASTBOUND	0.124	N/A	0.343	N/A	0.013	N/A
NORTHBOUND	0.051	N/A	0.209	0.209	N/A	N/A
SOUTHBOUND	0.078	N/A	0.406	0.406	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.363
 NORTH-SOUTH CRITICAL V/C RATIO 0.458
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.001

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT PROJECT

		** INPUT VOLUMES **			
APPROACH				** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED	
WESTBOUND	116	763	94		0
EASTBOUND	158	1265	70		0
NORTHBOUND	130	600	97		0
SOUTHBOUND	209	582	152		0

		** NUMBER OF LANES **					
APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	TOTAL LANES
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

		** ASSIGNED CAPACITIES **				
APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

		** ASSIGNED V/C RATIOS **				
APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.040	N/A	0.179	0.179	N/A	N/A
EASTBOUND	0.055	N/A	0.278	0.278	N/A	N/A
NORTHBOUND	0.081	N/A	0.145	0.145	N/A	N/A
SOUTHBOUND	0.072	N/A	0.153	0.153	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.318
 NORTH-SOUTH CRITICAL V/C RATIO 0.234
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.733

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	26	4	63	0
EASTBOUND	48	7	25	0
NORTHBOUND	6	1379	30	0
SOUTHBOUND	86	1744	85	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.058
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.050
NORTHBOUND	0.004	N/A	0.294	0.294	N/A	N/A
SOUTHBOUND	0.054	N/A	0.381	0.381	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.088
 NORTH-SOUTH CRITICAL V/C RATIO 0.385
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.593

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITH PROJECT

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	341	1568	100	76
EASTBOUND	340	595	35	0
NORTHBOUND	168	1381	30	242
SOUTHBOUND	209	1236	227	340

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	LEFT	ASSIGNED CAPACITIES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	ASSIGNED V/C RATIOS		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.118	N/A	0.327	N/A	0.062	N/A
EASTBOUND	0.118	N/A	0.131	0.131	N/A	N/A
NORTHBOUND	0.058	N/A	0.216	N/A	0.019	N/A
SOUTHBOUND	0.072	N/A	0.257	N/A	0.079	N/A

EAST-WEST CRITICAL V/C RATIO 0.445
 NORTH-SOUTH CRITICAL V/C RATIO 0.316
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.941

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITH PROJECT

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	301	1387	238	26
EASTBOUND	87	888	121	106
NORTHBOUND	296	995	243	150
SOUTHBOUND	105	481	37	0

** NUMBER OF LANES **

APPROACH	LEFT	**		**		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY		
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	**		**		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	**		**		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	0.104	N/A	0.289	N/A	0.149	N/A
EASTBOUND	0.054	N/A	0.185	N/A	0.076	N/A
NORTHBOUND	0.103	N/A	0.207	N/A	0.152	N/A
SOUTHBOUND	0.036	N/A	0.108	0.108	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.343
 NORTH-SOUTH CRITICAL V/C RATIO 0.244
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.767

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITH PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	139	1838	545	168
EASTBOUND	280	1140	0	132
NORTHBOUND	314	1512	195	0
SOUTHBOUND	183	1336	485	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	ONLY	SHARED	
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	ONLY	SHARED
WESTBOUND	0.049	N/A	0.383	N/A	0.341	N/A
EASTBOUND	0.097	N/A	0.237	N/A	0.000	N/A
NORTHBOUND	0.109	N/A	0.267	0.267	N/A	N/A
SOUTHBOUND	0.064	N/A	0.379	0.379	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.480
 NORTH-SOUTH CRITICAL V/C RATIO 0.488
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.149

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITH PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	74	1463	161	0
EASTBOUND	110	697	75	0
NORTHBOUND	180	599	74	0
SOUTHBOUND	61	453	155	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY		
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	
WESTBOUND	0.026	N/A	0.338	0.338	N/A	N/A
EASTBOUND	0.038	N/A	0.161	0.161	N/A	N/A
NORTHBOUND	0.112	N/A	0.140	0.140	N/A	N/A
SOUTHBOUND	0.021	N/A	0.127	0.127	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.376
 NORTH-SOUTH CRITICAL V/C RATIO 0.239
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.796

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/6/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITH PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	22	5	81	0
EASTBOUND	62	8	32	0
NORTHBOUND	7	1750	26	0
SOUTHBOUND	69	1261	22	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.068
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.064
NORTHBOUND	0.004	N/A	0.370	0.370	N/A	N/A
SOUTHBOUND	0.043	N/A	0.268	0.268	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.106
 NORTH-SOUTH CRITICAL V/C RATIO 0.413
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.639

LEVEL OF SERVICE B

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITH PROJECT

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	339	594	212	123
EASTBOUND	587	1558	330	0
NORTHBOUND	77	1481	125	85
SOUTHBOUND	304	1734	0	556

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	LEFT	ASSIGNED CAPACITIES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	ASSIGNED V/C RATIOS		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.118	N/A	0.124	N/A	0.132	N/A
EASTBOUND	0.204	N/A	0.393	0.393	N/A	N/A
NORTHBOUND	0.026	N/A	0.231	N/A	0.078	N/A
SOUTHBOUND	0.106	N/A	0.361	N/A	0.000	N/A

EAST-WEST CRITICAL V/C RATIO 0.511
 NORTH-SOUTH CRITICAL V/C RATIO 0.388
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.079

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITH PROJECT

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	256	921	54	70
EASTBOUND	72	1531	236	97
NORTHBOUND	289	685	347	128
SOUTHBOUND	279	773	106	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.089	N/A	0.192	N/A	0.034	N/A
EASTBOUND	0.045	N/A	0.319	N/A	0.147	N/A
NORTHBOUND	0.100	N/A	0.142	N/A	0.217	N/A
SOUTHBOUND	0.097	N/A	0.183	0.183	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.408
 NORTH-SOUTH CRITICAL V/C RATIO 0.314
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.902

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITH PROJECT

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	68	729	406	194
EASTBOUND	361	1645	20	74
NORTHBOUND	149	1170	171	0
SOUTHBOUND	229	1725	226	0

** NUMBER OF LANES **

APPROACH	**		**		L/T/R	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED		
WESTBOUND	2	0	2	1	0	6
EASTBOUND	2	0	3	0	1	6
NORTHBOUND	2	0	3	1	0	6
SOUTHBOUND	2	0	2	1	0	5

** ASSIGNED CAPACITIES **

APPROACH	**		**		L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	
WESTBOUND	2880	N/A	3200	1600	1600
EASTBOUND	2880	N/A	4800	N/A	1600
NORTHBOUND	2880	N/A	4800	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A

** ASSIGNED V/C RATIOS **

APPROACH	**		**		L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	
WESTBOUND	0.024	N/A	0.177	0.177	0.177
EASTBOUND	0.125	N/A	0.343	N/A	0.013
NORTHBOUND	0.051	N/A	0.209	0.209	N/A
SOUTHBOUND	0.079	N/A	0.406	0.406	N/A

EAST-WEST CRITICAL V/C RATIO 0.366
 NORTH-SOUTH CRITICAL V/C RATIO 0.458
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.004

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITH PROJECT

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	116	765	94	0
EASTBOUND	158	1266	70	0
NORTHBOUND	130	600	97	0
SOUTHBOUND	209	582	152	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.040	N/A	0.179	0.179	N/A	N/A
EASTBOUND	0.055	N/A	0.278	0.278	N/A	N/A
NORTHBOUND	0.081	N/A	0.145	0.145	N/A	N/A
SOUTHBOUND	0.072	N/A	0.153	0.153	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.318
 NORTH-SOUTH CRITICAL V/C RATIO 0.234
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.733

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/6/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITH PROJECT

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	26	4	63	0
EASTBOUND	48	7	25	0
NORTHBOUND	6	1382	30	0
SOUTHBOUND	86	1746	85	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	SHARED	ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.058
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.050
NORTHBOUND	0.004	N/A	0.294	0.294	N/A	N/A
SOUTHBOUND	0.054	N/A	0.381	0.381	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.088
 NORTH-SOUTH CRITICAL V/C RATIO 0.385
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.593

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

APPENDIX D
URBAN LAND INSTITUTE
PARKING UTILIZATION PERCENTAGES

ULI PARKING UTILIZATION PERCENTAGES - WEEKDAY

Hour Beginning	Use: Conference /			
	Use: Hotel		Meeting Room	Use: Hotel Restaurant
	Visitor	Employee	Visitor	Visitor
6:00 AM	95%	5%	0%	0%
7:00 AM	90%	30%	0%	10%
8:00 AM	80%	90%	50%	30%
9:00 AM	70%	90%	100%	10%
10:00 AM	60%	100%	100%	10%
11:00 AM	60%	100%	100%	5%
12:00 PM	55%	100%	100%	100%
1:00 PM	55%	100%	100%	100%
2:00 PM	60%	100%	100%	33%
3:00 PM	60%	100%	100%	10%
4:00 PM	65%	90%	100%	10%
5:00 PM	70%	70%	100%	30%
6:00 PM	75%	40%	50%	55%
7:00 PM	75%	20%	30%	60%
8:00 PM	80%	20%	30%	70%
9:00 PM	85%	20%	10%	67%
10:00 PM	95%	20%	0%	60%
11:00 PM	100%	10%	0%	40%
12:00 AM	100%	5%	0%	30%

Source: *Shared Parking*, 2nd Edition, Urban Land Institute. "Table 2-5 Recommended Time-of-Day Factors for Weekdays."

ULI PARKING UTILIZATION PERCENTAGES - WEEKEND

Hour Beginning	Use: Conference /			
	Use: Hotel		Meeting Room	Use: Hotel Restaurant
	Visitor	Employee	Visitor	Visitor
6:00 AM	95%	5%	0%	0%
7:00 AM	90%	30%	0%	10%
8:00 AM	80%	90%	50%	30%
9:00 AM	70%	90%	100%	10%
10:00 AM	60%	100%	100%	10%
11:00 AM	60%	100%	100%	5%
12:00 PM	55%	100%	100%	100%
1:00 PM	55%	100%	100%	100%
2:00 PM	60%	100%	100%	33%
3:00 PM	60%	100%	100%	10%
4:00 PM	65%	90%	100%	10%
5:00 PM	70%	75%	100%	30%
6:00 PM	75%	60%	50%	55%
7:00 PM	75%	55%	30%	60%
8:00 PM	80%	55%	30%	70%
9:00 PM	85%	55%	10%	67%
10:00 PM	95%	45%	0%	60%
11:00 PM	100%	45%	0%	40%
12:00 AM	100%	30%	0%	30%

Source: *Shared Parking*, 2nd Edition, Urban Land Institute. "Table 2-6 Recommended Time-of-Day Factors for Weekends."

APPENDIX E
CONSTRUCTION TRAFFIC ANALYSIS

STAYBRIDGE SUITES LONG BEACH AIRPORT PROJECT CONSTRUCTION TRAFFIC ANALYSIS

The Staybridge Suites - Long Beach Airport hotel project (the “Project”) is the proposed construction of a new 125-room hotel near the Long Beach Airport in the City of Long Beach. The Project site is located at northeast corner of Lakewood Boulevard and Willow Street. The Project site is bounded by the San Diego Freeway (I-405) to the north and east, commercial and residential uses to the south, and commercial uses to the west. Vehicular access to parking would continue be provided via by the two existing driveways on Lakewood Boulevard and the one existing driveway on Willow Street. An existing driveway on Willow Street, which is closer to the I-405 southbound off-ramp, will be closed. The active driveways will continue to be restricted to right-turn only movements due to the raised medians on Lakewood Boulevard and Willow Street. These streets will also be used for access during the Project’s construction period. A Project traffic study was prepared which analyzes the Project traffic impacts at the study intersections following Project completion and occupancy. This analysis assesses the potential Project traffic impacts during the construction period. The procedures, assumptions and results of this analysis are detailed below.

Construction Phases

The total Project construction period includes six phases with a total estimated duration of 17 months with approximately 22 workdays per month. The estimated time period per phase is: eight working days for Demolition; 11 working days for Site Preparation and Shoring; 23 working days for Grading/Excavation; 255 working days for Construction; 68 working days for Interior Finishing; 11 working days for Exterior Finishing. It is anticipated that time overlaps will likely occur between the phases. However, during any overlap of two activities, each activity will be less than half the analyzed high-activity level, so that the total site level of activity will not exceed the total analyzed level for the previous and/or subsequent construction phase.

The duration of the construction activities sequence through the six phases is summarized below in Table 1. The schedule is tentative and adjustments in the period lengths may occur due to currently unforeseen circumstances.

Table 1
Project Construction Schedule

<u>Phase</u>	<u>Approximate Time Period</u>
1. Demolition	8 working days
2. Site Preparation and Shoring	11 working days
3. Grading/Excavation	23 working days
4. Construction	255 working days
5. Interior Finishing	68 working days
6. Exterior Finishing	<u>11 working days</u>
Total	376 working days 17 months

To reflect the maximum construction traffic generation at the site and on the surrounding streets, the analysis assumes that all construction-related vehicles, including construction worker private commute vehicles, would access and park, or be stored, on-site throughout the construction process. Likewise, it is expected that on-site construction activity will fluctuate on a weekly basis, depending largely on the number of workers and construction trucks needed for the on-going activities during each particular time period. However, to remain conservative, the portion of the Project construction period generating the highest daily construction-related traffic was analyzed and assumed to represent the entire period. Further, the impacts have been calculated for both Existing (2015) and Future (2019) conditions in order to assess whether the cumulative traffic growth may have an effect on conclusions regarding the Project construction period impacts.

Based on the total amount of proposed construction work and the anticipated durations, the number of delivery/haul trucks and construction workers on-site per day will vary according to the construction period as shown in Table 2 below. Table 2 shows the highest level of daily activity for each phase and the footnote highlights the limits on the peak hour activity.

Table 2
Project Construction Workers and Delivery/Haul Trucks

<u>Phase</u>	<u>Workers</u>		<u>Trucks</u>	
	<u>#/Day</u>	<u>Operation Period</u>	<u>#/Day</u>	<u>Haul Period</u>
1. Demolition	25 workers	7:00AM-3:30PM	24 trucks	7 AM - 7 PM
2. Site Preparation and Shoring	25 workers	7:00AM-3:30PM	24 trucks	7 AM - 7 PM
3. Grading/Excavation	25 workers	7:00AM-3:30PM	24 trucks	7 AM - 7 PM
4. Construction	150 workers	7:00AM-3:30PM	14 trucks	7 AM - 7 PM
5. Interior Finishing	50 workers	7:00AM-3:30PM	27 trucks	7 AM - 7 PM
6. Exterior Finishing	50 workers	7:00AM-3:30PM	27 trucks	7 AM - 7 PM

Project Construction Period Trip Generation

The Institute of Transportation Engineers (ITE) compiles studies, documents traffic-generating characteristics of various land uses, and presents its findings in the ITE Trip Generation manual, most recently in its 9th Edition. The traffic analysis for this Project uses the 9th Edition rates for calculating the non-delivery and haul vehicle trips during construction. No land-use type of construction site is included in the ITE Trip Generation manual or other source deemed credible. Further, assumptions that all workers make trips only to arrive in the morning and commute home at night were deemed to not reflect the observed behavior of a construction site. Therefore, the analysis assumes that traffic generation patterns for construction workers are similar to those of typical industrial workers; and the analysis utilizes daily, AM and PM peak hour trip rates for General Light Industrial uses to determine the Project’s non-delivery and haul vehicle trip generating potential during construction. The 9th Edition ITE Trip Generation rates for General Light Industrial are shown in Table 3.

Table 3
Project Trip Generation Rates and Equations

General Light Industrial (per employee) – LU 110

Daily:	T = 3.02 (E)
AM Peak Hour:	T = 0.44 (E); I/B = 83%, O/B = 17%
PM Peak Hour:	T = 0.42 (E); I/B = 21%, O/B = 79%

Where:

T = Trip ends	E = Employee
I/B = Inbound	O/B = Outbound

Source: Trip Generation, 9th Edition, Institute of Transportation Engineers, Washington D.C., 2012.

The ITE rates are for on-going operations of all vehicle trips, including truck trips. However, to be conservative, this analysis considers construction delivery/haul truck trips as a separate addition. Further, the heavy-vehicle adjustment factor of two (from Chapter 18 of the Highway Capacity Manual 2010, Transportation Research Board) was applied to the truck trips to account for the trucks’ slower acceleration rate and larger size.

With the above conservative assumptions, a construction-related trip generation estimate was calculated for the peak of each phase. As illustrated in Table 4, the maximum number of construction-related peak hour vehicle trips is expected to occur during the maximum intensity time within Phase 4 – Construction. For the purpose of a conservative study, the following analysis assumed the maximum (Phase 4) trip generation conditions for the entire construction analysis during all six phases.

Table 4
Project Construction-Related Trip Generation

<u>Construction Stages</u>		<u>Crew</u>	<u>Daily</u>	<u>AM Peak Hour</u>			<u>PM Peak Hour</u>		
				<u>In</u>	<u>Out</u>	<u>Total</u>	<u>In</u>	<u>Out</u>	<u>Total</u>
1. Demolition	Employee	25 workers	76	9	2	11	2	9	11
	Truck*	24 truck loads	<u>96</u>	<u>4</u>	<u>4</u>	<u>8</u>	<u>4</u>	<u>4</u>	<u>8</u>
			172	13	6	19	6	13	19
2. Site Preparation and Shoring	Employee	25 workers	76	9	2	11	2	9	11
	Truck*	24 truck loads	<u>96</u>	<u>4</u>	<u>4</u>	<u>8</u>	<u>4</u>	<u>4</u>	<u>8</u>
			172	13	6	19	6	13	19
3. Grading/Excavation	Employee	25 workers	76	9	2	11	2	9	11
	Truck*	24 truck loads	<u>96</u>	<u>4</u>	<u>4</u>	<u>8</u>	<u>4</u>	<u>4</u>	<u>8</u>
			172	13	6	19	6	13	19
4. Construction	Employee	150 workers	453	55	11	66	13	50	63
	Truck*	14 truck loads	<u>56</u>	<u>3</u>	<u>2</u>	<u>5</u>	<u>3</u>	<u>2</u>	<u>5</u>
			509	58	13	71	16	52	68
5. Interior Finishing	Employee	50 workers	151	18	4	22	4	17	21
	Truck*	27 truck loads	<u>108</u>	<u>5</u>	<u>4</u>	<u>9</u>	<u>5</u>	<u>4</u>	<u>9</u>
			259	23	8	31	9	21	30
6. Exterior Finishing	Employee	50 workers	151	18	4	22	4	17	21
	Truck*	27 truck loads	<u>108</u>	<u>5</u>	<u>4</u>	<u>9</u>	<u>5</u>	<u>4</u>	<u>9</u>
			259	23	8	31	9	21	30
Maximum Construction Trips			509	58	13	71	16	52	68

* For truck trips, a heavy vehicle factor is included in the trip generation calculations. Both inbound trip and outbound trip are included for each truck. Truck trips are conservatively assumed to be constant throughout the day, rather than avoiding peak periods.

Heavy-vehicle factor: 2 **Hours for truck trips:** 12

Since construction workers are expected to live throughout the Southern California region, they are also expected to travel to the Project Site from all directions. The trip pattern is expected to be similar to the Project trip assignment percentages with the majority of trips occurring to and from the I-405. Therefore, these same trip assignment percentages were used for the construction period analysis. Construction period Project traffic volumes for the peak hours are shown in Attachment A, Figures 1(a) and 1(b) for the AM and PM peak hours, respectively.

Existing and Future Traffic Volumes

The analysis methodology for construction-related trip generation is consistent with the Project traffic study analysis for Project operations. Information pertaining to intersection traffic counts, widths and geometrics, on-street parking restrictions, and traffic signal operations were obtained from on-line aerial photographs and other sources. Future (2019) traffic volume estimates were developed to analyze traffic conditions in the vicinity after the completion of Project's construction. The following steps were performed to estimate "Existing (2015) With Construction" and "Future (2019) Without Project" conditions:

1. Existing (2015) traffic volume counts were used as a base;
2. Existing (2015) with construction traffic volumes were analyzed. These volumes were used to determine "Existing (2015) With Construction" traffic impacts directly attributable to the construction traffic of the proposed Project;
3. A 1.0 percent ambient growth factor each year and Related Projects volumes were added to the existing traffic volumes to calculate the "Future (2019) Without Construction" (baseline) conditions; and
4. The traffic volumes in the future without construction conditions were further increased by adding Project construction traffic volumes to calculate "Future (2019) With Construction" volumes.

The Project traffic study analysis for Project operations should be reviewed for additional details.

Intersection Construction Traffic Impacts of the Proposed Project

This technical report analyzes the temporary construction-related traffic impacts at all of the study intersections. This analysis utilizes the same intersection analysis methodology, Intersection Capacity Utilization (ICU) method, used in the Project traffic study per the City of Long Beach guidelines. This methodology determines the operating characteristics of an intersection in terms of the "Level of Service" based on different levels of traffic volume and lane capacities. The generally accepted lane capacities are 1,600 vehicles per lane for all through and left- and right-turn lanes, and a capacity of 2,880 for dual turn lanes. The City has adopted clearance interval adjustments that incorporate the number of signal phases and phasing type. Table 5 presents these clearance intervals.

Table 5
City of Long Beach
Clearance Intervals

<u>Number of Signal Phases</u>	<u>Left-turn Phasing Type</u>	<u>Clearance Interval</u>
2	Permitted	10%
3	Protected and Permitted	12%
3	Fully Protected	15%
4	Protected and Permitted	14%
4	Fully Protected	18%

Source: City of Long Beach Guidelines and Signalized Intersection Analysis.

The term "Level of Service" (LOS) describes the quality of traffic flow, ranging from excellent conditions at LOS A to failure conditions at LOS F. The City recognizes LOS D as the minimum acceptable service level.

The volume-to-capacity (V/C) ratios used in this study were calculated by dividing the sum of critical movement volumes by the appropriate capacity value, then including the clearance interval, as discussed earlier. Table 6 describes the LOS and their corresponding V/C ratios.

Table 6
Level of Service (LOS)
As a Function of Intersection Capacity Utilization (ICU) Values

<u>Level of Service</u>	<u>Description of Operating Characteristics</u>	<u>Range of V/C Ratios</u>
A	Excellent. No vehicle waits longer than one red light.	0.000 - 0.600
B	Very Good. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.	0.601 - 0.700
C	Good. Occasionally, drivers may have to wait through more than one red light; backups may develop behind turning vehicles.	0.701 - 0.800
D	Fair. Delays may be substantial during portions of the rush hour, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.	0.801 - 0.900
E	Poor. Represents the most vehicles that intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.	0.901 - 1.000
F	Failure. Backups from nearby intersections or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.	> 1.000

The City of Long Beach defines a significant project traffic impact when an intersection impact is operating at LOS E or F. No significant impacts are deemed to occur at LOS A to D, as these conditions exhibit sufficient surplus capacities to accommodate large traffic volumes with little effect on traffic delay. These criteria are summarized in Table 7 below.

Table 7
City of Long Beach Criteria for
Significant Traffic Impact

<u>LOS</u>	<u>Final V/C Value</u>	<u>Project-Related Increase in V/C Value</u>
E, F	> 0.900	equal to or greater than 0.020

The Project's maximum construction period impacts were calculated and were analyzed with construction traffic being added to both existing volumes and anticipated future volumes. The results of the ICU calculations are summarized in Table 8 for the existing and future conditions.

As shown in Table 4, the maximum site trip generation during construction would occur during Phase 4 – Construction. The conditions and impacts shown in Table 8 correspond to these highest generation levels. As shown in Table 8, construction activities of the Project are not expected to significantly impact any of the study intersections given projected conditions for the peak of the construction period. Therefore, no mitigation measures are required for the Project construction traffic.

Parking During Construction

Parking for the construction workers is expected to be provided on the Project site. Parking for the construction equipment will be provided on the Project site. No parking or storage of construction equipment or construction worker parking is expected on local residential streets.

Construction Management Plan

A Construction Management Plan would be developed by the contractor and approved by the City and would include the following:

- Identify the locations of the off-site truck staging and detail measures to ensure that trucks use the specified haul route, and do not travel through nearby residential neighborhoods.
- Schedule vehicle movements to ensure that there are no vehicles waiting off-site and impeding public traffic flow on the surrounding streets.
- Establish requirements for loading/unloading and storage of materials on the Project site.
- Coordinate with the City and emergency service providers to ensure adequate access is maintained to the Project site and neighboring businesses.
- During construction activities when construction worker parking cannot be accommodated on-site, a Construction Worker Parking Plan would be prepared which identifies alternate parking location(s) for construction workers and the method of transportation to and from the Project site (if beyond walking distance) for approval by the City. The parking plan would prohibit construction worker parking on residential streets and prohibit on-street parking, except as approved by the City.

The Project proposes to provide most staging on-site and site access would be controlled so as to limit impacts to adjacent traffic. While sometimes inconvenient, construction-related traffic effects are temporary. Further, maximum construction traffic activity occurs on a few number of peak days within the overall construction program.

For any traffic delays that occur longer than 72 hours, a work site traffic control plan would be required to be approved by the City to ensure that any construction-related effects are minimized to the greatest extent possible. Delays shorter than 72 hours in duration would be required to follow the most current guidelines noted in Part 6 within the California Manual on Uniform Traffic Control Devices (CA MUTCD).

Table 8
Intersection Capacity Utilization (ICU) Values
Without and With Project Maximum Construction Trips
Existing (2015) and Future (2019) Conditions

No.	Intersection	Peak Hour	Existing (2015)		Existing (2015) With Construction			Future (2019)				
			V/C	LOS	V/C	LOS	Impact	Without Construction		With Construction		
								V/C	LOS	V/C	LOS	Impact
1	Lakewood Boulevard / Spring Street	AM	0.874	D	0.876	D	0.002	0.940	E	0.942	E	0.002
		PM	1.001	F	1.003	F	0.002	1.078	F	1.080	F	0.002
2	Redondo Avenue / Willow Street	AM	0.727	C	0.727	C	0.000	0.767	C	0.767	C	0.000
		PM	0.822	D	0.824	D	0.002	0.902	E	0.902	E	0.000
3	Lakewood Boulevard / Willow Street	AM	1.049	F	1.052	F	0.003	1.147	F	1.150	F	0.003
		PM	0.926	E	0.933	E	0.007	1.001	F	1.008	F	0.007
4	Clark Avenue / Willow Street	AM	0.759	C	0.760	C	0.001	0.796	C	0.797	C	0.001
		PM	0.695	B	0.696	B	0.001	0.733	C	0.734	C	0.001
5	Lakewood Boulevard / 23rd Street	AM	0.593	A	0.595	A	0.002	0.638	B	0.640	B	0.002
		PM	0.552	A	0.552	A	0.000	0.593	A	0.594	A	0.001

ATTACHMENT A

Graphics

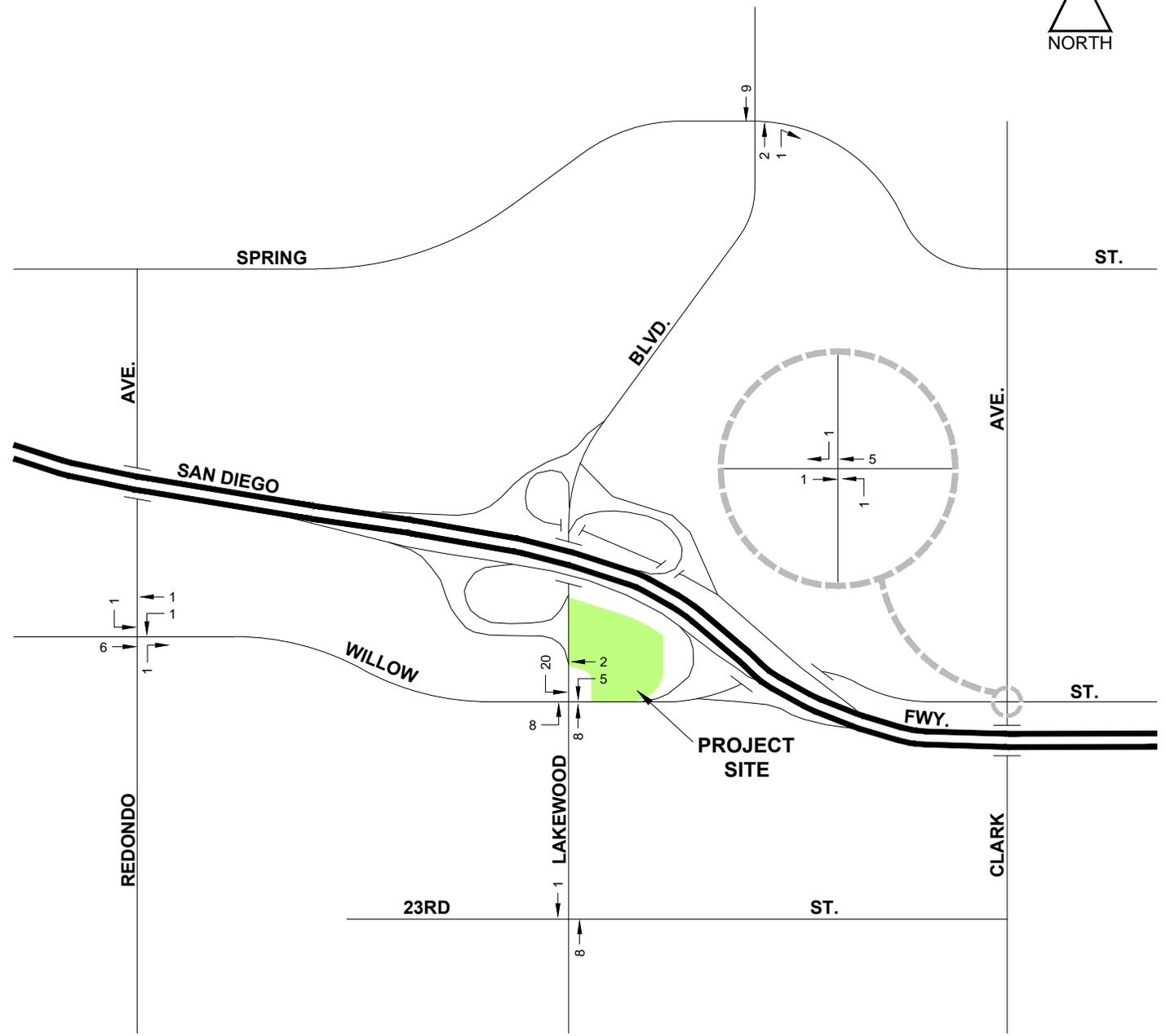


FIGURE 1(a)

9/8/2016

FN: StaybridgeSuitesLongBchAMCONVOL

TOTAL CONSTRUCTION TRAFFIC AM PEAK HOUR



Transportation Planning
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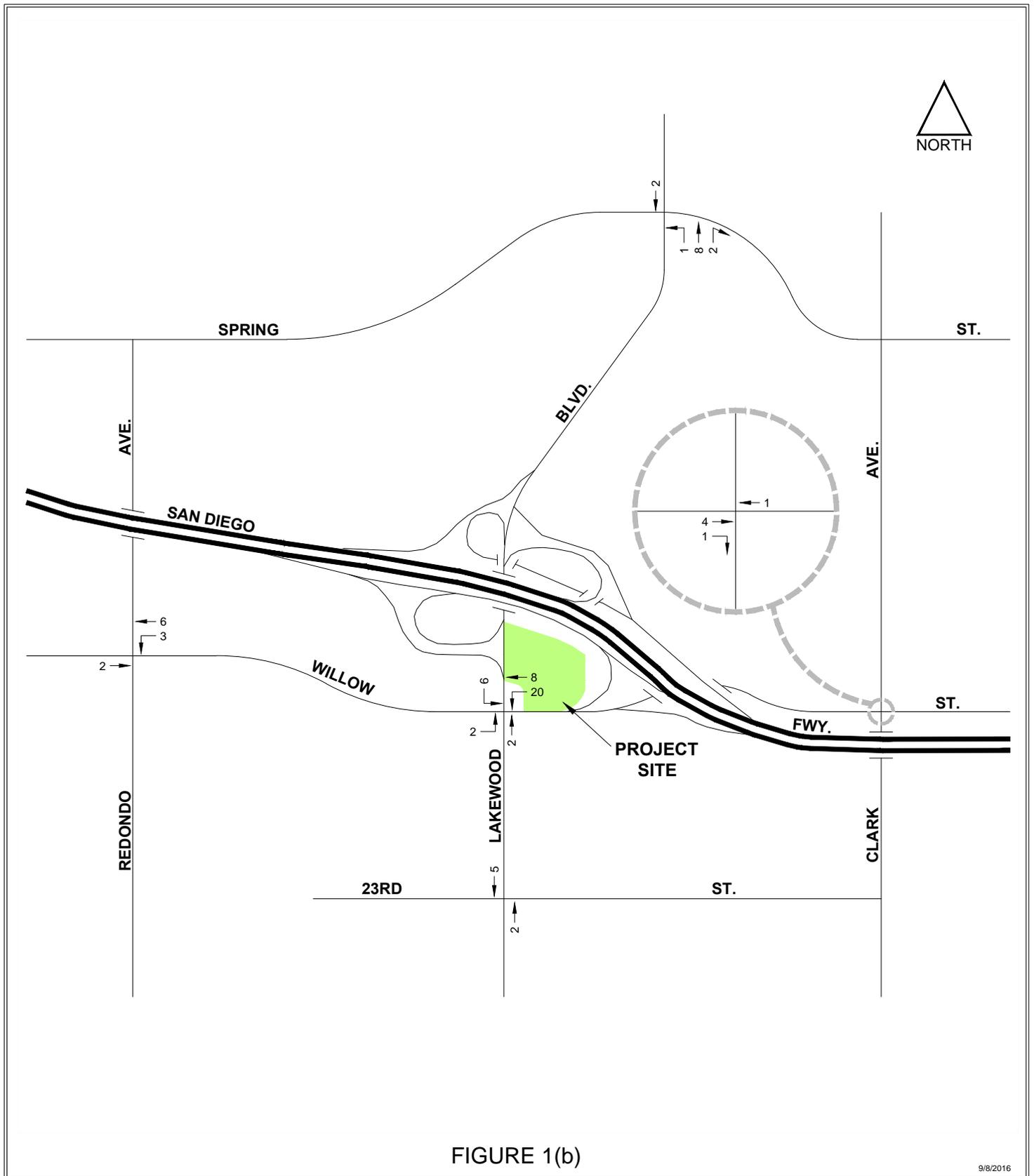


FIGURE 1(b)

9/8/2016

FN: StaybridgeSuitesLongBchPMCONVOL

TOTAL CONSTRUCTION TRAFFIC
PM PEAK HOUR



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ATTACHMENT B

ICU Worksheets

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	325	1491	88	78
EASTBOUND	307	566	34	0
NORTHBOUND	161	1115	34	226
SOUTHBOUND	199	1061	212	308

** NUMBER OF LANES **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R	TOTAL
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED	LANES
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	0.112	N/A	0.311	N/A	0.055	N/A
EASTBOUND	0.107	N/A	0.125	0.125	N/A	N/A
NORTHBOUND	0.056	N/A	0.174	N/A	0.021	N/A
SOUTHBOUND	0.069	N/A	0.221	N/A	0.074	N/A

EAST-WEST CRITICAL V/C RATIO 0.418
 NORTH-SOUTH CRITICAL V/C RATIO 0.277
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.874

LEVEL OF SERVICE D

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	197	1320	214	19
EASTBOUND	83	827	85	102
NORTHBOUND	274	930	266	98
SOUTHBOUND	76	397	35	0

** NUMBER OF LANES **

APPROACH	LEFT		THROUGH		RIGHT		L/T/R	TOTAL LANES
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED		
WESTBOUND	2	0	3	0	1	0	6	
EASTBOUND	1	0	3	0	1	0	5	
NORTHBOUND	2	0	3	0	1	0	6	
SOUTHBOUND	2	0	2	1	0	0	5	

** ASSIGNED CAPACITIES **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	0.068	N/A	0.275	N/A	0.134	N/A
EASTBOUND	0.052	N/A	0.172	N/A	0.053	N/A
NORTHBOUND	0.095	N/A	0.194	N/A	0.166	N/A
SOUTHBOUND	0.026	N/A	0.090	0.090	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.327
 NORTH-SOUTH CRITICAL V/C RATIO 0.220
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.727

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	128	1706	476	143
EASTBOUND	242	1073	0	103
NORTHBOUND	279	1364	175	0
SOUTHBOUND	170	1205	387	0

** NUMBER OF LANES **

APPROACH	**		**		L/T/R	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED		
WESTBOUND	2	0	2	1	0	6
EASTBOUND	2	0	3	0	1	6
NORTHBOUND	2	0	3	1	0	6
SOUTHBOUND	2	0	2	1	0	5

** ASSIGNED CAPACITIES **

APPROACH	**		**		L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	
WESTBOUND	2880	N/A	4800	N/A	1600
EASTBOUND	2880	N/A	4800	N/A	1600
NORTHBOUND	2880	N/A	4800	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A

** ASSIGNED V/C RATIOS **

APPROACH	**		**		L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	
WESTBOUND	0.044	N/A	0.356	N/A	0.298
EASTBOUND	0.084	N/A	0.224	N/A	0.000
NORTHBOUND	0.097	N/A	0.241	0.241	N/A
SOUTHBOUND	0.059	N/A	0.332	0.332	N/A

EAST-WEST CRITICAL V/C RATIO 0.440
 NORTH-SOUTH CRITICAL V/C RATIO 0.429
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.049

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	59	1390	151	0
EASTBOUND	105	661	70	0
NORTHBOUND	171	526	60	0
SOUTHBOUND	58	411	139	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	ASSIGNED CAPACITIES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	ASSIGNED V/C RATIOS		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.021	N/A	0.321	0.321	N/A	N/A
EASTBOUND	0.036	N/A	0.153	0.153	N/A	N/A
NORTHBOUND	0.107	N/A	0.122	0.122	N/A	N/A
SOUTHBOUND	0.020	N/A	0.114	0.114	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.357
 NORTH-SOUTH CRITICAL V/C RATIO 0.221
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.759

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	21	5	78	0
EASTBOUND	60	8	31	0
NORTHBOUND	7	1557	25	0
SOUTHBOUND	66	1106	21	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					L/T/R SHARED
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					L/T/R SHARED
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.065
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.062
NORTHBOUND	0.004	N/A	0.329	0.329	N/A	N/A
SOUTHBOUND	0.041	N/A	0.235	0.235	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.102
 NORTH-SOUTH CRITICAL V/C RATIO 0.371
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.593

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	326	567	214	105
EASTBOUND	544	1484	317	0
NORTHBOUND	74	1276	115	82
SOUTHBOUND	289	1476	0	519

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.113	N/A	0.118	N/A	0.134	N/A
EASTBOUND	0.189	N/A	0.375	0.375	N/A	N/A
NORTHBOUND	0.026	N/A	0.199	N/A	0.072	N/A
SOUTHBOUND	0.100	N/A	0.308	N/A	0.000	N/A

EAST-WEST CRITICAL V/C RATIO 0.488
 NORTH-SOUTH CRITICAL V/C RATIO 0.333
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.001

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	232	863	31	78
EASTBOUND	68	1455	248	62
NORTHBOUND	248	594	244	116
SOUTHBOUND	252	726	101	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.081	N/A	0.180	N/A	0.019	N/A
EASTBOUND	0.043	N/A	0.303	N/A	0.155	N/A
NORTHBOUND	0.086	N/A	0.124	N/A	0.153	N/A
SOUTHBOUND	0.087	N/A	0.172	0.172	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.384
 NORTH-SOUTH CRITICAL V/C RATIO 0.259
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.822

LEVEL OF SERVICE D

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	57	686	367	174
EASTBOUND	260	1519	9	62
NORTHBOUND	124	1060	151	0
SOUTHBOUND	214	1568	195	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	ASSIGNED CAPACITIES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	3200	1600	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	ASSIGNED V/C RATIOS		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.019	N/A	0.164	0.164	0.164	N/A
EASTBOUND	0.090	N/A	0.316	N/A	0.006	N/A
NORTHBOUND	0.043	N/A	0.189	0.189	N/A	N/A
SOUTHBOUND	0.074	N/A	0.368	0.368	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.336
 NORTH-SOUTH CRITICAL V/C RATIO 0.411
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.926

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	101	727	89	0
EASTBOUND	141	1204	66	0
NORTHBOUND	124	552	84	0
SOUTHBOUND	198	517	145	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.035	N/A	0.170	0.170	N/A	N/A
EASTBOUND	0.049	N/A	0.264	0.264	N/A	N/A
NORTHBOUND	0.078	N/A	0.132	0.132	N/A	N/A
SOUTHBOUND	0.069	N/A	0.138	0.138	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.299
 NORTH-SOUTH CRITICAL V/C RATIO 0.216
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.695

LEVEL OF SERVICE B

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015)

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	25	4	61	0
EASTBOUND	46	7	24	0
NORTHBOUND	6	1231	29	0
SOUTHBOUND	83	1564	82	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.056
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.048
NORTHBOUND	0.004	N/A	0.262	0.262	N/A	N/A
SOUTHBOUND	0.052	N/A	0.343	0.343	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.085
 NORTH-SOUTH CRITICAL V/C RATIO 0.347
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.552

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION:1, Lakewood Boulevard / Spring Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	325	1491	87	79
EASTBOUND	307	566	34	0
NORTHBOUND	161	1117	35	226
SOUTHBOUND	199	1070	212	308

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.112	N/A	0.311	N/A	0.054	N/A
EASTBOUND	0.107	N/A	0.125	0.125	N/A	N/A
NORTHBOUND	0.056	N/A	0.174	N/A	0.022	N/A
SOUTHBOUND	0.069	N/A	0.223	N/A	0.074	N/A

EAST-WEST CRITICAL V/C RATIO 0.418
 NORTH-SOUTH CRITICAL V/C RATIO 0.279
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.876

LEVEL OF SERVICE D

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015) WITH CONSTRUCTION

APPROACH	** INPUT VOLUMES **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	198	1321	214	19
EASTBOUND	83	833	85	102
NORTHBOUND	274	930	266	99
SOUTHBOUND	77	397	35	0

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.069	N/A	0.275	N/A	0.134	N/A
EASTBOUND	0.052	N/A	0.174	N/A	0.053	N/A
NORTHBOUND	0.095	N/A	0.194	N/A	0.166	N/A
SOUTHBOUND	0.026	N/A	0.090	0.090	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.327
 NORTH-SOUTH CRITICAL V/C RATIO 0.220
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.727

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	133	1708	477	142
EASTBOUND	250	1073	0	103
NORTHBOUND	279	1372	175	0
SOUTHBOUND	190	1205	387	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.046	N/A	0.356	N/A	0.298	N/A
EASTBOUND	0.087	N/A	0.224	N/A	0.000	N/A
NORTHBOUND	0.097	N/A	0.242	0.242	N/A	N/A
SOUTHBOUND	0.066	N/A	0.332	0.332	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.442
 NORTH-SOUTH CRITICAL V/C RATIO 0.429
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.052

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015) WITH CONSTRUCTION

APPROACH	** INPUT VOLUMES **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	59	1395	151	0
EASTBOUND	105	662	70	0
NORTHBOUND	172	526	60	0
SOUTHBOUND	58	411	140	0

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.021	N/A	0.322	0.322	N/A	N/A
EASTBOUND	0.036	N/A	0.153	0.153	N/A	N/A
NORTHBOUND	0.108	N/A	0.122	0.122	N/A	N/A
SOUTHBOUND	0.020	N/A	0.115	0.115	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.358
 NORTH-SOUTH CRITICAL V/C RATIO 0.222
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.760

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: EXISTING (2015) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	21	5	78	0
EASTBOUND	60	8	31	0
NORTHBOUND	7	1565	25	0
SOUTHBOUND	66	1107	21	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	LEFT		RIGHT		L/T/R
	ONLY	SHARED	THROUGH ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	LEFT		RIGHT		L/T/R
	ONLY	SHARED	THROUGH ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.065
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.062
NORTHBOUND	0.004	N/A	0.331	0.331	N/A	N/A
SOUTHBOUND	0.041	N/A	0.235	0.235	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.102
 NORTH-SOUTH CRITICAL V/C RATIO 0.373
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.595

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION:1, Lakewood Boulevard / Spring Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	326	567	214	105
EASTBOUND	544	1484	317	0
NORTHBOUND	75	1284	117	82
SOUTHBOUND	289	1478	0	519

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.113	N/A	0.118	N/A	0.134	N/A
EASTBOUND	0.189	N/A	0.375	0.375	N/A	N/A
NORTHBOUND	0.026	N/A	0.201	N/A	0.073	N/A
SOUTHBOUND	0.100	N/A	0.308	N/A	0.000	N/A

EAST-WEST CRITICAL V/C RATIO 0.488
 NORTH-SOUTH CRITICAL V/C RATIO 0.335
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.003

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	235	869	30	79
EASTBOUND	68	1457	248	62
NORTHBOUND	248	594	242	118
SOUTHBOUND	252	726	101	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.082	N/A	0.181	N/A	0.019	N/A
EASTBOUND	0.043	N/A	0.304	N/A	0.155	N/A
NORTHBOUND	0.086	N/A	0.124	N/A	0.151	N/A
SOUTHBOUND	0.087	N/A	0.172	0.172	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.386
 NORTH-SOUTH CRITICAL V/C RATIO 0.259
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.824

LEVEL OF SERVICE D

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015) WITH CONSTRUCTION

APPROACH	** INPUT VOLUMES **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	77	694	367	174
EASTBOUND	262	1519	9	62
NORTHBOUND	124	1062	151	0
SOUTHBOUND	220	1568	195	0

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.026	N/A	0.166	0.166	0.166	N/A
EASTBOUND	0.091	N/A	0.316	N/A	0.006	N/A
NORTHBOUND	0.043	N/A	0.189	0.189	N/A	N/A
SOUTHBOUND	0.076	N/A	0.368	0.368	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.343
 NORTH-SOUTH CRITICAL V/C RATIO 0.411
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.933

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	101	728	89	0
EASTBOUND	141	1208	67	0
NORTHBOUND	124	552	84	0
SOUTHBOUND	198	517	145	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **					L/T/R	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY		
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	0.035	N/A	0.170	0.170	N/A	N/A
EASTBOUND	0.049	N/A	0.266	0.266	N/A	N/A
NORTHBOUND	0.078	N/A	0.132	0.132	N/A	N/A
SOUTHBOUND	0.069	N/A	0.138	0.138	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.300
 NORTH-SOUTH CRITICAL V/C RATIO 0.216
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.696

LEVEL OF SERVICE B

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: EXISTING (2015) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	25	4	61	0
EASTBOUND	46	7	24	0
NORTHBOUND	6	1233	29	0
SOUTHBOUND	83	1569	82	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	LEFT		RIGHT		L/T/R
	ONLY	SHARED	THROUGH ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	LEFT		RIGHT		L/T/R
	ONLY	SHARED	THROUGH ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.056
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.048
NORTHBOUND	0.004	N/A	0.263	0.263	N/A	N/A
SOUTHBOUND	0.052	N/A	0.344	0.344	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.085
 NORTH-SOUTH CRITICAL V/C RATIO 0.347
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.552

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT CONSTRUCTION

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	341	1568	101	75
EASTBOUND	340	595	35	0
NORTHBOUND	168	1379	29	242
SOUTHBOUND	209	1233	227	340

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.118	N/A	0.327	N/A	0.063	N/A
EASTBOUND	0.118	N/A	0.131	0.131	N/A	N/A
NORTHBOUND	0.058	N/A	0.216	N/A	0.018	N/A
SOUTHBOUND	0.072	N/A	0.257	N/A	0.079	N/A

EAST-WEST CRITICAL V/C RATIO 0.445
 NORTH-SOUTH CRITICAL V/C RATIO 0.315
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.940

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT CONSTRUCTION

** INPUT VOLUMES **

APPROACH	** INPUT VOLUMES **		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	300	1386	238	26
EASTBOUND	87	886	121	106
NORTHBOUND	296	995	243	150
SOUTHBOUND	105	481	37	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.104	N/A	0.289	N/A	0.149	N/A
EASTBOUND	0.054	N/A	0.184	N/A	0.076	N/A
NORTHBOUND	0.103	N/A	0.207	N/A	0.152	N/A
SOUTHBOUND	0.036	N/A	0.108	0.108	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.343
 NORTH-SOUTH CRITICAL V/C RATIO 0.244
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.767

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT CONSTRUCTION

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	134	1836	544	169
EASTBOUND	277	1140	0	132
NORTHBOUND	314	1509	195	0
SOUTHBOUND	177	1336	485	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.047	N/A	0.382	N/A	0.340	N/A
EASTBOUND	0.096	N/A	0.237	N/A	0.000	N/A
NORTHBOUND	0.109	N/A	0.266	0.266	N/A	N/A
SOUTHBOUND	0.061	N/A	0.379	0.379	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.478
 NORTH-SOUTH CRITICAL V/C RATIO 0.488
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.147

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT CONSTRUCTION

APPROACH	** INPUT VOLUMES **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	74	1461	161	0
EASTBOUND	110	696	75	0
NORTHBOUND	180	599	74	0
SOUTHBOUND	61	453	155	0

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.026	N/A	0.338	0.338	N/A	N/A
EASTBOUND	0.038	N/A	0.161	0.161	N/A	N/A
NORTHBOUND	0.112	N/A	0.140	0.140	N/A	N/A
SOUTHBOUND	0.021	N/A	0.127	0.127	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.376
 NORTH-SOUTH CRITICAL V/C RATIO 0.239
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.796

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT CONSTRUCTION

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	22	5	81	0
EASTBOUND	62	8	32	0
NORTHBOUND	7	1747	26	0
SOUTHBOUND	69	1260	22	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.068
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.064
NORTHBOUND	0.004	N/A	0.369	0.369	N/A	N/A
SOUTHBOUND	0.043	N/A	0.267	0.267	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.106
 NORTH-SOUTH CRITICAL V/C RATIO 0.412
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.638

LEVEL OF SERVICE B

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT CONSTRUCTION

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	339	594	213	122
EASTBOUND	587	1558	330	0
NORTHBOUND	77	1478	124	85
SOUTHBOUND	304	1731	0	556

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	LEFT	ASSIGNED CAPACITIES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	ASSIGNED V/C RATIOS		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.118	N/A	0.124	N/A	0.133	N/A
EASTBOUND	0.204	N/A	0.393	0.393	N/A	N/A
NORTHBOUND	0.026	N/A	0.231	N/A	0.078	N/A
SOUTHBOUND	0.106	N/A	0.361	N/A	0.000	N/A

EAST-WEST CRITICAL V/C RATIO 0.511
 NORTH-SOUTH CRITICAL V/C RATIO 0.387
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.078

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT CONSTRUCTION

APPROACH	** INPUT VOLUMES **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	255	919	54	70
EASTBOUND	72	1529	236	97
NORTHBOUND	289	685	347	128
SOUTHBOUND	279	773	106	0

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.089	N/A	0.191	N/A	0.034	N/A
EASTBOUND	0.045	N/A	0.319	N/A	0.147	N/A
NORTHBOUND	0.100	N/A	0.142	N/A	0.217	N/A
SOUTHBOUND	0.097	N/A	0.183	0.183	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.408
 NORTH-SOUTH CRITICAL V/C RATIO 0.314
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.902

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT CONSTRUCTION

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	61	726	405	195
EASTBOUND	358	1645	20	74
NORTHBOUND	149	1167	171	0
SOUTHBOUND	223	1725	226	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.021	N/A	0.177	0.177	0.177	N/A
EASTBOUND	0.124	N/A	0.343	N/A	0.013	N/A
NORTHBOUND	0.051	N/A	0.209	0.209	N/A	N/A
SOUTHBOUND	0.078	N/A	0.406	0.406	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.363
 NORTH-SOUTH CRITICAL V/C RATIO 0.458
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.001

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT CONSTRUCTION

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	116	763	94	0
EASTBOUND	158	1265	70	0
NORTHBOUND	130	600	97	0
SOUTHBOUND	209	582	152	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **					L/T/R	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY		
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					L/T/R
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	0.040	N/A	0.179	0.179	N/A	N/A
EASTBOUND	0.055	N/A	0.278	0.278	N/A	N/A
NORTHBOUND	0.081	N/A	0.145	0.145	N/A	N/A
SOUTHBOUND	0.072	N/A	0.153	0.153	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.318
 NORTH-SOUTH CRITICAL V/C RATIO 0.234
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.733

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITHOUT CONSTRUCTION

** INPUT VOLUMES **

APPROACH				** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED	
WESTBOUND	26	4	63		0
EASTBOUND	48	7	25		0
NORTHBOUND	6	1379	30		0
SOUTHBOUND	86	1744	85		0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R SHARED	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY		
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	LEFT		RIGHT		L/T/R SHARED
	ONLY	SHARED	THROUGH ONLY	SHARED	RIGHT ONLY	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	LEFT		RIGHT		L/T/R SHARED
	ONLY	SHARED	THROUGH ONLY	SHARED	RIGHT ONLY	
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.058
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.050
NORTHBOUND	0.004	N/A	0.294	0.294	N/A	N/A
SOUTHBOUND	0.054	N/A	0.381	0.381	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.088
 NORTH-SOUTH CRITICAL V/C RATIO 0.385
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.593

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION:1, Lakewood Boulevard / Spring Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH				** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED	
WESTBOUND	341	1568	100	76	
EASTBOUND	340	595	35	0	
NORTHBOUND	168	1381	30	242	
SOUTHBOUND	209	1242	227	340	

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	0.118	N/A	0.327	N/A	0.062	N/A
EASTBOUND	0.118	N/A	0.131	0.131	N/A	N/A
NORTHBOUND	0.058	N/A	0.216	N/A	0.019	N/A
SOUTHBOUND	0.072	N/A	0.259	N/A	0.079	N/A

EAST-WEST CRITICAL V/C RATIO 0.445
 NORTH-SOUTH CRITICAL V/C RATIO 0.317
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.942

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	301	1387	238	26
EASTBOUND	87	892	121	106
NORTHBOUND	296	995	244	150
SOUTHBOUND	106	481	37	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.104	N/A	0.289	N/A	0.149	N/A
EASTBOUND	0.054	N/A	0.186	N/A	0.076	N/A
NORTHBOUND	0.103	N/A	0.207	N/A	0.153	N/A
SOUTHBOUND	0.037	N/A	0.108	0.108	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.343
 NORTH-SOUTH CRITICAL V/C RATIO 0.244
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.767

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	139	1838	545	168
EASTBOUND	285	1140	0	132
NORTHBOUND	314	1517	195	0
SOUTHBOUND	197	1336	485	0

** NUMBER OF LANES **

APPROACH	**		**		L/T/R	TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED		
WESTBOUND	2	0	2	1	0	6
EASTBOUND	2	0	3	0	1	6
NORTHBOUND	2	0	3	1	0	6
SOUTHBOUND	2	0	2	1	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
	WESTBOUND	2880	N/A	4800	N/A	1600
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
	WESTBOUND	0.049	N/A	0.383	N/A	0.341
EASTBOUND	0.099	N/A	0.237	N/A	0.000	N/A
NORTHBOUND	0.109	N/A	0.268	0.268	N/A	N/A
SOUTHBOUND	0.068	N/A	0.379	0.379	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.482
 NORTH-SOUTH CRITICAL V/C RATIO 0.488
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.150

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	74	1466	161	0
EASTBOUND	110	697	75	0
NORTHBOUND	181	599	74	0
SOUTHBOUND	61	453	156	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R SHARED	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY		
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R SHARED
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R SHARED
	ONLY	LEFT SHARED	THROUGH ONLY	THROUGH SHARED	RIGHT ONLY	
WESTBOUND	0.026	N/A	0.339	0.339	N/A	N/A
EASTBOUND	0.038	N/A	0.161	0.161	N/A	N/A
NORTHBOUND	0.113	N/A	0.140	0.140	N/A	N/A
SOUTHBOUND	0.021	N/A	0.127	0.127	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.377
 NORTH-SOUTH CRITICAL V/C RATIO 0.240
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.797

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/8/2016 INITIALS: PERIOD: AM PEAK HOUR
 CASE: FUTURE (2019) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	22	5	81	0
EASTBOUND	62	8	32	0
NORTHBOUND	7	1755	26	0
SOUTHBOUND	69	1261	22	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	LEFT	THROUGH	RIGHT	RIGHT	L/T/R
	ONLY	SHARED	ONLY	SHARED	ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.068
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.064
NORTHBOUND	0.004	N/A	0.371	0.371	N/A	N/A
SOUTHBOUND	0.043	N/A	0.268	0.268	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.106
 NORTH-SOUTH CRITICAL V/C RATIO 0.414
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.640

LEVEL OF SERVICE B

Capacity used for through lanes, first RT and LT lanes = 1600.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 1, Lakewood Boulevard / Spring Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	339	594	213	122
EASTBOUND	587	1558	330	0
NORTHBOUND	78	1486	126	85
SOUTHBOUND	304	1733	0	556

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	2	0	4	0	1	0	7
SOUTHBOUND	2	0	3	0	2	0	7

** ASSIGNED CAPACITIES **

APPROACH	LEFT	ASSIGNED CAPACITIES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	2880	N/A	6400	N/A	1600	N/A
SOUTHBOUND	2880	N/A	4800	N/A	2880	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	ASSIGNED V/C RATIOS		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	0.118	N/A	0.124	N/A	0.133	N/A
EASTBOUND	0.204	N/A	0.393	0.393	N/A	N/A
NORTHBOUND	0.027	N/A	0.233	N/A	0.079	N/A
SOUTHBOUND	0.106	N/A	0.361	N/A	0.000	N/A

EAST-WEST CRITICAL V/C RATIO 0.511
 NORTH-SOUTH CRITICAL V/C RATIO 0.388
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.080

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.
 Capacity used for additional RT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 2, Redondo Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	258	925	54	70
EASTBOUND	72	1531	237	96
NORTHBOUND	289	685	346	129
SOUTHBOUND	279	773	106	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	3	0	1	0	6
EASTBOUND	1	0	3	0	1	0	5
NORTHBOUND	2	0	3	0	1	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	4800	N/A	1600	N/A
EASTBOUND	1600	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	N/A	1600	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.090	N/A	0.192	N/A	0.034	N/A
EASTBOUND	0.045	N/A	0.319	N/A	0.148	N/A
NORTHBOUND	0.100	N/A	0.142	N/A	0.216	N/A
SOUTHBOUND	0.097	N/A	0.183	0.183	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.408
 NORTH-SOUTH CRITICAL V/C RATIO 0.313
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.902

LEVEL OF SERVICE E

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 3, Lakewood Boulevard / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH	**		** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	81	734	406	194
EASTBOUND	360	1645	20	74
NORTHBOUND	149	1169	171	0
SOUTHBOUND	229	1725	226	0

** NUMBER OF LANES **

APPROACH	LEFT	**		**		L/T/R	TOTAL LANES
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY		
WESTBOUND	2	0	2	1	1	0	6
EASTBOUND	2	0	3	0	1	0	6
NORTHBOUND	2	0	3	1	0	0	6
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	LEFT	**		**		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	2880	N/A	3200	1600	1600	N/A
EASTBOUND	2880	N/A	4800	N/A	1600	N/A
NORTHBOUND	2880	N/A	4800	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	**		**		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	
WESTBOUND	0.028	N/A	0.178	0.178	0.178	N/A
EASTBOUND	0.125	N/A	0.343	N/A	0.013	N/A
NORTHBOUND	0.051	N/A	0.209	0.209	N/A	N/A
SOUTHBOUND	0.079	N/A	0.406	0.406	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.370
 NORTH-SOUTH CRITICAL V/C RATIO 0.458
 CLEARANCE INTERVAL 0.180

ICU VALUE 1.008

LEVEL OF SERVICE F

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 4, Clark Avenue / Willow Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH	** RIGHT TURNS **			
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	116	764	94	0
EASTBOUND	158	1269	71	0
NORTHBOUND	130	600	97	0
SOUTHBOUND	209	582	152	0

** NUMBER OF LANES **

APPROACH	** NUMBER OF LANES **						TOTAL LANES
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED	
WESTBOUND	2	0	2	1	0	0	5
EASTBOUND	2	0	2	1	0	0	5
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	2	0	2	1	0	0	5

** ASSIGNED CAPACITIES **

APPROACH	** ASSIGNED CAPACITIES **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	2880	N/A	3200	1600	N/A	N/A
EASTBOUND	2880	N/A	3200	1600	N/A	N/A
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	2880	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	** ASSIGNED V/C RATIOS **					
	LEFT ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	L/T/R SHARED
WESTBOUND	0.040	N/A	0.179	0.179	N/A	N/A
EASTBOUND	0.055	N/A	0.279	0.279	N/A	N/A
NORTHBOUND	0.081	N/A	0.145	0.145	N/A	N/A
SOUTHBOUND	0.072	N/A	0.153	0.153	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.320
 NORTH-SOUTH CRITICAL V/C RATIO 0.234
 CLEARANCE INTERVAL 0.180

ICU VALUE 0.734

LEVEL OF SERVICE C

Capacity used for through lanes, first RT and LT lanes = 1600.
 Capacity used for additional LT lane(s) = 1280.

CRAIN & ASSOCIATES
ICU CALCULATIONS

INTERSECTION: 5, Lakewood Boulevard / 23rd Street
 DATE: 9/8/2016 INITIALS: PERIOD: PM PEAK HOUR
 CASE: FUTURE (2019) WITH CONSTRUCTION

** INPUT VOLUMES **

APPROACH			** RIGHT TURNS **	
	LEFT	THROUGH	MIN ON GREEN	MAX ON RED
WESTBOUND	26	4	63	0
EASTBOUND	48	7	25	0
NORTHBOUND	6	1381	30	0
SOUTHBOUND	86	1749	85	0

** NUMBER OF LANES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R	TOTAL
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED	LANES
WESTBOUND	0	0	0	0	0	1	1
EASTBOUND	0	0	0	0	0	1	1
NORTHBOUND	1	0	2	1	0	0	4
SOUTHBOUND	1	0	2	1	0	0	4

** ASSIGNED CAPACITIES **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	1600
EASTBOUND	N/A	N/A	N/A	N/A	N/A	1600
NORTHBOUND	1600	N/A	3200	1600	N/A	N/A
SOUTHBOUND	1600	N/A	3200	1600	N/A	N/A

** ASSIGNED V/C RATIOS **

APPROACH	LEFT	NUMBER OF LANES		RIGHT		L/T/R
	ONLY	LEFT SHARED	THROUGH ONLY	RIGHT SHARED	RIGHT ONLY	SHARED
WESTBOUND	N/A	N/A	N/A	N/A	N/A	0.058
EASTBOUND	N/A	N/A	N/A	N/A	N/A	0.050
NORTHBOUND	0.004	N/A	0.294	0.294	N/A	N/A
SOUTHBOUND	0.054	N/A	0.382	0.382	N/A	N/A

EAST-WEST CRITICAL V/C RATIO 0.088
 NORTH-SOUTH CRITICAL V/C RATIO 0.386
 CLEARANCE INTERVAL 0.120

ICU VALUE 0.594

LEVEL OF SERVICE A

Capacity used for through lanes, first RT and LT lanes = 1600.