Appendix I

Local Transportation Assessment

Imperial Avalon

Local Transportation Assessment

Prepared for:
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FEHR PEERS

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1. Introduction

This report documents the assumptions, methodologies, and findings of a traffic study conducted by Fehr & Peers to address non-CEQA related transportation needs and potential improvements for the Imperial Avalon project's specific plan in the City of Carson, California, on a 27-acre site located to the west of Avalon Boulevard between the I-405 Freeway interchange and 213th Street.

1.1 Project Description

The Project is proposed to be developed in the City of Carson in the South Bay area of Los Angeles County on a site currently containing a mobile home park known as Imperial Avalon Mobile Estates. It is located approximately 17 miles south of downtown Los Angeles and approximately 6.5 miles east of the Pacific Ocean. The Project site is comprised of approximately 27 acres located to the west of Avalon Boulevard between the I-405 Freeway interchange and 213th Street. The Project site is bounded by the District at South Bay development (currently under construction) and the Torrance Lateral Flood Control Channel to the north, the potential mixed-use Kott development to the east and south, and other residential uses to the west and south. Figure 1 illustrates the Project site and study area. Figure 2 includes the site plan.

The Project as analyzed in this study involves the construction of:

- 653 apartment units
- 380 townhome units
- 180 senior independent living units
- 10,352 square feet of restaurant space

The Project, as illustrated in the site plan in Figure 2, will have signalized access and egress at one main driveway location. This main Project driveway will provide access to and from Avalon Boulevard. Site access will also be served by one side-street stop-controlled driveway to and from Grace Avenue to the west. One additional stop-controlled right-turn-in/right-turn-out only driveway will be constructed along southbound Avalon Boulevard to the south of the main driveway. The Project may also be served by an additional driveway at the northern end of Grace Avenue (likely for emergency use only).

This study considers two potential driveway configurations for the project:

1. Non-Gated Entry Option: This option does not include any gated entry restrictions within the project site.

2. Gated Entry Option: This option includes gated entries restricting access onto Grace Avenue to only residents/visitors of the 380 townhome dwelling units.

Chapter 5. Site Access Analysis contains a detailed discussion of site access locations.

1.2 Study Scope

The scope of work for this study was determined in conjunction with the City of Carson's Transportation staff. The base assumptions and technical methodologies were discussed with the City of Carson as part of the study approach and agreed to in email communications dated September 24, 2020 and October 10, 2020. These emails are included in Appendix F of this document.

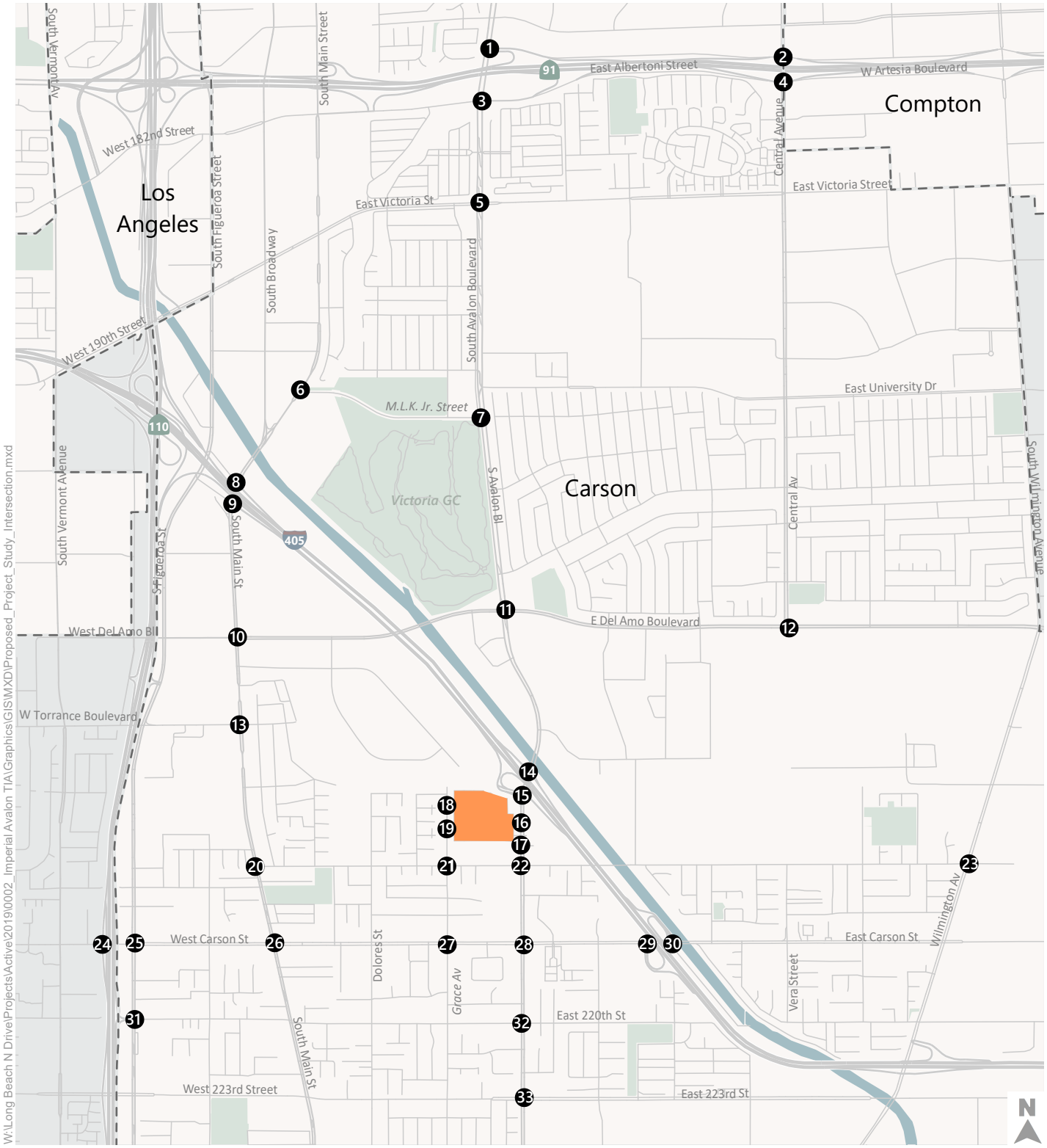


Figure 1

Proposed Project and Study Intersections

Stop Sign Signalized Intersection Study Intersections

Figure 2

Site Plan

1.3 Traffic Scenarios

The study assumes that the Project will be completed by year 2027. This study analyzes the potential project-generated traffic effects to the local street system under both existing and future year traffic conditions and for both the non-gated entry and gated entry driveway options. The following traffic scenarios have been developed and analyzed as part of this study:

- Existing Conditions – The existing conditions analysis includes a description of the transportation system serving the Project site, existing traffic volumes, and an assessment of the operating conditions at the study analysis locations described below. This scenario is described in detail in Chapter 2.

- Existing plus Project Conditions – This traffic scenario provides projected traffic volumes and an assessment of operations under existing conditions with the addition of project-generated traffic. The effects of the proposed Project on existing traffic operating conditions were then identified. This scenario is described in detail in Chapter 3.

- Future Base (Year 2027) Conditions – Future traffic projections without the proposed Project were developed for the year 2027. The objective of this analysis was to project future traffic growth and operating conditions that could be expected to result from regional growth, related projects, and transportation network changes in the vicinity of the Project site by the year 2027. This scenario is described in detail in Chapter 3.

- Future (Year 2027) plus Project Conditions – This traffic scenario provides projected traffic volumes and an assessment of operating conditions under future conditions with the addition of Project-generated traffic. The effects of the proposed Project on future traffic operating conditions were then identified. This scenario is described in detail in Chapter 3.

1.4 Study Intersections

A total of 33 intersections were selected for the analysis of the Project in consultation with the City of Carson. Of the 33 intersections, 29 are signalized intersections and 4 are unsignalized intersections.

1.4.1 Signalized Intersections

The following signalized intersections, illustrated in Figure 1, were identified in conjunction with the City of Carson to be analyzed as part of the scope of work for this Project:

1. Avalon Boulevard & Artesia Boulevard/SR 91 westbound ramps
2. Central Avenue & Artesia Boulevard/SR 91 westbound ramps
3. Avalon Boulevard & Albertoni Street/SR 91 eastbound ramps
4. Central Avenue & Albertoni Street/SR 91 eastbound ramps
5. Avalon Boulevard & Victoria Street

6. Main Street & Martin Luther King Jr. Street
7. Avalon Boulevard & Martin Luther King Jr. Street
8. Main Street & I-405 northbound off-ramp
9. Main Street & I-405 southbound on-ramp
10. Main Street & Del Amo Boulevard
11. Avalon Boulevard & Del Amo Boulevard
12. Central Avenue & Del Amo Boulevard
13. Main Street & Torrance Boulevard
14. Avalon Boulevard & I-405 northbound ramps
15. Avalon Boulevard & I-405 southbound ramps
16. Avalon Boulevard & Main Project Driveway
20. Main Street & 213th Street
22. Avalon Boulevard & 213th Street
23. Wilmington Avenue & 213th Street
24. I-110 southbound ramps & Carson Street
25. Figueroa Street & Carson Street
26. Main Street & Carson Street
27. Grace Avenue & Carson Street
28. Avalon Boulevard & Carson Street
29. I-405 southbound ramps & Carson Street
30. I-405 northbound ramps & Carson Street
31. Figueroa Street & 220th Street/I-110 northbound ramps
32. Avalon Boulevard & 220th Street
33. Avalon Boulevard & 223rd Street

1.4.2 Unsignalized Intersections

The following four unsignalized intersections, illustrated in Figure 1, were identified in conjunction with the City of Carson. The three secondary project driveways generate low peak hour traffic volume and therefore are only analyzed as part of the site access analysis in Chapter 6. The analysis for the Grace Avenue & 213th Street intersection includes a signal warrant analysis:

17. Avalon Boulevard & Secondary Project Driveway
18. Grace Avenue & Northern Secondary Project Driveway
19. Grace Avenue & Southern Secondary Project Driveway
21. Grace Avenue & 213th Street

1.5 Organization of Report

This report is divided into 8 chapters, including this introduction. Chapter 2 describes the existing conditions including an inventory of the streets, highways, and transit service in the study area, a summary of existing traffic volumes, and an assessment of existing operating conditions. The methodologies used to develop traffic forecasts for the Existing, Existing plus Project, Future Base, and Future plus Project scenarios and the

forecasts themselves are included in Chapter 3. Chapter 4 presents an assessment of intersection traffic conditions with the addition of Project trips. Chapter 5 provides an assessment of the proposed Project's access scheme and transportation demand management (TDM) features. Chapter 6 summarizes the construction impact analysis. Chapter 8 provides a summary and conclusions.

2. Existing Conditions

Comprehensive data collection was conducted to develop a detailed description of existing conditions in the study area. The assessment of conditions includes a description of the study area, an inventory of the local street system, a review of traffic volume on these facilities, an assessment of the resulting operating conditions, and the current transit service in the study area. This chapter presents a detailed description of these elements.

2.1 Study Area

The Project site is located within the City of Carson. The study area selected for analysis is bounded by the State Route 91 freeway to the north, the Harbor Freeway (I-110) to the west, the I-405 freeway interchange with Carson Street to the east, and 223rd Street to the south. The streets in the study area are under the jurisdiction of the City of Carson, except for all freeway ramp terminal intersections which are controlled by Caltrans.

2.2 Existing Street System

As illustrated in Figure 1, the Project site is located just southwest of the I-405 freeway interchange with Avalon Boulevard. The site currently is occupied by the Imperial Avalon Mobile Estates mobile home park. I-405 and I-110 provide the primary regional access to the Project site.

Major arterials serving the study area include Del Amo Boulevard and Carson Street in the east/west direction and Main Street and Avalon Boulevard in the north/south direction.

The characteristics of the freeways and major roadways serving the study area are described below.

2.2.1 Freeways

- **Interstate 405** runs in a northwest/southeast direction in the study area, extending from I-5 in the City of Irvine to the San Fernando Valley in the City of Los Angeles. In the study area, the freeway provides four lanes and one carpool lane in each direction plus auxiliary lanes. Ramps are provided at Carson Street, Avalon Boulevard and Main Street.

- **Interstate 110** runs in the north/south direction, extending from the San Pedro community in the City of Los Angeles to Downtown Los Angeles. In the study area, the Harbor Freeway provides four lanes in each direction plus auxiliary lanes. Ramps are provided at Carson Street and 220th Street.

- **State Route 91** runs in the east/west direction, extending from the Harbor Gateway in the City of Los Angeles to the City of Riverside in the Inland Empire. In the study area, the freeway provides five lanes in each direction (including one carpool lane in the eastbound direction) plus auxiliary lanes. Ramps are provided at Avalon Boulevard and Central Avenue.

2.2.2 East/West Streets

- **Del Amo Boulevard** is classified as a Major Highway in the City of Carson's General Plan, Transportation and Infrastructure Element and runs in the east/west direction north of the Project site with three travel lanes in each direction within the Project study area. Left-turn pockets are present at major intersections.

- **213th Street** is designated as a Collector and runs in the east/west direction south of the Project site with one travel lane in each direction. Parking is permitted on both sides of the street.

- **Carson Street** is classified as a Major Highway and runs in the east/west direction south of the Project site with two travel lanes in each direction through most of the study area. Parking is generally permitted on both sides of the street and left-turn pockets are present at major intersections. Carson Street from Figueroa Street to the I-405 interchange was recently renovated as part of the Carson Street Mixed-Use District Master Plan, adding pedestrian enhancements including curb bulbouts and high-visibility crosswalks.

2.2.3 North/South Streets

- **Main Street** is classified as a Major Highway and runs in the north/south direction west of the Project site with two travel lanes in each direction with a center turn lane present in some parts of the street. Parking is generally permitted on both sides of the street and left-turn pockets are present at major intersections.

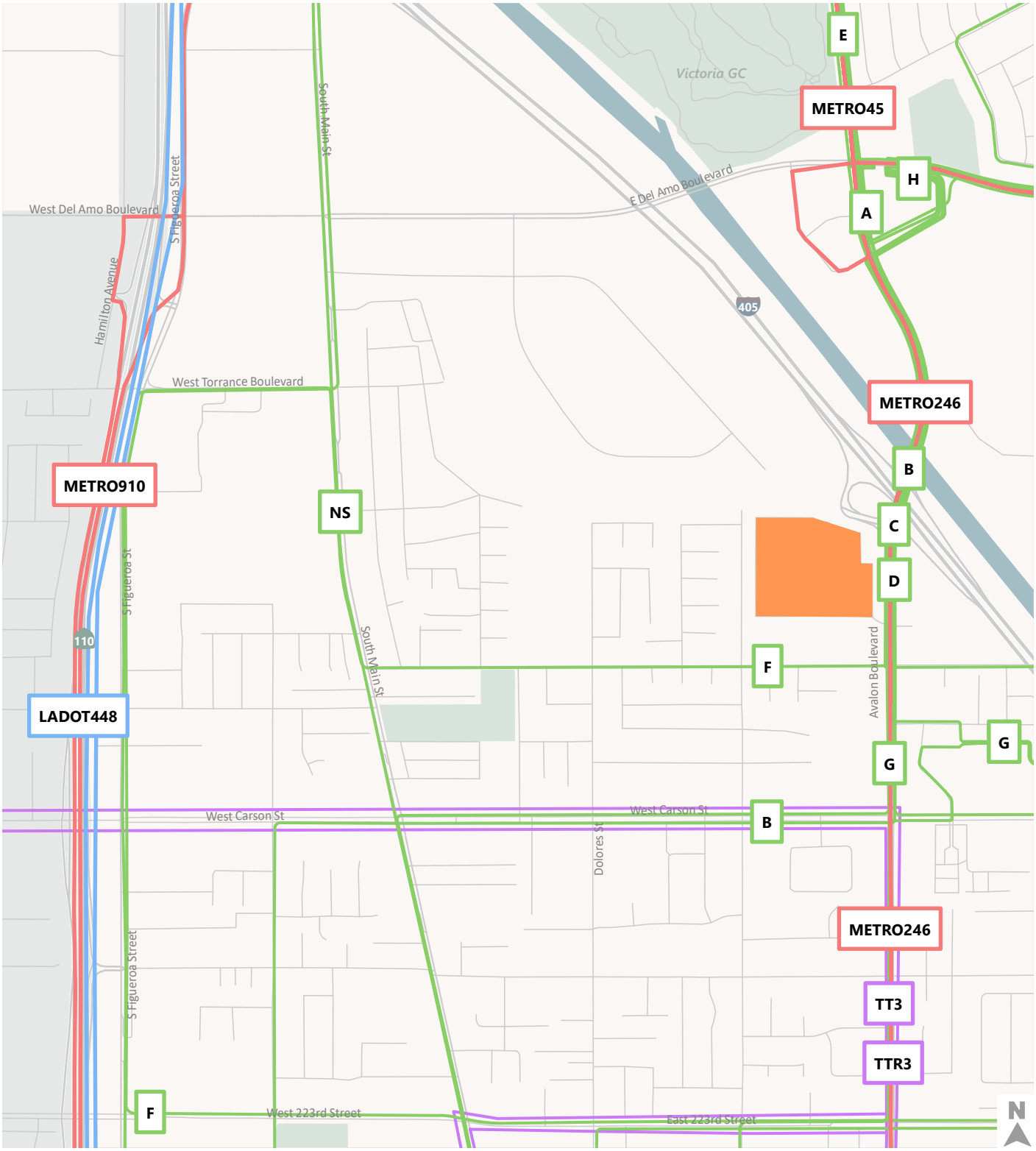
- **Grace Avenue** is designated as a Collector Street and runs in the north/south direction west of the Project site with one travel lane in each direction. Parking is permitted on both sides of the street.

- **Avalon Boulevard** is classified as a Major Highway and runs in the north/south direction east of the Project site with generally three travel lanes in each direction. Northbound Avalon Boulevard reduces to two travel lanes approaching the I-405 interchange just north of the Project site. Parking is not permitted on the blocks adjacent to the Project site. Left-turn pockets are present at major intersections.

Lane configurations of the study intersections are provided in Appendix A.

2.3 Existing Public Transit Service

The Project site is served by a handful of public transit routes, although no routes with peak period frequency of 15 minutes or less directly serve the Project. Figure 3 shows the various municipal bus routes, rapid bus routes, and circulators providing service in the study area. Two local Metro (Routes 45, 246), the Metro Silver Line, two Torrance Transit (3, R3), all Carson Circuit, and one Commuter Express (448) bus routes provide service within the study area. Table 1 details the transit service near the Project site.



Proposed Project Site
LA Metro Routes
LADOT Routes
Torrance Transit Routes
Carson Circuit Routes

Figure 3

Existing Transit

TABLE 1
IMPERIAL AVALON PROJECT
EXISTING TRANSIT SERVICE

Transit Route	Operator	Service Type	Service From	Via	Weekday Headways	
					AM	PM
S (North South Shuttle)	Carson Shuttle	Shuttle & Circulator	Artesia Transit Center	Figueora St and Main St	50 min	-
A	Carson Circuit	Shuttle & Circulator	South Bay Pavilion to Cal State Dominguez Hills	Avalon Blvd	40 min	40 min
B	Carson Circuit	Shuttle & Circulator	South Bay Pavilion to Carson High School	Avalon Blvd and Carson St	40 min	40 min
C	Carson Circuit	Shuttle & Circulator	South Bay Pavilion to Carson Civic Center	Avalon Blvd	40 min	40 min
D	Carson Circuit	Shuttle & Circulator	South Bay Pavilion to Del Amo & Wilmington	Avalon Blvd, Del Amo Blvd, Carson St	40 min	40 min
E	Carson Circuit	Shuttle & Circulator	South Bay Pavilion to Home Depot Center	Avalon Blvd and Del Amo Blvd	40 min	40 min
F	Carson Circuit	Shuttle & Circulator	South Bay Pavilion	Avalon Blvd, 213th St, Figueroa St, 223rd St	40 min	40 min
G	Carson Circuit	Shuttle & Circulator	South Bay Pavilion to Del Amo & Wilmington	Avalon Blvd, Del Amo Blvd, Carson St	40 min	40 min
H	Carson Circuit	Shuttle & Circulator	South Bay Pavilion to Hemingway Park	Avalon Blvd	40 min	40 min
246/45	Metro	Local	San Pedro to Harbor Transit Gateway Center	Avalon Blvd	20-30 min	30-40 min
Silver Line (910/950)	Metro	Busway	San Pedro to El Monte	Figueroa St and I-110 Fwy	5 min	5 min
3	Torrance Transit	Local	Redondo Beach Pier to Downtown Long Beach	Carson St	20-25 min	20-25 min
R3	Torrance Transit	Rapid	South Bay Galleria to Downtown Long Beach	Carson St and Avalon Blvd	05-20 min	20-30 min
448	LADOT	Commuter Express	Rancho Palos Verdes to Downtown Los Angeles	I-110 Fwy	25-30 min	15-30 min

2.4 Existing Bicycle and Pedestrian Facilities

Figure 4 shows existing bicycle facilities in the study area. As shown in the figure, the study area has a limited existing bikeway network which includes Class II bike lanes in each direction on Del Amo Boulevard east of Avalon Boulevard, and on Avalon Boulevard between Del Amo Boulevard and University Drive. Carson Street is now designated as a Class III bike route as part of the recent street renovation. The study area generally has a network of 4 to 8-foot sidewalks, but does not have crosswalks on all intersection legs, and countdown pedestrian signals at all marked crossings.

There are several bike lanes and bike routes planned throughout the study area and an extension of the bike path along the Dominguez Channel, east of I-405. The planned District at South Bay development adjacent to the Project site will include a Class II bike lane and a Class I bike path on its internal roadway network. Proposed bicycle facilities are also shown in Figure 4. Data on the proposed facilities come from two sources: the City of Carson Master Plan of Bikeways and Metro's Active Transportation Strategic Plan.

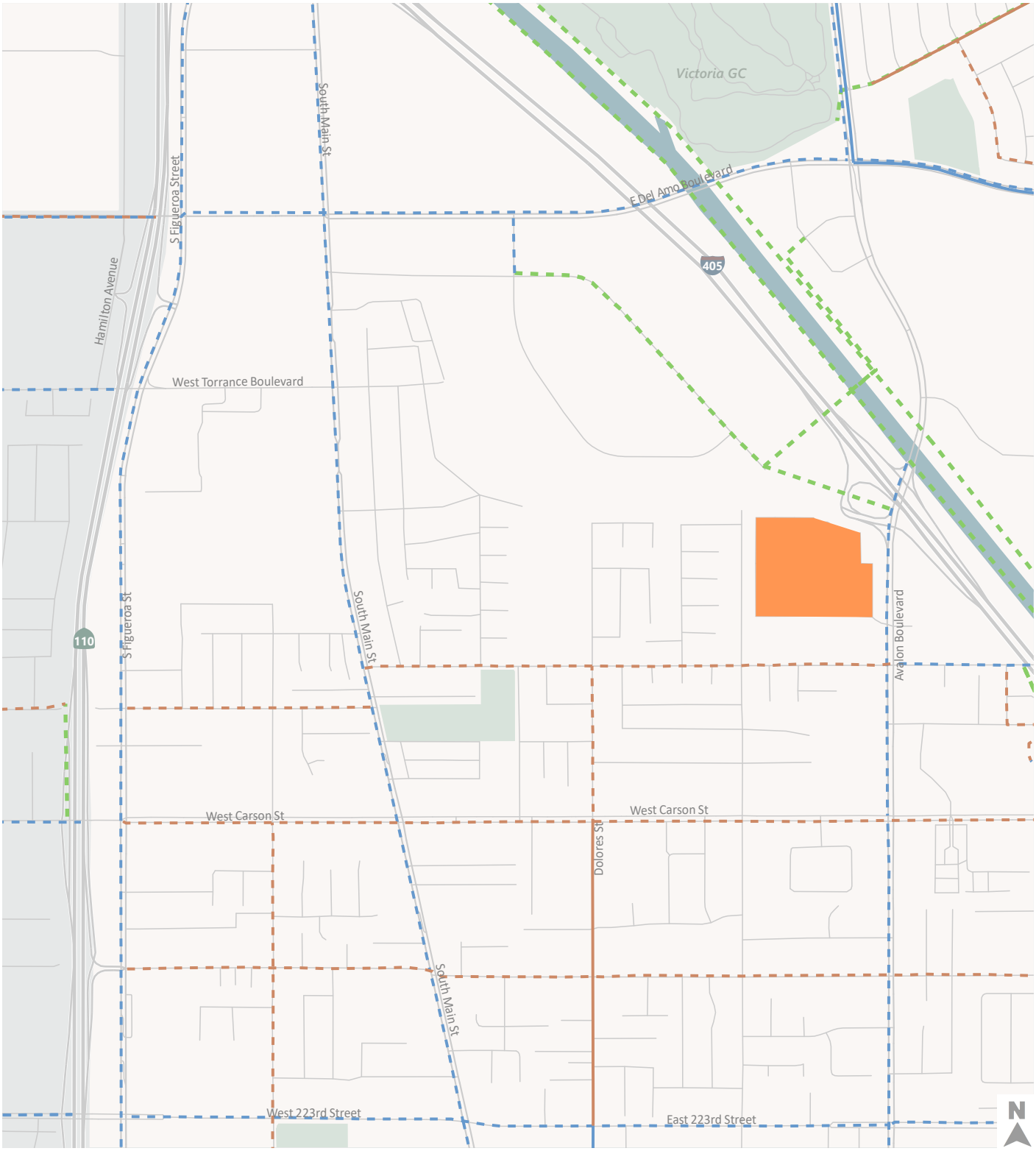


Figure 4

Existing and Proposed Bicycle Facilities

2.5 Existing Traffic Volumes and Level of Service

This section presents existing peak hour traffic volumes, describes the methodology used to assess the traffic conditions at each intersection, and analyzes the resulting operating conditions at each location, indicating volume-to-capacity (V/C) ratios and levels of service (LOS).

2.5.1 Existing Traffic Volumes

Weekday AM and PM peak hour turning movement counts were collected at the study intersections (while Los Angeles Unified School District schools were in session) on Wednesday, August 28, 2019 and Wednesday, October 2, 2019. The existing weekday morning and evening peak hour volumes at the study intersections are provided in Appendix A. Traffic count worksheets for these intersections are contained in Appendix C.

2.5.2 Level of Service Methodology

Per the City of Carson guidelines, signalized intersections are analyzed using the Intersection Capacity Utilization (ICU) method. The ICU method estimates the V/C ratio for an intersection based on the individual V/C ratios for the conflicting traffic movements. It should be noted that the ICU methodology assumes uniform traffic distribution per intersection approach lane and optimal signal timing. The overall intersection V/C ratio is subsequently assigned a LOS value to describe intersection operations, shown in Table 2. LOS ranges from LOS A (free flow) to LOS F (gridlock condition). Signalized study intersections are considered adversely affected if the project's traffic results in a change in level of service from LOS D or better to LOS E or F, or if there is an increase in the V/C ratio of 0.02 or more when the intersection level of service without project traffic is already at LOS E or F (V/C = 0.901 or more). The minimum acceptable level of service for new intersections (i.e. project driveways) is LOS D.

Unsignalized intersections in the City of Carson are analyzed using the Highway Capacity Manual (HCM) methodology to determine traffic operations. The *HCM, 6th Edition* analysis methodology describes the operation of an intersection using a range of LOS from LOS A (free flow) to LOS F (severely congested conditions), based on a range of stopped delay in seconds experienced per vehicle, shown in Table 3.

If adverse effects are identified at any signalized or unsignalized study intersection, this study makes recommendations for potential physical or operational roadway improvements.

2.5.3 Existing 2019 Levels of Service

Existing year traffic volumes, presented in Appendix A, were analyzed using the methodologies described above to determine the existing operating conditions at the study intersections. Table 4 summarizes the resulting V/C ratios for the ICU analysis and the seconds of delay per vehicle for the HCM analysis of existing weekday morning and evening peak hours and the corresponding LOS at each of the analyzed intersections. Of the 28 existing signalized intersections, 24 intersections operate at LOS D or better during both peak periods.

TABLE 2
LEVEL OF SERVICE DEFINITIONS FOR
CITY OF CARSON SIGNALIZED INTERSECTIONS
ICU METHODOLOGY

Level of Service	Volume/Capacity Ratio	Definition
A	0.000 - 0.600	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	>0.600 - 0.700	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat what restricted within groups of vehicles.
C	>0.700 - 0.800	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	>0.800 - 0.900	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	>0.900 - 1.000	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	> 1.000	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths

Source: *Transportation Research Circular No. 212, Interim Materials on Highway Capacity,*
Transportation Research Board, 1980.

TABLE 3
HCM LEVEL OF SERVICE DEFINITIONS FOR
CITY OF CARSON STOP-CONTROLLED INTERSECTIONS

Level of Service	Average Control Delay (seconds/vehicle)
A	$\leq$ 10.0
B	> 10.0 and $\leq$ 15.0
C	> 15.0 and $\leq$ 25.0
D	> 25.0 and $\leq$ 35.0
E	> 35.0 and $\leq$ 50.0
F	> 50.0

Source: *Highway Capacity Manual,* Transportation Research Board, 2017.

TABLE 4
IMPERIAL AVALON PROJECT
EXISTING CONDITIONS INTERSECTION LEVELS OF SERVICE

ID	N/S Street Name	E/W Street Name	Intersection Control	Analyzed Period	Existing [1]	
					V/C or Delay (s)	LOS
1	Avalon Blvd	Artesia Blvd/SR 91 WB Ramps	Signalized	AM	0.577	A
				PM	0.599	A
2	Central Ave	Artesia Blvd/SR 91 WB Ramps	Signalized	AM	0.888	D
				PM	0.776	C
3	Avalon Blvd	Albertoni St/SR 91 EB Ramps	Signalized	AM	0.566	A
				PM	0.774	C
4	Central Ave	Albertoni St/SR 91 EB Ramps	Signalized	AM	0.768	C
				PM	0.781	C
5	Avalon Blvd	Victoria St	Signalized	AM	0.718	C
				PM	0.863	D
6	Main St	M.L.K. Jr. St	Signalized	AM	0.392	A
				PM	0.583	A
7	Avalon Blvd	M.L.K. Jr. St	Signalized	AM	0.456	A
				PM	0.632	B
8	Main St	I-405 NB Off-Ramp	Signalized	AM	0.562	A
				PM	0.617	B
9	Main St	I-405 SB On-Ramp	Signalized	AM	0.480	A
				PM	0.757	C
10	Main St	Del Amo Blvd	Signalized	AM	0.690	B
				PM	0.895	D
11	Avalon Blvd	Del Amo Blvd	Signalized	AM	0.824	D
				PM	0.889	D
12	Central Ave	Del Amo Blvd	Signalized	AM	0.754	C
				PM	0.774	C
13	Main St	Torrance Blvd	Signalized	AM	1.115	F
				PM	0.797	C
14	Avalon Blvd	I-405 NB Ramps	Signalized	AM	0.468	A
				PM	0.562	A
15	Avalon Blvd	I-405 SB Ramps	Signalized	AM	0.624	B
				PM	0.599	A
16	Avalon Blvd	Imperial Avalon Main Driveway	Signalized	AM	Project Intersection	
				PM		

17	Avalon Blvd	Imperial Avalon Secondary Driveway	TWSC	AM PM	Project Intersection	
18	Grace Ave	Imperial Avalon Northern Secondary Driveway	TWSC	AM PM	Project Intersection	
19	Grace Ave	Imperial Avalon Southern Secondary Driveway	TWSC	AM PM	Project Intersection	
20	Main St	213th St	Signalized	AM PM	0.738 0.735	C C
21	Grace Ave	213th St	AWSC	AM PM	15.1 seconds 30.9 seconds	C D
22	Avalon Blvd	213th St	Signalized	AM PM	0.576 0.725	A C
23	Wilmington Ave	213th St	Signalized	AM PM	0.509 0.657	A B
24	I-110 SB Ramps	Carson St	Signalized	AM PM	0.837 0.899	D D
25	Figueroa St	Carson St	Signalized	AM PM	0.692 0.691	B B
26	Main St	Carson St	Signalized	AM PM	0.581 0.789	A C
27	Grace Ave	Carson St	Signalized	AM PM	0.542 0.562	A A
28	Avalon Blvd	Carson St	Signalized	AM PM	0.893 1.026	D F
29	I-405 SB Ramps	Carson St	Signalized	AM PM	0.576 0.717	A C
30	I-405 NB Ramps	Carson St	Signalized	AM PM	0.458 0.563	A A
31	Figueroa St	220th St/I-110 NB Ramps	Signalized	AM PM	0.958 0.974	E E
32	Avalon Blvd	220th St	Signalized	AM PM	0.697 0.667	B B
33	Avalon Blvd	223rd St	Signalized	AM PM	0.925 0.924	E E

Notes

TWSC Two-Way Stop Controlled

AWSC All Way Stop Controlled

[1] Signalized intersections are analyzed with Intersection Capacity Utilization (ICU) methodology.
Un-signalized intersections are analyzed with HCM, 6th Edition.

Four signalized intersections are currently operating at LOS E or F: No. 13. Main Street & Torrance Boulevard (AM Peak Hour), No. 28. Avalon Boulevard & Carson Street (PM Peak Hour), No. 31. Figueroa Street & 220th Street/I-110 northbound ramps (AM & PM Peak Hours), and No. 33. Avalon Boulevard & 223rd Street (AM & PM Peak Hours).

Detailed LOS analysis sheets for the Project are provided in Appendix D.

3. Traffic Projections

3.1 Project Traffic

The development of trip generation estimates for the proposed Project involves the use of a 3-step process: trip generation, trip distribution, and traffic assignment.

3.1.1 Project Trip Generation

As indicated in Chapter 1, the proposed Project will include the construction of 653 apartment units, 380 townhome units, 180 senior independent living units, and 10,352 square feet of restaurant space.

Trip generation rates from *Trip Generation, 10th Edition* (Institute of Transportation Engineers [ITE], 2017) were used to estimate the number of trips associated with the Project and are presented in Table 5. As described below, several reductions were applied to the standard ITE rates to account for internal trip capture and pass-by trips. The standard ITE rates reflect land uses within a suburban, auto-oriented environment. To be conservative, this analysis does not include trip reductions for walking, biking and transit use beyond the levels found in a typical suburban environment.

Internal trip credits are a reduction that can be applied to the trip generation estimates for individual land uses to account for trips occurring within the site between the different uses. These are trips usually made via walking within the site. The City of Carson does not have standard internal trip credit guidelines. As a result, local and national best practices were used to develop internal trip credits for the Project. The internal trip credit applied to the Project trip generation estimates are informed by the *Trip Generation Handbook, 3rd Edition* (ITE, 2014) and the findings of NCHRP Project 8-51 as described in the article: "Improved Estimation for Internal Trip Capture for Mixed-Use Developments," ITE Journal, August 2010. Analysis sheets for the NCHRP method are included in Appendix B.

Pass-by credits account for patrons making an intermediate stop on the way from an origin to a primary trip destination without a route diversion. A typical pass-by trip is a retail destination that people may stop at on the way home from work. These trips would be attracted from traffic passing the site on nearby streets. The City of Carson does not have standard pass-by credit guidelines. As a result, local and national best practices were used to develop pass-by credits for the Project. Pass-by credits were also informed by the *Trip Generation Handbook*.

As shown in Table 5, the Project will generate an estimated net increase of 5,586 daily trips, including 402 trips (125 inbound/277 outbound) during the AM peak hour and 457 trips (283 inbound/174 outbound) during the PM peak hour.

3.1.2 Project Traffic Distribution

The geographic distribution of traffic generated by the proposed Project depends on several factors. These include the type and density of the proposed land uses, the geographic distribution of population and

TABLE 5
IMPERIAL AVALON PROJECT
ESTIMATED PROJECT TRIP GENERATION

Land Use	ITE Land Use Code	Size	Trip Generation Rates [a]							Estimated Trip Generation						
				AM Peak Hour			PM Peak Hour				AM Peak Hour Trips			PM Peak Hour Trips		
			Daily	Rate	In%	Out%	Rate	In%	Out%	Daily	In	Out	Total	In	Out	Total
PROPOSED PROJECT																
Multifamily Housing (Mid-Rise)	221	1,033 DU	5.44	0.36	26%	74%	0.44	61%	39%	5,620	97	275	372	278	177	455
Less: Internal capture			*5%*		*5%*	*9%*		*4%*	*7%*	*(281)*	*(5)*	*(25)*	*(30)*	*(11)*	*(12)*	*(23)*
Less: Walk/Bike/Transit Credit [b]			*0%*	*0%*			*0%*			*0*	*0*	*0*	*0*	*0*	*0*	*0*
Net External Vehicle Trips										5,339	92	250	342	267	165	432
Quality Restaurant	931	8.47 KSF	83.84	0.73	55%	45%	7.8	67%	33%	710	3	3	6	44	22	66
Less: Internal capture			*11%*		*20%*	*4%*		*14%*	*18%*	*(78)*	*(1)*	*0*	*(1)*	*(6)*	*(4)*	*(10)*
Less: Walk/Bike/Transit Credit [b]			*0%*	*0%*			*0%*			*0*	*0*	*0*	*0*	*0*	*0*	*0*
Total Driveway Trips										632	2	3	5	38	18	56
Less: Pass-by			*43%*	*43%*			*43%*			*(272)*	*(1)*	*(1)*	*(2)*	*(16)*	*(8)*	*(24)*
Net External Vehicle Trips										360	1	2	3	22	10	32
Coffee/Donut Shop without Drive-Through Window [c]	936	1.882 KSF	346.23	101.14	51%	49%	36.31	50%	50%	652	97	93	190	34	34	68
Less: Internal capture			*10%*		*20%*	*4%*		*14%*	*18%*	*(65)*	*(19)*	*(4)*	*(23)*	*(5)*	*(6)*	*(11)*
Less: Walk/Bike/Transit Credit [b]			*0%*	*0%*			*0%*			*0*	*0*	*0*	*0*	*0*	*0*	*0*
Total Driveway Trips										587	78	89	167	29	28	57
Less: Pass-by			*43%*	*43%*			*43%*			*(252)*	*(34)*	*(38)*	*(72)*	*(12)*	*(12)*	*(24)*
Net External Vehicle Trips										335	44	51	95	17	16	33
Senior Adult Housing - Attached	252	180 DU	3.85	0.2	35%	65%	0.26	55%	45%	693	13	23	36	26	21	47
Less: Internal capture			*0%*		*0%*	*0%*		*0%*	*0%*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Less: Walk/Bike/Transit Credit [b]			*0%*	*0%*			*0%*			*0*	*0*	*0*	*0*	*0*	*0*	*0*
Net External Vehicle Trips										693	13	23	36	26	21	47
TOTAL DRIVEWAY TRIPS										7,251	185	365	550	360	232	592
TOTAL PROJECT EXTERNAL VEHICLE TRIPS										6,727	150	326	476	332	212	544
EXISTING USE CREDIT																
Mobile Home Park	-	225 DU	-	-	-	-	-	-	-	1,141	25	49	74	49	38	87
	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL EXISTING DRIVEWAY TRIPS [d]										1,141	25	49	74	49	38	87
NET INCREMENTAL EXTERNAL TRIPS										5,586	125	277	402	283	174	457

Notes:

[a] Source: Institute of Transportation Engineers (ITE), *Trip Generation, 10th Edition* , 2017 and NCHRP 8-51, Internal Trip Capture Estimation Tool, Texas Transportation Institute.

[b] A 0% Walk/Bike/Transit Credit was used based on the site's general suburban context.

[c] ITE use 933 - Fast-Food Restaurant without Drive-Through Window used for daily rate due to lack of daily rate data for ITE use 936 - Coffee/Donut Shop without Drive-Through Window.

[d] 24-hour counts were taken at existing driveways at the proposed Project site in lieu of using estimated existing trips from ITE Trip Generation.

employment centers from which the patrons, employees and residents of the Project may be drawn, and the location of the Project's access points in relation to the surrounding street system. Considering these factors, trip distribution patterns were developed according to the nature of the land uses and the corresponding percentage of traffic likely to be regionally oriented and using the freeway as opposed to the local street system. Figure 5 illustrates the distribution pattern for the Project.

3.1.3 Project Traffic Assignment

The traffic expected to be generated by the proposed Project was assigned to the street network using the distribution patterns illustrated in Figure 5. Appendix A shows the assignment of Project-only traffic volumes for the morning and evening peak hours at the 33 analyzed intersection locations for both the non-gated entry and gated entry driveway options.

3.2 Existing Plus Project Traffic Conditions

The Project traffic estimated and assigned to the study intersections was added to the existing traffic volumes to estimate Existing plus Project traffic volumes. Turning movement traffic volumes for the Existing plus Project scenario are provided in Appendix A. Analysis sheets are provided in Appendix D.

3.3 Future Year 2027 Traffic Conditions

To evaluate the potential effects of the proposed Project on future (Year 2027) conditions, it was necessary to develop estimates of future traffic conditions in the area both with and without Project traffic. First, estimates of traffic growth were developed for the study area to forecast future conditions without the Project. These forecasts included traffic increases as a result of both regional ambient traffic growth and traffic generated by specific developments in the vicinity of the Project (related projects). Including both ambient growth and trips from specific projects proposed within the vicinity of the Project provides a conservative estimate of future traffic projections.

These projected traffic volumes, identified herein as the Future Base conditions, represent the future conditions without the proposed Project.

3.3.1 Background or Ambient Growth

Based on historic trends and at the direction of the City of Carson, it was established that an ambient growth factor of 0.5% per year should be applied to adjust the existing base year traffic volumes to reflect the effects of regional growth and development by year 2027. This growth factor was developed based on regional growth patterns, the Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan Model, and at the direction of the City of Carson. This growth factor was applied to the 2019 traffic volume data to reflect the effect of ambient growth by the year 2027.

3.3.2 Related Project Traffic Generation and Assignment

Future Base traffic forecasts include the effects of known specific projects, called related projects, expected to be implemented in the vicinity of the proposed Project site prior to the buildout date of the proposed

Project. This list of related projects was prepared based on data from the City of Carson and the County of Los Angeles. A total of 25 related projects were identified in the study area; these projects are listed in Table 6 and illustrated in Figure 6.

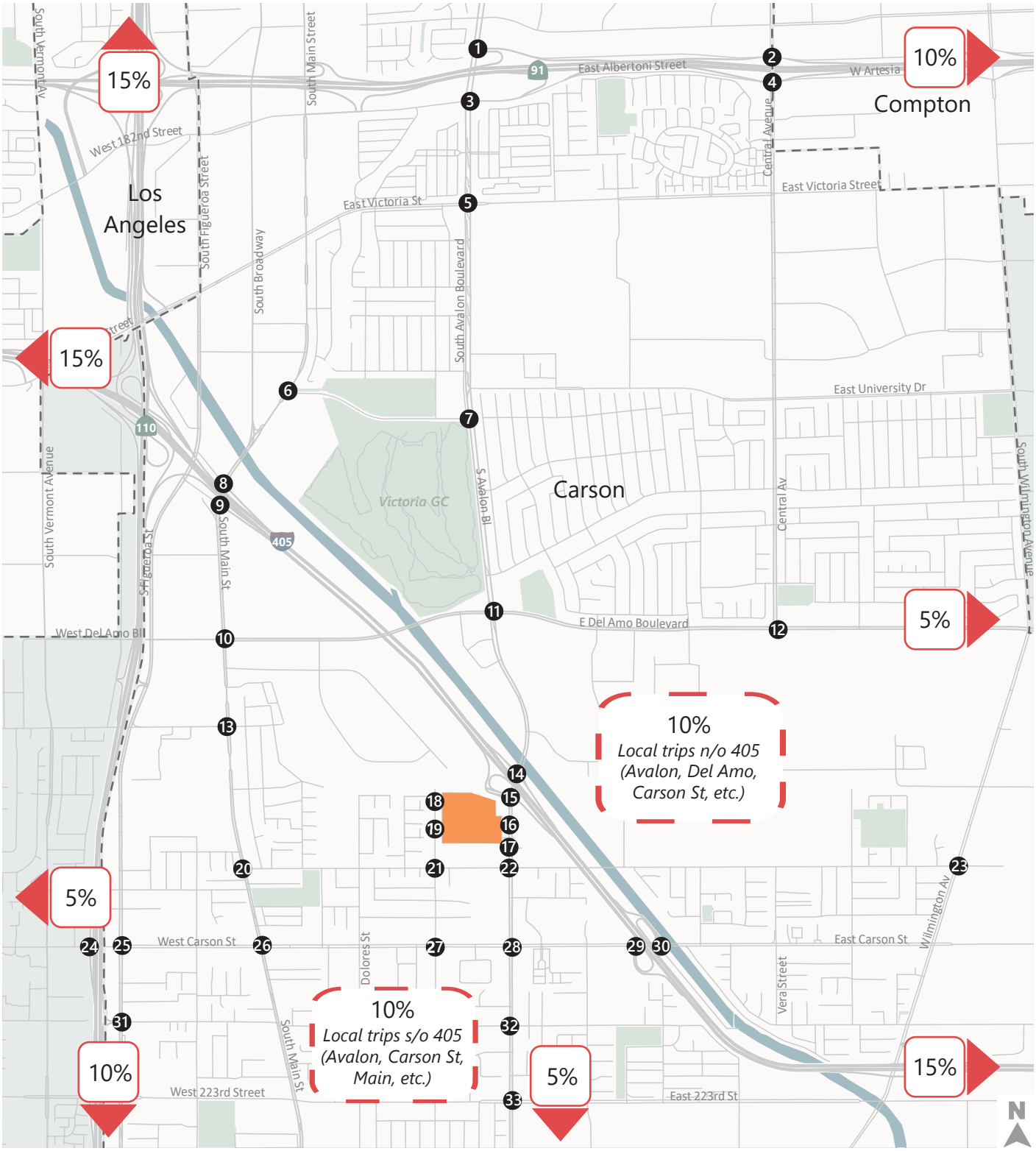


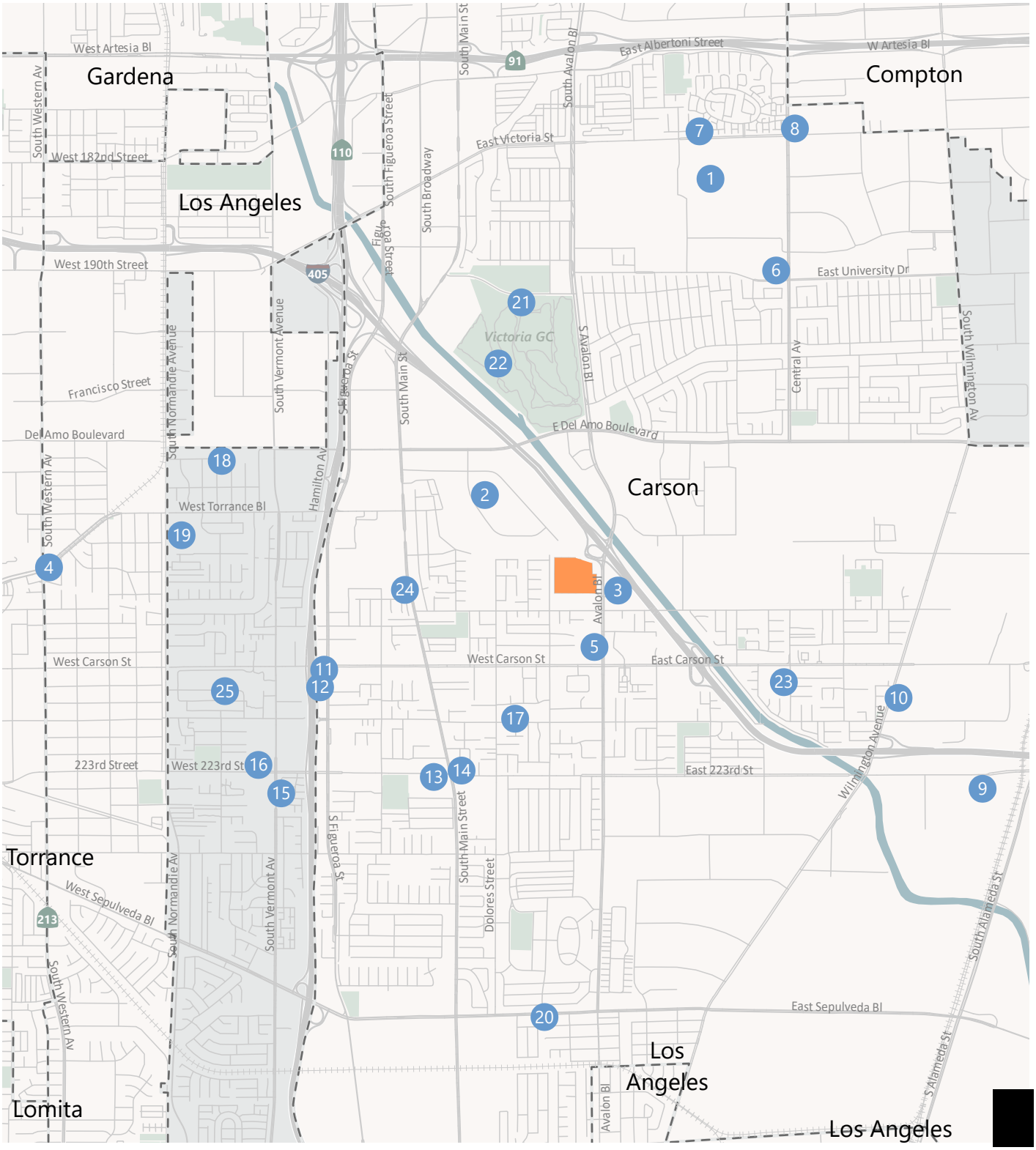
Figure 5

Trip Distribution

TABLE 6
IMPERIAL AVALON PROJECT
RELATED PROJECTS

No.	Project Location	Land Use	Size		Trip Generation						
						AM			PM		
					Daily	IN	OUT	TOTAL	IN	OUT	TOTAL
1	CSUDH Master Plan	Mixed Use	[1]	[1]	N/A	2,299	1,415	3,714	1,940	2,286	4,226
2	The District at South Bay	Mixed Use	[1]	[1]	41,421	1,364	1,510	2,874	1,852	1,254	3,106
3	Jefferson at Avalon	Mixed Use	[1]	[1]	10,854	190	350	540	431	295	726
4	21138 S Western Ave	Gas Station	12	fp	1,461	56	48	104	52	51	103
5	Union South Bay (21521 S Avalon Blvd)	Multifamily	357	du	2,613	38	126	164	126	74	200
		Shopping	32,000	ksf	1,208	19	11	30	59	63	122
6	University Village	Shopping	47,000	ksf	1,774	27	17	44	86	93	179
7	1007 E Victoria St	Multifamily	38	du	278	4	13	17	13	8	21
8	NEC Victoria and Central	Multifamily	175	du	1,281	19	62	81	62	36	98
9	2254 E 223rd St	Warehousing	120,500	ksf	210	16	5	21	6	17	23
10	21900 S Wilmington Ave	Warehousing	411,840	ksf	717	54	16	70	21	57	78
11	Veterans Village	Multifamily	51	du	373	5	18	23	18	11	29
		General Housing	15,000	ksf	146	15	2	17	3	14	17
12	21809-21811 S Figueroa St	Multifamily	32	du	234	3	11	14	11	7	18
13	140 W 223rd st	Multifamily	2	du	15	0	1	1	1	0	1
14	123 E 223rd st	Multifamily	9	du	66	1	3	4	3	2	5
15	22410 Vermont Ave	Multifamily	41	du	300	4	15	19	14	8	22
16	939 W 223rd St	Warehousing	5,820	ksf	10	1	0	1	0	1	1
17	345/369 E 220th St	Multifamily	35	du	256	4	12	16	12	7	19
18	1054 W 204th St	Public Park	9	Acre	7	0	0	0	1	0	1
19	20850 Normandie Ave	Warehousing	204	ksf	469	36	14	50	12	41	53
20	402 Sepulveda Blvd	Senior Adult Housing	65	du	278	5	10	15	12	8	20
21	Carol Kimmelman Campus	Mixed Use	[1]	[1]	3,808	105	83	188	244	192	436
22	Creek Dominguez Hills	Mixed Use	[1]	[1]	16,132	580	384	964	727	669	1,396
23	21801 Vera St	Single Family	18	du	170	3	10	13	11	7	18
24	Carson Arts Project	Multifamily	46	du	337	5	16	21	16	10	26
25	Harbour UCLA Medical Center	Mixed Use	[1]	[1]	1,620	166	34	200	33	164	197
				Total	86,038	5,019	4,186	9,205	5,766	5,375	11,141

Notes:
du = dwelling unit
ksf = one thousand square feet
fp = fueling positions
[1] Mixed Use developments contain more than one independent variable to calculate trip generation.
Related projects list is based on information provided by the City of Carson, the County of Los Angeles, publicly available environmental documentation, and trip generation rates contained in ITE Trip Generation, 10th Edition.



Proposed Project Site

Cities

Related_Projects

Figure 6

[redacted]

Related Projects

3.3.2.1 Trip Generation

Trip generation estimates for the related projects were calculated using a combination of previous study findings, publicly available environmental documentation, and trip generation rates contained in *Trip Generation, 10th Edition*. Table 6 presents the resulting trip generation estimates for these related projects. These trip generation projections are conservative in that they do not in every case account for either the existing uses to be removed or the possible use of walking, biking and transit. Traffic mitigation measures associated with the related projects are also not in every case accounted for in the analysis.

3.3.2.2 Trip Distribution

The geographic distribution of the traffic generated by the related projects is dependent on several factors. These factors include the type and density of the proposed land uses, the geographic distribution of population from which employees and potential patrons of proposed commercial developments may be drawn, the locations of employment and commercial centers to which residents of residential projects may be drawn, and the location of the projects in relation to the surrounding street system. Additionally, if the traffic study or environmental document for a related project was available, the trip distribution from that study was considered.

Using the estimated trip generation and trip distribution patterns described above, traffic generated by the related projects was assigned to the street network.

3.3.3 Future Year 2027 Street Network Improvements

The City of Carson Interim Development and Soundwall Impact Fee study, prepared for the City of Carson by W.G. Zimmerman Engineering, Inc. in February 2019 identified a number of physical improvements planned for the City's street network, including at some of the study intersections for this project. The Future (Year 2027) Base and Future (Year 2027) plus Project scenarios include these physical improvements, summarized below:

- **No. 10 – Main Street & Del Amo Boulevard**
    - Addition of a second westbound left-turn lane
    - Addition of an eastbound right-turn lane
    - Conversion of the eastbound thru/right-turn lane to thru lane
    - Addition of a second northbound left-turn lane
    - Addition of a northbound right-turn lane
    - Conversion of the northbound thru/right-turn lane to thru lane
    - Conversion of the southbound thru/right-turn lane to thru lane
    - Addition of southbound thru/right-turn lane

- **No. 11 – Avalon Boulevard & Del Amo Boulevard**
    - Addition of a second northbound left-turn lane
    - Addition of a second westbound left-turn lane
    - Conversion of the westbound right-turn lane to thru/right lane

  - Conversion of the southbound thru/right-turn lane to a right-turn lane

- **No. 28 – Avalon Boulevard & Carson Street**
  - Conversion of the first southbound thru lane to left-turn lane
  - Conversion of the second eastbound left-turn lane to thru lane
  - Conversion of the northbound thru/right-turn lane to right-turn lane

In addition to these improvements, the I-405 southbound off-ramp at Avalon Boulevard will be modified upon completion of the District at South Bay project. This modification will affect the following study intersection's lane geometry as summarized below:

- **No. 15 – Avalon Boulevard & I-405 Southbound Ramps**
  - Addition of a northbound left-turn lane
  - Addition of a southbound right-turn overlap phase

3.3.4 Future Year 2027 Base Traffic Volumes

Future (Year 2027) Base weekday AM and PM peak hour traffic volumes and lane geometries for the analyzed intersections are provided in Appendix A. The Future Base traffic conditions represent an estimate of future conditions without the proposed Project inclusive of the ambient background growth and related projects traffic.

3.4 Future Plus Project Traffic Projections

The proposed Project traffic volumes were added to the Future (Year 2027) Base traffic projections, resulting in Future (Year 2027) plus Project AM and PM peak hour traffic volumes. The Future (Year 2027) plus Project scenarios present future traffic conditions with the completion of the proposed Project. Appendix A shows the lane configurations and volumes analyzed as part of the Future plus Project scenario.

4. Intersection Traffic Analysis

The intersection traffic analysis evaluates the projected LOS at each study intersection under the Existing plus Project and Future (Year 2027) plus Project conditions to estimate the incremental increase in the V/C ratio or seconds of delay per vehicle expected to be caused by the proposed Project.

4.1 Existing Plus Project Analysis

4.1.1 Existing Plus Project Traffic Level of Service

The Existing plus Project traffic volumes presented in Appendix A were analyzed to determine the projected V/C ratios and LOS for each of the analyzed signalized intersections for both the non-gated entry and gated entry driveway options. Table 7 and Table 8 summarize the Existing plus Project LOS for each option. Analysis sheets are provided in Appendix D. As shown in Table 7, 23 of the 29 analyzed Existing plus Project intersections are projected to operate at LOS D or better, during both morning and evening peak hours for the non-gated entry option. Likewise, as shown in Table 8, 23 of the 29 analyzed Existing plus Project intersections are projected to operate at LOS D or better, during both morning and evening peak hours for the gated entry option.

Under the Existing plus Project scenario for both driveway options, with the full implementation of the Project, the following 5 signalized intersections are projected to operate at LOS E or F (no increase in V/C ratio greater than 0.02 caused by the Project):

13. Main Street & Torrance Boulevard (AM Peak Hour)
24. I-110 southbound ramps & Carson Street (PM Peak Hour)
28. Avalon Boulevard & Carson Street (PM Peak Hour)
31. Figueroa Street & 220th Street/I-110 northbound ramps (AM & PM Peak Hours)
33. Avalon Boulevard & 223rd Street (AM & PM Peak Hours)

Under the Existing plus Project scenario for both driveway options, one unsignalized intersection is projected to operate at LOS E or F: 21. Grace Avenue & 213th Street (PM Peak Hour). If this intersection became signalized it would operate at LOS D or better during both morning and evening peak hours for both driveway options. Section 4.3 of this chapter describes the signal warrant analysis conducted for this intersection.

Detailed LOS analysis sheets for the Existing plus Project scenario are provided in Appendix D.

TABLE 7
IMPERIAL AVALON PROJECT
EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

ID	N/S Street Name	E/W Street Name	Intersection Control	Analyzed Period	Existing [1]		Existing + Project [1]		V/C Change
					V/C or Delay (s)	LOS	V/C or Delay (s)	LOS	
1	Avalon Blvd	Artesia Blvd/SR 91 WB Ramps	Signalized	AM	0.577	A	0.577	A	0.000
				PM	0.599	A	0.600	A	0.001
2	Central Ave	Artesia Blvd/SR 91 WB Ramps	Signalized	AM	0.888	D	0.888	D	0.000
				PM	0.776	C	0.777	C	0.001
3	Avalon Blvd	Albertoni St/SR 91 EB Ramps	Signalized	AM	0.566	A	0.566	A	0.000
				PM	0.774	C	0.774	C	0.000
4	Central Ave	Albertoni St/SR 91 EB Ramps	Signalized	AM	0.768	C	0.768	C	0.000
				PM	0.781	C	0.781	C	0.000
5	Avalon Blvd	Victoria St	Signalized	AM	0.718	C	0.719	C	0.001
				PM	0.863	D	0.865	D	0.002
6	Main St	M.L.K. Jr. St	Signalized	AM	0.392	A	0.393	A	0.001
				PM	0.583	A	0.585	A	0.002
7	Avalon Blvd	M.L.K. Jr. St	Signalized	AM	0.456	A	0.458	A	0.002
				PM	0.632	B	0.635	B	0.003
8	Main St	I-405 NB Off-Ramp	Signalized	AM	0.562	A	0.564	A	0.002
				PM	0.617	B	0.619	B	0.002
9	Main St	I-405 SB On-Ramp	Signalized	AM	0.480	A	0.481	A	0.001
				PM	0.757	C	0.759	C	0.002
10	Main St	Del Amo Blvd	Signalized	AM	0.690	B	0.690	B	0.000
				PM	0.895	D	0.895	D	0.000
11	Avalon Blvd	Del Amo Blvd	Signalized	AM	0.824	D	0.825	D	0.001
				PM	0.889	D	0.893	D	0.004
12	Central Ave	Del Amo Blvd	Signalized	AM	0.754	C	0.756	C	0.002
				PM	0.774	C	0.775	C	0.001
13	Main St	Torrance Blvd	Signalized	AM	**1.115**	**F**	**1.116**	**F**	0.001
				PM	0.797	C	0.800	C	0.003
14	Avalon Blvd	I-405 NB Ramps	Signalized	AM	0.468	A	0.482	A	0.014
				PM	0.562	A	0.610	B	0.048
15	Avalon Blvd	I-405 SB Ramps	Signalized	AM	0.624	B	0.688	B	0.064
				PM	0.599	A	0.639	B	0.040
16	Avalon Blvd	Imperial Avalon Main Driveway	Signalized	AM	Project Intersection		0.504	A	N/A
				PM			0.557	A	N/A

17	Avalon Blvd	Imperial Avalon Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
18	Grace Ave	Imperial Avalon Northern Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
19	Avalon Blvd	Imperial Avalon Southern Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
20	Main St	213th St	Signalized	AM	0.738	C	0.743	C	0.005
				PM	0.735	C	0.740	C	0.005
21	Grace Ave	213th St	AWSC	AM	15.1 seconds	C	16.1 seconds	C	N/A
				PM	30.9 seconds	D	**36.8 seconds**	**E**	N/A
22	Avalon Blvd	213th St	Signalized	AM	0.576	A	0.591	A	0.015
				PM	0.725	C	0.729	C	0.004
23	Wilmington Ave	213th St	Signalized	AM	0.509	A	0.518	A	0.009
				PM	0.657	B	0.668	B	0.011
24	I-110 SB Ramps	Carson St	Signalized	AM	0.837	D	0.841	D	0.004
				PM	0.899	D	**0.904**	**E**	0.005
25	Figueroa St	Carson St	Signalized	AM	0.692	B	0.698	B	0.006
				PM	0.691	B	0.695	B	0.004
26	Main St	Carson St	Signalized	AM	0.581	A	0.586	A	0.005
				PM	0.789	C	0.792	C	0.003
27	Grace Ave	Carson St	Signalized	AM	0.542	A	0.549	A	0.007
				PM	0.562	A	0.566	A	0.004
28	Avalon Blvd	Carson St	Signalized	AM	0.893	D	0.900	D	0.007
				PM	**1.026**	**F**	**1.033**	**F**	0.007
29	I-405 SB Ramps	Carson St	Signalized	AM	0.576	A	0.581	A	0.005
				PM	0.717	C	0.720	C	0.003
30	I-405 NB Ramps	Carson St	Signalized	AM	0.458	A	0.458	A	0.000
				PM	0.563	A	0.563	A	0.000
31	Figueroa St	220th St/I-110 NB Ramps	Signalized	AM	**0.958**	**E**	**0.960**	**E**	0.002
				PM	**0.974**	**E**	**0.978**	**E**	0.004
32	Avalon Blvd	220th St	Signalized	AM	0.697	B	0.699	B	0.002
				PM	0.667	B	0.671	B	0.004
33	Avalon Blvd	223rd St	Signalized	AM	**0.925**	**E**	**0.927**	**E**	0.002
				PM	**0.924**	**E**	**0.926**	**E**	0.002

Notes

TWSC Two-Way Stop Controlled

AWSC All Way Stop Controlled

[1] Signalized intersections are analyzed with Intersection Capacity Utilization (ICU) methodology.
Un-signalized intersections are analyzed with HCM, 6th Edition.

TABLE 8
IMPERIAL AVALON PROJECT - GATES OPTION
EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

ID	N/S Street Name	E/W Street Name	Intersection Control	Analyzed Period	Existing [1]		Existing + Project [1]		V/C Change
					V/C or Delay (s)	LOS	V/C or Delay (s)	LOS	
1	Avalon Blvd	Artesia Blvd/SR 91 WB Ramps	Signalized	AM	0.577	A	0.577	A	0.000
				PM	0.599	A	0.600	A	0.001
2	Central Ave	Artesia Blvd/SR 91 WB Ramps	Signalized	AM	0.888	D	0.888	D	0.000
				PM	0.776	C	0.777	C	0.001
3	Avalon Blvd	Albertoni St/SR 91 EB Ramps	Signalized	AM	0.566	A	0.566	A	0.000
				PM	0.774	C	0.774	C	0.000
4	Central Ave	Albertoni St/SR 91 EB Ramps	Signalized	AM	0.768	C	0.768	C	0.000
				PM	0.781	C	0.781	C	0.000
5	Avalon Blvd	Victoria St	Signalized	AM	0.718	C	0.719	C	0.001
				PM	0.863	D	0.865	D	0.002
6	Main St	M.L.K. Jr. St	Signalized	AM	0.392	A	0.393	A	0.001
				PM	0.583	A	0.585	A	0.002
7	Avalon Blvd	M.L.K. Jr. St	Signalized	AM	0.456	A	0.458	A	0.002
				PM	0.632	B	0.635	B	0.003
8	Main St	I-405 NB Off-Ramp	Signalized	AM	0.562	A	0.564	A	0.002
				PM	0.617	B	0.619	B	0.002
9	Main St	I-405 SB On-Ramp	Signalized	AM	0.480	A	0.481	A	0.001
				PM	0.757	C	0.759	C	0.002
10	Main St	Del Amo Blvd	Signalized	AM	0.690	B	0.690	B	0.000
				PM	0.895	D	0.895	D	0.000
11	Avalon Blvd	Del Amo Blvd	Signalized	AM	0.824	D	0.825	D	0.001
				PM	0.889	D	0.893	D	0.004
12	Central Ave	Del Amo Blvd	Signalized	AM	0.754	C	0.756	C	0.002
				PM	0.774	C	0.775	C	0.001
13	Main St	Torrance Blvd	Signalized	AM	**1.115**	**F**	**1.116**	**F**	0.001
				PM	0.797	C	0.800	C	0.003
14	Avalon Blvd	I-405 NB Ramps	Signalized	AM	0.468	A	0.482	A	0.014
				PM	0.562	A	0.610	B	0.048
15	Avalon Blvd	I-405 SB Ramps	Signalized	AM	0.624	B	0.688	B	0.064
				PM	0.599	A	0.639	B	0.040
16	Avalon Blvd	Imperial Avalon Main Driveway	Signalized	AM	Project Intersection		0.506	A	N/A
				PM			0.563	A	N/A

17	Avalon Blvd	Imperial Avalon Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
18	Grace Ave	Imperial Avalon Northern Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
19	Avalon Blvd	Imperial Avalon Southern Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
20	Main St	213th St	Signalized	AM	0.738	C	0.743	C	0.005
				PM	0.735	C	0.740	C	0.005
21	Grace Ave	213th St	AWSC	AM	15.1 seconds	C	15.7 seconds	C	N/A
				PM	30.9 seconds	D	**35.1 seconds**	**E**	N/A
22	Avalon Blvd	213th St	Signalized	AM	0.576	A	0.592	A	0.016
				PM	0.725	C	0.730	C	0.005
23	Wilmington Ave	213th St	Signalized	AM	0.509	A	0.518	A	0.009
				PM	0.657	B	0.668	B	0.011
24	I-110 SB Ramps	Carson St	Signalized	AM	0.837	D	0.842	D	0.005
				PM	0.899	D	**0.906**	**E**	0.007
25	Figueroa St	Carson St	Signalized	AM	0.692	B	0.700	B	0.008
				PM	0.691	B	0.696	B	0.005
26	Main St	Carson St	Signalized	AM	0.581	A	0.588	A	0.007
				PM	0.789	C	0.793	C	0.004
27	Grace Ave	Carson St	Signalized	AM	0.542	A	0.552	A	0.010
				PM	0.562	A	0.572	A	0.010
28	Avalon Blvd	Carson St	Signalized	AM	0.893	D	0.900	D	0.007
				PM	**1.026**	**F**	**1.033**	**F**	0.007
29	I-405 SB Ramps	Carson St	Signalized	AM	0.576	A	0.581	A	0.005
				PM	0.717	C	0.720	C	0.003
30	I-405 NB Ramps	Carson St	Signalized	AM	0.458	A	0.458	A	0.000
				PM	0.563	A	0.563	A	0.000
31	Figueroa St	220th St/I-110 NB Ramps	Signalized	AM	**0.958**	**E**	**0.960**	**E**	0.002
				PM	**0.974**	**E**	**0.979**	**E**	0.005
32	Avalon Blvd	220th St	Signalized	AM	0.697	B	0.699	B	0.002
				PM	0.667	B	0.671	B	0.004
33	Avalon Blvd	223rd St	Signalized	AM	**0.925**	**E**	**0.927**	**E**	0.002
				PM	**0.924**	**E**	**0.926**	**E**	0.002

Notes

TWSC Two-Way Stop Controlled

AWSC All Way Stop Controlled

[1] Signalized intersections are analyzed with Intersection Capacity Utilization (ICU) methodology.
Un-signalized intersections are analyzed with HCM, 6th Edition.

4.2 Future Plus Project Analysis

4.2.1 Future Base Traffic Level of Service

The year 2027 Future Base peak hour traffic volumes were analyzed to determine the projected V/C ratio or delay in seconds per vehicle and LOS for each of the analyzed intersections for both the non-gated entry and gated entry driveway options. Table 9 and Table 10 summarize the future LOS for each option. Fifteen of the 29 intersections analyzed are projected to operate at LOS D or better during the morning and afternoon peak hours under Future Base conditions for the non-gated entry option. Likewise, 15 of the 29 intersections analyzed are projected to operate at LOS D or better during the morning and afternoon peak hours under Future Base conditions for the gated entry option.

The following 13 signalized intersections are projected to operate at LOS E or F under Future Base conditions for both driveway options:

2. Central Avenue & Artesia Blvd/State Route 91 westbound ramps (AM Peak Hour)
4. Central Avenue & Albertoni Street/State Route 91 eastbound ramps (AM & PM Peak Hours)
5. Avalon Boulevard & Victoria Street (AM & PM Peak Hours)
6. Main Street & Martin Luther King Jr. Street (PM Peak Hour)
8. Main Street & I-405 northbound off-ramp (AM & PM Peak Hours)
9. Main Street & I-405 southbound on-ramp (PM Peak Hour)
11. Avalon Boulevard & Del Amo Boulevard (PM Peak Hour)
12. Central Avenue & Del Amo Boulevard (PM Peak Hour)
13. Main Street & Torrance Boulevard (AM Peak Hour)
24. I-110 southbound ramps & Carson Street (AM & PM Peak Hours)
28. Avalon Boulevard & Carson Street (PM Peak Hour)
31. Figueroa Street & 220th Street/I-110 northbound ramps (AM & PM Peak Hours)
33. Avalon Boulevard & 223rd Street (AM & PM Peak Hours)

One unsignalized intersection is projected to operate at LOS E or F for both driveway options: No. 19 Grace Avenue & 213th Street (PM Peak Hour). If this intersection became signalized it would operate at LOS D or better during both morning and evening peak hours for both driveway options. Section 4.3 of this chapter describes the signal warrant analysis conducted for this intersection.

Detailed LOS analysis sheets are provided in Appendix D.

TABLE 9
IMPERIAL AVALON PROJECT
FUTURE YEAR (2027) PLUS PROJECT INTERSECTION LEVELS OF SERVICE

ID	N/S Street Name	E/W Street Name	Intersection Control	Analyzed Period	Future [1]		Future + Project [1]		V/C Change
					V/C or Delay (s)	LOS	V/C or Delay (s)	LOS	
1	Avalon Blvd	Artesia Blvd/SR 91 WB Ramps	Signalized	AM	0.625	B	0.626	B	0.001
				PM	0.663	B	0.663	B	0.000
2	Central Ave	Artesia Blvd/SR 91 WB Ramps	Signalized	AM	**0.981**	**E**	**0.981**	**E**	0.000
				PM	0.876	D	0.876	D	0.000
3	Avalon Blvd	Albertoni St/SR 91 EB Ramps	Signalized	AM	0.608	B	0.608	B	0.000
				PM	0.839	D	0.840	D	0.001
4	Central Ave	Albertoni St/SR 91 EB Ramps	Signalized	AM	**1.235**	**F**	**1.235**	**F**	0.000
				PM	**0.985**	**E**	**0.986**	**E**	0.001
5	Avalon Blvd	Victoria St	Signalized	AM	**1.252**	**F**	**1.255**	**F**	0.003
				PM	**1.422**	**F**	**1.423**	**F**	0.001
6	Main St	M.L.K. Jr. St	Signalized	AM	0.861	D	0.862	D	0.001
				PM	**1.124**	**F**	**1.125**	**F**	0.001
7	Avalon Blvd	M.L.K. Jr. St	Signalized	AM	0.604	B	0.607	B	0.003
				PM	0.877	D	0.882	D	0.005
8	Main St	I-405 NB Off-Ramp	Signalized	AM	**1.054**	**F**	**1.056**	**F**	0.002
				PM	**1.285**	**F**	**1.287**	**F**	0.002
9	Main St	I-405 SB On-Ramp	Signalized	AM	0.716	C	0.717	C	0.001
				PM	**1.104**	**F**	**1.106**	**F**	0.002
10	Main St	Del Amo Blvd	Signalized	AM	0.803	D	0.803	D	0.000
				PM	0.883	D	0.883	D	0.000
11	Avalon Blvd	Del Amo Blvd	Signalized	AM	0.861	D	0.863	D	0.002
				PM	**1.056**	**F**	**1.060**	**F**	0.004
12	Central Ave	Del Amo Blvd	Signalized	AM	0.861	D	0.862	D	0.001
				PM	**0.906**	**E**	**0.907**	**E**	0.001
13	Main St	Torrance Blvd	Signalized	AM	**1.382**	**F**	**1.383**	**F**	0.001
				PM	0.871	D	0.872	D	0.001
14	Avalon Blvd	I-405 NB Ramps	Signalized	AM	0.615	B	0.677	B	0.062
				PM	0.781	C	0.833	D	0.052
15	Avalon Blvd	I-405 SB Ramps	Signalized	AM	0.789	C	0.853	D	0.064
				PM	0.796	C	0.836	D	0.040
16	Avalon Blvd	Imperial Avalon Main Driveway	Signalized	AM	Project Intersection		0.635	B	N/A
				PM			0.654	B	N/A

17	Avalon Blvd	Imperial Avalon Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
18	Grace Ave	Imperial Avalon Northern Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
19	Grace Ave	Imperial Avalon Southern Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
20	Main St	213th St	Signalized	AM	0.807	D	0.811	D	0.004
				PM	0.828	D	0.833	D	0.005
21	Grace Ave	213th St	AWSC	AM	18.4 seconds	C	20.0 seconds	C	N/A
				PM	**51.0 seconds**	**F**	**60.7 seconds**	**F**	N/A
22	Avalon Blvd	213th St	Signalized	AM	0.672	B	0.684	B	0.012
				PM	0.831	D	0.835	D	0.004
23	Wilmington Ave	213th St	Signalized	AM	0.585	A	0.593	A	0.008
				PM	0.740	C	0.749	C	0.009
24	I-110 SB Ramps	Carson St	Signalized	AM	**0.934**	**E**	**0.939**	**E**	0.005
				PM	**0.994**	**E**	**0.999**	**E**	0.005
25	Figueroa St	Carson St	Signalized	AM	0.740	C	0.746	C	0.006
				PM	0.775	C	0.779	C	0.004
26	Main St	Carson St	Signalized	AM	0.663	B	0.670	B	0.007
				PM	0.858	D	0.862	D	0.004
27	Grace Ave	Carson St	Signalized	AM	0.603	B	0.610	B	0.007
				PM	0.642	B	0.646	B	0.004
28	Avalon Blvd	Carson St	Signalized	AM	0.884	D	0.892	D	0.008
				PM	**1.057**	**F**	**1.068**	**F**	0.011
29	I-405 SB Ramps	Carson St	Signalized	AM	0.651	B	0.656	B	0.005
				PM	0.811	D	0.814	D	0.003
30	I-405 NB Ramps	Carson St	Signalized	AM	0.491	A	0.491	A	0.000
				PM	0.600	A	0.600	A	0.000
31	Figueroa St	220th St/I-110 NB Ramps	Signalized	AM	**1.041**	**F**	**1.043**	**F**	0.002
				PM	**1.119**	**F**	**1.122**	**F**	0.003
32	Avalon Blvd	220th St	Signalized	AM	0.767	C	0.769	C	0.002
				PM	0.798	C	0.802	D	0.004
33	Avalon Blvd	223rd St	Signalized	AM	**0.975**	**E**	**0.977**	**E**	0.002
				PM	**0.979**	**E**	**0.981**	**E**	0.002

Notes

TWSC Two-Way Stop Controlled

AWSC All Way Stop Controlled

[1] Signalized intersections are analyzed with Intersection Capacity Utilization (ICU) methodology.
Un-signalized intersections are analyzed with HCM, 6th Edition.

TABLE 10
IMPERIAL AVALON PROJECT - GATES OPTION
FUTURE YEAR (2027) PLUS PROJECT INTERSECTION LEVELS OF SERVICE

ID	N/S Street Name	E/W Street Name	Intersection Control	Analyzed Period	Future [1]		Future + Project [1]		V/C Change
					V/C or Delay (s)	LOS	V/C or Delay (s)	LOS	
1	Avalon Blvd	Artesia Blvd/SR 91 WB Ramps	Signalized	AM	0.625	B	0.626	B	0.001
				PM	0.663	B	0.663	B	0.000
2	Central Ave	Artesia Blvd/SR 91 WB Ramps	Signalized	AM	**0.981**	**E**	**0.981**	**E**	0.000
				PM	0.876	D	0.876	D	0.000
3	Avalon Blvd	Albertoni St/SR 91 EB Ramps	Signalized	AM	0.608	B	0.608	B	0.000
				PM	0.839	D	0.840	D	0.001
4	Central Ave	Albertoni St/SR 91 EB Ramps	Signalized	AM	**1.235**	**F**	**1.235**	**F**	0.000
				PM	**0.985**	**E**	**0.986**	**E**	0.001
5	Avalon Blvd	Victoria St	Signalized	AM	**1.252**	**F**	**1.255**	**F**	0.003
				PM	**1.422**	**F**	**1.423**	**F**	0.001
6	Main St	M.L.K. Jr. St	Signalized	AM	0.861	D	0.862	D	0.001
				PM	**1.124**	**F**	**1.125**	**F**	0.001
7	Avalon Blvd	M.L.K. Jr. St	Signalized	AM	0.604	B	0.607	B	0.003
				PM	0.877	D	0.882	D	0.005
8	Main St	I-405 NB Off-Ramp	Signalized	AM	**1.054**	**F**	**1.056**	**F**	0.002
				PM	**1.285**	**F**	**1.287**	**F**	0.002
9	Main St	I-405 SB On-Ramp	Signalized	AM	0.716	C	0.717	C	0.001
				PM	**1.104**	**F**	**1.106**	**F**	0.002
10	Main St	Del Amo Blvd	Signalized	AM	0.803	D	0.803	D	0.000
				PM	0.883	D	0.883	D	0.000
11	Avalon Blvd	Del Amo Blvd	Signalized	AM	0.861	D	0.863	D	0.002
				PM	**1.056**	**F**	**1.060**	**F**	0.004
12	Central Ave	Del Amo Blvd	Signalized	AM	0.861	D	0.862	D	0.001
				PM	**0.906**	**E**	**0.907**	**E**	0.001
13	Main St	Torrance Blvd	Signalized	AM	**1.382**	**F**	**1.383**	**F**	0.001
				PM	0.871	D	0.872	D	0.001
14	Avalon Blvd	I-405 NB Ramps	Signalized	AM	0.615	B	0.677	B	0.062
				PM	0.781	C	0.833	D	0.052
15	Avalon Blvd	I-405 SB Ramps	Signalized	AM	0.789	C	0.853	D	0.064
				PM	0.796	C	0.836	D	0.040
16	Avalon Blvd	Imperial Avalon Main Driveway	Signalized	AM	Project Intersection		0.635	B	N/A
				PM			0.660	B	N/A

17	Avalon Blvd	Imperial Avalon Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
18	Grace Ave	Imperial Avalon Northern Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
19	Grace Ave	Imperial Avalon Southern Secondary Driveway	TWSC	AM	Project Intersection		Stop-Controlled Driveway		N/A
				PM					N/A
20	Main St	213th St	Signalized	AM	0.807	D	0.811	D	0.004
				PM	0.828	D	0.833	D	0.005
21	Grace Ave	213th St	AWSC	AM	18.4 seconds	C	19.5 seconds	C	N/A
				PM	**51.0 seconds**	**F**	**58.0 seconds**	**F**	N/A
22	Avalon Blvd	213th St	Signalized	AM	0.672	B	0.685	B	0.013
				PM	0.831	D	0.837	D	0.006
23	Wilmington Ave	213th St	Signalized	AM	0.585	A	0.593	A	0.008
				PM	0.740	C	0.749	C	0.009
24	I-110 SB Ramps	Carson St	Signalized	AM	**0.934**	**E**	**0.941**	**E**	0.007
				PM	**0.994**	**E**	**1.001**	**F**	0.007
25	Figueroa St	Carson St	Signalized	AM	0.740	C	0.748	C	0.008
				PM	0.775	C	0.780	C	0.005
26	Main St	Carson St	Signalized	AM	0.663	B	0.671	B	0.008
				PM	0.858	D	0.863	D	0.005
27	Grace Ave	Carson St	Signalized	AM	0.603	B	0.612	B	0.009
				PM	0.642	B	0.652	B	0.010
28	Avalon Blvd	Carson St	Signalized	AM	0.884	D	0.896	D	0.012
				PM	**1.057**	**F**	**1.076**	**F**	0.019
29	I-405 SB Ramps	Carson St	Signalized	AM	0.651	B	0.656	B	0.005
				PM	0.811	D	0.814	D	0.003
30	I-405 NB Ramps	Carson St	Signalized	AM	0.491	A	0.491	A	0.000
				PM	0.600	A	0.600	A	0.000
31	Figueroa St	220th St/I-110 NB Ramps	Signalized	AM	**1.041**	**F**	**1.043**	**F**	0.002
				PM	**1.119**	**F**	**1.124**	**F**	0.005
32	Avalon Blvd	220th St	Signalized	AM	0.767	C	0.769	C	0.002
				PM	0.798	C	0.802	D	0.004
33	Avalon Blvd	223rd St	Signalized	AM	**0.975**	**E**	**0.977**	**E**	0.002
				PM	**0.979**	**E**	**0.981**	**E**	0.002

Notes

TWSC Two-Way Stop Controlled

AWSC All Way Stop Controlled

[1] Signalized intersections are analyzed with Intersection Capacity Utilization (ICU) methodology.
Un-signalized intersections are analyzed with HCM, 6th Edition.

4.2.2 Future Plus Project Traffic Level of Service

The resulting Future (Year 2027) plus Project peak hour traffic volumes, provided in Appendix A, were analyzed to determine the projected future operating conditions with the addition of the proposed Project traffic and project intersections for the non-gated entry and gated entry driveway options. The results of the Future (Year 2027) plus Project analysis are also presented in Table 9 and Table 10, with analysis sheets provided in Appendix D. Sixteen of the 30 intersections analyzed are projected to operate at LOS D or better during the morning and evening peak hours under Future (Year 2027) plus Project conditions for the non-gated entry option. Likewise, 16 of the 30 intersections analyzed are projected to operate at LOS D or better during the morning and evening peak hours under Future (Year 2027) plus Project conditions for the gated entry option.

The following 13 signalized intersections are projected to operate at LOS E or F under Future plus Project conditions for both driveway options (no increase in V/C ratio greater than 0.02 caused by the Project):

2. Central Avenue & Artesia Blvd/State Route 91 westbound ramps (AM Peak Hour)
4. Central Avenue & Albertoni Street/State Route 91 eastbound ramps (AM & PM Peak Hours)
5. Avalon Boulevard & Victoria Street (AM & PM Peak Hours)
6. Main Street & Martin Luther King Jr. Street (PM Peak Hour)
8. Main Street & I-405 northbound off-ramp (AM & PM Peak Hours)
9. Main Street & I-405 southbound on-ramp (PM Peak Hour)
11. Avalon Boulevard & Del Amo Boulevard (PM Peak Hour)
12. Central Avenue & Del Amo Boulevard (PM Peak Hour)
13. Main Street & Torrance Boulevard (AM Peak Hour)
24. I-110 southbound ramps & Carson Street (AM & PM Peak Hours)
28. Avalon Boulevard & Carson Street (PM Peak Hour)
31. Figueroa Street & 220th Street/I-110 northbound ramps (AM & PM Peak Hours)
33. Avalon Boulevard & 223rd Street (AM & PM Peak Hours)

One unsignalized intersections is projected to operate at LOS E or F for both driveway options: No. 19 Grace Avenue & 213th Street (PM Peak Hour). If this intersection became signalized it would operate at LOS D or better during both morning and evening peak hours for both driveway options. Section 4.3 of this chapter describes the signal warrant analysis conducted for this intersection.

Detailed LOS analysis sheets for the Future plus Project scenario are provided in Appendix D.

4.3 Unsignalized Intersection Signal Warrant Analysis

Traffic volumes and lane configurations, as presented in Appendix A, were used to prepare the California Manual on Uniform Traffic Control Devices (MUTCD) Peak Hour (Warrant 3) signal warrant analysis for the following intersection:

19. Grace Avenue & 213th Street

This unsignalized intersection was analyzed under Existing, Existing plus Project, Future Base, and Future plus Project conditions. As shown in Table 11, the volumes at the Grace Avenue & 213th Street intersection met the signal warrant thresholds during the PM peak hour under the Future Base and Future plus Project scenarios for both the non-gated entry and gated entry driveway options. Signal analysis worksheets are included in Appendix E.

This analysis is intended to examine the general correlation between the planned level of future development and the need to install new traffic signals. It estimates the effect of future development-generated traffic on a sub-set of the standard traffic signal warrants recommended in the Federal Highway Administration *Manual on Uniform Traffic Control Devices* and associated State guidelines. This analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated based on field-measured, rather than forecasted, traffic data and a thorough study of traffic and roadway conditions by a licensed professional engineer. Furthermore, the decision to install a signal should not be based solely upon the warrants, since a detailed evaluation of the safety of the installation of signals based on the field conditions where the signal is located is extremely important. The City of Carson should undertake regular monitoring of actual traffic conditions and collision data, and timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization. Should the City of Carson prefer to install traffic signals at this location, the Project would be responsible for a fair share contribution to the costs of the signal installation.

TABLE 11
IMPERIAL AVALON PROJECT
PEAK HOUR SIGNAL WARRANT ANALYSIS

No.	OPTION	INTERSECTIONS	PEAK HOUR	EXISTING SIGNAL WARRANT MET	EXISTING PLUS PROJECT SIGNAL WARRANT MET	FUTURE SIGNAL WARRANT MET	FUTURE PLUS PROJECT SIGNAL WARRANT MET
21	No Gates Option	Grace Avenue & 213th Street	AM	No	No	No	No
			PM	No	No	**YES**	**YES**
21	Gates Option	Grace Avenue & 213th Street	AM	No	No	No	No
			PM	No	No	**YES**	**YES**

5. Site Access and TDM Measures

5.1 Site Access

The Project will have the following access locations:

- The main Project driveway (study intersection 16) will provide direct vehicle access to Avalon Boulevard between the I-405 interchange and 213th Street. This driveway will form the eastbound leg of a new signalized intersection. The westbound leg of this new signalized intersection will serve the potential mixed-use Kott development. This driveway is included in the LOS analysis portion of this study.

- One stop-controlled driveway (study intersection 19) will be provided along Grace Avenue between the Torrance Lateral Flood Control Channel and 213th Street. No more than 30 vehicles will exit this driveway during any peak hour and therefore minimal driveway vehicle delay is expected.

- A third driveway (study intersection 17) will be provided along Avalon Boulevard, south of the main Project driveway. This stop-controlled driveway will provide right-turn-in/right-turn-out only movements from the Project onto southbound Avalon Boulevard. No more than 24 vehicles will exit this driveway during any peak hour and therefore minimal driveway vehicle delay is expected.

- The Project may also be served by an additional driveway at the northern end of Grace Avenue. The additional Grace Avenue driveway will likely be for emergency use only.

Figure 7 shows the site plan and Project site access.

5.2 TDM Measures

The Project contains several features to encourage the use of active transportation modes, such as walking, biking, carpooling and taking transit.

5.2.1 Mix of Complementary Land Uses

The Project includes residential and restaurant components. This allows for the internal capture of some Project trips, as described in Chapter 3. For example, residents of the Project can walk to the Project's restaurant uses, instead of driving.

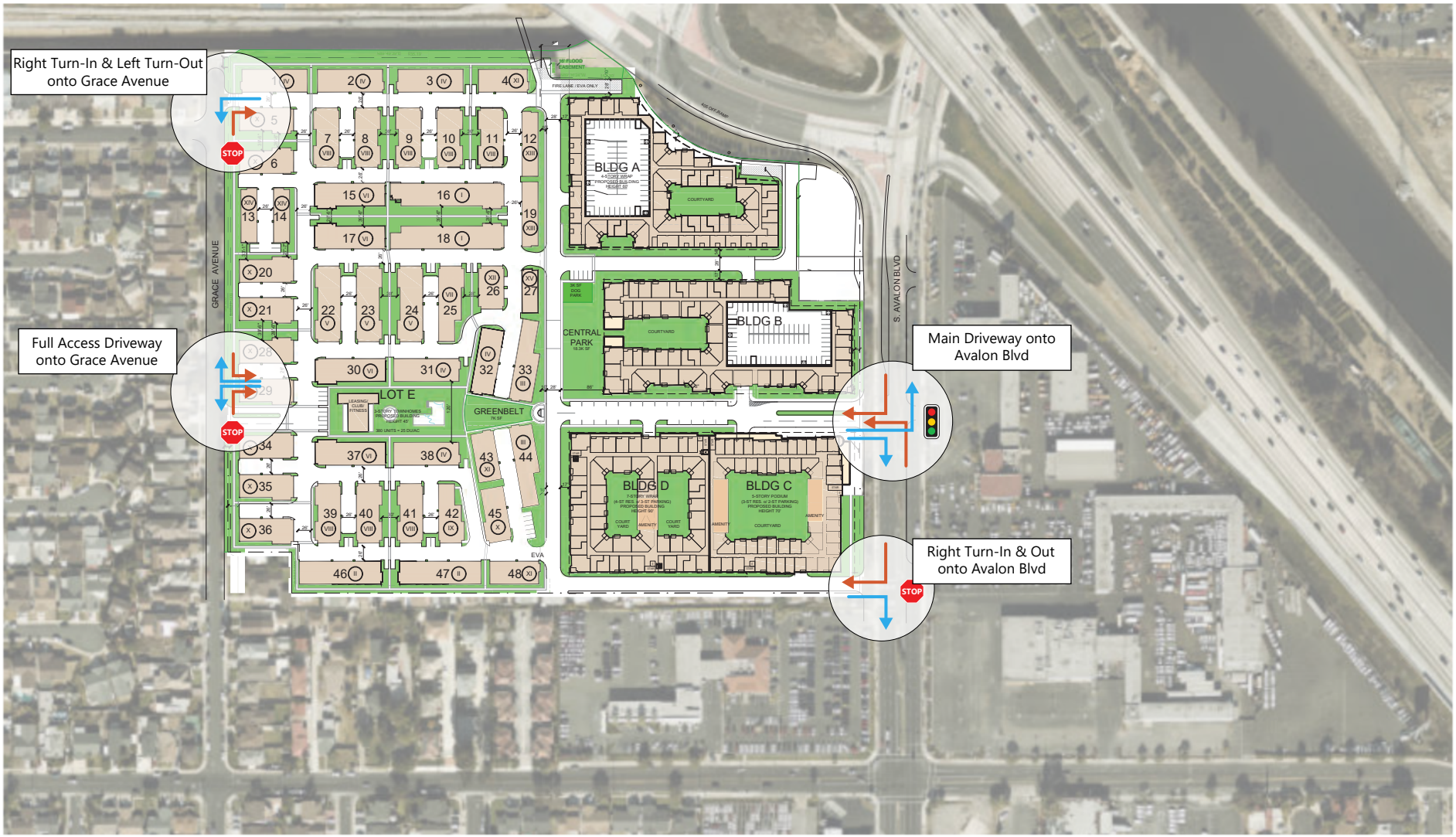


Figure 7

Site Access

5.2.2 Senior Housing Shuttle

The Project's senior housing component will provide a regularly scheduled shuttle service for residents to access shopping and services in the surrounding area. The shuttles will transport groups of residents for each trip. Thus, this service can potentially reduce the need for single-occupant vehicle trips to and from the Project site.

5.2.3 Unbundled Parking

The monthly rent expense allocated to parking will be "unbundled" as a separate, optional line item for residents of the Project's apartment units. Unbundling the expense of parking allows tenants to more consciously weigh the costs and benefits of purchasing additional parking spaces and incentivizes reducing overall vehicle occupancy.

5.2.4 Car Sharing Program

The Project will include designated parking spaces for car sharing vehicles. Car sharing programs allow greater flexibility for residents who do not own a vehicle but may occasionally require a vehicle for some trips, such as: furniture shopping, recreational activities, visiting family and friends in suburban/rural locations, etc.

5.2.5 Workstation Areas

The Project's amenity spaces for residents will include workstation areas to facilitate telecommuting. Each resident telecommuter can potentially reduce daily single-occupant vehicle trips, especially peak hour trips.

6. Construction Period Impact Analysis

6.1.1 Project Schedule of Construction Activity

Construction is anticipated to start in Spring 2022 and would take between 32 and 60 months to complete, ending in Q1 2027. The Project is proposed to be constructed in several phases:

- Phase I – Demolition
- Phase II – Horizontal Construction
- Phase III – Building Construction
- Phase IV – Exterior Finishes/Sitework

The City of Carson Municipal Code provides that construction activities are limited to the hours of 7:00 AM to 6:00 PM on weekdays, unless otherwise permitted by the City Engineer.

6.1.2 Construction Trucks

The Project is expected to generate equipment and delivery trucks during construction. One example would be concrete delivery, which would be required for the buildings on-site. Other materials could include plumbing supplies, electrical fixtures, and items used in furnishing the buildings. These materials would be delivered to the site and stored on-site. These deliveries are expected to occur in variously sized vehicles including small delivery trucks, cement mixer trucks and 18-wheel trucks. Additionally, construction equipment would have to be delivered to the site. This equipment could include cranes, bulldozers, excavators, and other large items of machinery. Most of the heavy equipment is expected to be transported to the site on large trucks such as 18-wheelers or other similar vehicles.

6.1.3 Construction Worker Parking

During all phases of construction, construction workers are anticipated to park on-site and/or at nearby public parking spaces in the area.

6.2 Construction Effects Assessment

During all phases of construction, there will be no full-time closures to any parking or travel lanes near the Project site. There will also be no sidewalk closures for the duration of construction. The sidewalks along Avalon Boulevard fronting the construction site will be open during construction.

7. Summary and Conclusions

The following summarizes the results of the Project's specific plan traffic study analysis:

- The Project consists of the construction of 653 apartment units, 380 townhome units, 180 senior independent living units, and 10,352 square feet of restaurant space.

- The site on which the Project will be developed is comprised of approximately 27 acres located to the west of Avalon Boulevard between the I-405 Freeway interchange and 213th Street. The Project proposes to provide signalized vehicular ingress and egress at one primary location: along Avalon Boulevard midblock between the I-405 Freeway interchange and 213th Street.

- The Project is expected to generate approximately 5,586 net new daily trips, 402 net new trips during the AM peak hour, and 457 net new trips during the PM peak hour.

- The non-gated entry option adds 44 AM peak hour trips and 50 PM peak hour trips onto Grace Avenue, whereas the gated entry option adds 31 AM peak hour trips and 35 PM peak hour trips onto Grace Avenue.

- The addition of Project trips to the Grace Avenue & 213th Street intersection causes PM peak hour LOS to worsen from LOS D or better to LOS E or F in both the Existing plus Project and Future (Year 2027) plus Project scenarios for both the non-gated entry and gated entry driveway options. If this intersection became signalized it would operate at LOS D or better during both morning and evening peak hours for both driveway options.

- The Grace Avenue & 213th Street intersection meets the California MUTCD peak hour traffic signal warrant in both the Future (Year 2027) Base and Future (Year 2027) plus Project scenarios during the PM peak hour for both the non-gated entry and gated entry driveway options.

REFERENCES

Highway Capacity Manual, 6th Edition, Transportation Research Board, 2016.

Enhancing Internal Trip Capture Estimation for Mixed-Use Developments, NCHRP Report 684

Trip Generation, 10th Edition, ITE, 2017.