4 Environmental Impact Analysis

This section discusses the possible environmental effects of the project for the issue area that was identified through the Initial Study and NOP process as having the potential to experience significant impacts. "Significant effect" is defined by §15382 of the *CEQA Guidelines* as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment, but may be considered in determining whether the physical change is significant."

The assessment of environmental effects begins with a discussion of the setting, followed by a discussion of the project's impacts. In the impact analysis, the first subsection identifies the methodologies used and the "significance thresholds," which are those criteria used for this analysis to determine whether potential impacts are significant. The next subsection describes the impact of the project, regulatory compliance measures, project design features, and mitigation measures for significant impacts, where needed and feasible, as well as the level of significance after mitigation.

Mitigation Measures are designed once a threshold has been exceeded to avoid, reduce, or remediate the impact.

The significance of the project's environmental impacts was identified based on the following classifications:

- **Significant and Unavoidable**. An impact that cannot be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires a Statement of Overriding Considerations to be issued if the project is approved.
- **Less than Significant with Mitigation Incorporated**. An impact that can be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires findings to be made.
- **Not Significant**. An impact that may be adverse, but does not exceed the threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.
- **No Impact or Beneficial**. No impact would occur or the project would reduce existing environmental problems or hazards.

The impact analysis concludes with a discussion of cumulative effects, which evaluates the impacts associated with the project in conjunction with other future development in the area.

4.1 Transportation and Traffic

This section analyzes the potential for the project to cause significant impacts to the existing traffic and transportation facilities in the city of Long Beach. The analysis in this section is based on a TIA prepared for the project by Linscott, Law & Greenspan (LLG) in December 2016 (Appendix D).

4.1.1 Setting

Existing Roadway and Intersection Characteristics

Existing Intersection Conditions

The TIA evaluates the following nine intersections that are located within the project site:

1. Alamitos Avenue at 7th Street
2. Alamitos Avenue at 6th Street
3. Alamitos Avenue at 5th Street
4. Alamitos Avenue at 4th Street
5. Alamitos Avenue at 3rd Street
6. Alamitos Avenue at Broadway
7. Alamitos Avenue at 1st Street
8. Alamitos Avenue at Medio Street
9. Alamitos Avenue/Shoreline Drive at Ocean Boulevard

Alamitos Avenue is generally a four-lane roadway, separated by a two-way left-turn lane, that extends in the north-south direction. Parking is generally permitted on both sides of the roadway in the vicinity of the project, but is restricted along certain sections during certain time periods, including weekday peak commute periods. The posted speed limit on Alamitos Avenue is 30 miles per hour. Alamitos Avenue is currently classified as a Class III bike facility, which allows for shared road use by bicycles and vehicles. Traffic signals control the study intersections of Los Alamitos Boulevard at 7th Street, 6th Street, 5th Street, 4th Street, 3rd Street, Broadway, 1st Street, and Ocean Boulevard. The study intersection of Los Alamitos Boulevard at Medio Street is one-way (side-street) stop controlled.

Existing Traffic Volumes and Level of Service

Existing weekday peak hour traffic volumes for the nine intersections evaluated in the TIA were obtained from manual turning movement counts conducted by AimTD LLC in May 2016 and September 2016. Existing traffic volumes are detailed in Figures 3-1 and 3-2 of the TIA (Appendix D). All nine intersections within the project site currently operate at a level of service (LOS) of D or better, which is an acceptable service level within the City. LOS criteria for signalized (based on the Intersection Capacity Utilization [ICU] methodology)[1] and unsignalized (based on the Highway Capacity Manual [HCM] methodology)[2] intersections are defined in Table 4 and Table 5, respectively.

[1] The ICU method of analysis is intended for signalized intersection analysis and estimates the volume to capacity (V/C) relationship for an intersection based on the individual V/C ratios for key conflicting traffic movements. The ICU numerical value represents the percent signal (green) time, and thus capacity, required by existing and/or future traffic. The ICU methodology assumes uniform traffic distribution per intersection approach lane and optimal signal timing.

[2] The HCM methodology for stop-controlled intersections was utilized for the analysis of the key unsignalized intersections. This methodology estimates the average control delay for each of the subject movements and determines the level of service for each

Table 4 Level of Service Criteria for Signalized Intersections (ICU Methodology)

Level of Service (LOS)	Intersection Capacity Utilization Value (V/C)	Level of Service Description
A	≤ 0.60	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	0.61 – 0.70	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.71 – 0.80	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.81 – 0.90	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	0.91 – 1.00	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	> 1.00	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: LLG 2016

Table 5 Level of Service Criteria for Signalized and Unsignalized Intersections (HCM Methodology)

Level of Service (LOS)	Highway Capacity Manual Delay Value (sec/veh)	Level of Service Description
A	≤ 10.0	Little or no delay
B	> 10.0 and ≤ 15.0	Short traffic delays
C	> 15.0 and ≤ 25.0	Average traffic delays
D	> 25.0 and ≤ 35.0	Long traffic delays
E	> 35.0 and ≤ 50.0	Very long traffic delays
F	> 50.0	Severe congestion

Source: LLG 2016

Existing Public Transit

The Los Angeles County Metropolitan Transportation Authority and Long Beach Transit (LBT) provide public transit service in the vicinity of the project site. The Metro Blue Line currently serves 1st Street, while the Los Angeles Department of Transportation (LADOT) Commuter Express 142 currently serves Ocean Boulevard. Existing transit routes and LBT bus stops are illustrated in Figures 3-3 and 3-4 of the TIA (Appendix D).

movement. Control delay is a measure of the increase in travel time due to traffic signal control, driver discomfort, and fuel consumption. In addition, the HCM 2010 operations method of analysis was used to evaluate level of service of signalized intersections.

Existing Multimodal Level of Service

In California, a multimodal/complete streets assessment is required by Law. The California Complete Streets Act of 2008 (AB 1358, Chapter 657, 2009), was adopted into law on September 30, 2008. Commencing January 1, 2011, the bill requires, "that the legislative body of a city or county, upon any substantive revision of the circulation element of the general plan, modify the circulation element to plan for a balanced, multimodal transportation network that meets the needs of all users of streets, roads, and highways, defined to include motorists, pedestrians, bicyclists, children, persons with disabilities, seniors, movers of commercial goods, and users of public transportation, in a manner that is suitable to the rural, suburban, or urban context of the general plan.

A detailed multimodal level of service (MMLOS) evaluation for Alamitos Avenue between 7th Street and Ocean Boulevard is included in the TIA (Appendix D). The MMLOS objectives are to evaluate the adequacy of existing motorist, transit, bicycle and/or pedestrian users along this corridor. The segment of Alamitos Avenue within the project site currently meets 67 percent of the criteria for a complete street (Appendix D).

Regulatory Setting

Congestion Management Program

In Los Angeles County (County), the Congestion Management Plan (CMP) uses ICU intersection analysis methodology to analyze its operations. In June 1990, the passage of the Proposition 111 gas tax increase required urbanized areas in the State with a population of 50,000 or more to adopt a CMP. The Los Angeles County Metropolitan Transportation Authority (Metro) is the Congestion Management Agency (CMA) for the County. Metro has been charged with the development, monitoring, and biennial updating of the County's CMP. The Los Angeles County CMP is intended to address the impact of local growth on the regional transportation system. The CMP Highway System includes specific roadways, including State highways, and CMP arterial monitoring locations/intersections. The CMP is also the vehicle for proposing transportation projects that are eligible to compete for the State gas tax funds.

Long Beach General Plan

It is the stated goal of the City to maintain or improve the current ability to move people and goods to and from activity centers while reinforcing the quality of life in their neighborhoods. This goal is supported by the following objectives: (1) maintain traffic and transportation LOS at LOS D, (2) accommodate reasonable, balanced growth, and (3) maintain or enhance our quality of life. The following specific Mobility of People (MOP) policies are included in the Mobility Element of the General Plan.

MOP Policy 1-1: To improve the performance and visual appearance of Long Beach's streets, design streets holistically using the "complete streets approach" which considers walking, those with mobility constraints, bicyclists, public transit users, and various other modes of mobility in parallel.

MOP Policy 1-9: Increase mode shift of transit, pedestrians, and bicycles.

MOP Policy 1-18: Focus development densities for residential and nonresidential uses around the eight Metro Blue Line stations within City boundaries.

MOP Policy 4-1: Consider effects on overall mobility and various travel modes when evaluating transportation impacts of new developments or infrastructure projects.

MOP Policy 15-3: Consider pickup and delivery activities associated with various land uses when approving new development, implementing projects, and improving highways, streets, and bridges.

Bicycle Master Plan

The City of Long Beach promotes bicycling as a means of mobility and a way in which to improve the quality of life within the community. In February 2017, the City adopted an updated Bicycle Master Plan. The plan recognizes the needs of bicycle users and aims to create a complete and safe bicycle network throughout the City (City of Long Beach 2017). The Bicycle Master Plan identifies bike facilities on Alamitos Avenue as a Backbone Next Step Facility because it would connect residents across the City to the Beach Bike Path and Class IV separated bikeways in both Uptown and Downtown Long Beach. Existing and proposed bicycle facilities in the vicinity of the project site are illustrated in Figure 3-5 of the TIA (Appendix D).

4.1.2 Impact Analysis and Mitigation Measures

Methodology and Significance Thresholds

Methodology

The potential impact of the project during the AM and PM peak hours was evaluated based on analysis of existing and future operating conditions at the nine study intersections under the following scenarios:

- Existing Traffic Conditions
- Existing Plus Project Traffic Conditions
- Year 2020 Traffic Conditions
- Year 2020 Plus Project Traffic Conditions

Since the project is the implementation of “Complete Streets” improvements along Alamitos Avenue, the project would not generate any additional vehicular trips. As such, Existing Plus Project traffic volumes are identical to the Existing traffic volumes, and Year 2020 Plus Project traffic volumes are identical to the Year 2020 traffic volumes.

In conformance with the City of Long Beach requirements, AM and PM peak hour operating conditions for the study intersections were evaluated in Traffix using the Intersection Capacity Utilization (ICU) methodology for signalized intersections. In addition, an operations assessment was completed at the study intersections using Synchro 9.0 and the Highway Capacity Manual 2010 (HCM 2010) methodology. These capacity analysis procedures (ICU and HCM), described in more detail in the TIA (Appendix D), were utilized to estimate future volume-to-capacity relationships and service level characteristics. The capacity of signalized intersections along Alamitos Avenue, between 6th Street and Ocean Boulevard, takes into account supportive Intelligent Transportation System (ITS) measures, which were assumed to improve capacity by ten percent; this assumption is consistent with that experienced in other jurisdictions with Adaptive Traffic Control System (ATCS)/ITS programs and is

consistent with the capacity enhancement assumed as part of the Douglas Park Area-Wide Adaptive Signal Control project (City of Long Beach 2009).

YEAR 2020 TRAFFIC VOLUMES

As discussed in Section 3, *Environmental Setting*, the future year scenario assumes a one percent annual growth rate factor from Year 2016 traffic volumes for Year 2020 Conditions. The ambient traffic growth factor is intended to include unknown and future cumulative projects in the project area, as well as account for regular growth in traffic volumes due to the development of projects outside the project area. The ambient growth factor of one percent per year is generally consistent with the background traffic growth estimates contained in the most current Congestion Management Program for Los Angeles County and was approved by City of Long Beach staff.

In addition, the 26 planned and pending projects shown in Table 3 of Section 3, *Environmental Setting*, were included in the Year 2020 traffic volume scenario. The TIA assumes that all of these cumulative projects would be developed and operational when the proposed project would be operational. This is the most conservative, worst-case approach, since the exact timing of each cumulative project is uncertain. In addition, impacts for these cumulative projects would likely be, or have been, subject to mitigation measures, which could reduce potential impacts. Under this analysis, however, those mitigation measures are not considered. The 26 cumulative projects would generate a combined total of 44,145 daily trips, 3,338 AM peak hour trips (1,397 inbound and 1,941 outbound), and 3,645 PM peak hour trips (1,958 inbound and 1,687 outbound) on a typical weekday.

Roadway network changes in the downtown area were applied to the Year 2020 cumulative background setting. The roadway network changes include the conversion of 7th Street and 6th Street to a two-way roadway west of Atlantic Avenue; the conversion of these two streets from one-way flow to two-way traffic flow west to Alamitos Avenue was recently completed by the City. These recent and planned improvements are included in the cumulative traffic setting.

QUEUING ANALYSIS

For informational purposes, a Synchro queuing evaluation was prepared for the northbound and southbound left-turn and right-turn pockets along Alamitos Avenue, between 7th Street and Ocean Boulevard, with proposed project improvements to validate the adequacy of the stacking/storage lengths. The queuing evaluation was conducted based on Existing Plus Project and Year 2020 Cumulative Plus Project traffic settings and utilizes the *Synchro 9.0/SimTraffic 95th* percentile delay methodology.

MULTIMODAL TRAFFIC

Consistent with the City of Long Beach Mobility Element, a detailed MMLOS evaluation for the project was conducted in the TIA. The MMLOS objectives are to evaluate the adequacy of existing motorist, transit, bicycle and/or pedestrian users along the Alamitos Avenue corridor within the project site. The MMLOS evaluation considers LOS for eight mode users of streets, roads, and highways: Motorists, pedestrians, bicyclists, children, persons with disabilities, seniors, movers of commercial goods, and users of public transportation. Movers of commercial goods were omitted from the multimodal traffic analysis because Alamitos Avenue is not classified as a truck route. LOS for the motorist mode was determined using HCS (Highway Capacity Software) 2010 Street software, which is based on the 2010

HCM. The remaining seven mode users' LOS were based on a combination of *Fort Collins* methodology and the *Florida Department of Transportation 2002 Quality / Level of Service Handbook* (Appendix D).

Significance Thresholds

Impacts related to transportation and circulation would be potentially significant if development facilitated by the project would:

1. Conflict with an applicable plan, ordinance, or policy establishing a measure of effectiveness for the performance of a circulation system, taking into account all modes of transportation, including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways, and freeways, pedestrian and bicycle paths, and mass transit
2. Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways
3. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks
4. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)
5. Result in inadequate emergency access
6. Conflict with adopted policies, plans, or programs regarding public transit, bikeways, or pedestrian facilities, or otherwise substantially decrease the performance or safety of such facilities

The Initial Study for the project (Appendix A) determined that the project would have less than significant impacts with respect to thresholds 3, 5, and 6; therefore, thresholds related to these topics are not discussed further in this EIR.

According the City of Long Beach, LOS D is the minimum acceptable condition that should be maintained during the peak commute hours. The current LOS is the acceptable condition if the existing LOS is worse than LOS D (i.e. LOS E of F). Impacts to local and regional transportation systems are considered significant if:

- The project causes a study intersection to deteriorate from LOS D to LOS E or F. The City of Long Beach considers LOS D (ICU = 0.801 - 0.900) to be the minimum acceptable LOS for all intersections; or
- The project increases traffic demand at the study intersection by 2 percent of capacity (ICU increase ≥ 0.020), causing or worsening LOS E or F (ICU > 0.901) when an intersection is operating LOS E or F in the baseline condition.

a Impact Analysis

THRESHOLD 1 - CONFLICT WITH AN APPLICABLE PLAN, ORDINANCE OR POLICY ESTABLISHING MEASURES OF EFFECTIVENESS FOR THE PERFORMANCE OF THE CIRCULATION SYSTEM, TAKING INTO ACCOUNT ALL MODES OF TRANSPORTATION, INCLUDING MASS TRANSIT AND NON-MOTORIZED TRAVEL AND RELEVANT COMPONENTS OF THE CIRCULATION SYSTEM, INCLUDING BUT NOT LIMITED TO INTERSECTIONS, STREETS, HIGHWAYS, AND FREEWAYS, PEDESTRIAN AND BICYCLE PATHS, AND MASS TRANSIT

THRESHOLD 2 - CONFLICT WITH AN APPLICABLE CONGESTION MANAGEMENT PROGRAM, INCLUDING, BUT NOT LIMITED TO, LEVEL OF SERVICE STANDARDS AND TRAVEL DEMAND MEASURES, OR OTHER STANDARDS ESTABLISHED BY THE COUNTY CONGESTION MANAGEMENT AGENCY FOR DESIGNATED ROADS OR HIGHWAYS

Impact T-1 THE PROJECT WOULD RESTRICT TRAVEL LANES, THEREBY REDUCING CAPACITY FOR VEHICLE TRAFFIC AND SLOWING TRAFFIC FLOW AT INTERSECTIONS ALONG ALAMITOS AVENUE. UNDER THE ICU METHOD OF ANALYSIS, THE PROJECT WOULD RESULT IN EXCEEDANCES OF THE CITY'S LOS STANDARD AT THREE OF NINE STUDY INTERSECTIONS. UNDER THE HCM METHOD OF ANALYSIS, THE PROJECT WOULD NOT RESULT IN EXCEEDANCES OF THE CITY'S LOS STANDARD AT ANY OF THE NINE STUDY INTERSECTIONS. FURTHERMORE, THE PROJECT WOULD DECREASE THE OVERALL MMLOS OF THIS SEGMENT OF ALAMITOS AVENUE; HOWEVER, ALTHOUGH THE MOBILITY OF THE MOTORIST WOULD BE REDUCED, THE MOBILITY OF THE BICYCLIST WOULD BE IMPROVED. NONETHELESS, BECAUSE THE PROJECT WOULD RESULT IN EXCEEDANCES OF THE CITY'S LOS STANDARDS USING THE ICU METHOD OF ANALYSIS, IMPACTS WOULD BE SIGNIFICANT AND UNAVOIDABLE.

In conformance with the City of Long Beach requirements, AM and PM peak hour operating conditions were evaluated using the ICU methodology for the signalized intersections. In addition, an operations assessment using the HCM methodology was completed at signalized and unsignalized intersections. The ICU methodology evaluates LOS in terms of volume to capacity ratios, while the HCM methodology evaluates LOS in terms of control delay, which is a measure of the increase in travel time due to traffic signal control, driver discomfort, and fuel consumption. The ICU methodology is included in this analysis because it is required by the City of Long Beach and the HCM methodology is included for informational purposes.

As shown in Table 6, all intersections evaluated using the ICU method of analysis currently operate at an acceptable service level (LOS D or better), with existing traffic volumes and current street geometry. Five of the study intersections would continue to operate at an acceptable service level with the proposed new street geometry under Existing Plus Project traffic conditions (Alamitos Avenue at 6th Street, 5th Street, 3rd Street, 1st Street, and Ocean Boulevard). As shown in Table 6, LOS at the three remaining intersections (Alamitos Avenue at 7th Street, Alamitos Avenue at 4th Street, and Alamitos Avenue at Broadway) would be reduced to LOS E during the PM peak hour. This would be a significant impact according to City criteria.

Table 6 Existing Plus Project Intersection Capacity Analysis (ICU Methodology)

Key Intersections	Time Period	(1) Existing Traffic Conditions		(2) Existing Plus Project Traffic Conditions[1]		(3) Significant Impact	
		ICU	LOS	ICU	LOS	ICU	Yes/No
1. Alamitos Avenue at 7th Street	AM	0.825	D	0.825	D	0.000	No
	PM	0.763	C	**0.975**	**E**	**0.212**	**Yes**
2. Alamitos Avenue at 6th Street	AM	0.502	A	0.581	A	0.079	No
	PM	0.664	B	0.822	D	0.158	No
3. Alamitos Avenue at 5th Street	AM	0.427	A	0.547	A	0.120	No
	PM	0.446	A	0.599	A	0.153	No
4. Alamitos Avenue at 4th Street	AM	0.657	B	0.733	C	0.076	No
	PM	0.742	C	**0.921**	**E**	**0.179**	**Yes**
5. Alamitos Avenue at 3rd Street	AM	0.853	D	0.846	D	-0.007	No
	PM	0.577	A	0.706	C	0.129	No
6. Alamitos Avenue at Broadway	AM	0.713	C	0.613	B	-0.100	No
	PM	0.867	D	**0.928**	**E**	**0.061**	**Yes**
7. Alamitos Avenue at 1st Street	AM	0.573	A	0.473	A	-0.100	No
	PM	0.467	A	0.628	B	0.061	No
8. Alamitos Avenue at Medio Street[2]	AM	–	–	–	–	–	–
	PM	–	–	–	–	–	–
9. Alamitos Avenue/Shoreline Drive at Ocean Boulevard	AM	0.779	C	0.679	B	-0.100	No
	PM	0.854	D	0.754	C	-0.100	No

Note: LOS = Level of Service, please refer to Table 4 for the LOS definitions (ICU method).

[1] Alamitos Avenue, between 6th Street and Ocean Boulevard, includes a ten percent reduction (0.10) to account for the installation of support ITS/ATCS measures to improve efficient of traffic signals along this corridor.

[2] Alamitos Avenue at Medio Street is a stop controlled (unsignalized) intersection and the level of service results can be found in Table 7.

Source: LLG 2016

As shown in Table 7, all nine study intersections currently operate at an acceptable service level (LOS D or better) based on the HCM method of analysis, with existing traffic volumes and street geometry. Under Existing Plus Project conditions, all nine study intersections would continue to operate at acceptable service levels with the proposed new street geometry, based on the HCM method of analysis. Impacts would be less than significant based on the HCM method of analysis.

Table 7 Existing Plus Project Intersection Capacity Analysis (HCM Methodology)

Key Intersections	Time Period	(1) Existing Traffic Conditions HCM (s/v)	(1) Existing Traffic Conditions LOS	(2) Existing Plus Project Traffic Conditions1 HCM (s/v)	(2) Existing Plus Project Traffic Conditions1 LOS	(3) Significant Impact Increase (s/v)	(3) Significant Impact Yes/No
1. Alamitos Avenue at 7th Street	AM	24.8	C	24.9	C	0.1	No
	PM	22.3	C	26.3	C	4.0	No
2. Alamitos Avenue at 6th Street	AM	6.5	A	14.8	B	8.3	No
	PM	14.3	B	15.2	B	0.9	No
3. Alamitos Avenue at 5th Street	AM	3.3	A	6.8	A	3.5	No
	PM	4.0	A	4.5	A	0.5	No
4. Alamitos Avenue at 4th Street	AM	16.4	B	20.4	C	4.0	No
	PM	11.7	B	14.2	B	2.5	No
5. Alamitos Avenue at 3rd Street	AM	7.4	A	14.2	B	6.8	No
	PM	6.0	A	9.8	A	3.8	No
6. Alamitos Avenue at Broadway	AM	15.4	B	18.8	B	3.4	No
	PM	22.4	C	30.2	C	7.8	No
7. Alamitos Avenue at 1st Street	AM	4.8	A	4.1	A	0.0[1]	No
	PM	6.3	A	8.4	A	2.1	No
8. Alamitos Avenue at Medio Street[2]	AM	10.6	B	13.3	B	2.7	No
	PM	9.5	A	10.5	B	1.0	No
9. Alamitos Avenue/Shoreline Drive at Ocean Boulevard	AM	40.4	D	40.4	D	0.0	No
	PM	43.3	D	43.3	D	0.0	No

Note: LOS = Level of Service, please refer to Table 7 for the LOS definitions (HCM method); s/v = seconds per vehicle (delay).

[1] Theoretical negative increase, which is possible with HCM calculations, is denoted as an increase of 0.0 s/v.

Source: LLG 2016

In order to accommodate proposed improvements, the project would impact turn-pocket lengths and storage at some intersections. For informational purposes, Table 8 summarizes the results of the queuing evaluation conducted by LLG using *Synchro 9.0/ Sim Traffic* for Existing Plus Project traffic conditions. As shown in Table 8, with implementation of the proposed project, Alamitos Avenue would generally provide adequate storage in the left- and right-turn lanes at nine intersections under existing traffic conditions (LLG 2016). However, the northbound left-turn pockets at Alamitos Avenue/4th Street and Alamitos Avenue/1st Street, the northbound right-turn pocket at Alamitos Avenue/Broadway, and the southbound left-turn pocket at Alamitos Avenue/3rd Street would not be able to fully accommodate the projected queue lengths due to existing roadway constraints.

Table 8 Queuing Evaluation for Existing Plus Project Traffic Conditions

Study Intersections	Existing Plus Project Traffic Conditions		Control Queue[1] (feet)	Existing/ Recommended Storage Length (feet)
	AM Peak Hour Queue (feet)	PM Peak Hour Queue (feet)		
1. Alamitos Avenue at 7th Street				
Northbound Left-Turn	153	221	221	1,452
Northbound Right-Turn	153	149	153	155
2. Alamitos Avenue at 6th Street				
Northbound Left-Turn	N/A[3]	N/A[2]	N/A[2]	604
Northbound Right-Turn	22	58	58	65
Southbound Left-Turn	22	115	115	604
3. Alamitos Avenue at 5th Street				
Northbound Left-Turn	54	67	67	602
Southbound Left-Turn	30	92	92	602
4. Alamitos Avenue at 4th Street				
Northbound Left-Turn	143	124	143	1,155
Southbound Left-Turn	160	263	263	1,552
5. Alamitos Avenue at 3rd Street				
Northbound Left-Turn	270	267	270	852
Northbound Right-Turn	37	154	154	1,606
Southbound Left-Turn	101	150	150	1,105
6. Alamitos Avenue at Broadway				
Northbound Right-Turn	66	159	159	607
Southbound Left-Turn	38	150	150	702
7. Alamitos Avenue at 1st Street				
Northbound Left-Turn	37	91	131	605
Southbound Right-Turn	27	47	47	110
9. Alamitos Avenue/ Shoreline Drive at Ocean Boulevard				
Southbound Left-Turn	41	43	43	60
Southbound Right-Turn	77	34	77	80

[1] Maximum queue length is the higher of the two peak hour queue lengths

[2] The north-bound left-turn would be implemented in future years (it is included in Year 2020 analysis) as part of the conversion of 6th Street and 7th Street from one-way traffic flow to two-way traffic flow as planned by the City of Long Beach.

Source: LLG 2016

Table 9 summarizes the results of the MMLOS evaluation for Existing and Existing Plus Project conditions. The first column (1) provides the minimum acceptable LOS for each user group, the second column (2) presents the calculated LOS for each user group, and the third column (3) presents the relationship between the calculated LOS and acceptable LOS expressed as percentage; for example, 100 percent means that the calculated LOS entirely meets acceptable LOS standards. As shown in Table 9, the segment of Alamitos Avenue within the project site currently meets 67 percent of the criteria for a complete street.

Table 9 Existing and Existing Plus Project Multimodal LOS Evaluation

User Groups		Minimum Acceptable LOS (1)	Calculated LOS (2) Existing	Calculated LOS (2) Existing Plus Project	Percent Conformance (3) Existing	Percent Conformance (3) Existing Plus Project
Motorists		D	E	F	50%	0%
Transit Passengers		C	D	D	67%	67%
Bicyclists		C	D	C	67%	100%
Pedestrians		C	C	C	100%	100%
Children					100%	100%
	a.	Are adequately marked/ controlled school crossings provided as needed?			100%	100%
	b.	Does the street meet the agency's design and lighting policies			100%	100%
Persons with Disabilities Seniors					83%	83%
	a.	Are there accessible routes on both sides of the street?			100%	100%
	b.	Are the street crossings accessible?			100%	100%
	c.	Are the traffic signals accessible?			100%	100%
	d.	Are there sufficient on-street parking spaces?			100%	100%
	e.	Are there sufficient accessible passenger loading zones?			0%	0%
	f.	Are bus stops accessible?			100%	100%
Movers of Commercial Goods[1]	a.	Are streets designed to accommodate trucks?			NA	NA
	b.	Are there adequate truck routes for through trucks here or nearby?				
	c.	Are there adequate on-street loading zones/off-street loading docks?				
Overall Assessment:					**67%**	**64%**

[1] As noted under "Methodology," Movers of Commercial Goods, were omitted from this assessment since Alamitos Avenue is not classified as a truck route.

Source: LLG 2016

Based on a multimodal evaluation of transportation impacts, the project would decrease the LOS of Alamitos Avenue for motorists, but would increase LOS for bicyclists. The project would not affect the other five mode users evaluated: transit passengers, pedestrians, children, persons with disabilities, and seniors. Although the overall service level grade would not change for the pedestrian (as indicated in Table 9) the project would benefit pedestrian users by adding a striped bike lane and increasing the setback between pedestrians and vehicles, reducing potential conflicts between pedestrians and vehicles (Appendix C and Appendix D).

As shown in Table 9, under the Existing Plus Project condition, the segment of Alamitos Avenue within the project would meet 64 percent of the overall criteria for a complete street. However, although the mobility of the motorist would be reduced, the mobility of the bicyclist would be improved. As demonstrated in Table 9, the project would reduce the motorist LOS for this segment of Alamitos

Avenue from LOS E, which is below the minimum acceptable LOS D, to LOS F, while improving bicyclist LOS from LOS D to LOS C, which is the minimum acceptable LOS standard for bicyclists.

The project would significantly impact traffic flow based on the ICU method of analysis at three intersections (Alamitos Avenue at 7th Street, Alamitos Avenue at 4th Street, and Alamitos Avenue at Broadway) during the PM peak hours. However, implementation of the proposed project would allow for a more balanced, multimodal transportation network that meets the needs of all users of streets, roads, and highways, including motorist, pedestrians, and bicyclists. As noted in the City of Long Beach Mobility Element, some cities are adopting more flexible policies to solving traffic problems. For example, some communities have started accepting a lower (worse) automobile LOS standard in their downtowns and in urban neighborhoods or along transit corridors. By doing so, these cities are increasing capacity for other modes like transit and bikes.

Lastly, as indicated in the City's Bicycle Master Plan, improving the safety and connectivity of the City's bicycle network reduces vehicle miles traveled (VMT) by replacing vehicular trips with bicycle trips. Reducing VMT has a measurable impact on reducing human generated greenhouse gases (GHGs) in the atmosphere that contribute to climate change. While the City's current significant impact criteria evaluates local and regional transportation systems based on adopted LOS standards, the State recently passed Senate Bill (SB) 743, which adds Chapter 2.7, Modernization of Transportation Analysis for Transit-Oriented Infill Projects, to Division 13 (Section 21099) of the Public Resources Code. A key provision of SB 743 includes replacing the measurement of automobile delay (LOS standards) with VMT as a metric that can be used for measuring environmental impacts. Under SB 743, the focus of the environmental impacts of transportation shift from driver delay to reduction of greenhouse gas (GHG) emissions, creation of multimodal networks, and promotion of a mix of land uses, and LOS standards become local policy thresholds as adopted among individual agencies. Although the project is not a transit-oriented infill project, it is consistent with the goals of SB 743 to reduce VMT, as it improves mobility for bicyclists and pedestrians.

Mitigation Measures

While no feasible mitigation measures are available, Section 6, *Alternatives,* includes an evaluation of three alternatives that would reduce project impacts.

Significance after Mitigation

Under the ICU method of analysis, impacts to LOS at three of nine study intersections would be significant and unavoidable.

THRESHOLD 4 SUBSTANTIALLY INCREASE HAZARDS DUE TO A DESIGN FEATURE (E.G., SHARP CURVES OR DANGEROUS INTERSECTIONS) OR INCOMPATIBLE USES (E.G., FARM EQUIPMENT).

Impact T-2 THE PROJECT WOULD REPLACE A CLASS III BIKE ROUTE WITH A CLASS IV DIRECTIONAL SEPARATED BIKEWAY THAT WOULD PROVIDE A DESIGNATED LANE FOR BIKE USE AND REDUCE CONFLICTS BETWEEN BICYCLISTS AND VEHICLES. IMPACTS WOULD BE BENEFICIAL.

The project would upgrade the roadway in the project site from a Class III bike route, which allows for shared road use by bicycles and vehicles, to a Class IV directional separated bikeway, which provides a designated lane for bike use. According to the City's Bicycle Master Plan Update (2017), a before and after study in Montreal of physically separated bikeways indicated that this type of facility can reduce

collisions between bicyclists and vehicles by 74 percent. Other studies have found a range in crash reductions from eight percent to 94 percent when physically separated bikeways are implemented (City of Long Beach 2017). As noted under Impact T-1, the project would benefit pedestrians users by increasing the setback between pedestrians and vehicles, reducing potential conflicts between pedestrians and vehicles and improving safety (Appendix C and Appendix D). By providing a designated lane, the project would reduce conflicts between bicyclists, pedestrians, and vehicles, reducing hazards and providing a beneficial impact.

Mitigation Measures

Mitigation would not be required.

Significance after Mitigation

Impacts would be beneficial without mitigation.

Cumulative Impacts

Planned development in the project area, listed in Table 3 in Section 3.3, *Cumulative Development*, would increase traffic on area roadways. As discussed under Impact T-1 above, implementation of the project would have significant and unavoidable impacts to vehicle circulation at a number of study intersections under Existing Plus Project conditions. As shown in Table 10, under Year 2020 Cumulative, four intersections are forecast to operate at unacceptable service levels during the AM and/or PM peak hours based on the ICU method of analysis. Under Year 2020 Cumulative Plus Project conditions, the project would have a cumulatively considerable impact based on the City's significance criteria at five intersections. However, the project would improve traffic conditions at Alamitos Avenue/ Shoreline Drive and Ocean Boulevard from LOS E to LOS D. Nonetheless, based on the ICU method of analysis, the project would have significant impacts to vehicle traffic under cumulative traffic conditions. Therefore, cumulative impacts would be significant based on the ICU method of analysis.

Table 10 Year 2020 Cumulative Plus Project Intersection Capacity Analysis (ICU Methodology)

Key Intersections	Time Period	(1) Existing Traffic Conditions		(2) Year 2020 Cumulative Traffic Conditions		(3) Year 2020 Cumulative Plus Project Traffic Conditions[1]		(4) Significant Impact	
		ICU	LOS	ICU	LOS	ICU	LOS	ICU	Yes/ No
1. Alamitos Avenue at 7th Street	AM	0.825	D	**1.004**	**F[2]**	1.004	**F[2]**	0.000	No
	PM	0.763	C	**1.253**	**F[2]**	1.333	**F[2]**	**0.080**	**Yes**
2. Alamitos Avenue at 6th Street	AM	0.502	A	0.626	B[2]	0.881	D[2]	0.255	No
	PM	0.664	B	0.663	B[2]	**0.981**	**E[2]**	**0.318**	**Yes**
3. Alamitos Avenue at 5th Street	AM	0.427	A	0.527	A	0.744	C	0.217	No
	PM	0.446	A	0.568	A	0.839	D	0.271	No
4. Alamitos Avenue at 4th Street	AM	0.657	B	0.787	C	**0.957**	**E**	**0.170**	**Yes**
	PM	0.742	C	0.893	D	**1.191**	**F**	**0.298**	**Yes**
5. Alamitos Avenue at 3rd Street	AM	0.853	D	**1.014**	**F**	**1.072**	**F**	**0.058**	**Yes**
	PM	0.577	A	0.770	C	**0.949**	**E**	**0.179**	**Yes**
6. Alamitos Avenue at Broadway	AM	0.713	C	0.859	D	0.806	D	-0.053	No
	PM	0.867	D	**0.991**	**E**	**1.153**	**F**	0.162	**Yes**
7. Alamitos Avenue at 1st Street	AM	0.573	A	0.765	C	0.665	B	-0.100	No
	PM	0.467	A	0.701	C	0.812	D	0.111	No
8. Alamitos Avenue at Medio Street[3]	AM	–	–	–	–	–	–	–	–
	PM	–	–	–	–	–	–	–	–
9. Alamitos Avenue/Shoreline Drive at Ocean Boulevard	AM	0.779	C	**0.964**	**E**	0.864	D	-0.100	No
	PM	0.854	D	**0.982**	**E**	0.882	D	-0.100	No

Note: LOS = Level of Service, please refer to Table 4 for the LOS definitions (ICU method).

[1] Alamitos Avenue, between 6th Street and Ocean Boulevard, includes a ten percent reduction (0.10) to account for the installation of support ITS/ATCS measures to improve efficient of traffic signals along this corridor.

[2] Includes the conversion of 6th Street and 7th Street from one-way traffic flow to two-way traffic flow as planned by the City of Long Beach. The conversion is assumed as a part of the Year 2020 cumulative traffic conditions/traffic network per the direction of City staff.

[3] Alamitos Avenue at Medio Street is a stop controlled intersection and the level of service results can be found in Table 11.

Source: LLG 2016

As shown in Table 11, all nine intersections currently operate at an acceptable service level (LOS D or better) under Year 2020 Cumulative conditions based on the HCM method of analysis. Under Year 2020 Cumulative Plus Project conditions, the project would have a cumulatively considerable impact based on the City's significance criteria at two intersections. Therefore, cumulative impacts would be significant based on the HCM method of analysis.

Table 11 Year 2020 Cumulative Plus Project Intersection Capacity Analysis (HCM Methodology)

Key Intersections	Time Period	(1) Existing Traffic Conditions HCM (s/v)	LOS	(2) Year 2020 Cumulative Traffic Conditions HCM (s/v)	LOS	(3) Year 2020 Cumulative Plus Project Traffic Conditions[1] HCM (s/v)	LOS	(4) Significant Impact HCM (s/v)	Yes/ No
1. Alamitos Avenue at 7th Street	AM	24.8	C	36.3	D[1]	36.4	D[1]	0.1	No
	PM	22.3	C	49.5	D[1]	**69.6**	**E[1]**	**20.1**	**Yes**
2. Alamitos Avenue at 6th Street	AM	6.5	A	6.4	A[1]	6.8	A[1]	0.4	No
	PM	14.3	B	4.8	A[1]	12.9	B[1]	8.1	No
3. Alamitos Avenue at 5th Street	AM	3.3	A	5.0	A	5.4	A	0.4	No
	PM	4.0	A	3.7	A	2.7	A	0.02	No
4. Alamitos Avenue at 4th Street	AM	16.4	B	13.2	B	17.7	B	4.5	No
	PM	11.7	B	13.9	B	**78.3**	**E**	**64.4**	**Yes**
5. Alamitos Avenue at 3rd Street	AM	7.4	A	8.2	A	22.4	C	14.2	No
	PM	6.0	A	2.0	A	16.0	B	14.0	No
6. Alamitos Avenue at Broadway	AM	15.4	B	16.0	B	17.2	B	1.2	No
	PM	22.4	C	27.3	C	38.9	D	11.6	No
7. Alamitos Avenue at 1st Street	AM	4.8	A	7.2	A	7.3	A	0.1	No
	PM	6.3	A	7.9	A	12.4	B	4.5	No
8. Alamitos Avenue at Medio Street[3]	AM	10.6	B	13.3	B	21.5	C	8.2	No
	PM	9.5	A	11.5	B	14.7	B	3.2	No
9. Alamitos Avenue/Shoreline Drive at Ocean Boulevard	AM	40.4	D	49.4	D	49.4	D	0.0	No
	PM	43.3	D	44.0	D	47.5	D	3.5	No

Note: LOS = Level of Service, please refer to Table 5 for the LOS definitions (HCM method); s/v = seconds per vehicle (delay).

[1] Alamitos Avenue, between 6th Street and Ocean Boulevard, includes a ten percent reduction (0.10) to account for the installation of support ITS/ATCS measures to improve efficient of traffic signals along this corridor.

[2] Theoretical negative increase, which is possible with HCM calculations, is denoted as an increase of 0.0 s/v.

Source: LLG 2016

As discussed under Impact T-1, implementation of the project under existing conditions would result in insufficient queuing lengths at four turn-pockets. For informational purposes, Table 12 provides the queuing evaluation results for both Existing Plus Project and 2020 Cumulative Plus Project traffic conditions. Under 2020 Cumulative Plus Project conditions, the project would result in insufficient queuing lengths at the same four turn-pockets- and the maximum queue lengths for eight intersections would be increased.

Table 12 Queuing Evaluation for Year 2020 Cumulative Plus Project TrafficConditions

Study Intersections	Existing Plus Project Traffic Conditions		2020 Cumulative Plus Project Traffic Conditions		Maximum Queue Length[1] (feet)	Existing/ Recommended Storage Length (feet)
	AM Peak Hour Queue (feet)	PM Peak Hour Queue (feet)	AM Peak Hour Queue (feet)	PM Peak Hour Queue (feet)		
Alamitos Avenue at 7th Street						
Northbound Left-Turn	153	221	218	160	221	145[2]
Northbound Right-Turn	153	149	144	144	153	155
Alamitos Avenue at 6th Street						
Northbound Left-Turn	N/A[3]	N/A[3]	182	120	182*	60[4]
Northbound Right-Turn	22	58	61	40	61*	65
Southbound Left-Turn	22	115	22	85	115	60[4]
Alamitos Avenue at 5th Street						
Northbound Left-Turn	54	67	129	56	129*	60[2]
Southbound Left-Turn	30	92	45	76	92	60[2]
Alamitos Avenue at 4th Street						
Northbound Left-Turn	143	124	226	150	226*	115[5]
Southbound Left-Turn	160	263	195	279	279*	155[2]
Alamitos Avenue at 3rd Street						
Northbound Left-Turn	270	267	315	301	301*	85[2]
Northbound Right-Turn	37	154	130	156	156*	160[6]
Southbound Left-Turn	101	150	120	206	206*	110[5]
Alamitos Avenue at Broadway						
Northbound Right-Turn	66	159	136	164	164*	60[7]
Southbound Left-Turn	38	150	45	79	150	70[2]
Alamitos Avenue at 1st Street						
Northbound Left-Turn	37	91	91	131	131	60[5]
Southbound Right-Turn	27	47	47	23	47	110
Alamitos Avenue/ Shoreline Drive at Ocean Boulevard						
Southbound Left-Turn	41	43	58	58	58*	60
Southbound Right-Turn	77	34	77	63	77	80

[1] Maximum queue length is the higher of the two peak hour queue lengths.

[2] Maintaining the existing storage length is recommended; however, the two-way left-turn will be able to accommodate any spillover queues if necessary.

[3] The north-bound left-turn would be implemented in future years (it is included in Year 2020 analysis) as part of the conversion of 6th Street and 7th Street from one-way traffic flow to two-way traffic flow as planned by the City of Long Beach.

[4] A minimum storage length of 60 feet is recommended; however, the two-way left-turn lane will be able to accommodate any spillover queues if necessary.

[5] Maintaining the existing storage length is recommended. Although it does not fully accommodate the projected queue lengths, existing roadway conditions restrict the possibility of lengthening the turn pocket.

[6] Construction of a 160-foot storage length would require the removal of on-street parking.

[7] A minimum storage length of 60 feet is recommended. Although it does not fully accommodate the projected queue lengths, existing roadway conditions restrict the possibility of lengthening the turn pocket.

Mitigation Measures

While no feasible mitigation measures are available, Section 6, *Alternatives,* includes an evaluation of three alternatives that would reduce cumulative impacts.

Significance after Mitigation

Cumulative impacts to LOS of five intersections under the ICU method of analysis and two intersections under the HCM method analysis would be significant and unavoidable.