

2.4 Traffic and Transportation/Pedestrian and Bicycle Facilities

This section discusses the proposed project's impacts on traffic and circulation, both during construction (construction impacts) and after completion of the project (long-term or operational impacts).

2.4.1 Regulatory Setting

Caltrans, as assigned by the Federal Highway Administration (FHWA), directs that full consideration should be given to the safe accommodation of pedestrians and bicyclists during the development of Federal-aid highway projects (see 23 Code of Federal Regulations [CFR] 652). It further directs that the special needs of the elderly and the disabled must be considered in all Federal-aid projects that include pedestrian facilities. When current or anticipated pedestrian and/or bicycle traffic presents a potential conflict with motor vehicle traffic, every effort must be made to minimize the detrimental effects on all highway users who share the facility.

In July 1999, the U.S. Department of Transportation (USDOT) issued an Accessibility Policy Statement pledging a fully accessible multimodal transportation system. Accessibility in federally assisted programs is governed by the USDOT regulations (49 CFR 27) implementing Section 504 of the Rehabilitation Act (29 United States Code 794). The FHWA has enacted regulations for the implementation of the 1990 Americans with Disabilities Act (ADA), including a commitment to build transportation facilities that provide equal access for all persons. These regulations require application of the ADA requirements to federal-aid projects, including Transportation Enhancement Activities.

2.4.2 Affected Environment

This section is based on the Traffic Volume Report (March 2018), Traffic Study Report (August 2018), Addendum to the Traffic Study Report (January 2019), and the Community Impact Assessment (March 2019) for the project.

2.4.2.1 Existing Facilities

The Interstate 5 (I-5)/El Toro Road Interchange configuration is a mix of loop and direct ramp configurations: the southeast quadrant contains a direct exit off-ramp from northbound I-5 to El Toro Road and a loop on-ramp from a controlled intersection at El Toro Road to northbound I-5; the northeast quadrant contains a direct on-ramp from El Toro Road to northbound I-5; the southwest quadrant contains a direct on-ramp from El Toro Road to southbound I-5; and the northwest quadrant contains a hook ramp off-ramp from southbound I-5 to Avenida De la Carlota and a hook ramp on-ramp from Avenida De la Carlota to the southbound I-5. All ramp termini incorporate controlled free-right movements.

The I-5/El Toro Road Interchange is bounded by the cities of Laguna Hills, Lake Forest, and Laguna Woods in Orange County. The project limits extend from I-5 Post Mile (PM) 17.8 to PM 19.7 in the north-south direction and includes El Toro Road from Rockfield Boulevard to Paseo de Valencia in the east-west direction. In addition to serving as the primary I-5 access to the adjacent cities, the I-5/El Toro Road Interchange is also the primary access to Five Lagunas, formerly known as the

Laguna Hills Mall, and the adjacent retirement community of Laguna Woods Village (formerly Leisure World). Land uses in the vicinity of the project limits include residential, recreational, commercial, and educational, public facility, and commercial/retail. High demand coupled with short spacing between adjacent local intersections have resulted in heavy traffic congestion during the weekday peak hours, weekends, and holidays.

The I-5 corridor serves as a vital north-south link throughout the State and provides for the interregional, interstate, and international movement of goods and vehicles from the Mexican border south of San Diego to the Oregon state line. It is the major link between San Diego, Orange, and Los Angeles counties.

In the vicinity of the I-5/El Toro Road Interchange, I-5 has five existing general-purpose (GP) lanes, an auxiliary lane, and one High-Occupancy Vehicle (HOV) lane in the northbound direction. A second HOV lane picks up just north of the interchange. In the southbound direction, the existing configuration includes five GP lanes, one auxiliary lane, and two HOV lanes that merge into one just south of the El Toro Road Undercrossing. The outside shoulder varies from 10 feet to 18 feet, and there is a retaining wall separating I-5 from the adjacent westerly frontage road, Avenida De La Carlota. Along I-5, existing soundwalls are generally located throughout the project limits in the northbound direction and north of El Toro Road in the southbound direction.

Sidewalks and pedestrian facilities, including crosswalks, are provided at the El Toro Road/Bridger Road and El Toro Road/Avenida De La Carlota intersections. Dedicated bicycle lanes are not provided through the interchange.

2.4.2.2 Existing Traffic Volumes, Operations, and Demand

The existing traffic volumes are presented in Table 2.4.1, Existing Traffic Volumes. The table provides information on the existing traffic volumes during the AM and PM peak hours on the I-5 mainline, ramps, and local intersections. Because no access point changes or mainline capacity changes are included as part of the Build Alternatives, each Build Alternative used the forecasted traffic volumes.

Peak hour volumes are based on vehicles per hour (vph). As shown, traffic volumes along the I-5 mainline are generally directional where northbound AM peak hours are higher than in the northbound PM peak hour. The reciprocal occurs in the southbound direction. Traffic volumes at various local arterials adjacent to the I-5/El Toro Road Interchange generally experience slightly higher PM peak hour volumes than at the AM peak hour. With respect to ramp volumes, there is an equal distribution of I-5 northbound and southbound volumes entering and exiting I-5 during AM and PM peak hours with exception of the I-5 on-ramps from Lake Forest Drive and El Toro Road.

Forecasted traffic volumes with and without the Build Alternatives (including Design Option B) in 2030 and 2050 are discussed in detail later in Section 2.4.3 Environmental Consequences, in the subsections titled “Build Alternatives 2, and 4” and “No Build Alternative.”

Table 2.4.1: Existing Traffic Volumes

Roadway	County Location	Existing Conditions Peak Hour (2017)	
		AM	PM
I-5 Mainline			
I-5 Northbound	Alicia Pkwy On-Ramp to El Toro Rd Off-Ramp	11,649	9,415
I-5 Northbound	El Toro Rd Off-Ramp to El Toro Rd (Loop) On-Ramp	10,475	8,061
I-5 Northbound	El Toro Rd (Loop) On-Ramp to El Toro Rd On-Ramp	11,276	9,021
I-5 Northbound	El Toro Rd On-Ramp to Lake Forest Dr	12,539	9,451
I-5 Southbound	Lake Forest Dr On-Ramp and Avenida De La Carlota/Paseo De Valencia Off-Ramp	9,583	11,031
I-5 Southbound	Carlota/Valencia Off- Ramp and Carlota/Valencia On-Ramp	7,974	9,725
I-5 Southbound	Carlota/Valencia On- Ramp and El Toro Rd On-Ramp	8,697	10,528
I-5 Southbound	El Toro Rd On- Ramp and Alicia Pkwy Off-Ramp	9,074	11,173
Ramps			
I-5 Northbound	Alicia Pkwy On-Ramp form WB Alicia Pkwy	1,350	1,043
I-5 Northbound	El Toro Rd Off-Ramp	945	1,245
I-5 Northbound	El Toro Rd (Loop) On-Ramp from EB El Toro Rd	801	960
I-5 Northbound	El Toro Rd On-Ramp from WB El Toro Rd	1,242	720
I-5 Northbound	Lake Forest Dr. Off-Ramp	1,100	750
I-5 Southbound	Lake Forest Dr. On Ramp from EB Lake Forest Dr	210	529
I-5 Southbound	El Toro Rd Off-Ramp	1,670	1,528
I-5 Southbound	Hook On-Ramp from WB Carlota	723	803
I-5 Southbound	El Toro Rd On-Ramp from EB El Toro Rd	321	588
I-5 Southbound	Alicia Pkwy Off-Ramp	1,708	2,036
Intersections¹			
I-5 SB Ramps/Paseo De Valencia	Avenida De La Carlota	3,179	3,934
Avenida De La Carlota	El Toro Rd	4,372	6,200
I-5 NB Ramps/ Bridger Road	El Toro Rd	5,419	6,303
Rockfield Blvd	El Toro Rd	4,591	5,808
Paseo De Valencia	El Toro Rd	3,097	4,122
Avenida De La Carlota	Los Alisos Blvd	2,139	2,858

Source: Traffic Study Report (August 2018)
 * AM/PM Volumes are based on Total Approach Volumes
 EB = eastbound
 I-5 = Interstate 5
 NB = northbound
 SB = southbound
 WB = westbound

Basic Freeway Segment Analysis – Level of Service

A basic freeway segment is characterized by various performance measures, including level of service (LOS), density in terms of passenger cars per mile, per lane (pc/mi/ln), average speed, and volume-to-capacity (v/c) or demand volume-to-capacity (d/c) ratio.

The LOS for freeway segments is estimated using the Highway Capacity Manual (HCM) 2016 Basic Freeway Segment analysis method, as shown in Table 2.4.2, Basic Freeway Segment LOS. The freeway mainline analysis was performed using the Highway Capacity Software (HCS) version 7.1 and modeling using Synchro and Sim Traffic Version 10). The results provide density with pc/mi/ln and a LOS for the freeway segments. Each freeway mainline segment evaluation is based upon directional traffic volumes during both the AM and PM peak hours. The basic freeway segment can be characterized by density (passenger cars per mile per lane). These performance measures indicate how well the freeway segment accommodates traffic volumes and flow. The LOS criteria for basic freeway segments are provided in Table 2.4.2.

Table 2.4.2: Basic Freeway Segment LOS

LOS	Density (pc/mi/hr)
A	0.0-11.0
B	11.1-18.0
C	18.1-26.0
D	36.1-35.0
E	35.1-45.0
F	> 45.0

Source: Traffic Study Report (August 2018)
pc/mi/hr = passenger cars/mile/hour

LOS A through D is used to describe increasing density from a level of traffic flow where free-flow speeds are prevalent (LOS A) to a level of traffic flow where speeds begin to decline due to increased density (LOS D). LOS E is where the operation of the freeway reaches its capacity and maneuverability is extremely limited. LOS F is used to define breakdowns in vehicular flow. Breakdowns occur when traffic incidents cause a temporary reduction in the capacity at merge or weaving segments that result in a greater number of vehicles discharged and when the projected peak-hour flow rate exceeds the estimated capacity of the location.

As shown on Table 2.4.3, I-5 between Alicia Parkway and Lake Forest Drive experiences an AM/PM directional travel pattern where the I-5 northbound direction has higher vehicular densities and unacceptable levels of services in the AM peak hour. Northbound I-5 PM peak hour experiences an acceptable level of service. The reciprocal occurs along southbound I-5 where lower vehicular densities occur in AM peak hour and higher in the PM peak hour.

Weaving Analysis – Level of Service

The HCM defines weaving as the crossing of two or more traffic streams traveling in the same general direction along a substantial length of highway without the aid of traffic-control devices. Weaving segments are formed when a merge area is closely followed by a diverge area, or when an on-ramp is closely followed by an off-ramp and the two are joined by an auxiliary lane. Weaving segments require intense lane-changing maneuvers as drivers must access lanes appropriate to their desired exit points.

Table 2.4.3: Existing Basic Freeway Segment LOS

Freeway	No. of Lanes	AM Peak Hour			PM Peak Hour		
		Volume	Density (lc/mi/ln)	LOS	Volume	Density (pc/mi/ln)	LOS
I-5 Northbound							
Alicia Pkwy On-Ramp to El Toro Rd Off-Ramp	7	11,649	39.2	E	9,415	27.6	D
El Toro Rd Off-Ramp to El Toro Rd (Loop) On-Ramp	6	10,475	42.5	E	8,061	28.7	D
El Toro Rd (Loop) On-Ramp to El Toro Rd On-Ramp	6	11,276	*	F	9,021	34.2	D
El Toro Rd On-Ramp to Lake Forest Dr	8	12,539	*	F	9,451	27.2	D
I-5 Southbound							
Lake Forest Dr On-Ramp and Avenida De La Carlota/Paseo De Valencia Off-Ramp	8	9,583	28.3	D	11,031	35.4	E
Carlota/Valencia Off- Ramp and Carlota/Valencia On- Ramp	7	7,974	28.2	D	9,725	39.3	E
Carlota/Valencia On- Ramp and El Toro Rd On- Ramp	6	8,697	32.2	D	10,528	42.9	E
El Toro Rd On- Ramp and Alicia Pkwy Off-Ramp	6	9,074	34.6	D	11,173	*	F

Source: Traffic Study Report (August 2018)

* General purpose and auxiliary lane LOS is based on density (cars/mile/lane) except when the weaving segment V/C ratio is greater than 1.00, which is LOS F.

¹ Density is not calculated for LOS F.

■ indicates unacceptable F conditions.

I-5 = Interstate 5

LOS = level of service

pc/mi/ln = passenger cars per mile per lane as a measure of vehicle density.

A weaving analysis of the existing was conducted using HCS Software and using the existing roadway geometrics in the Study Area. LOS of weaving segments is based on vehicle density (pc/mi/ln), which is computed using the traffic flow rates, free-flow speeds and weaving segment configuration type. The LOS criteria for weaving segments for freeways and collector distributor roads are provided in Table 2.4.4.

Table 2.4.4: Weaving Level of Service

LOS	Freeway Weaving Segment Density (pc/mi/hr)
A	≤ 10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35-43
F	Demand exceeds capacity

Source: Traffic Study Report (August 2018)

pc/mi/hr = passenger cars/per mile/per hour.

Currently, weaving at the I-5/El Toro Road Interchange occurs at three freeway segments: between the northbound I-5 Alicia Parkway on-ramp to the El Toro Road Off-Ramp, the northbound I-5 El Toro Road on-ramp to the Lake Forest Drive off-ramp, and at the southbound I-5 Lake Forest Drive on-ramp to the El Toro Road off-ramp. The northbound Alicia Parkway on-ramp to El Toro Road off-ramp weave

currently operates at an unacceptable LOS where demand exceeds capacity in both AM and PM peak hours. The next northbound weave segment between I-5/EI Toro Road on-ramp to Lake Forest Drive off-ramp experiences a continuation of unacceptable LOS in the AM peak hour, however operates at an acceptable LOS D at in the PM peak hour. Lastly, the southbound I-5 from the Lake Forest Drive on-ramp to the EI Toro Road off-ramp operates at acceptable LOS levels in both AM and PM peak hour. The existing weave analysis based on density and LOS is provided in Table 2.4.5.

Table 2.4.5: Weave Analysis (Existing 2017)

Interchange	Existing			
	AM Peak Hour		PM Peak Hour	
	Density	LOS	Density	LOS
Northbound - I-5 Alicia Pkwy On-ramp to EI Toro Rd Off-Ramp				
Existing Condition - No-Build	-	F	-	F
Northbound - I-5 EI Toro Rd On-Ramp to Lake Forest Dr Off-Ramp				
Existing Condition - No-Build	-	F	32.0	D
Southbound – I-5 Lake Forest Dr On-Ramp to EI Toro Rd Off-Ramp				
Existing Condition - No-Build	32.5	D	38.2	E

Source: Traffic Study Report (August 2018)
 (-) = Demand exceeds capacity
 ■ indicates unacceptable F conditions.
 I-5 = Interstate 5
 LOS = level-of-service
 pc/mi/ln = passenger cars per mile per lane as a measure of vehicle density.

Freeway Ramp Junction Analysis – Level of Service

Peak-hour ramp operations were analyzed using the methodology contained in “Chapter 13 – Freeway Merge and Diverge Segments” of the HCM 2010. This analysis examines the LOS within the ramp influence areas of the freeway. The analysis of the on-ramps examines the impact of merging onto the freeway, while the analysis of the off-ramps examines the impacts of diverging from the freeway. Consistent with HCM 2010 procedures, a single-lane on-ramp that results in a lane addition is not analyzed as a merge area (HCM 2010, p. 25-9). A dual-lane off-ramp that results in a lane drop is analyzed as a major diverge area. Lane additions and major diverge areas are analyzed by means of a capacity analysis at each leg of the lane addition or major diverge area. A summary of the merge, diverge and weaving performance criteria is shown below in Table 2.4.6, Freeway Ramp Junction LOS.

Table 2.4.6: Freeway Ramp Junction LOS

LOS	Density (pc/mi/hr)
A	≤ 10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35-43
F	> 43

Source: Traffic Study Report (August 2018)
 LOS = level-of-service
 pc/mi/hr = passenger cars/per mile/per hour.

Ramps and ramp-freeway junction operation analysis (merge and diverges) are also based on the HCM, specifically the HCM merge, diverge and/or weave analysis methodologies. The ramps and ramp-freeway junction analysis are conducted using HCS software. A ramp consists of three geometric elements of interest: the ramp-freeway junction, the ramp roadway, and the ramp/street junction. They include all of the variables affecting basic freeway segment operation: lane widths, lateral clearances, terrain, driver population and the presence of heavy vehicles. Additional parameters of particular importance to the operations of ramp-freeway junctions include length of acceleration and deceleration lanes, ramp free-flow speed and lane distribution of upstream traffic.

Free-flow speed is an influential factor, because it determines the speed at which entering/merging vehicles enter the acceleration lane and the speed at which exiting/diverging vehicles must enter the ramp. This, in turn, determines the amount of acceleration or deceleration that must take place. Ramp free flow speeds generally vary between 25 and 45 miles per hour (mph). There are three major factors that affect the capacity of a ramp-freeway junction:

1. The capacity of the freeway immediately downstream of an on-ramp or immediately upstream of an off-ramp;
2. The capacity of the ramp roadway, and
3. The maximum flow rate entering the ramp influence area.

Segment density was calculated for each ramp segment; refer to Table 2.4.7, AM/PM Peak-Hour Ramp LOS (Existing). The key factors in the segment density calculation are the capacity (number of lanes) and traffic volumes. Due to the high level of volume, the northbound on-ramp at El Toro Road from eastbound El Toro Road has the highest segment density in the AM peak hour (LOS F), with the southbound on-ramp at El Toro Road from eastbound El Toro Rd showing high density in the PM peak hour (LOS F).

The density and LOS for each of the ramps along I-5 within the Study Area is based on existing traffic volumes. Table 2.3.3 provides a summary of density and LOS along I-5 within the Study Area, based on existing traffic volumes. From northbound and southbound analysis, under existing (2017) conditions, the northbound and southbound ramp junction peak hour LOS varies from C to F. As shown in Table 2.4.7, two on-ramps operate at unacceptable level of Service F during AM and PM peak hour; I-5 northbound on-ramp at the El Toro Road Loop on-ramp from eastbound El Toro Road (AM), and the I-5 southbound on-ramp at the El Toro Road on-ramp from eastbound El Toro Road (PM), respectively.

Intersection Analysis

Traffic operation analyses for arterial components of the I-5/El Toro Road Interchange that include arterial intersections bisecting freeway on and off ramps and other arterial intersection in the immediate vicinity that directly feed into freeway interchange traffic operations were evaluated for levels of service using the 2016 HCM methodology (based on vehicle delay). Table 2.4.8 provides a list of intersections studied. Under the HCM methodology, the intersection LOS were analyzed based on Peak Hour Factor (PHF) – Existing and future PHFs are based on existing traffic counts; saturation flow rates—a base saturation flow rate of 1,900 vehicles per hour—and traffic signal coordination and cycle length.

Table 2.4.7: AM/PM Peak Hour Ramp Junction LOS (Existing)

Segment	Existing			
	AM Peak Hour		PM Peak Hour	
	Density	LOS	Density	LOS
Off-Ramps				
I-5 Northbound - El Toro Rd Off-Ramp	23.1	E	18.7	E
I-5 Northbound – Lake Forest Dr. Off-Ramp	21.2	E	15.7	D
I-5 Southbound - El Toro Rd/Avenida De La Carlota Off-Ramp	18.9	C	21.7	C
I-5 Southbound – Alicia Pkwy Off-Ramp	17.9	C	22.4	C
On-Ramps				
I-5 Northbound – Alicia Pkwy On-Ramp from WB Alicia Pkwy	27.3	E	20.1	D
I-5 Northbound - El Toro Rd (Loop) On-Ramp from EB El Toro Rd	*	F	22.8	C
I-5 Northbound - El Toro Rd On-Ramp from WB El Toro Rd	31.8	E	20.7	C
I-5 Southbound - Lake Forest Dr. On-Ramp from EB Lake Forest Dr.	19.7	C	23.6	C
I-5 Southbound – Hook On-Ramp from Carlota	21.5	C	29.1	D
I-5 Southbound – El Toro Rd On-Ramp from EB El Toro Rd	22.7	C	*	F

Source: Traffic Study Report (August 2018)

*Density is not calculated for LOS F.

■ indicates unacceptable F conditions.

EB = eastbound

I-5 = Interstate 5

LOS = level of service

WB = westbound

Table 2.4.8: Study Intersection Locations

No.	Location	Owner
1	Southbound I-5 Ramps/Avenida De La Carlota/Paseo De Valencia	Caltrans
2	El Toro Road/Avenida De La Carlota	Caltrans
3	Northbound I-5 Ramps/El Toro Road/Bridger Road	Caltrans
4	El Toro Road/Rockfield Blvd	City of Lake Forest
5	El Toro Road/Paseo De La Valencia	City of Laguna Woods
6*	Southbound I-5 Ramps/Avenida De La Carlota	Caltrans

* Proposed ramp location

Caltrans = California Department of Transportation

I-5 = Interstate 5

The LOS for interrupted flow (controlled intersections) is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption and increased travel time. The LOS is evaluated based on average control delay per vehicle for signalized and unsignalized intersections using HCM methodologies. Control delay is the portion of total delay attributed to the intersection controller (signal, stop, or yield).

Signalized intersections were analyzed using Synchro 10. The LOS criteria is provided in Table 2.4.9, Local Intersection LOS. The minimum LOS standard for intersections is LOS D. For intersections outside the Caltrans right-of-way, LOS was calculated based on intersection methodologies used by local cities (Lake Forest, Laguna Hills, and Laguna Woods). The Intersection Capacity Utilization (ICU) method (based on Volume-to-Capacity Ratio) was used to determine existing and future intersection conditions for those intersections.

Table 2.4.9: Local Intersection LOS

LOS	Description	Caltrans – HCM	Local – ICU
		Average Delay (Sec Del/Veh)	Delay (v/c)
A	Excellent operation. All approaches to the intersection appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation.	0.0-10.0	0.00-0.60
B	Very good operation. Many drivers begin to feel somewhat restricted within platoons of vehicles. This represents stable flow. An approach to an intersection may occasionally be fully utilized and traffic queues start to form.	10.1-20.0	0.61-0.70
C	Good operation. Occasionally drivers may have to wait more than 60 seconds, and backups may develop behind turning vehicles. Most drivers feel somewhat restricted.	20.1-35.0	0.71-0.80
D	Fair operation. Cars are sometimes required to wait more than 60 seconds during short peaks. There are no long-standing traffic queues.	35.1-55.0	0.81-0.90
E	Poor operation. Some long-standing vehicular queues develop on critical approaches to intersections. Delays may be up to several minutes.	55.1-80.0	0.91-1.00
F	Forced flow. Represents jammed conditions. Backups form locations downstream or on the cross street may restrict or prevent movement of vehicles out of the intersection approach lanes; therefore, volumes carried are not predictable. Potential for stop and go type traffic flow.	> 80.0	>1.00

Source: Traffic Study Report (August 2018)
 HCM = Highway Capacity Manual
 ICU = Intersection Capacity Utilization
 LOS = level of service
 Sec Del/Veh = delay per vehicle, in seconds
 v/c = volume-to-capacity

A summary of LOS, v/c ratio, ICU value and average delay under existing conditions for AM and PM peak hours is provided in Table 2.4.10. As previously discussed, the study intersections are either owned by Caltrans or by the local cities.

Caltrans Intersections

The following are the three study intersections that Caltrans owns:

- Southbound I-5 Ramps/Avenida De La Carlota/Paseo De Valencia
- El Toro Road/Avenida De La Carlota
- Northbound I-5 Ramps/El Toro Road/Bridger Road

Table 2.4.10: Existing Peak Hour Intersection Delay/LOS

No.	Intersection	Agency	Existing Year 2017									
			Caltrans HCM						Local – ICU			
			AM Peak Hour			PM Peak Hour			AM Peak Hour		PM Peak Hour	
			v/c	Delay	LOS	v/c	Delay	LOS	v/c	LOS	v/c	LOS
1	Southbound I-5 Ramps/Avenida De La Carlota/Paseo De Valencia	Caltrans	0.62	41.8	D	0.71	78.0	E	-	-	-	-
2	El Toro Road/Avenida De La Carlota	Caltrans	0.69	48.5	D	0.91	109.9	F	-	-	-	-
3	Northbound I-5 Ramps/El Toro Road/ Bridger Road	Caltrans	0.76	65.4	E	0.87	71.6	E	-	-	-	-
4	El Toro Road/Rockfield Blvd	Lake Forest	-	-	-	-	-	-	0.75	C	0.85	D
5	El Toro Road/Paseo De La Valencia	Laguna Woods	-	-	-	-	-	-	0.63	B	0.79	C

Source: Traffic Study Report (August 2018)

*Density is not calculated for LOS F.

■ indicates unacceptable F conditions.

■ represents City Agencies having jurisdiction over. ICU methodology was used to calculate delay and LOS

HCM = Highway Capacity Manual

ICU = Intersection Capacity Utilization

LOS = level-of-service

v/c = volume-to-capacity

All of these intersections are currently signalized. Intersections under Caltrans jurisdiction are considered acceptable if the intersection operations at LOS of E or better. As shown in Table 2.4.10, the existing condition HCM analysis indicates that most of the study intersections operate between a LOS C and LOS F during the AM and PM Peak hours.

The following intersections operate at LOS F during the AM and PM Peak hours:

- El Toro Road/Avenida De La Carlota (PM)

The LOS F criterion is based on an average signalized control delay greater than 80 seconds.

Local City Intersections (Cities of Laguna Hills, Laguna Woods and Lake Forest)

The following are the two local controlled study intersections:

- El Toro Road/Rockfield Blvd (Lake Forest)
- El Toro Road/Paseo De La Valencia (Laguna Hills/Laguna Woods)

Like that of the Caltrans intersections, the evaluated Local City intersections are currently signalized. As shown in Table 2.4.10, the existing condition ICU LOS analysis indicates that all the intersections operate at an appropriate LOS.

LOS analysis, v/c calculations, and queue analysis were conducted for the arterial/ramp intersections and other key arterial intersections for both Opening Year (2030) and Design Year (2050) traffic conditions. The results of these analyses are presented in the following sections by performance measure. Summary tables of LOS, d/c, average delay and queuing analysis are included in each alternative section. For future conditions, the v/c ratio is the d/c ratio where the demand is used.

Existing Travel Speeds

Travel times were measured along the I-5 corridor for a full-length trip within the project limits from Alicia Parkway to Lake Forest Drive. Table 2.4.11 provides a summary of the existing average travel speeds along the I-5 corridor within the project limits. As shown, the average speeds in the GP lanes on northbound I-5 for a trip within the project limits are 52 and 57 mph for the AM and PM peak hours, respectively. The average speeds in the GP lanes on southbound I-5 are 66 and 42 mph for the AM and PM peak hours, respectively. Vehicle hours of delay on weekdays were calculated for GP lanes only by using the projected traffic volumes and calculating projected speeds using HCS software for the geometric conditions present and comparing the same traffic volumes, assuming no congestion. The difference in free-flow conditions to the projected speeds provided daily vehicle hours of delay. Daily delay was multiplied by 250 to determine annual vehicle hours of delay.

Table 2.4.11: Existing (2017) I-5 Freeway Mainline Average Speeds (mph) and Vehicle Hours of Delay

I-5 Segment – Alicia Pkwy to Lake Forest Drive	General Purpose Lanes within Project Limits		
	AM Peak Hour (average speed – mph)	PM Peak Hour (average speed – mph)	Vehicle Hours of Delay (daily)
Northbound I-5	52	57	1,162
Southbound I-5	66	42	2,347
Total daily hours of vehicle delay	-	-	3,509

Source: Traffic Study Report (August 2018)

2.4.2.3 Future Forecasting Methodology

The Orange County Transportation Analysis Model (OCTAM) version 4.0 was used to develop traffic forecasts for this project. The baseline future year network consists of the Constrained (Buildout) Network.

Traffic forecasts are developed using the difference methodology outlined in the National Cooperative Highway Research Program Report 255 published by the Transportation Research Board. Annual growth calculated from the 2012 Base Year and 2050 Future Year models was applied to 2017 traffic counts to develop the traffic forecasts for 2030 (Opening Year) and 2050 (Design Year), with any negative growth adjusted to zero. To increase localized accuracy, 2030 and 2050 forecast ramp volumes and HOV volumes were added or subtracted from upstream mainline volumes, as appropriate.

2030 to 2050 Growth

Because OCTAM’s furthest out future traffic forecast year is 2030, a growth factor was developed to project traffic volumes from 2030 conditions to 2050 conditions. Orange County’s forecasted growth in population and employment from 2030 to 2050 was used to develop the growth factor. This value was annualized for the 20-year period between 2030 and 2050 as 4.04 percent. The 4-percent growth factor was applied to the growth in traffic volume from 2030 to 2050 as opposed to the total 2030 volume because the land use in the area surrounding the Study Area is largely built out, even under existing conditions, compared to Orange County as a whole. The absolute growth in traffic volumes forecasted by OCTAM along I-5/EI Toro Road was distributed proportionately through the Study Area based on the baseline traffic volumes.

Future Freeway Traffic Volumes

Similar to the existing volumes, Directional volume forecasts for mainline general purpose lanes, HOV lanes, and ramp forecasts are reported between Lake Forest Drive and Alicia Parkway for the AM Peak Hour, PM Peak Hour, and day period. As OCTAM outputs are for the peak period, conversion factors of 0.3566 and 0.2662 were applied to generate the AM and PM Peak Hour forecasts, respectively.

Future Arterial Traffic Volumes

Intersection turning movement forecasts are reported at six locations for the AM Peak Hour, Midday Peak Hour, and PM Peak Hour. As OCTAM outputs are for peak periods rather than peak hour, conversion factors of 0.3566, 0.2622, and 0.19 were applied to generate the AM, Midday, and PM Peak Hour forecasts, respectively.

Tables 2.4.16 and 2.4.17 show the projected 2030 opening year and 2050 design year traffic volumes, respectively, for the northbound and southbound I-5 mainline, weave segments, on-/off-ramps, and intersections throughout the Study Area.

A detailed description of the development of the future forecast is provided in the Traffic Volumes Report (March 2018).

2.4.2.4 Pedestrian and Bicycle Facilities

Pedestrian travel within the project limits is currently provided via sidewalks at the following roadway street/arterials:

- El Toro Road
- Paseo De Valencia
- Avenida De La Carlota
- Bridger Road
- Rockfield Boulevard

These arterials include sidewalks on at least one side of the road segments and include crosswalks, pedestrian crossing signage, ADA curb ramps with truncated domes, and lighting. Of these local roadways, Class II on-street bicycle lanes are currently available along Paseo De Valencia (0.3 mile west of the southbound on-ramps) and Rockfield Boulevard (0.25 mile) east of the northbound I-5 off-ramp. Bicyclists can travel underneath the El Toro Road undercrossing, regardless of the provision of designated bicycle lanes.

According to the cities of Lake Forest, Laguna Hills, and Laguna Woods Bicycle Master Plans, there are no future planned bicycle facilities for Class II connectivity to transect the I-5/El Toro Road Interchange; however, the Orange County Transportation Authority's District 5 Bikeway Strategy Report (2015) – Corridor C proposes a regional 15.3-mile bikeway corridor that would extend from Alicia Parkway in Rancho Santa Margarita to Paseo De Valencia, to El Toro Road, then along State Route 133 and ending at Pacific Coast Highway in Laguna Beach. The proposed bikeway is south of the Paseo de Colinas/El Toro Road intersection, southerly of the project limits.

The Aliso Creek Bikeway, a Class I (off-street) bike path is within 1 mile south of the project limits.

2.4.3 Environmental Consequences

The Traffic Study Report (August 2018) and Addendum to the Traffic Study Report (January 2019) considered existing conditions, conditions under the No-Build Alternative (both in year 2030 and 2050), and two Build Alternatives (Build Alternative 2 and 4 Including Design Option B) for 2030 and 2050:

- Existing Conditions (2017)
- No Build Conditions (2030 and 2050) The No Build Alternative functions as the baseline and would leave the interchange in its current planned configuration as proposed as part of the I-5 Widening Project (EA 0K020). The I-5 Widening Project proposes to add general-purpose lanes in each direction on I-5 between Avery Parkway and Alicia Parkway and extend the second HOV lane from Alicia Parkway to El Toro Road. The I-5 Widening Project is approximately 6 miles long and extends from 0.5 mile south of the State Route 73 interchange (PM 12.4) to 0.2 miles north of the El Toro Road Undercrossing (PM 18.9), reestablish existing auxiliary lanes and construct new auxiliary lanes, and improve several existing on- and off-ramps. Additionally, the project does not include an HOV buffer, which would accommodate continuous access to the HOV lanes throughout the project limits. The I-5 Widening Project is in the design phase and will complete construction in 2023–2024. The I-5 Widening Project is anticipated to relieve some of the on-ramp congestion throughout the project limits during peak periods by adding capacity to the mainline; however, it would also increase traffic demands to the interchange off-ramps, by improving mainline traffic flow and reducing travel times to the interchange.
- Alternative 2 - Southbound I-5 Off-Ramp Flyover Connecting to Bridger Road
 - Opening Year 2030 and Design Year 2050
- Alternative 4 - Southbound I-5 Off-Ramp Collector-Distributor at El Toro Road; Design Option B – Proposed northbound I-5 on-ramp from Bridger Road. The design of Alternative 4 has taken into consideration the entitlement (layout and density) for the Five Lagunas project approved by the City of Laguna Hills in March 2016. The property owner is currently revising their plans for the Five Lagunas project and these revisions will need to be processed through the City of Laguna Hills. As part of this review, the City will identify additional mitigation measures or other requirements to address any proposed increase in density or changes in layout/design.
 - Opening Year 2030 and Design Year 2050

2.4.3.1 Temporary Impacts

Build Alternatives (Alternative 2 and 4 [Including Design Option B])

The construction of the Build Alternatives (including Design Option B) would result in temporary impacts to traffic circulation and pedestrian and bicycle access on and in the vicinity of the project segment of I-5. Those impacts would include short-term closures of mainline, ramp, and arterial facilities as described in the following sections. These temporary construction impacts would be similar for both Build Alternatives (including Design Option B); however, the proposed length of closures may slightly differ from one build alternative to the next.

Construction activities expected to require temporary closures of the I-5 mainline, interchange ramps, and local arterials include:

- Installation, moving, and removal of construction barriers (k-rails)
- Pavement restriping

- Falsework erection and removal
- Construction of retaining walls and tie-back walls
- Widening of undercrossing structures and foundations
- Installation and removal of overhead signs and loop detectors
- Placement of concrete pavement using rapid set concrete, such as at ramp termini
- Asphalt and concrete pavement construction and overlay operations
- Utility work

Construction of the Build Alternatives is anticipated to take 3 years for Alternative 2, and 2.5 years for Alternative 4 with or without Design Option B, with opening year in April 2030. Temporary closures of the I-5 mainline, interchange ramps, and local arterials would be limited to overnight (between 10:00 PM and 5:00 PM) closures.

In addition to the temporary closures described above, the following temporary modifications to the existing freeway mainline, connector and ramp facilities, and arterial streets in the construction zone could be implemented during construction of the Build Alternatives (including Design Option B):

- Narrowing of the widths of the travel lanes and shoulders
- Reductions in the number of available travel lanes
- Speed-limit reductions

These temporary modifications would allow for traffic to pass through the project limits along I-5, the ramps, and the arterials, but those travelers would be expected to experience some delays as they travel on those facilities.

The proposed temporary closures of, and modifications to, the freeway and local arterials and the potential effects of those closures and modifications under the Build Alternatives (including Design Option B) are described further in the following sections.

Temporary Mainline Closures and Other Modifications on Interstate 5

Table 2.4.12 summarizes the anticipated temporary closures on the I-5 mainline during construction of the Build Alternatives (including Design Option B), the proposed detour routes that would be provided during those closures, and the estimated increase of travel time for travelers required to exit the mainline freeway and travel around the closures on the detour routes. As shown, both Build Alternatives (including Design Option B) would require temporary overnight closures of two segments of southbound I-5 and two segments of northbound I-5. Alternative 2 would require longer closures along southbound I-5 due to the Alternative 2 flyover structure. Detours around the temporary mainline closures would be provided on local arterials in the vicinity of the closures. As shown in Table 2.4.12, the proposed detours around the temporarily closed mainline segments of I-5 would result in increased travel times ranging from approximately 10–15 minutes.

During construction, travel lanes along the I-5 mainline is expected to experience temporary closures and lane and shoulder widths would be temporarily narrowed to

accommodate the placement of construction barriers. The speed limits on the segments of I-5 with narrowed lanes may also be temporarily reduced.

Temporary Ramp Closures on I-5

Table 2.4.12 also summarizes temporary ramp closures that would be required for both Build Alternatives, the proposed detour routes that would be provided during those closures, and the estimated increases in travel times for travelers required to use the detour routes around the closed ramps. As shown, both Build Alternatives (including Design Option B) would require temporary ramp closures; however, it is expected that Alternative 4 would require the greatest number of ramp closures versus Alternative 2. The proposed detours around the temporarily closed ramps would result in increased travel times ranging from approximately 5 to 15 minutes.

Table 2.4.12: Anticipated Detours During Construction (Build Alternatives [including Design Option B])

Temporary Roadway Closures ¹	Proposed Detour Routes	Estimated Travel Delay (minutes)
Mainline Segments		
NB I-5: Alicia Parkway on-ramp to El Toro Road off-ramp	Alicia Pkwy/Muirlands Blvd/El Toro Rd	15
	Alicia Pkwy/Paseo De Valencia/El Toro Rd	15
NB I-5: El Toro Road on-ramp Lake Forest Drive off-ramp	El Toro Rd/Rockfield Blvd/Lake Forest Dr	10
	El Toro Rd/Moulton Pkwy/Lake Forest Dr	15
SB I-5: Lake Forest Drive on-ramp to El Toro Road off-ramp	Lake Forest Rd/Moulton Pkwy/El Toro Rd	15
	Lake Forest Rd/Rockfield Blvd/El Toro Rd	10
SB I-5: El Toro Road on-ramp to Alicia Parkway off-ramp	El Toro Rd/Paseo De Valencian/Alicia Pkwy	10
	El Toro Rd/Muirlands Blvd/Alicia Pkwy	10
Ramps		
NB I-5 off-ramp to El Toro Rd	Alicia Pkwy/Muirlands Blvd/El Toro Rd	15
	Alicia Pkwy/Paseo De Valencia/El Toro Rd	15
WB El Toro Rd to NB I-5 on-ramp	U-turn at El Toro Rd/Avenida De La Carlota/NB I-5 Loop	5
	EB El Toro Rd/Rockfield Blvd/Lake Forest Rd	10
EB El Toro Rd to NB I-5 on-ramp (Loop)	El Toro Rd/Rockfield Blvd/Lake Forest Dr	10
	EB El Toro Rd/U-turn at Rockfield Blvd/NB I-5 on-ramp	5
SB I-5 off-ramp to Avenida De La Carlota/Paseo De Valencia	Lake Forest Rd off-ramp/Avenida De La Carlota	5
	Lake Forest Rd off-ramp/Rockfield Blvd/El Toro Rd	10
Avenida De La Carlota/Paseo De Valencia to SB I-5 on-ramp	Avenida De La Carlota/El Toro Rd/SB I-5 on-ramp	5
EB El Toro Rd to SB I-5 on-ramp	NB Avenida De La Carlota/SB I-5 on-ramp (hook)	5
Local Arterials		
NB Avenida De La Carlota	Paseo De Valencia/ El Toro Rd	5
SB Avenida De La Carlota	El Toro Rd/Paseo De Valencia	5
SB Paseo De Valencia	Avenida De la Carlota/El Toro Rd	5
NB Paseo De Valencia	El Toro Rd/Avenida De La Carlota	5
WB El Toro Rd	Rockfield Blvd/Los Alisos Blvd/Paseo De Valencia	10
EB El Toro Rd	Paseo De Valencia/Los Alisos Blvd/Rockfield Blvd	10

Source: Email from Shahrdad Dervai to Brian Liu dated October 9, 2018.

¹ Temporary roadway closures pertain to mainline, ramps, or local arterial segments that would be subject to overnight closures (all closures would take place between 10:00 PM and 5:00 AM). The overnight closures are not anticipated to take place on consecutive nights.

EB = eastbound
I-5 = Interstate 5
NB = northbound
SB = southbound
WB = westbound

The temporary ramp closures are not expected to be long term at any given ramp. To minimize inconvenience to the traveling public, no two consecutive on- or off-ramps in the same direction would be closed at the same time.

Temporary Closures of Local Arterials

In addition to mainline and ramp closure information, Table 2.4-12 also describes anticipated temporary overnight closures of local arterials during construction of the Build Alternatives (including Design Option B), the proposed detour routes that would be provided during those closures, and the estimated increases in travel times for travelers required to travel around the closures on the detour routes. As shown, both Build Alternatives (including Design Option B) would require temporary overnight closures of segments of El Toro Road, Avenida De la Carlota, and Paseo De Valencia. No other local street closures would be required during construction of any of the Build Alternatives (including Design Option B).

The proposed detours around the temporarily closed segments of these local arterials would result in increased travel times ranging from approximately 5 to 10 minutes.

Temporary closures of the I-5/El Toro Road Interchange ramps are expected to occur but would be limited to weekend closures to avoid impacts during weekday peak hours. Additionally, temporary lane closures are expected at on- and off-ramps, mainline lanes, and local arterial lanes throughout the duration of construction. These lane closures would take place over a period of approximately 3 months, and travel in both directions along impacted roadways would be maintained at all times.

Pedestrian and Bicycle Facilities

Pedestrian and bicycles are not allowed to travel on the I-5 mainline or on- or off-ramps. Temporary mainline, ramp, and arterial closures and the temporary detours associated with those closures would not affect the existing Class I bike path southeast of the project limits. As a result, the mainline closures, delays, and increased travel times under both Build Alternatives (including Design Option B) would not impact pedestrians and bicyclists or pedestrian and bicycle facilities.

The temporary closures of arterial roads would include closure of the sidewalks along those roads at their crossings of I-5 along El Toro Road. The detours provided for vehicular traffic to travel around the closed arterials would also be signed for use by pedestrians and bicyclists. As a result, pedestrians and bicyclists who use those arterials would be required to travel north or south of the closed arterial to reach the closest open arterial crossing at I-5. This would result in a longer travel path for both pedestrians and bicyclists and would substantially increase their travel times. However, the arterials would be closed only overnight and for very limited periods, which would minimize the effects of the closures on pedestrians and bicyclists.

Construction of the Build Alternatives (including Design Option B) would result in temporary effects related to the circulation of vehicles, bicyclists, and pedestrians within the project limits. The Build Alternatives (including Design Option B) include Project Feature (PF-TRA-1) - Transportation Management Plan (TMP) that addresses closures of the freeway mainline, ramps and arterial roadways and

associated detours. The Caltrans Transportation Management Plan Guidelines identifies the processes, roles, and responsibilities for preparing and implementing TMPs, as well as useful strategies for reducing congestion and managing work zone traffic impacts. TMPs are Project Features built into all Caltrans projects and minimize short-term construction impacts. With the incorporation of the TMP, construction impacts would not be adverse:

PF-TRA-1 Transportation Management Plan. The project will include preparation of a Transportation Management Plan (TMP) during the Plans, Specifications, and Estimates (PS&E) phase. “TMP” is an approach for alleviating or minimizing traffic delays by the effective application of traditional traffic handling practices and an innovative combination of various strategies. These strategies include public awareness campaigns, motorist information, incident management, construction methods, demand management, and alternate route planning.

No Build Alternative

Under the No Build Alternative, no reconstruction or improvements would be made to the existing I-5/EI Toro Road Interchange other than routine roadway maintenance. As a result, the No Build Alternative would not result in temporary impacts related to traffic and circulation or to pedestrian or bicycle facilities.

2.4.3.2 Permanent Impacts

Build Alternatives (Alternatives 2 and 4 [Including Design Option B])

The following tables provide detailed information of the traffic operations for existing conditions, No Build 2030 and 2050; 2030 Open Year; and 2050 Future Year.

- Table 2.4.15, Existing (2017)/No Build (2030/2050)—Mainline, Ramps, and Intersection Volumes and Level of Service: This table provides the Existing (2017) and No Build conditions at 2030 Open Year and 2050 Future Year LOS for AM and PM peak hours on along northbound and southbound of the I-5 mainline and weaving segments; on- and off-ramps at Alicia Parkway, El Toro Road, and Lake Forest Drive; and at six intersections immediately adjacent El Toro Road.
- Table 2.4.16, 2030 Opening Year—I-5 Mainline, Ramps, Intersection and Weaving—Level of Service: This table provides 2030 Open Year AM and PM Peak Hour LOS for both Build Alternatives and evaluates northbound and southbound lanes of the I-5 mainline and weaving segments; on- and off-ramps at Alicia Parkway, El Toro Road, and Lake Forest Drive; and at six intersections immediately adjacent El Toro Road.
- Table 2.4.17, 2050 Future Year—I-5 Mainline, Ramps, Intersection and Weaving—Level of Service—This table provides 2050 Future Year AM and PM Peak Hour LOS for both Build Alternatives and evaluates northbound and southbound lanes of the I-5 mainline and weaving segments; on- and off-ramps at Alicia Parkway, El Toro Road, and Lake Forest Drive; and at six intersections immediately adjacent El Toro Road.

As noted above, Year 2030 represents the project opening year, and Year 2050 represents the project build-out year. The traffic operations under the Build and No Build Alternatives in 2030 and 2050 are discussed by alternative below.

Alternative 2

2030 Open Year

As shown in Table 2.4.16 under Alternative 2 (2030):

Mainline

Mainline segments in the northbound direction operate between LOS E and LOS F and between LOS C and LOS E in the AM and PM peak hours, respectively. In the southbound direction, mainline segments operate at LOS D and LOS E in the AM and between LOS E to LOS F in the PM peak hours.

The following segments operate at LOS F in the GP lanes during the AM and PM peak hours:

- AM Peak Hour: Northbound I-5 between El Toro Road Off-Ramp and El Toro Road Loop On-Ramp
- AM Peak Hour: Northbound I-5 between El Toro Road Loop On-Ramp and El Toro Road On-Ramp
- PM Peak Hour: Southbound I-5 between Avenida De La Carlota/Paseo De Valencia On- Ramp and El Toro Rd On-Ramp

In Comparison to the 2030 No Build Scenario:

Improved LOS I-5 Mainline segment:

- AM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive; **LOS F to LOS E**
- PM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive; **LOS D to LOS C**

Weaving

Mainline weaving segments in the NB direction operate at LOS F in the AM and PM peak hours, respectively. In the southbound direction, mainline weaving segments operate at LOS D in the AM and between LOS E and LOS F in the PM peak hours, respectively.

The following mainline weaving segments operate at LOS F during the AM and PM peak hours:

- AM/PM Peak Hour: Northbound I-5 Alicia Parkway On-Ramp to El Toro Road Off-Ramp
- AM/PM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive Off-Ramp
- PM Peak Hour: Southbound I-5 El Toro Road On-Ramp to Alicia Parkway Off-Ramp

In comparison to the 2030 No Build Scenario:

Degraded LOS I-5 Weave Segment Mainline segment:

- PM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive Off-Ramp: **LOS D to LOS F**

Ramp Junctions

Ramps in the northbound direction operate between LOS D and LOS F and between LOS C and LOS E in the AM and PM peak hours, respectively. In the southbound direction, ramps operate between LOS B and LOS E in the AM and between LOS C to LOS F in the PM peak hours.

The following segment operates at LOS F during AM and PM peak hours:

- AM Peak Hour: Northbound I-5 El Toro Road (Loop) On-Ramp from eastbound El Toro Road
- PM Peak Hour: Southbound I-5 Hook On-Ramp from westbound Avenida De La Carlota

In Comparison to the 2030 No Build Scenario:

Improved LOS I-5 Ramps:

- AM Peak Hour: Northbound El Toro Road On-Ramp from westbound El Toro; **LOS F to LOS E**
- AM Peak Hour: Southbound El Toro Road Off-Ramp; **LOS C to LOS B**
- PM Peak Hour: Southbound El Toro Road Off-Ramp; **LOS D to LOS C**

Intersections

The evaluated intersections operate between LOS C and LOS E in the AM and between LOS C and LOS D in the PM peak hours.

In 2030 Open Year, intersections evaluated under Alternative 2 would operate at an acceptable LOS.

In Comparison to the 2030 No Build Scenario:

Improved Intersections:

- AM Peak Hour: Southbound I-5 Ramps/Paseo De Valencia/Avenida De La Carlota; **LOS D to LOS C**
- PM Peak Hour: Southbound I-5 Ramps/Paseo De Valencia/Avenida De La Carlota; **LOS F to LOS C**
- PM Peak Hour: Avenida De La Carlota/ El Toro Road; **LOS F to LOS C**
- AM Peak Hour: Northbound I-5/Bridger Road/El Toro Road; **LOS F to LOS E**
- PM Peak Hour: Northbound I-5/Bridger Road/El Toro Road; **LOS E to LOS D**

2050 Future Year

As shown in Table 2.4.17 under Alternative 2 (2050):

Mainline

Mainline segments in the northbound direction operate between LOS E and LOS F and between LOS D and LOS E in the AM and PM peak hours, respectively. In the southbound direction, mainline segments operate between LOS D and LOS E in the AM and between LOS E and LOS F in the PM peak hours.

The following segments operate at LOS F in the GP lanes during the AM and PM peak hours:

- AM Peak Hour: Northbound I-5 between El Toro Road Off-Ramp and El Toro Road Loop On-Ramp
- AM Peak Hour: Northbound I-5 between El Toro Road Loop On-Ramp and El Toro Road On-Ramp
- PM Peak Hour: Southbound I-5 between El Toro Flyover Off-Ramp to Avenida De La Carlota/Paseo De Valencia Off-Ramp
- PM Peak Hour: Southbound I-5 between Avenida De La Carlota/Paseo De Valencia On- Ramp and El Toro Road On-Ramp

In Comparison to the 2050 No Build Scenario:

Improved LOS I-5 Mainline segments:

- AM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive; **LOS F to LOS E**

Weaving

Mainline weaving segments in the northbound direction operate at LOS F and between LOS D and LOS F in the AM and PM peak hours, respectively. In the southbound direction, mainline weaving segments operate at LOS E in the AM and LOS F in PM peak hours.

The following mainline weaving segments operate at LOS F during the AM and PM peak hours:

- AM/PM Peak Hour: Northbound I-5 Alicia Parkway On-ramp to El Toro Road Off-Ramp
- AM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive Off-Ramp
- PM Peak Hour: Southbound I-5 Lake Forest On-Ramp to El Toro Road Off-Ramp
- PM Peak Hour: Southbound I-5 El Toro Road On-Ramp to Alicia Parkway Off-Ramp

In Comparison to the 2050 No Build Scenario:

Improved LOS I-5 Weaving segments:

- PM Peak Hour: I-5 Northbound El Toro Road On-Ramp to Lake Forest Drive Off-Ramp: **LOS E to LOS D**

Ramp Junctions

Ramps in the northbound direction operate between LOS D and LOS F and between LOS D and LOS E in the AM and PM peak hours, respectively. In the southbound direction, ramps operate between LOS C and LOS E in the AM and between LOS C to LOS F in the PM peak hours.

The following segment operates at LOS F during AM and PM peak hours:

- AM Peak Hour: Northbound I-5 El Toro Road (Loop) On-Ramp from eastbound El Toro Road
- PM Peak Hour: Southbound I-5 Hook On-Ramp from westbound Avenida De La Carlota

In Comparison to the 2050 No Build Scenario:

Improved LOS I-5 Ramps:

- AM Peak Hour: Northbound I-5 El Toro Road On-Ramp from westbound El Toro Road; **LOS F to LOS E**
- PM Peak Hour: Southbound I-5 El Toro Road Off-Ramp; **LOS D to LOS C**

Intersections

Intersections operate between LOS C and LOS E in the AM and PM peak hours.

In 2050 Future Year, intersections evaluated under Alternative 2 would operate at an acceptable LOS.

In Comparison to the 2050 No Build Scenario:

Improved Intersections:

- AM Peak Hour: Southbound I-5 Ramp/Paseo De Valencia/Avenida De La Carlota; **LOS E to LOS D**
- PM Peak Hour: Southbound I-5 Ramp/Paseo De Valencia/Avenida De La Carlota; **LOS F to LOS C**
- PM Peak Hour: Avenida De La Carlota/El Toro Road: **LOS F to LOS D**
- AM Peak Hour: Northbound I-5 Ramp/Bridger Road/El Toro Road; **LOS F to LOS E**
- PM Peak Hour: Northbound I-5 Ramp/Bridger Road/El Toro Road; **LOS F to LOS E**

- PM Peak Hour: Rockfield Boulevard/El Toro Road; **LOS E to LOS D**

Degraded Intersection:

- AM Peak Hour: Rockfield Boulevard/El Toro Road: **LOS D to LOS E**

Alternative 4

2030 Open Year

As shown in Table 2.4.16 under Alternative 4 (2030):

Mainline

Mainline segments in the northbound direction operate between LOS E and LOS F and between LOS C and LOS D in the AM and PM peak hours, respectively. In the southbound direction, mainline segments operate at LOS C and LOS D in the AM and between LOS D to LOS E in the PM peak hours.

The following segment operates at LOS F in the general purpose lanes during the AM peak hour:

- AM Peak Hour: Northbound I-5 between El Toro Road Off-Ramp to El Toro Road (Loop) On-Ramp

In Comparison to the 2030 No Build Scenario:

Improved LOS I-5 Mainline segments:

- AM Peak Hour: Northbound I-5/El Toro Road (Loop) On-Ramp to El Toro Road On-Ramp; **LOS F to LOS E**
- PM Peak Hour: Northbound I-5/El Toro Road (Loop) On-Ramp to El Toro Road On-Ramp; **LOS E to LOS D**
- AM Peak Hour: Northbound I-5/El Toro Road On-Ramp to Lake Forest Drive; **LOS F to LOS E**
- PM Peak Hour: Northbound I-5/El Toro Road On-Ramp to Lake Forest Drive; **LOS D to LOS C**
- PM Peak Hour: Southbound I-5/Avenida De La Carlota/Paseo De Valencia On-Ramp and El Toro Road On-Ramp; **LOS F to LOS E**
- AM Peak Hour: Southbound I-5/El Toro Road On-Ramp and Alicia Parkway Off-Ramp; **LOS D to LOS C**
- PM Peak Hour: Southbound I-5 El Toro Road On-Ramp and Alicia Parkway Off-Ramp; **LOS E to LOS D**

Weaving

Mainline weaving segments in the northbound direction operate at LOS F and between LOS D and LOS F in the AM and PM peak hours, respectively. In the southbound direction, mainline weaving segments operate between LOS B and LOS D in the AM and LOS C and LOS F in the PM peak hours.

The following mainline weaving segments operate at LOS F during the AM and PM peak hours:

- NB I-5 Alicia Parkway On-ramp to El Toro Road Off-Ramp (AM/PM)
- NB I-5 El Toro Road On-Ramp to Lake Forest Drive Off-Ramp (AM)
- SB I-5 El Toro Road On-Ramp (Collector Distributor) to Alicia Parkway Off-Ramp (PM)

In comparison to the 2030 No Build scenario, there is no change to LOS at current mainline weaving segment locations.

Ramp Junctions

Ramps in the northbound direction operate between LOS D and LOS E in the AM peak hours, and LOS C and LOS E in the PM peak hours. In the southbound direction, ramps operate at LOS C in the AM peak hours and LOS D in the PM peak hours.

In 2030 Open Year, ramps evaluated under Build Alternative 4 would operate at an acceptable LOS.

In Comparison to the 2030 No Build Scenario:

Improved LOS I-5 Ramps:

- AM Peak Hour: Northbound I-5/El Toro Road (Loop) On-Ramp from eastbound El Toro Road; **LOS F to LOS D**
- AM Peak Hour: Northbound I-5 El Toro Road On-Ramp from westbound El Toro Road; **LOS F to LOS E**

Intersections

Intersections evaluated operate between LOS C and LOS D in both AM and PM peak hours: therefore, in 2030 Open Year, intersections evaluated under Build Alternative 4 would operate at an acceptable LOS.

In Comparison to the 2030 No Build Scenario:

Improved Intersection:

- AM Peak Hour: Southbound I-5 Ramps/Paseo De Valencia/Avenida De La Carlota; **LOS D to LOS C**
- PM Peak Hour: Southbound I-5 Ramps/Paseo De Valencia/Avenida De La Carlota; **LOS F to LOS C**
- AM Peak Hour: Avenida De La Carlota/El Toro Road; **LOS D to LOS C**
- PM Peak Hour: Avenida De La Carlota/El Toro Road: **LOS F to LOS D**
- AM Peak Hour: Northbound I-5 /Bridger Road/El Toro Road: **LOS F to LOS C**

- PM Peak Hour: Northbound I-5 /Bridger Road/El Toro Road: **LOS E to LOS D**

2050 Future Year

As shown in Table 2.4.17 under Alternative 4 (2050):

Mainline

Mainline segments in the northbound direction operate between LOS E and LOS F in the AM peak hours and at LOS D in the PM peak hours. In the southbound direction, mainline segments operate between LOS C and LOS D in the AM and between LOS D and LOS E in the PM peak hours.

The following segment operates at LOS F in the GP lanes during the AM and PM peak hours:

- Northbound I-5 between El Toro Road Off-Ramp and El Toro Road Loop On-Ramp (AM)

In Comparison to the 2050 No Build Scenario:

Improved LOS I-5 Mainline segments:

- AM Peak Hour: Northbound I-5 El Toro Road (Loop) On-Ramp to El Toro Road On-Ramp; **LOS F to LOS E**
- PM Peak Hour: Southbound I-5 El Toro Road (Loop) On-Ramp to El Toro Road On-Ramp; **LOS E to LOS D**
- AM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive; **LOS F to LOS E**
- AM Peak Hour: Southbound I-5 Avenida De La Carlota/Paseo De Valencia On-Ramp and El Toro Road On-Ramp; **LOS E to LOS D**
- PM Peak Hour: Southbound I-5 Avenida De La Carlota/Paseo De Valencia On-Ramp and El Toro Road On-Ramp; **LOS F to LOS E**
- AM Peak Hour: Southbound I-5 El Toro Road On-Ramp and Alicia Parkway Off-Ramp; **LOS D to LOS C**
- PM Peak Hour: Southbound I-5 El Toro Road On-Ramp and Alicia Parkway Off-Ramp; **LOS E to LOS D**

Weaving

Mainline weaving segments in the northbound direction operate at LOS F in the AM peak hours and between LOS D and LOS F in the PM peak hours. In the southbound direction, mainline weaving segments operate between LOS B and LOS E in the AM and between LOS C and LOS F in PM peak hours.

The following mainline weaving segments operate at LOS F during the AM and PM peak hours:

- Northbound I-5 Alicia Parkway On-ramp to El Toro Road Off-Ramp (AM/PM)
- Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive Off-Ramp (AM)
- Southbound I-5 Lake Forest Drive On-Ramp to El Toro Road Off-Ramp (PM)
- Southbound I-5 El Toro Road On-Ramp to Alicia Parkway Off-Ramp (PM)

In Comparison to the 2050 No Build Scenario:

Improved LOS I-5 Weaving segments:

- PM Peak Hour: I-5 Northbound El Toro Road On-Ramp to Lake Forest Drive Off-Ramp: **LOS E to LOS D**

Ramp Junctions

Ramps in the northbound direction operate between LOS D and LOS E and between LOS C and LOS E in the AM and PM peak hours, respectively. In the southbound direction, ramps operate between LOS C and LOS D in the AM and between LOS C to LOS E in the PM peak hours.

In 2050 Future Year, ramps evaluated under Build Alternative 4 would operate at an acceptable LOS.

In Comparison to the 2050 No Build Scenario:

Improved LOS I-5 Ramps:

- AM Peak Hour: Northbound I-5 El Toro Road (Loop) On-Ramp from eastbound El Toro Road; **LOS F to LOS E**
- AM Peak Hour: Northbound I-5 El Toro Road On-Ramp from westbound El Toro Road; **LOS F to LOS E**
- AM Peak Hour: Southbound I-5 El Toro Road On-Ramp from Collector/Distributor road; **LOS D to LOS C**
- PM Peak Hour: Southbound I-5 El Toro Road On-Ramp from Collector/Distributor road; **LOS E to LOS D**

Intersections

Intersections operate between LOS C and LOS D in the AM and between LOS C and LOS E in the PM peak hours; therefore, in 2050 Future Year, intersections evaluated under Build Alternatives (including Design Option B) would operate at an acceptable LOS.

In Comparison to the 2050 No Build Scenario:

Improved Intersection:

- AM Peak Hour: Southbound I-5 Ramp/Paseo De Valencia/Avenida De La Carlota: **LOS E to LOS C**
- PM Peak Hour: Southbound I-5 Ramp/Paseo De Valencia/Avenida De La Carlota: **LOS F to LOS C**
- AM Peak Hour: Avenida De La Carlota/El Toro Road: **LOS D to LOS C**
- PM Peak Hour: Avenida De La Carlota/El Toro Road: **LOS F to LOS D**
- AM Peak Hour - NB I-5 Ramp/Bridger/El Toro Road; **LOS F to LOS D**
- PM Peak Hour - NB I-5 Ramp/Bridger/El Toro Road; **LOS F to LOS D**

*Alternative 4 - Design Option B (Proposed NB I-5 on-ramp from Bridger Road)
2030 Open Year*

As shown in Table 2.4.16 under Alternative 4/Design Option B (2030):

Mainline

Mainline segments in the northbound direction operate between LOS E and LOS F and between LOS D and LOS E in the AM and PM peak hours, respectively. In the southbound direction, mainline segments operate between LOS D and LOS C in the AM and between LOS E and LOS D in the PM peak hours.

The following segments operate at LOS F in the GP lanes during the AM and PM peak hours:

- AM Peak Hour: Northbound I-5 between El Toro Road Off-Ramp and El Toro Road Loop On-Ramp
- AM Peak Hour: Northbound I-5 between El Toro Road Loop On-Ramp and El Toro Road On-Ramp

In Comparison to the 2030 No Build Scenario:

Improved Mainline Segments:

- AM Peak Hour: Northbound I-5/El Toro Road On-Ramp to Lake Forest Drive; **LOS F to LOS E**
- PM Peak Hour: Southbound I-5/Avenida De La Carlota/Paseo De Valencia On-Ramp and El Toro Road On-Ramp; **LOS F to LOS E**
- AM Peak Hour: Southbound I-5/El Toro Road On-Ramp and Alicia Parkway Off-Ramp; **LOS D to LOS C**
- PM Peak Hour: Southbound I-5 El Toro Road On-Ramp and Alicia Parkway Off-Ramp; **LOS E to LOS D**

Weaving

Mainline weaving segments in the northbound and southbound directions operate at LOS F in the AM and PM peak hours. In the southbound

direction, mainline weaving segments operate between LOS B and LOS D in the AM and LOS C and LOS F in the PM peak hours.

The following mainline weaving segments operate at LOS F during the AM and PM peak hours:

- AM/PM Peak Hour: Northbound I-5 Alicia Parkway On-ramp to El Toro Road Off-Ramp
- AM/PM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive Off-Ramp
- PM Peak Hour: Southbound I-5 El Toro Road On-Ramp (Collector/Distributors) to Alicia Parkway Off-Ramp

In Comparison to the 2030 No Build Scenario:

Degraded Weaving Mainline Segment:

- PM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive Off-Ramp; **LOS D to LOS F**

Ramp Junctions

Ramps in the northbound direction operate between LOS D and LOS F in the AM peak hours, and LOS C and LOS E in the PM peak hours. In the southbound direction, ramps operate at LOS C in the AM peak hours and LOS D in the PM peak hours.

The following ramp operates at LOS F during the AM and PM peak hours:

- AM Peak Hour: Northbound I-5 El Toro Road (Loop) On-Ramp from eastbound El Toro Road

In Comparison to the 2030 No Build Scenario:

Improved LOS I-5 Ramps:

- AM Peak Hour: Northbound I-5 El Toro Road On-Ramp from westbound El Toro Road; **LOS F to LOS E**

Intersections

The evaluated intersections operate between LOS B and LOS D in both AM and PM peak hours; therefore, in 2030 Open Year, intersections evaluated under Build Alternative 4 Design Option B would operate at an acceptable LOS.

In Comparison to the 2030 No Build Scenario:

Improved Intersection:

- AM Peak Hour: Southbound I-5 Ramps/Paseo De Valencia/Avenida De La Carlota; **LOS D to LOS C**

- PM Peak Hour: Southbound I-5 Ramps/Paseo De Valencia/Avenida De La Carlota; **LOS F to LOS C**
- AM Peak Hour: Avenida De La Carlota/ El Toro Road; **LOS D to LOS C**
- PM Peak Hour: Avenida De La Carlota/ El Toro Road; **LOS F to LOS D**
- AM Peak Hour: Northbound I-5 /Bridger Road/El Toro Road; **LOS F to LOS C**

2050 Future Year

As shown in Table 2.4.17 under Alternative 4/Design Option B (2050):

Mainline

Mainline segments in the northbound direction operate between LOS E and LOS F and between LOS C and LOS E in the AM and PM peak hours, respectively. In the southbound direction, mainline segments operate between LOS D and LOS E in both AM and PM peak hours.

The following segments operate at LOS F in the GP lanes during the AM and PM peak hours:

- AM Peak Hour: Northbound I-5 between El Toro Road Off-Ramp and El Toro Road Loop On-Ramp
- AM Peak Hour: Northbound I-5 between El Toro Road Loop On-Ramp and El Toro Road On-Ramp

In Comparison to the 2050 No Build Scenario:

Improved Mainline Segments:

- AM Peak Hour: Northbound I-5/El Toro Road On-Ramp to Lake Forest Drive; **LOS F to LOS E**
- PM Peak Hour: Northbound I-5/El Toro Road On-Ramp to Lake Forest Drive; **LOS D to LOS C**
- PM Peak Hour: Southbound I-5/Avenida De La Carlota/Paseo De Valencia On-Ramp and El Toro Road On- Ramp; **LOS F to LOS E**
- AM Peak Hour: Southbound I-5/El Toro Road On-Ramp and Alicia Parkway Off-Ramp; **LOS D to LOS C**
- PM Peak Hour: Southbound I-5 El Toro Road On-Ramp and Alicia Parkway Off-Ramp; **LOS E to LOS D**

Weaving

Mainline weaving segments in the northbound and southbound directions operate at LOS F in the AM and PM peak hours. In the southbound direction, mainline weaving segments operate between LOS B and LOS E in the AM and LOS C and LOS F in the PM peak hours.

The following mainline weaving segments operate at LOS F during the AM and PM peak hours:

- AM/PM Peak Hour: Northbound I-5 Alicia Parkway On-ramp to El Toro Road Off-Ramp
- AM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive Off-Ramp
- PM Peak Hour: Southbound I-5 Lake Forest Drive On-Ramp to El Toro Road On-Ramp
- PM Peak Hour: Southbound I-5 El Toro Road On-Ramp (Collector/Distributor) to Alicia Parkway Off-Ramp

In Comparison to the 2050 No Build Scenario:

Improved Weaving Mainline Segment:

- PM Peak Hour: Northbound I-5 El Toro Road On-Ramp to Lake Forest Drive Off-Ramp; **LOS E to LOS D**

Ramps

Ramps in the northbound direction operate between LOS D and LOS F in the AM peak hours, and LOS C and LOS D in the PM peak hours. In the southbound direction, ramps operate between LOS C and LOS D in the AM peak hours and between LOS D and LOS E in the PM peak hours.

The following ramp operates at LOS F during the AM and PM peak hours:

- AM Peak Hour: Northbound I-5 El Toro Road (Loop) On-Ramp from eastbound El Toro Road

In Comparison to the 2050 No Build Scenario:

Improved LOS I-5 Ramps:

- PM Peak Hour: Northbound I-5 El Toro Road Off-Ramp; **LOS E to LOS C**
- AM Peak Hour: Northbound I-5 El Toro Road On-Ramp from westbound El Toro Road; **LOS F to LOS E**

Intersections

The evaluated intersections operate between LOS B and LOS D in both the AM and the PM peak hours; therefore, in 2030 Open Year, intersections evaluated under Build Alternative 4 Design Option B would operate at an acceptable LOS.

In Comparison to the 2050 No Build Scenario:

Improved Intersection:

- AM Peak Hour: Southbound I-5 Ramps/Paseo De Valencia/Avenida De La Carlota; **LOS E to LOS C**

- PM Peak Hour: Southbound I-5 Ramps/Paseo De Valencia/Avenida De La Carlota; **LOS F to LOS C**
- AM Peak Hour: Avenida De La Carlota/ El Toro Road; **LOS D to LOS C**
- PM Peak Hour: Avenida De La Carlota/ El Toro Road; **LOS F to LOS D**
- AM Peak Hour: Northbound I-5/Bridger Road/El Toro Road; **LOS F to LOS D**
- PM Peak Hour: Northbound I-5 /Bridger Road/El Toro Road; **LOS F to LOS E**

Opening Year and Future Year Traffic Operations

Table 2.4.16 and 2.4.17 provide density/delay and LOS comparison between the No Build Alternative and each Build Alternative (including Design Option B). By modifying and relocating the El Toro Road I-5 On-/Off-Ramps and using some of the existing auxiliary lanes to provide additional ramp storage and/or reconfiguring the geometry of the I-5/El Toro Road Interchange, freeway capacity was added to the I-5 mainline providing an improved LOS in both the northbound I-5 and southbound I-5 directions.

Both alternatives provide a better LOS to the I-5 mainline in the northbound I-5 direction during the AM peak period, with Alternative 4 providing a better LOS on the I-5 mainline on both the northbound I-5 and southbound I-5 during the 2050 AM and PM peak periods. The 2050 reduction in Average Daily Vehicle Hours of Delay for the Build Alternatives versus the No Build Alternatives ranges from 800 hours (Alternative 2) to 2,053 hours (Alternative 4) in the northbound direction and 2,160 hours (Alternatives 2) to 3,515 hours (Alternative 4) in the southbound direction.

As shown in Table 2.4.16, each of the Study Area intersections within Caltrans' jurisdiction are expected to operate at LOS F during either the AM or PM peak-hour periods during the 2030 No Build conditions. The intersection of El Toro Road and Avenida De La Carlota has the highest delay during the PM peak period with the highest v/c of any intersection within the Study Area. All the intersections within the jurisdiction of the local cities of Lake Forest, Laguna Hills, and Laguna Woods are expected to operate at a LOS E or better. As shown in Table 2.4.17, each of the study intersections within Caltrans' jurisdiction are expected to operate at a LOS F during either the AM or PM peak hour periods during the 2050 No Build conditions, with the intersection of El Toro Road and the northbound I-5 ramps operating at LOS F during both the 2050 AM and PM peak periods. The intersection of El Toro Road and Avenida De La Carlota has the highest delay during the PM peak period with the highest v/c of any intersection within the Study Area. All the intersections within the jurisdiction of the local cities of Lake Forest, Laguna Hills, and Laguna Woods are expected to operate at a LOS E or better.

Mainline Travel Speeds and Daily Vehicle Hours of Delay

Table 2.4.13 provides a summary of year 2030 and year 2050 average travel speeds along the I-5 corridor for both Build Alternative conditions (including Design Option B). Based on OCTAM forecast volume data and HCS calculations, the average speeds in the general purpose lanes within the Study Area (Alicia Parkway to Lake Forest Drive) under both Build Alternatives (including Design Option B) are expected to increase (in mph) in 2030 and 2050 when compared to existing average speeds, opening year, and future year projections. Alternative 2 is expected to experience an average speed slightly lower along southbound I-5 when comparing speeds to Alternative 4 in both 2030 and 2050. In 2050, average speeds are also slightly lower than 2030 average speeds; however, this reduction can be attributed to future local and regional projected growth patterns and travel trends. Furthermore, as vehicle hour delay increases, average speeds decrease, which increases vehicle hours traveled.

Table 2.4.13: Existing (2017)/No Build (2030/2050) Alternative Comparison - Average Travel Speeds

I-5 Freeway Mainline General Purpose Lanes (Alicia Parkway to Lake Forest Drive) – Average Speeds (mph)						
I-5 Mainline GP Lanes	No Build		Alternative 2		Alternative 4	
	AM	PM	AM	PM	AM	PM
Existing (2017)						
I-5 Northbound	52	57	-	-	-	-
I-5 Southbound	66	42	-	-	-	-
Opening Year (2030)						
I-5 Northbound	40	60	45	61	50	62
I-5 Southbound	61	50	62	51	62	58
Future (2050)						
I-5 Northbound	39	57	44	58	49	60
I-5 Southbound	59	48	59	48	61	55

Source: Traffic Study Report (August 2018)
GP = general purpose

Vehicle hours of delay on weekdays were calculated for GP lanes only by using the projected traffic volumes and calculating projected speeds using HCS software for the geometric conditions present and comparing the same traffic volumes assuming no congestion. The difference in free-flow conditions to the projected speeds provided daily vehicle hours of delay. Weekday daily delay was multiplied by 250 working days to determine annual vehicle hours of delay.

Table 2.4.14, Existing/No Build (2030/2050) Alternative Comparison Freeway Mainline Average Vehicle Hours of Delay, compares daily vehicle hours of delay for Existing, Open Year, and Future Year for No Build and Build Alternatives (including Design Option B). As shown, both Build Alternatives (including Design Option B) reduce total daily vehicle hours of delay between 19 percent to 48 percent in 2030 and between 35 percent and 57 percent in 2050, with Alternative 4 providing the most reduction of daily vehicle hours of delay.

**Table 2.4.14: Existing (2017)/No Build (2030/2050) Alternative Comparison
Freeway Mainline Average Vehicle Hours of Delay**

I-5 Segment – Alicia Pkwy to Lake Forest Drive	Vehicle Hours of Delay (Daily)			Percent Reduction ¹
	Northbound I-5	Southbound I-5	Total Daily Vehicle Hours Delay	
Exiting (2017)	1,162	2,347	3,509	-
Open Year (2030)				
No Build	2,714	1,537	4,251	-
Alternative 2	1,940	1,510	3,450	19%
Alternative 4	1,394	804	2,198	48%
Future Year (2050)				
No Build	3,010	3,209	6,219	-
Alternative 2	2,237	1,822	4,059	35%
Alternative 4	1,610	1,104	2,704	57%

Source: Traffic Study Report (August 2018)

¹ Percentage reduction is based on comparing Total Vehicle Hours Delay of build alternatives with the 2030/2050 No Build condition.

Pedestrian and Bicycle Facilities

The Build Alternatives (including Design Option B) include minor modifications to existing arterials at their crossings of I-5 to accommodate the permanent improvements to the I-5/EI Toro Road Interchange and contributing ramps/intersections proposed by the Build Alternatives. Arterials and travel lanes temporarily closed and/or modified during construction would be returned to their existing cross sections no later than the completion of construction of the improvements in the Build Alternatives (including Design Option B). Existing sidewalks and/or bicycle facilities on arterials impacted during construction would also be returned to their original or better conditions no later than the completion of construction. At arterial crossings where modifications to the sidewalks are needed as part of the Build Alternatives (including Design Option B), those modifications would be consistent with ADA accessibility requirements. The permanent improvements in the Build Alternatives (including Design Option B) would not permanently affect the existing on street Class II bicycle lanes along Rockfield Boulevard, Paseo De Valencia, or Los Alisos Boulevard or Aliso Creek Bikeway (Class I bicycle path); therefore, the Build Alternatives would not permanently result in gaps or disruptions in the regional bicycle lane network and would not interfere with the regional bicycle lane planning efforts.

No Build Alternative

Under this alternative, no improvements would be made to the existing I-5/EI Toro Road Interchange other than the planned configuration as proposed as part of the I-5 Widening Project (EA 0K020). This widening project has not proposed major improvements to the I-5/EI Toro Road Interchange; as shown in Table 2.4.15, intersection delay and density are expected to worsen at Open Year 2030 and Future Year 2050 during the AM and PM peak hours. Refer to Table 2.1.5.15, Existing (2017)/No Build (2030/2050) - Mainline, Ramps, and Intersection Volumes and Level of Service.

2.4.4 Avoidance, Minimization, and/or Mitigation Measures

No avoidance, minimization, and/or mitigation measures are required with adherence to the Project Feature described above.

This page intentionally left blank

Table 2.4.15: Existing (2017)/No Build (2030/2050) - Mainline, Ramps, and Intersection Volumes and Levels of Service

Roadway	Count Location	Existing (2017) Volumes		Existing (2017) LOS		Opening Year (2030) No Build Volumes		Opening Year (2030) No Build LOS		Future (2050) No Build Volumes		Future (2050) No Build LOS	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
I-5 Mainline													
I-5 Northbound	Alicia Pkwy On-Ramp to El Toro Rd Off-Ramp	11,649	9,415	E	D	11,893	9,874	E	D	12,269	10,580	E	D
	El Toro Rd Off-Ramp to El Toro Rd (Loop) On-Ramp	10,475	8,061	E	D	10,727	8,472	F	D	11,158	9,102	F	D
	El Toro Rd (Loop) On-Ramp to El Toro Rd On-Ramp	11,276	9,021	F	D	11,545	9,446	F	E	11,995	10,098	F	E
	El Toro Rd On-Ramp to Lake Forest Dr	12,539	9,451	F	D	12,896	9,934	F	D	13,483	10,675	F	D
I-5 Southbound	Lake Forest Dr On-Ramp and Carlota/Valencia Off-Ramp	9,583	11,031	D	E	9,957	11,417	D	E	10,531	12,007	D	E
	Carlota/Valencia Off-Ramp and Carlota/Valencia On-Ramp	7,974	9,725	D	E	8,309	10,045	D	E	8,828	10,538	D	E
	Carlota/Valencia On-Ramp and El Toro Rd On-Ramp	8,697	10,528	D	E	9,071	10,943	D	F	9,651	11,583	E	F
	El Toro Rd On-Ramp and Alicia Pkwy Off-Ramp	9,074	11,173	D	F	9,464	11,585	D	E	10,069	12,264	D	E
Weave Segment – Mainline**													
I-5 Northbound	Alicia Pkwy On-Ramp to El Toro Rd Off-Ramp	-	-	F	F	-	-	F	F	-	-	F	F
	El Toro On-Ramp to Lake Forest Dr Off-Ramp	-	-	F	D	-	-	F	D	-	-	F	E
I-5 Southbound	Lake Forest On-Ramp to El Toro Rd Off-Ramp	-	-	D	E	-	-	D	E	-	-	E	F
	El Toro On-Ramp to Alicia Pkwy Off-Ramp	-	-	-	-	-	-	D	F	-	-	E	F
Ramps													
I-5 Northbound	Alicia Pkwy On-Ramp from WB Alicia Pkwy	1,350	1,043	E	D	1,391	1,067	E	D	1,428	1,095	E	D
	El Toro Rd Off-Ramp	945	1,245	E	E	1,022	1,284	D	C	1,096	1,345	D	E
	El Toro Rd (Loop) On-Ramp from EB El Toro Rd	801	960	F	C	818	974	F	D	837	996	F	D
	El Toro Rd On-Ramp from WB El Toro Rd	1,242	720	E	C	1,251	725	F	D	1,265	734	F	D
	Lake Forest Dr Off-Ramp	1,100	750	E	D	1,125	788	E	E	1,161	845	E	E
I-5 Southbound	Lake Forest Dr On-Ramp from EB Lake Forest Dr	210	529	C	C	224	564	C	D	245	619	D	E
	El Toro Rd Off-Ramp	1,670	1,528	C	C	1,709	1,594	C	D	1,764	1,691	C	D
	Hook On-Ramp from WB Carlota	723	803	C	D	762	898	C	F	823	1,045	D	F
	El Toro Rd On-Ramp from EB El Toro Rd	321	588	C	F	349	588	C	D	392	608	D	E
	Alicia Pkwy Off-Ramp	1,708	2,036	C	C	1,747	2,083	C	D	1,793	2,138	C	D
Intersections***													
I-5 SB Ramps/ Paseo De Valencia	Avenida De La Carlota	3,179	3,934	D	E	3,277	4,111	D	F	3,425	4,377	E	F
Avenida De La Carlota	El Toro Rd	4,372	6,200	D	F	4,805	6,429	D	F	5,427	6,772	D	F
I-5 NB Ramps/Bridger Road	El Toro Rd	5,419	6,303	E	E	5,823	6,516	F	E	6,391	6,840	F	F
Rockfield Blvd	El Toro Rd	4,591	5,808	C	D	4,915	5,976	D	D	5,410	6,339	D	E
Paseo De Valencia	El Toro Rd	3,097	4,122	B	C	3,243	4,273	C	D	3,448	4,504	C	D
SB I-5 Ramp ¹	Avenida De La Carlota	-	-	-	-	-	-	-	-	-	-	-	-

Source: Traffic Volumes Report (March 2018) and Traffic Study Report (August 2018)

* Den/Del – Density/Delay: Density is calculated for Mainline, Weave Segment, and Ramps. Delay is a unit of measurement at Intersections. ** Weaving Segments consists of the 2 rightmost lanes (slow lane and auxiliary lane of the identified segment). ***AM/PM Volumes are based on Peak Hour - Total Approach Volumes. Notes: and bold indicates unacceptable F conditions. represents City Agencies having jurisdiction over the cited segment. ICU methodology was used to calculate V/C and LOS. Represents improved LOS. represents degraded LOS.

¹ "Peak hour" is defined as the 1 hour during the morning or evening commute that has the highest traffic volumes as follows: AM peak hour – 8:00 to 9:00 AM; PM peak hour – 5:00 to 6:00 PM. (-) demand exceeds capacity.

¹ The southbound I-5 ramp at Avenida De La Carlota was not evaluated for the existing condition.

EB = eastbound

ICU = Intersection Capacity Utilization

LOS = level of service

C?C= volume-to-capacity

WB = westbound

This page intentionally left blank

Table 2.4.16: 2030 Opening Year – I-5 Mainline, Ramps, Intersection and Weaving - Level of Service

Roadway	Location	No Build (2030) LOS				Alternative 2 (2030) LOS				Alternative 4 (2030) LOS				Alternative 4/Option B (2030) LOS			
		Den /Del*	AM	Den /Del*	PM	Den/ Del*	AM	Den/ Del*	PM	Den/ Del*	AM	Den/ Del*	PM	Den/ Del*	AM	Den/ Del*	PM
I-5 Mainline																	
Northbound	Alicia Pkwy On-Ramp to El Toro Rd Off-Ramp	38.1	E	29.5	D	40.9	E	29.5	D	40.9	E	29.5	D	40.9	E	29.5	D
	El Toro Rd Off-Ramp to El Toro Rd (Loop) On-Ramp	43.5	F	30.9	D	-	F	30.9	D	-	F	29.5	D	-	F	29.5	D
	El Toro Rd (Loop) On-Ramp to El Toro Rd On-Ramp	-	F	37.2	E	-	F	37.2	E	38.5	E	27.7	D	-	F	37.2	E
	El Toro Rd On-Ramp to Lake Forest Dr	-	F	29.8	D	35.5	E	24.2	C	35.5	E	24.2	C	35.5	E	24.2	D
I-5 Southbound	Lake Forest Dr On-Ramp to El Toro Rd Flyover Off-Ramp	-	-	-	-	29.9	D	37.7	E	-	-	-	-	-	-	-	-
	El Toro Flyover Off-Ramp to Carlota/Valencia Off-Ramp	-	-	-	-	35.9	E	44.1	E	-	-	-	-	-	-	-	-
	Lake Forest Dr On-Ramp and Carlota/Valencia Off-Ramp	29.9	D	37.7	E	-	-	-	-	29.9	D	37.7	E	29.9	D	37.7	E
	Carlota/Valencia Off- Ramp and Carlota/Valencia On-Ramp	30.0	D	42.1	E	28.3	D	37.7	E	-	-	-	-	-	-	-	-
	Carlota/Valencia On- Ramp and El Toro Rd On- Ramp	34.5	D	-	F	34.5	D	-	F	30.0	D	42.1	E	30.0	D	42.1	E
	El Toro Rd On- Ramp and Alicia Pkwy Off-Ramp	27.8	D	38.8	E	27.8	D	38.8	E	22.9	C	29.8	D	22.9	C	29.8	D
Weave Segment – Mainline**																	
I-5 Northbound	Alicia Pkwy On-Ramp to El Toro Rd Off-Ramp	-	F	-	F	-	F	-	F	-	F	-	F	-	F	-	F
	El Toro Rd On-Ramp to Lake Forest Dr Off-Ramp	-	F	33.9	D	-	F	-	F	-	F	28.4	D	-	F	-	F
I-5 Southbound	Lake Forest On-Ramp to El Toro Rd Off-Ramp	33.9	D	39.7	E	33.2	D	40.9	E	33.9	D	40.0	E	33.9	D	40.0	E
	El Toro Rd Off-Ramp to El Toro Rd On-Ramp (Inside CD) Road	-	-	-	-	-	-	-	-	21.3	B	26.2	C	21.3	B	26.2	C
	El Toro Rd On-Ramp (Collector Distributor) to Alicia Pkwy Off-Ramp	-	-	-	-	-	-	-	-	34.3	D	-	F	34.3	D	-	F
	El Toro On-Ramp to Alicia Pkwy Off-Ramp	33.0	D	-	F	33.0	D	-	F	-	-	-	-	-	-	-	-
Ramps																	
I-5 Northbound	Alicia Pkwy On-Ramp from WB Alicia Pkwy	28.5	E	21.2	D	28.5	E	21.2	D	28.5	E	21.2	D	28.5	E	21.2	D
	El Toro Rd Off-Ramp	24.0	D	19.7	C	24.0	D	19.7	C	24.0	D	19.7	C	24.0	D	19.7	C
	El Toro Rd (Loop) On-Ramp from EB El Toro Rd	-	F	24.5	D	-	F	23.8	D	25.3	D	23.8	D	-	F	23.8	D
	El Toro Rd On-Ramp from WB El Toro Rd	-	F	22.0	D	30.6	E	18.6	D	30.6	E	18.6	D	30.6	E	18.6	D
	Lake Forest Dr Off-Ramp	22.4	E	18.2	E	22.4	E	18.2	E	22.4	E	18.2	E	22.4	E	18.2	E
I-5 Southbound	Lake Forest Dr On Ramp from EB Lake Forest Dr	20.8	C	25.3	D	20.0	C	25.3	D	20.8	C	25.3	D	20.8	C	25.3	D
	Flyover Off-Ramp to El Toro Rd	-	-	-	-	19.9	E	23.0	E	-	-	-	-	-	-	-	-
	El Toro Rd Off-Ramp (Collector Distributor Road)	-	-	-	-	-	-	-	-	20.1	C	23.2	D	20.1	C	23.2	D
	El Toro Rd On-Ramp (Collector Distributor Road)	-	-	-	-	-	-	-	-	17.1	C	23.0	D	17.1	C	23.0	D
	El Toro Rd Off-Ramp	20.1	C	23.2	D	18.3	B	21.2	C	-	-	-	-	-	-	-	-
	Hook On-Ramp from WB Carlota	23.0	C	-	F	23.0	C	-	F	-	-	-	-	-	-	-	-
	El Toro Rd On-Ramp from EB El Toro Rd	19.8	C	25.4	D	19.8	C	25.4	D	-	-	-	-	-	-	-	-
	Alicia Pkwy Off-Ramp	16.2	C	20.2	D	16.2	C	20.2	D	16.2	C	20.2	D	16.2	C	20.2	D
Intersections***																	
I-5 SB Ramps/Paseo De Valencia	Avenida De La Carlota	42.7	D	88.3	F	35.0	C	27.6	C	26.7	C	28.9	C	26.7	C	28.9	C
Avenida De La Carlota	El Toro Rd	49.3	D	118.9	F	36.5	D	34.6	C	23.3	C	44.9	D	23.3	C	44.9	D
EB El Toro Rd	SB I-5 Off-Ramp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I-5 NB Ramps/Bridger Road	El Toro Rd	82.0	F	77.3	E	651	E	40.1	D	26.6	C	38.3	D	37.9	D	58.4	E
Rockfield Blvd	El Toro Rd	0.80	D	0.86	D	0.84	D	0.89	D	0.80	D	0.86	D	0.80	D	0.86	D
Paseo De Valencia	El Toro Rd	0.64	C	0.81	D	0.64	C	0.81	D	0.64	C	0.81	D	0.64	C	0.81	D
SB I-5 Ramp ¹	Avenida De La Carlota	-	-	-	-	-	-	-	-	14.5	B	14.3	B	14.5	B	14.3	B

Source: Traffic Volumes Report (March 2018) and Traffic Study Report (August 2018) * Den/Del – Density/Delay: Density is calculated for Mainline, Weave Segment, and Ramps. Delay is a unit of measurement at Intersections. ** Weaving Segments consists of the 2 rightmost lanes (slow lane and auxiliary lane of the identified segment). ***AM/PM Volumes are based on Peak Hour - Total Approach Volumes. Notes: indicates unacceptable F conditions. Represents City Agencies having jurisdiction over the segments. ICU methodology was used to calculate V/C and LOS. Represents improved LOS. Represents degraded LOS. (-) demand exceeds capacity.

¹ The southbound I-5 ramp at Avenida De La Carlota was not evaluated for the existing condition.

EB = eastbound
 I-5 = Interstate 5
 ICU = Intersection Capacity Utilization
 LOS =level of service
 NB = northbound
 SB = southbound
 V/C = volume-to-capacity
 WB = westbound

This page intentionally left blank

Table 2.4-17: 2050 Future Year – I-5 Mainline, Ramps, Intersection and Weaving - Level of Service

Roadway	Location	No Build (2050) LOS				Alternative 2 (2050) LOS				Alternative 4 (2050) LOS				Alternative 4/Option B (2050) LOS			
		Den /Del*	AM	Den /Del*	PM	Den /Del*	AM	Den /Del*	PM	Den /Del*	AM	Den /Del*	PM	Den /Del*	AM	Den /Del*	PM
I-5 Mainline																	
Northbound	Alicia Pkwy On-Ramp to El Toro Rd Off-Ramp	43.8	E	32.9	D	43.8	E	32.9	D	43.8	E	32.9	D	43.8	E	32.9	D
	El Toro Rd Off-Ramp to El Toro Rd (Loop) On-Ramp	-	F	34.7	D	-	F	34.7	D	-	F	32.9	D	-	F	32.9	D
	El Toro Rd (Loop) On-Ramp to El Toro Rd On-Ramp	-	F	42.6	E	-	F	42.6	E	41.7	E	30.6	D	-	F	42.6	E
	El Toro Rd On-Ramp to Lake Forest Dr	-	F	33.4	D	38.6	E	26.6	D	38.6	E	26.6	D	38.6	E	26.6	C
I-5 Southbound	Lake Forest Dr On-Ramp to El Toro Rd Flyover Off-Ramp	-	-	-	-	32.6	D	41.8	E	32.6	D	41.8	E	32.6	D	41.8	E
	El Toro Flyover Off-Ramp to Carlota/Valencia Off-Ramp	-	-	-	-	37.5	E	-	F	-	-	-	-	-	-	-	-
	Lake Forest Dr On-Ramp and Carlota/Valencia Off-Ramp	32.6	D	41.8	E	-	-	-	-	-	-	-	-	-	-	-	-
	Carlota/Valencia Off- Ramp and Carlota/Valencia On-Ramp	31.3	D	42.9	E	31.2	D	41.7	E	-	-	-	-	-	-	-	-
	Carlota/Valencia On- Ramp and El Toro Rd On-Ramp	38.8	E	-	F	38.8	E	-	F	32.9	E	42.9	E	32.9	E	42.9	E
	El Toro Rd On- Ramp and Alicia Pkwy Off-Ramp	30.4	D	43.7	E	30.4	D	43.7	E	24.7	C	32.6	D	24.7	C	32.6	D
Weave Segment – Mainline**																	
I-5 Northbound	Alicia Pkwy On-Ramp to El Toro Rd Off-Ramp	-	F	-	F	-	F	-	F	-	F	-	F	-	F	-	F
	El Toro On-Ramp to Lake Forest Dr Off-Ramp	-	F	36.8	E	-	F	30.7	D	-	F	30.7	D	-	F	30.7	D
I-5 Southbound	Lake Forest On-Ramp to El Toro Rd Off-Ramp	36.1	E	-	F	36.8	E	-	F	36.1	E	-	F	36.1	E	-	F
	El Toro Rd Off-Ramp to El Toro Rd On-Ramp (Inside CD) Road	-	-	-	-	-	-	-	-	22.5	B	28.6	C	22.5	B	28.6	C
	El Toro Rd On-Ramp (CD) to Alicia Pkwy Off-Ramp	-	-	-	-	-	-	-	-	37.8	E	-	F	37.8	E	-	F
	El Toro On-Ramp to Alicia Pkwy Off-Ramp	35.9	E	-	F	35.9	E	-	F	-	-	-	-	-	-	-	-
Ramps																	
I-5 Northbound	Alicia Pkwy On-Ramp from WB Alicia Pkwy	30.3	E	23.2	D	30.3	E	23.2	D	30.3	E	23.2	D	30.3	E	23.2	D
	El Toro Rd Off-Ramp	24.9	D	25.8	E	24.9	D	25.8	E	24.0	D	19.7	C	24.0	D	19.7	C
	El Toro Rd (Loop) On-Ramp from EB El Toro Rd	-	F	27.3	D	-	F	26.5	D	27.1	E	21.7	D	-	F	26.5	D
	El Toro Rd On-Ramp from WB El Toro Rd	-	F	23.7	D	43.1	E	20.1	D	13.4	E	20.1	D	13.4	E	20.1	D
I-5 Southbound	Lake Forest Dr Off-Ramp	23.5	E	18.2	E	23.5	E	18.2	E	22.4	E	18.2	E	22.4	E	18.2	E
	Lake Forest Dr On Ramp from EB Lake Forest Dr	22.3	D	28.8	E	22.3	D	28.8	E	22.3	D	28.8	E	22.3	D	28.8	E
	Flyover Off-Ramp to El Toro Rd	-	-	-	-	21.1	E	24.3	E	-	-	-	-	-	-	-	-
	El Toro Rd Off-Ramp (Collector Distributor Road)	-	-	-	-	-	-	-	-	20.1	C	23.2	D	20.1	C	23.2	D
	El Toro Rd On-Ramp (Collector Distributor Road)	-	-	-	-	-	-	-	-	18.6	C	26.2	D	18.6	C	26.2	D
	El Toro Rd Off-Ramp	21.4	C	24.6	D	19.5	C	22.4	C	-	-	-	-	-	-	-	-
	Hook On-Ramp from WB Carlota	25.2	D	-	F	25.2	D	-	F	-	-	-	-	-	-	-	-
	El Toro Rd On-Ramp from EB El Toro Rd	21.3	D	28.5	E	21.3	D	28.5	E	-	-	-	-	-	-	-	-
	Alicia Pkwy Off-Ramp	17.3	C	21.7	D	17.3	C	21.7	D	16.2	C	20.2	D	16.2	C	20.2	D
Intersections***																	
I-5 SB Ramps/ Paseo De Valencia	Avenida De La Carlota	71.8	E	98.7	F	37.2	D	28.2	C	28.6	C	33.1	C	28.6	C	33.1	C
Avenida De La Carlota	El Toro Rd	53.7	D	134.1	F	38.0	D	37.7	D	23.8	C	50.7	D	23.8	C	50.7	D
EB El Toro Rd	SB I-5 Off-Ramp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I-5 NB Ramps/Bridger Road	El Toro Rd	89.3	F	92.7	F	67.5	E	55.2	E	43.5	D	46.7	D	51.9	D	64.1	E
Rockfield Blvd	El Toro Rd	0.87	D	0.92	E	0.91	E	0.89	D	0.87	D	0.92	E	0.87	D	0.92	E
Paseo De Valencia	El Toro Rd	0.66	C	0.84	D	0.66	C	0.81	D	0.66	C	0.84	D	0.66	C	0.84	D
SB I-5 Ramp ¹	Avenida De La Carlota	-	-	-	-	-	-	-	-	14.6	B	14.3	B	14.6	B	14.3	B

Source: Traffic Volumes Report (March 2018) and Traffic Study Report (August 2018) * Den/Del – Density/Delay: Density is calculated for Mainline, Weave Segment, and Ramps. Delay is a unit of measurement at Intersections. ** Weaving Segments consists of the 2 right most lanes (slow lane and auxiliary lane of the identified segment). ***AM/PM Volumes are based on Peak Hour - Total Approach Volumes. Notes: indicates unacceptable F conditions. represents City Agencies having jurisdiction over the segments. ICU methodology was used to calculate V/C and LOS. Represents improved LOS. Represents degraded LOS. "Peak hour" is defined as the 1 hour during the morning or evening commute that has the highest traffic volumes as follows: AM peak hour – 8:00 to 9:00 AM.; PM peak hour – 5:00 to 6:00 PM. (-) demand exceeds capacity.

¹ The southbound I-5 ramp at Avenida De La Carlota was not evaluated for the existing condition.

EB = eastbound
NB = northbound

LOS = level of service
WB = westbound

V/C = volume-to-capacity
ICU = Intersection Capacity Utilization

I-5 = Interstate 5
SB = southbound

This page intentionally left blank