

2.5 Traffic and Transportation/Pedestrian and Bicycle Facilities

2.5.1 Regulatory Setting

The California Department of Transportation (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 Part 27) implementing Section 504 of the Rehabilitation Act (29 United States Code [USC] 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.

2.5.2 Affected Environment

This section is based on the *Final Traffic/Circulation Impact Report* (January 2017) and the *Addendum to the Traffic/Circulation Impact Report* (August 2019) prepared for the project. The project limits begin at Interstate 5 (I-5), north of Interstate 405 (I-405) (Post Mile [PM] 21.3) to south of State Route 55 (SR-55) (PM 30.3).

The traffic operations analysis considered all the general purpose (GP) and high-occupancy vehicle (HOV) lanes on I-5 between I-405 and SR-55, all on- and off-ramps within the project limits, and 49 Study Area intersections. The traffic impact analysis considered the following scenarios:

- Existing Baseline Conditions (2014)
- No Build Alternative – Opening Year (2030)
- Alternatives 2A and 2B – Opening Year (2030)

- Alternatives 2A and 2B (Option 3) – Opening Year (2030)
- No Build Alternative – Design Year (2050)
- Alternatives 2A and 2B – Design Year (2050)
- Alternatives 2A and 2B (Option 3) – Design Year (2050)

Alternative 2A and Alternative 2B (Preferred Alternative) are not operationally different and, therefore, are considered the same for purposes of traffic impact analysis.

2.5.2.1 Existing Facility

As previously stated in Chapter 1, Proposed Project, I-5 is a major north-south interstate freeway that traverses the western United States from Mexico to Canada. In Orange County, I-5, also known as the Santa Ana Freeway, serves as the major connector from the County of Los Angeles to the County of San Diego. Within the project Study Area, the freeway serves the Cities of Irvine and Tustin, connecting on the northern end to the City of Santa Ana and central Orange County. The project segment of I-5, between I-405 and SR-55, is shown on Figure 1-1 in Chapter 1.

Within the project limits, I-5 has four-to-five GP lanes in each direction, plus a limited-access HOV lane in each direction. Auxiliary lanes exist between most of the 12 interchanges located within the project limits. During peak commute times, congestion exists within the corridor, and is expected to worsen in the future.

2.5.2.2 Existing Traffic Operations

Existing Levels of Service

Mainline and Ramps

As discussed in Section 1.2.2.1, Capacity, Transportation Demand, and Safety, and also shown in Table 1.2, the I-5 corridor in the Study Area currently operates at unacceptable levels of service (LOS) (E or F) in a substantial number of mainline segments and ramps. Existing traffic conditions described in this section and in Section 1.2.2.1 are based on traffic counts and baseline conditions in 2014. A level of service analysis was conducted for the Existing Baseline conditions on project mainline segments, weaving segments, and ramp merge and diverge areas within the Study Area limits. Table 1.1, provided earlier in Chapter 1, provides information on the average daily traffic (ADT) and Existing Baseline traffic volumes during the AM and PM peak periods on I-5. Many of the freeway segments operate at an unacceptable LOS (classified as LOS E or F) under Existing Baseline conditions, creating chokepoints and causing congestion on adjacent merge and diverge areas.

Overall, the freeway operates at an unsatisfactory LOS during both the AM and PM peak periods at several locations, with the PM peak period worse in the northbound direction compared to the southbound direction, especially in the northern portion of the Study Area. Of the 35 basic GP lane freeway segments analyzed, 24 operate at unacceptable LOS in the AM peak period, and 21 operate at unacceptable LOS in the PM peak period. Of the 24 segments that operate at unacceptable levels in the AM peak period, 13 are northbound (10 at LOS F) and 11 are southbound (seven at LOS F). For the 21 segments that operate at an unacceptable LOS in the PM peak period, 11 are northbound (eight at LOS F) and 10 are southbound (one at LOS F). Of the 14 weaving segments analyzed, 12 operate at unacceptable LOS in the AM peak period, and 11 operate at unacceptable LOS in the PM peak period. Of the 12 weaving segments that operate at unacceptable levels in the AM peak period, six are northbound (four at LOS F) and six are southbound (three at LOS F). For the 11 weaving segments that operate at unacceptable levels in the PM peak period, five are northbound (four at LOS F) and five are southbound (three at LOS F). Only four of the 47 merge/diverge areas operate at unacceptable LOS in the AM peak period, and three operate at unacceptable LOS in the PM peak period. Of the four merge/diverge areas that operate at unacceptable levels in the AM peak period, two are northbound (one at LOS F) and two are southbound (none at LOS F). Of the three merge/diverge areas that operate at unacceptable levels in the PM peak period, one is northbound and operates at LOS E, and two are southbound both operating at LOS E. All 49 HOV segments in the AM and PM peak periods (in both the northbound and southbound directions) operate at an acceptable LOS.

Intersections

In total, 49 Study Area intersections were evaluated and the LOS was calculated using Highway Capacity Manual (HCM) 2010 methodology. Intersections outside of Caltrans' jurisdiction (within the Cities of Irvine and Tustin) were analyzed using the Intersection Capacity Utilization (ICU) methodology consistent with the Orange County Transportation Authority (OCTA) 2013 Congestion Management Program (CMP), as ICU is the preferred methodology for evaluating intersection operations by these cities and by OCTA. As shown in Tables 2.5.5 and 2.5.6 (all tables are provided at the end of this section) 19 intersections (totaling approximately 38 percent of the analyzed intersections taking into account both methodologies) currently operate at an unacceptable LOS (LOS E or F) during either peak period. Some of these intersections are operating at an unacceptable LOS during both peak periods, while others are operating at an unacceptable LOS during at least one peak period.

Ramp Capacity

On-ramp and off-ramp queuing for Existing Baseline conditions was evaluated. It was determined that existing storage lengths, provided on all Study Area on- and off-ramps and taking into account ramp metering rates, are adequate for Existing Baseline conditions during both AM and PM peak periods. See Tables 2.5.1 and 2.5.2.

HOV Degradation

The Caltrans 2017 *California High-Occupancy Vehicle Facility Degradation Report and Action Plan* (Degradation Action Plan) (November 2018), found that the HOV lanes within the proposed project limits are degraded. This report identified the following potential causes of HOV lane degradation that may be applicable to I-5 within the proposed project limits:

- HOV demand exceeds capacity
- Vehicle weaving conflicts at the ingress/egress locations
- Congestion in the GP lanes

The Degradation Action Plan identifies the following remediation strategies, which Caltrans is implementing along I-5 within or immediately adjacent to the project limits such that the strategy would have an impact on the proposed project:

- Utilize the *Orange County Managed Lanes Feasibility Study* (January 2017), which addresses future regionwide development of the HOV network and scenarios under which potential conversion to High-Occupancy Toll (HOT) lanes could occur.
- Add a second HOV lane in each direction on I-5 between SR-55 and State Route 57 (SR-57) to provide a dual HOV lane facility. The project is currently under construction and is expected to be complete in 2020.¹

2.5.2.3 Pedestrian and Bicycle Facilities

Pedestrian travel across the project limits where arterial streets cross I-5 is provided via sidewalks at the following locations:

¹ Orange County Transportation Authority (OCTA). Website: [https://www.octa.net/Projects-and-Programs/All-Projects/Freeway-Projects/Santa-Ana-Freeway-\(I-5\)/I-5-\(SR-57-to-SR-55\)/?frm=7128#!Overview](https://www.octa.net/Projects-and-Programs/All-Projects/Freeway-Projects/Santa-Ana-Freeway-(I-5)/I-5-(SR-57-to-SR-55)/?frm=7128#!Overview) (accessed August 20, 2019).

- Alton Parkway overcrossing
- Barranca Parkway overcrossing
- Sand Canyon Avenue undercrossing
- Jeffrey Road overcrossing
- Yale Avenue overcrossing
- Culver Drive undercrossing
- Jamboree Road undercrossing
- Tustin Ranch Road overcrossing
- Red Hill Avenue undercrossing
- Newport Avenue undercrossing

These arterials generally include sidewalks on at least one side, and usually both sides, of the road as they cross I-5. Of these arterials, Tustin Ranch Road, Culver Drive, and Sand Canyon Avenue also have marked on-road (Class II) bicycle lanes on the westbound shoulder, and Yale Avenue, Jeffrey Road, and Barranca Parkway have marked bicycle lanes on the shoulders in both the eastbound and westbound directions. There are additional Class II bicycle lanes located along several other major arterials in the Study Area.

Class I bicycle lanes located within 0.5 mile (mi) of the project limits include:

- Walnut Trail in the City of Irvine, accessible from Sand Canyon Avenue just south of I-5, and running generally north-south between Sand Canyon Avenue and Harvard Avenue.
- Cypress Village Trail in the City of Irvine, accessible from Sand Canyon Avenue just north of I-5, and running parallel to I-5 until Jeffrey Road, where it turns northeast and continues along Jeffrey Road.
- Peters Canyon Regional Trail and Bikeway in the City of Irvine, located approximately 1,000 feet (ft) south of State Route 261 (SR-261) and running generally east-west across the Study Area.
- West Irvine Trail, in the City of Irvine, which branches off the Peters Canyon Regional Trail and Bikeway at Bryan Road and continues in a northeasterly direction situated north of SR-261.
- A separate off-street bicycle lane in the City of Tustin along the north side of Newport Boulevard between El Camino Real and Packers Circle.

2.5.3 Environmental Consequences

The methodologies for forecasting and assessing future year with and without project traffic effects are described in detail in Chapters 5 and 6 of the *Final Traffic/Circulation Impact Report* (January 2017). The findings of those analyses are summarized below.

The analysis evaluation criteria used to determine acceptable traffic operation conditions are based on the LOS policies identified by Caltrans. Caltrans strives for freeway facilities to operate at either LOS C or D. Freeway levels of service were shown on Figure 1-2 in Chapter 1. Based on Caltrans policy, LOS D was used as the threshold for the freeway facilities analysis. Any future freeway facilities projected to operate at an unacceptable LOS (LOS E or F) need to be mitigated. Per Caltrans, an impact to freeway facilities would be considered substantial if the project would:

- Degrade the LOS on the freeway facility from LOS D to LOS E or F, or
- Impact (worsen) a facility that is already operating at an unacceptable LOS (E or F)

The 49 Study Area intersections noted previously were taken into account in the traffic impact analysis as they may be potentially impacted due to mainline improvements. Intersections would be considered substantially impacted if they are projected to operate at an unacceptable LOS (E or F) under the Build Alternative (and are not projected to operate at unsatisfactory LOS under the No Build Alternative scenario).

The 2050 Design Year No Build Alternative consists of projects included in the Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan. The 2030 Opening Year No Build Alternative also consists of projects included in the SCAG 2012 Regional Transportation Plan; however, projects anticipated to be constructed after 2030 have been removed from the roadway network.

The improvements included in the Build Alternative are shown in Chapter 1 on Figures 1-3 and 1-4 for Alternative 2A and Alternative 2B (Preferred Alternative), respectively. Those improvements are described in more detail in Chapter 1, Proposed Project, in this environmental document, and in Chapter 1 of the *Final Traffic/Circulation Impact Report* (January 2017).

2.5.3.1 Temporary Impacts

Build Alternative (Alternative 2A and Alternative 2B [Preferred Alternative])¹

Project Feature PF-T-1 will address the potential for short-term impacts related to traffic and transportation during construction of the Build Alternative or Design Option 3.

PF-T-1 Transportation Management Plan. A Final Transportation Management Plan (TMP) will be developed in detail during final design, which would be implemented by the Construction Contractor during project construction to address short-term traffic circulation and access effects during project construction. Specifically, when the TMP is prepared during final design, a qualified traffic engineer will prepare the TMP, which will include, but not be limited to, the elements described below to reduce traveler delays and enhance traveler safety during project construction. The TMP will be closely coordinated with the appropriate entities and stakeholders and will be approved by the Orange County Transportation Authority (OCTA) and the California Department of Transportation (Caltrans) District 12 during final design and incorporated into the plans, specifications, and estimates for implementation by the Construction Contractor.

The purpose of the TMP is to address the short-term traffic and transportation impacts during construction of the project. The objectives of the TMP are to:

- Maintain traffic safety during construction
- Effectively maintain an acceptable level of traffic flow throughout the transportation system during construction
- Minimize traffic delays and facilitate reduction of the overall duration of construction activities
- Minimize detours and impacts to pedestrians and bicyclists
- Foster public awareness of the project and related transportation and traffic impacts
- Achieve public acceptance of construction of the project and the TMP measures

¹ Alternative 2B without Design Option 3 has been selected as the Preferred Alternative.

The TMP will contain, but not be limited to, the following elements intended to reduce traveler delay and enhance traveler safety. These elements will be refined during final design and incorporated in the TMP for implementation during project construction.

- **Public Information/Public Awareness Campaign (PAC).** The primary goal of the PAC is to educate motorists (as well as transit users, bicyclists, and pedestrians, as applicable), business owners and operators, residents, elected officials, and government agencies about project construction activities and associated transportation impacts. The PAC is an important tool for reaching target audiences with important construction project information and is anticipated to include, but not be limited to:
 - Rideshare information
 - Brochures and mailers
 - Media releases
 - Paid advertising
 - Public meetings
 - Broadcast fax and email services
 - Telephone hotline
 - Notification to targeted groups
 - Commercial traffic reporters/feeds
 - Project website
 - Visual information
 - Local cable television and news
 - Internet postings
- **Traveler Information Strategies.** The effective implementation of a traveler information system during construction is crucial for enabling motorists (as well as transit users, bicyclists, and pedestrians, as applicable) to make informed decisions about their travel plans and options with real-time traffic information. That real-time traffic information will include information on mainline, ramp, lane, and arterial closures and detours; travel delays; access to adjacent land uses; “businesses are open” signing; and other signing and information to assist travelers in navigating through,

around, and in construction areas. Key components of the traveler information system are anticipated to include, but not be limited to:

- Fixed and portable changeable message signs
 - Ground-mounted signs
 - Automated work zone information systems
 - Highway advisory radio
 - Lane closure website
 - Caltrans highway information network
 - Bicycle and pedestrian information
 - Commute Smart website
- **Incident Management.** Effective incident management will ensure that incidents in and near construction areas are cleared quickly and do not result in substantial delays for the traveling public in the vicinity of work zones. Incident management includes, but is not limited to:
 - Caltrans Construction Zone Enhanced Enforcement Program (COZEEP)
 - Freeway Service Patrol
 - Traffic surveillance stations
 - Caltrans Transportation Management Center
 - Traffic management team
 - Towing services
 - **Construction Strategies.** The TMP will include procedures to lessen the transportation effects of project-related construction activities and will include, but not be limited to, consideration of the following:
 - Conflicts with other projects and special events
 - Construction staging alternatives
 - Mainline lane closures
 - Local road closures
 - Ramp and connector closures (no two consecutive on- or off-ramps in the same direction would be closed at the same time)
 - Pedestrian and bicycle detours and facility closures

- Traffic control improvements
- Coordination with other projects
- Project phasing
- Traffic screens
- Truck traffic restrictions

- **Demand Management.** Temporarily reducing the overall traffic volumes on the project segment of Interstate 5 (I-5) could reduce the short-term adverse effects of construction on traffic operations. The TMP will include, but not be limited to, the following strategies that could reduce vehicular demand in the Study Area during project construction:
 - Rideshare incentives
 - Transit services
 - Shuttle services
 - Variable work hours and telecommuting
 - Park-and-ride lots

- **Alternate Route Strategies.** The TMP will provide strategies for notifying motorists, pedestrians, and bicyclists of planned construction activities. This notification will allow travelers to make informed decisions about their travel plans, including the consideration of possible alternate routes. The TMP will finalize the detour and alternate routes for motorists (as well as transit users, bicyclists, and pedestrians, as applicable), specifically addressing the following:
 - Mainline lane closures
 - Ramp/connector closures
 - Local road closures
 - Temporary highway or shoulder use
 - Local street improvements
 - Temporary detours and closures of bicycle and pedestrian facilities
 - Traffic signal coordination

The Construction Contractor will implement the measures in the TMP during construction.

Alternative 2A

Although Alternative 2A could mostly be completed with minimal impacts to lane configuration and width, the work that would more substantially affect the freeway and local street traffic would take place during bridge replacement construction, as well as during the widening of I-5 along El Camino Real and Nisson Road.

Construction of the bridge replacements for Alton Parkway and Jeffrey Road over I-5 could generally be completed with the I-5 maintaining its current lane configuration, but the placement of falsework, demolition, and other activities associated with the bridge construction, would require full nighttime closure of the freeway. Generally, lane closures would occur during off-peak and overnight hours, thereby minimizing delays to the traveling public. Full and partial closures will be coordinated with local jurisdictions as outlined in the Transportation Management Plan (TMP) (October 2017) (Project Feature PF-T-1). More detail regarding the preliminary detours associated with construction work is outlined as follows.

Alton Parkway Partial Bridge Closures

Alton Parkway over I-5 would be reconstructed under Alternative 2A. The bridge construction would be staged to generally maintain both directions of traffic during construction. Temporary directional closures may be needed during construction, and are anticipated to occur during off-peak or nighttime hours. Travelers on the eastbound Alton Parkway bridge over I-5 would be rerouted to Irvine Center Drive to Barranca Parkway to cross I-5, and then Technology Drive West to resume traveling on Alton Parkway. The reverse movement would occur for the partial closure of westbound Alton Parkway over I-5; travelers would be rerouted to Technology Drive West to Barranca Parkway to cross I-5, and then utilize Irvine Center Drive to resume travel on Alton Parkway. Barranca Parkway is approximately 2,200 ft north of Alton Parkway where it crosses I-5. As the Alton Parkway overcrossing structure has sidewalks and shoulder bicycle lanes, pedestrians and bicyclists would be temporarily impacted by these closures and detours.

Jeffrey Road Partial Bridge Closure

Jeffrey Road over I-5 would be reconstructed under Alternative 2A. The bridge construction would be staged to generally maintain both directions of traffic during construction. Temporary directional closures may be needed during

construction, and are anticipated to occur during off-peak and nighttime hours. Those traveling on eastbound and westbound Jeffrey Road would be rerouted to cross the I-5 at Yale Avenue using Walnut Avenue and Trabuco Road. Yale Avenue is less than one mi north of Jeffrey Road (approximately 4,400 ft). As the Jeffrey Road overcrossing structure has sidewalks and shoulder bicycle lanes, pedestrians and bicyclists would be temporarily impacted by these closures and detours.

Westbound Jeffrey Road to Northbound I-5 On-Ramp

Temporary construction of the northbound I-5 on-ramp to westbound Jeffrey Road would require temporary nighttime closures to reconstruct the ramp. Travelers on westbound Jeffrey Road would be rerouted to I-5 via a right turn on Trabuco Road and a left turn just before Culver Drive to access the northbound on-ramp.

Northbound I-5 to Jamboree Road Off-Ramp Closure

Construction of the widening of the northbound Jamboree Road off-ramp bridge over SR-261 would require temporary nighttime closures of the off-ramp for placement of falsework, demolition, and other activities associated with bridge construction. Travelers using the northbound Jamboree Road off-ramp would be rerouted to exit at either Culver Drive or Tustin Ranch Road. Those exiting Culver Drive would continue northbound on Culver Drive to westbound Bryan Avenue to Jamboree Road. Those exiting Tustin Ranch Road would continue northbound on Tustin Ranch Road to eastbound El Camino Real to Jamboree Road.

Westbound Jamboree Road to Northbound I-5 On-Ramp Closure

Construction would require a short-term closure on this ramp in order to avoid a potentially more substantial impact to traffic due to a nonstandard weaving length and lane closure on the I-5 mainline were the ramp to remain open. Travelers on westbound Jamboree Road would be rerouted to I-5 via a right turn on Walnut Avenue and a right at Tustin Ranch Road to access the northbound on-ramp at Tustin Ranch Road.

Westbound Red Hill Avenue to Northbound I-5 On-Ramp Closure

Due to the narrow existing ramp layout and the lack of available right-of-way, a short-term ramp closure would be required here for construction staging. Travelers on westbound Red Hill Avenue would be rerouted to I-5 via a right turn

on El Camino Real and a left on Newport Avenue to access the northbound on-ramp at Newport Avenue. Newport Avenue is approximately 2,700 ft north of Red Hill Avenue.

Tustin Ranch Road On-Ramp to Jamboree Road Off-Ramp Closure Along Southbound I-5

The stretch of I-5 between the above-mentioned ramps would have a non-standard weave length while both ramps remained operational, which may exacerbate congestion on the mainline. A full short-term closure of the Tustin Ranch Road on-ramp may occur, if deemed appropriate for the level of anticipated congestion.

Southbound SR-55 to Southbound I-5 Connector, Newport Avenue Off-Ramp Closure

In order to safely stage the proposed improvements under Alternative 2A and allow for the various tie-ins and profiles for southbound I-5, the southbound I-5 off-ramp to Newport Avenue, and the southbound SR-55 connector to southbound I-5, speed reduction and lane reduction will be required, as well as a full short-term closure during the second stage of construction. Travelers along this connector looking to exit at Newport Avenue will be rerouted to continue on I-5 southbound to the off-ramp to Red Hill Avenue, and then utilize Red Hill Avenue and Mitchell Avenue to backtrack to Newport Avenue. Along the southbound I-5 mainline, the Red Hill Avenue off-ramp is roughly 4,400 ft further south than the SR-55 to I-5 connector off-ramp at Newport Avenue.

Full Northbound I-5 Freeway Closure at Alton Parkway

For the proposed replacement of the Alton Parkway Overcrossing under Alternative 2A, full nighttime freeway closures will be required for bridge demolition, placement and removal of falsework, and other activities needed for the bridge replacement. During a full closure of the I-5 mainline at Alton Parkway, northbound I-5 travelers will detour to the I-405 connector south of the closure and travel along I-405 to Sand Canyon Avenue. After exiting at Sand Canyon Avenue and traveling northward, motorists can then re-access I-5 at the Sand Canyon on-ramp. Similarly, travelers on southbound I-5 would exit at Sand Canyon Avenue and travel southbound to access the southbound I-405, which connects with I-5 approximately three mi south of Sand Canyon Avenue. Depending on construction staging, both directions of the freeway may not need to be closed simultaneously.

Full Northbound I-5 Freeway Closure at Jeffrey Road

For the proposed replacement of the Jeffrey Road Overcrossing, full nighttime freeway closures will be required for bridge demolition, placement and removal of falsework, and other activities needed for the bridge replacement. During a full closure of the I-5 mainline at Jeffrey Road, northbound I-5 travelers will access the northbound I-405 connector approximately 3.6 mi south of Jeffrey Road, and exit at Culver Drive. By traveling northbound on Culver Drive for approximately 3.6 mi, motorists can then re-access I-5 northbound. Similarly, travelers on southbound I-5 would exit at Culver Drive and proceed southbound on Culver Drive to access southbound I-405, which connects with I-5 roughly 5.4 mi south of Culver Drive. Depending on construction staging, both directions of the freeway may not need to be closed simultaneously.

Alternative 2B (Preferred Alternative)

The following closures and detours described above under Alternative 2A would also be in effect under Alternative 2B: the westbound Jamboree Road to northbound I-5 on-ramp short-term closure and the Tustin Ranch Road on-ramp to Jamboree Road off-ramp along southbound I-5. As Alternative 2B has a generally smaller footprint, it maintains the existing northbound I-5 off-ramp to Jamboree Road bridge, does not include work at the northbound Red Hill Avenue on-ramp, the southbound SR-55 to southbound I-5 connector, the northbound SR-55 to southbound I-5 connector, and does not widen or replace the Alton Parkway or Jeffrey Road overcrossings.

No Build Alternative (Alternative 1)

None of the improvements proposed under Alternatives 2A or 2B would be constructed under the No Build Alternative. As a result, the No Build Alternative would not result in temporary impacts related to traffic and circulation or to pedestrian and bicycle facilities.

2.5.3.2 Permanent Impacts

The following tables provide detailed information on the traffic operations under the Build and No Build Alternatives in Opening Year 2030:

Table 2.5.3 summarizes the northbound freeway mainline and ramp LOS during AM and PM peak periods under the existing condition, the 2030 No Build Alternative, the 2030 Build Alternative, and the 2030 Build (with Option 3) Alternative.

Table 2.5.4 summarizes the southbound freeway mainline and ramp LOS during AM and PM peak periods under the existing condition, the 2030 No Build Alternative,

and the 2030 Build Alternative. The 2030 Build (Option 3) Alternative is not applicable in the southbound direction.

Table 2.5.5 summarizes the intersection LOS (using HCM methodology) under the existing condition, the 2030 No Build Alternative, the 2030 Build Alternative, and the 2030 Build (Option 3) Alternative.

Table 2.5.6 summarizes the intersection LOS (using ICU methodology) under the existing condition, the 2030 No Build Alternative, the 2030 Build Alternative, and the 2030 Build (Option 3) Alternative.

Table 2.5.7 summarizes the ramp storage adequacy under the existing condition, the 2030 No Build Alternative, the 2030 Build Alternative, and the 2030 Build (Option 3) Alternative.

The following tables provide detailed information on the traffic operations under the Build and No Build Alternatives in Design Year 2050:

Table 2.5.8 summarizes the northbound freeway mainline and ramp LOS during AM and PM peak periods under the existing condition, the 2050 No Build Alternative, the 2050 Build Alternative, and the 2050 Build (Option 3) Alternative.

Table 2.5.9 summarizes the southbound freeway mainline and ramp LOS during AM and PM peak periods under the existing condition, the 2050 No Build Alternative and the 2050 Build Alternative. The 2050 Build (Option 3) Alternative is not applicable in the southbound direction.

Table 2.5.10 summarizes the intersection LOS (using HCM methodology) under the existing condition, the 2050 No Build Alternative, the 2050 Build Alternative, and the 2050 Build (Option 3) Alternative.

Table 2.5.11 summarizes the intersection LOS (using ICU methodology) under the existing condition, the 2050 No Build Alternative, the 2050 Build Alternative, and the 2050 Build (Option 3) Alternative.

Table 2.5.12 summarizes the ramp storage adequacy under the existing condition, the 2050 No Build Alternative, the 2050 Build Alternative, and the 2050 Build (Option 3) Alternative.

As indicated previously, 2030 has been identified as the opening year for the project, and 2050 has been identified as the design year. The traffic impacts and operations under the Build Alternative (with and without Option 3) and No Build Alternative in 2030 and 2050 are discussed by alternative below.

Build Alternative (Alternative 2A and Alternative 2B [Preferred Alternative])

Mainline and Ramps

Opening Year 2030

As identified in Tables 2.5.3 and 2.5.4, many of the freeway mainline segments are projected to operate at unacceptable LOS under 2030 Alternative 2A and 2B conditions, creating chokepoints and causing congestion on adjacent merge/diverge areas.

Of the 18 basic freeway segments on the GP lanes in the northbound direction, 13 and 10 segments are projected to operate at unacceptable LOS during the AM and PM peak periods, respectively. Of the 17 basic freeway segments on the GP lanes in the southbound direction, 11 and eight segments are projected to operate at unacceptable LOS during the AM and PM peak periods, respectively.

Of the seven weaving segments within the project limits in the northbound direction, six and five segments are projected to operate at unacceptable LOS during the AM and PM peak periods, respectively. Of the seven weaving segments within the project limits in the southbound direction, four segments are projected to operate at unacceptable LOS during both the AM and PM peak periods.

Of the seven merge/diverge segments within the project limits in the northbound direction, two segments are projected to operate at unacceptable LOS during the AM peak period. Of the six merge/diverge segments within the project limits in the southbound direction, one and two segments are projected to operate at unacceptable LOS during the AM and PM peak periods, respectively.

Of the 25 HOV segments within the project limits in the northbound direction, seven segments are projected to operate at unacceptable LOS during the AM peak period. Of the 24 HOV segments within the project limits in the southbound direction, eight and two segments are projected to operate at unacceptable LOS during the AM and PM peak periods, respectively.

The Build Alternative includes the addition of one new GP lane in each direction. With the additional GP lanes in the mainline segments proposed by the Build Alternative under 2030 conditions, traffic operations within the Study Area are proposed to improve at several freeway segments over the No Build Alternative for both AM and PM peak periods. Of the 47 existing ramps, 10 ramps are proposed for improvement as part of the project (see Section 1.3). These ramp improvements would result in a reduction in the number of weaving segments and merge/diverge segments operating at LOS E or F as compared to the No Build Alternative in the 2030 Opening Year scenario.

With the improvements proposed under the Build Alternative, all off-ramps within the Study Area would be served by dual-lane exits, single-lane exits with an additional decision-lane exit, or single-lane with auxiliary-lane exits, with exceptions at northbound I-5/Alton Parkway, southbound I-5/Jeffrey Road, and northbound I-5/Trabuco Road/Culver Drive. All of these locations experience improved operations under the Build Alternative. Northbound I-5/Alton Parkway, northbound I-5/Trabuco Road/Culver Drive, and southbound I-5/Jeffrey Road would improve as compared to the No Build Alternative, wherein northbound I-5/Alton Parkway would operate at an acceptable LOS in the PM peak period, and northbound I-5/Trabuco Road/Culver Drive would operate at an acceptable LOS during both peak periods. Northbound I-5/Alton Parkway would improve as compared to 2014 Existing Baseline conditions.

Design Year 2050

As shown in Tables 2.5.8 and 2.5.9, under the Build Alternative in 2050, much like in 2030, many freeway segments operate at unacceptable LOS, creating chokepoints and causing congestion on adjacent merge and diverge areas.

Of the 18 basic freeway segments on the GP lanes in the northbound direction, 13 and 12 segments are projected to operate at unacceptable LOS during the AM and PM peak periods, respectively. Of the 17 basic freeway segments on the GP lanes in the southbound direction, 11 and 12 segments are projected to operate at unacceptable LOS during the AM and PM peak periods, respectively.

Of the seven weaving segments within the project limits in the northbound direction, six segments are projected to operate at unacceptable LOS during both the AM and PM peak periods. Of the seven weaving segments within the project

limits in the southbound direction, six and five segments are projected to operate at unacceptable LOS during the AM and PM peak periods, respectively.

Of the seven merge/diverge segments within the project limits in the northbound direction, two segments are projected to operate at unacceptable LOS during the AM peak period. Of the six merge/diverge segments within the project limits in the southbound direction, two segments are projected to operate at unacceptable LOS during both the AM and PM periods.

Of the 25 HOV segments within the project limits in the northbound direction, 10 and 21 segments are projected to operate at unacceptable LOS during the AM and PM peak periods, respectively. Of the 24 HOV segments within the project limits in the southbound direction, 14 and 19 segments are projected to operate at unacceptable LOS during the AM and PM peak periods, respectively.

However, as in 2030, the additional lanes in the mainline segments under the Build Alternative would improve several freeway segments as compared to the No Build Alternative. The previously described ramp improvements to 11 of the 47 existing ramp tie-ins would help reduce the number of weaves and merge/diverge areas operating at LOS E or F when compared to the 2050 No Build Alternative.

When compared to the No Build Alternative, the Build Alternative would:

- Reduce the number of weave segments operating at LOS E or F in the northbound direction by one segment during both the AM and PM peak periods.
- Reduce the number of weave segments operating at LOS E or F in the southbound direction by one and two segments during the AM and PM peak periods, respectively.
- Reduce the number of merge/diverge segments operating at LOS E or F in the northbound direction by one and two segments during the AM and PM peak periods, respectively.
- Reduce the number of merge/diverge segments operating at LOS E or F in the southbound direction by three segments during both the AM and PM peak periods.

Also similar to 2030, the three previously described off-ramp locations consisting of a single lane would experience improved operations in 2050 with the

implementation of the Build Alternative. When compared to the 2050 No Build Alternative, these off-ramp locations would all experience improved LOS (northbound I-5/Alton Parkway and northbound I-5/Trabuco Road/Culver Drive would both improve to an acceptable LOS in one or both peak periods), and when compared to the 2014 Existing Baseline conditions, two locations would remain at the same LOS and one (northbound I-5/Alton Parkway) would improve.

Intersections

Opening Year 2030

As shown in Tables 2.5.5 and 2.5.6, under the Build Alternative in 2030, a total of 25 Study Area intersections are projected to operate at LOS E or F in one or both peak periods, according to the HCM 2010 methodology. This represents approximately 54 percent of the studied intersections that were analyzed using the HCM 2010 methodology. Compared to the 2030 No Build Alternative, five intersections would experience an improvement in LOS in one or both peak periods under the Build Alternative; however, two locations were also identified where a minor degradation in LOS would also be experienced. At the intersection of the Tustin Ranch Road/I-5 southbound ramps, the LOS in the PM peak period would degrade to LOS D from LOS C under the 2030 No Build Alternative, and at the intersection of the Red Hill Avenue/I-5 northbound ramps, the LOS in the PM peak period would degrade from LOS C under the 2030 No Build Alternative to LOS D under the 2030 No Build Alternative. However, neither of these locations would reach LOS E or F and, therefore, would not be substantially impacted. There are 15 total intersections wherein operations under the 2030 Build Alternative would be degraded to an LOS E or F when compared to 2014 Existing Baseline conditions.

Five intersections would operate at LOS E or F according to the ICU methodology in either of the peak periods under the Build Alternative in 2030, which represent 21 percent of the studied intersections that were analyzed using the ICU methodology. When compared to the 2030 No Build Alternative, no intersections evaluated under the ICU methodology were identified as having an improvement in LOS that would elevate an intersection operating at LOS E or F to an acceptable LOS. There are five intersection locations identified as being degraded from an acceptable LOS to an unacceptable LOS when comparing the 2014 Existing Baseline conditions to 2030 conditions with the Build Alternative.

Design Year 2050

Tables 2.5.10 and 2.5.11 outline the intersection operations under the Build Alternative in 2050. In 2050, a total of 27 Study Area intersections are projected to operate at LOS E or F in one or both peak periods, as calculated by the HCM 2010 methodology. This represents approximately 59 percent of the studied intersections using the HCM methodology. Compared to the 2050 No Build Alternative, five intersection locations would experience an improvement in LOS in one or both peak periods under the Build Alternative. Similar to 2030, there are locations in which LOS would be degraded, but at none of these locations would LOS be degraded to such a degree that an intersection operating at an acceptable LOS under the 2050 No Build Alternative would continue to operate at an unacceptable LOS under the Build Alternative. There are 17 locations at which LOS (as evaluated and defined by HCM 2010) would be degraded to an unacceptable LOS when compared to 2014 Existing Baseline conditions.

Under the Build Alternative in 2050, and according to the ICU methodology, six intersections (representing approximately 25 percent of evaluated intersections under the ICU methodology) are projected to operate at an unacceptable LOS. When compared to the 2050 No Build Alternative, one intersection would experience an improvement in LOS: Jamboree Road/El Camino Real, is projected to operate at LOS E during the PM peak period under the 2050 No Build Alternative. Under the 2050 Build Alternative, the same intersection is projected to operate at LOS D. When compared to the 2014 Existing Baseline conditions, six intersections evaluated under the ICU methodology are projected to experience degradation to an unacceptable LOS.

Ramp Capacity

Tables 2.5.7 and 2.5.12 contain a summary of off-ramp storage adequacy determinations in 2030 and 2050, respectively. Storage lengths provided on all on-ramps with minimum ramp metering rates are projected to be adequate under 2030 Build Alternative conditions. Under the Build Alternative, ramp improvements are planned at the following off-ramps: Enterprise Drive (Alton Parkway) southbound, Sand Canyon Avenue southbound, Trabuco Road northbound, and Jamboree Road northbound.

Bicycle and Pedestrian Facilities

The Build Alternative includes minor modifications to existing arterials at their crossings at I-5 to accommodate the permanent improvements to I-5 and the ramps

provided by the Build Alternative. The arterials closed temporarily and/or modified during construction would be returned to their existing cross-sections or better no later than the completion of construction of the improvements proposed under the Build Alternative. Specifically, at arterial crossings where modifications to sidewalks and/or on-road marked bicycle lanes are necessary as part of the proposed improvements, those modifications would be consistent with ADA accessibility requirements. The permanent improvements proposed under the Build Alternative would not affect the existing Class I bike paths in the vicinity of the project.

Build Alternative (Option 3)

Mainline and Ramps

Opening Year 2030

Contained in Tables 2.5.3 and 2.5.4 are summaries of the freeway analysis results for the discrete Design Option 3 in 2030. Only the segments/ramps affected for the design option are included.

Design Option 3 eliminates the weave movement at I-5 northbound between the State Route 133 (SR-133) southbound connector and Jeffrey Road and, as such, no projected LOS for this weave is available. Therefore, for purposes of comparison, the adjacent new basic freeway segment between the Jeffrey Road off-ramp and the SR-133 southbound on-ramp is used and is projected to operate at LOS C or D in the AM and PM peak periods under Design Option 3 in 2030, with the exception of LOS E reached in the AM peak period in the segment from Jeffrey Road to Sand Canyon Avenue.

Design Year 2050

When compared to both the 2050 No Build Alternative and the 2014 Existing Baseline conditions, operations under Design Option 3 at the adjacent new basic freeway segment between the Jeffrey Road off-ramp and the SR-133 southbound on-ramp is projected to improve to LOS D in 2050. This is also an improvement over the base alternative configuration.

Intersections

Only the intersections affected by the various design options were evaluated and are included in Tables 2.5.5, 2.5.6, 2.5.10, and 2.5.11. For Design Option 3 in Opening Year 2030, when compared to the No Build conditions, no locations degrade to an unacceptable LOS under the HCM methodology, and one location degrades from LOS C during the PM peak period to LOS E under the ICU methodology (Newport Avenue and El Camino Real). When compared to the 2014 Existing Baseline

conditions, six locations experience an unacceptable LOS E or F under the HCM methodology, and two intersection locations experience an unacceptable LOS E or F under the ICU methodology.

For Design Option 3 in Design Year 2050, when compared to the No Build Alternative, no locations degrade to an unacceptable LOS under either the HCM or ICU methodologies. When compared to the 2014 Existing Baseline conditions, nine intersection locations degrade to an unacceptable LOS under the HCM methodology, and one under the ICU methodology (Barranca Parkway and Technology Drive West).

Ramp Capacity

Storage for all Study Area on-ramps with minimum metering rates is adequate for the Build Alternative (with and without Option 3) in both 2030 and 2050. As indicated in Tables 2.5.7 and 2.5.12, for the ramps affected by the design options, all off-ramps within the project limits have adequate storage lengths.

Bicycle and Pedestrian Facilities

Alternatives 2A and 2B (with and without Option 3), would not permanently impact bicycle or pedestrian facilities, as the improvements proposed under these design options pertain to weave movements and generally stay within current State right-of-way limits. Improvements included in the Build Alternative would also not preclude the planned Jeffrey Open Space Trail, a proposed bicycle/pedestrian overcrossing planned to be located easterly of the existing Jeffery Road overcrossing structure.

No Build Alternative (Alternative 1)

Mainline and Ramps

Many of the freeway segments are projected to operate at unacceptable LOS under the 2030 No Build condition; specific data for the No Build Alternative in 2030 and 2050 are provided in the previously cited tables. To summarize, of the 35 basic freeway segments on the GP lanes, 28 segments during the AM peak period and 26 segments during the PM peak period are projected to operate at LOS E or F. Of the 14 weaving segments analyzed, 13 segments in the AM peak period and 11 segments in the PM peak period are projected to operate at unacceptable LOS. Six merge/diverge areas in the AM peak period and five areas in the PM peak period would operate at LOS E or F, and of the 49 HOV segments, six in the AM peak period and seven in the PM peak period would operate at LOS E or F. With increased demands under the 2030 No Build Alternative conditions, traffic operations within the Study

Area are projected to deteriorate substantially in both AM and PM peak periods in 2030.

In Design Year 2050, demands on the system will continue to increase and operations will continue to deteriorate. Of the 35 basic freeway segments on GP lanes, 30 segments will operate at LOS E or F in the AM and PM peak periods. All 14 weaving segments in both the AM and PM peak periods will operate at LOS E or F, along with 7 of the 47 merge/diverge areas (again, in both the AM and PM peak periods). Of the 49 HOV segments, 19 in the AM peak period and 21 in the PM peak period would operate at unacceptable LOS in 2050.

Intersections

As indicated in Tables 2.5.5 and 2.5.6, a total of 26 intersections (57 percent of studied intersections) analyzed using the HCM 2010 methodology and five intersections (21 percent of studied intersections) analyzed using the ICU methodology are projected to operate at unacceptable LOS (E or F) during one or both peak periods under the 2030 No Build Alternative.

Tables 2.5.10 and 2.5.11 show that in 2050, a total of 31 intersections (67 percent of studied intersections) analyzed using the HCM 2010 methodology and seven (approximately 29 percent of studied intersections) analyzed using the ICU methodology are projected to operate at unacceptable LOS during one or both peak periods under the 2050 No Build Alternative.

Ramp Capacity

As indicated in Tables 2.5.7 and 2.5.12, storage lengths provided on all on-ramps with minimum ramp metering rates are projected to be adequate under both the 2030 and 2050 No Build Alternative. Similarly, all off-ramps within the project limits are projected to have adequate storage lengths under both the 2030 and 2050 No Build Alternative.

Bicycle and Pedestrian Facilities

None of the improvements proposed under the Build Alternative would be constructed under the No Build Alternative; therefore, no permanent impacts related to pedestrian or bicycle facilities would occur.

2.5.4 Avoidance, Minimization, and/or Mitigation Measures

The Preferred Alternative will incorporate the project feature outlined above in Section 2.5.3.1 to help address potential impacts. No additional avoidance, minimization, and/or mitigation measures other than the Standard Project Features are required.

Table 2.5.1: Existing 2014 On-Ramp Metering Analysis

Direction	Ramp Description	Number of Lanes	Min. Storage Required per Lane (ft)	Min. Meter Rate Required (vph/lane)	Existing Storage per Lane (ft)	Adequate Storage?
I-5 NB	Newport Ave. On-ramp	2	180	460	367	Yes
I-5 NB	Red Hill Ave. On-ramp	2	170	430	412	Yes
I-5 SB	Red Hill Ave. On-ramp	2	230	430	435	Yes
I-5 NB	Tustin Ranch Rd. On-ramp	2	720	550	900	Yes
I-5 SB	Tustin Ranch Rd. On-ramp	2	390	290	510	Yes
I-5 NB	Jamboree Rd. EB On-ramp	2	420	380	550	Yes
I-5 NB	Jamboree Rd. WB On-ramp	1	430	560	557	Yes
I-5 SB	Jamboree Rd. EB On-ramp	1	220	1,070	400	Yes
I-5 SB	Jamboree Rd. WB On-ramp	2	460	350	545	Yes
I-5 NB	Culver Dr. On-ramp	1	660	590	950	Yes
I-5 NB	Trabuco Rd. On-ramp	2	320	440	470	Yes
I-5 SB	Culver Dr. EB On-ramp	1	1,230	310	1,250	Yes
I-5 SB	Culver Dr. WB On-ramp	1	420	440	560	Yes
I-5 NB	Jeffrey Rd. EB On-ramp	2	10	240	525	Yes
I-5 NB	Jeffrey Rd. WB On-ramp	1	1,000	370	1,020	Yes
I-5 SB	Jeffrey Rd. On-ramp	2	30	410	310	Yes
I-5 NB	Sand Canyon Ave. On-ramp	3	10	240	545	Yes
I-5 SB	Sand Canyon Ave. On-ramp	2	450	270	630	Yes
SR-133 NB	Barranca Pkwy. On-ramp	1	540	370	670	Yes
SR-133 SB	Barranca Pkwy. On-ramp	1	530	830	805	Yes
I-5 NB	Alton Pkwy. EB On-ramp	2	10	240	470	Yes
I-5 NB	Alton Pkwy. WB On-ramp	2	720	520	1,005	Yes
I-5 SB	Enterprise Dr. On-ramp	2	1,640	240	2,260	Yes

Source: AECOM. *Final Traffic/Circulation Impact Report* (January 2017).

EB = eastbound

SB = southbound

ft = foot/feet

SR-133 = State Route 133

I-5 = Interstate 5

vph/lane = vehicles per hour per lane

NB = northbound

WB = westbound

Table 2.5.2: Existing 2014 Off-Ramp Intersection Queuing

No.	Intersection		Movement	Minimum Storage Required (ft/ln)	Provided Storage (ft/ln)	Adequate Storage?
1	Enterprise Dr.	I-5 SB Ramps	WBL	94	120	Yes
			WBT	214	480	Yes
			WBR	327	500	Yes
3	Alton Pkwy.	I-5 NB Ramps	NBL	391	920	Yes
			NBR	360	540	Yes
5	Barranca Pkwy.	I-5 HOV Ramps	SBL	124	860	Yes
			SBR	23	290	Yes
7	Sand Canyon Ave.	I-5 SB Ramps	SBL	175	280	Yes
			SBR	412	525	Yes
9	Sand Canyon Ave.	I-5 NB Ramps	SBL	325	630	Yes
			SBT	325	930	Yes
			SBR	77	930	Yes
12	Jeffrey Rd.	I-5 NB Ramps	NBL	373	1,225	Yes
			NBR	328	1,225	Yes
15	Culver Dr.	I-5 SB Ramps	SBL	155	680	Yes
			SBR	236	1,350	Yes
17	Trabuco Rd.	I-5 NB Ramps	EBL	347	620	Yes
			EBR	31	300	Yes
19	Jamboree Rd.	I-5 SB Ramps	SBL	304	1,100	Yes
			SBR	490	1,100	Yes
20	Jamboree Rd.	I-5 NB Ramps	NBL	603	1,080	Yes
			NBR	774 ¹	625	Yes
23	Tustin Ranch Rd.	I-5 SB Ramps	SBL	240	1,000	Yes
			SBR	189	1,000	Yes
24	Tustin Ranch Rd.	I-5 NB Ramps	SBL	70	1,100	Yes
			SBR	50	100	Yes
27	Red Hill Ave.	I-5 SB Ramps	SBT	281	690	Yes
			SBR	306	430	Yes
28	Red Hill Ave.	I-5 NB Ramps	NBL	188	630	Yes
			NBT	188	380	Yes
			NBR	176	380	Yes
31	Newport Ave.	I-5 SB Ramps	SBL	276	1,150	Yes
			SBT	273	750	Yes
			SBR	355	750	Yes
38	Barranca Pkwy.	SR-133 SB Ramps	SBL	99	1,545	Yes
			SBT	557	1,545	Yes
41	Irvine Blvd.	SR-133 SB Ramps	WBL	239	1,190	Yes
			WBR	88	1,190	Yes
42	Irvine Blvd.	SR-133 NB Ramps	EBL	253	1550	Yes
			EBR	138	550	Yes

Source: AECOM. *Final Traffic/Circulation Impact Report* (January 2017).

¹ Additional storage available on the off-ramp prior to the striping of multiple lanes. The 95th percentile queue is reported.

EBL = eastbound left

EBR = eastbound right

EBT = eastbound through

ft/ln = feet per lane

HOV = high-occupancy vehicle

I-5 = Interstate 5

NB = northbound

NBL = northbound left

NBR = northbound right

NBT = northbound through

SB = southbound

SBL = southbound left

SBR = southbound right

SBT = southbound through

SR-133 = State Route 133

WBL = westbound left

WBR = westbound right

WBT = westbound through

**Table 2.5.3: 2030 Peak Hour Level of Service Summary: I-5
Northbound General Purpose Lanes and Ramps**

Location Description	Type	Existing		2030 No Build		2030 Build (Build Alternative)		2030 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
North of SR-55 SB Off	Basic	F	F	F	F	F	F	N/A	N/A
SR-55 SB	On ¹	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	E	F	E	F	E	F	N/A	N/A
SR-55 NB	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	F	F	N/A	N/A
Newport Rd.	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Red Hill Ave.	On	F	D	F	D	F	D	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Red Hill Ave.	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	F	F	N/A	N/A
Tustin Ranch Rd.	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Tustin Ranch Rd.	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	F	F	N/A	N/A
Jamboree Rd. WB	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Jamboree Rd. EB	On ¹	N/A	N/A	N/A	N/A	N/A	N/A	C	C
--	Basic	F	F	F	F	F	F	E	D
Jamboree Rd.	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	F	E	N/A	N/A
Culver Dr. WB	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Trabuco Rd./Culver Dr.	On ¹	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	E	F	E	F	E	N/A	N/A
Culver Dr.	Off	D	D	E	E	D	D	N/A	N/A
--	Basic	E	E	F	E	E	E	N/A	N/A
Jeffrey Rd. WB	On	C	C	D	C	C	C	N/A	N/A
--	Basic	F	E	F	E	E	D	N/A	N/A
Jeffrey Rd. EB	On	C	C	C	C	C	C	C	C
--	Basic	F	D	F	E	E	D	E	D
Jeffrey Rd.	Off	N/A	N/A	N/A	N/A	N/A	N/A	C	D
--	Weave ²	E	D	E	D	E	D	C	C
SR-133 SB	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	D	D	D	D	D	D	N/A	N/A

**Table 2.5.3: 2030 Peak Hour Level of Service Summary: I-5
Northbound General Purpose Lanes and Ramps**

Location Description	Type	Existing		2030 No Build		2030 Build (Build Alternative)		2030 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
Sand Canyon Ave.	On	C	C	C	C	C	C	N/A	N/A
--	Basic	D	D	D	D	C	C	C	D
Sand Canyon Ave.	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	E	E	E	F	E	E	E	E
SR-133 NB	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	D	D	E	D	D	D	N/A	N/A
SR-133 NB	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	D	E	E	E	D	D	N/A	N/A
Alton Pkwy. WB	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	D	D	E	E	D	D	N/A	N/A
Alton Pkwy. EB	On	D	D	D	D	C	C	N/A	N/A
--	Basic	D	D	E	D	D	C	N/A	N/A
Alton Pkwy.	Off	E	E	F	E	E	D	N/A	N/A
South of Alton Pkwy. Off-ramp	Basic	E	D	F	D	E	D	N/A	N/A

Source: AECOM. *Final Traffic/Circulation Impact Report* (January 2017).

¹ Single-lane addition/drop; HCM methodology applied for analysis.

² Weave converted to Basic segment in Option 3.

EB = eastbound

HCM = Highway Capacity Manual

I-5 = Interstate 5

N/A = Not applicable

NB = northbound

SB = southbound

SR-133 = State Route 133

WB = westbound

**Table 2.5.4: 2030 Peak Hour Level of Service Summary: I-5
Southbound General Purpose Lanes and Ramps**

Location Description	Type	Existing		2030 No Build		2030 Build (Build Alternative)	
		AM	PM	AM	PM	AM	PM
North of Newport Rd. Off-ramp	Basic	D	D	E	E	E	E
Newport Rd.	On ¹	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	E	E	F	E	F	F
SR-55 NB	On	D	D	D	D	D	F
--	Basic	F	E	F	F	F	F
SR-55 SB	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	F	F
Red Hill Ave.	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	E	F	F	F	E
Red Hill Ave.	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	E	F	F	F	E
Tustin Ranch Rd.	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	E	F	F	F	E
Tustin Ranch Rd.	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	E	E
Jamboree Rd.	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	E	F	E	F	D
Jamboree Rd. WB	On ¹	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	E	D	F	D	F	D
Jamboree Rd. EB	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	E	F	F	F	E	E
Culver Dr.	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	E	F	E	F	D
Culver Dr. WB	On	D	D	D	D	D	C
--	Basic	F	E	F	E	F	E
Culver Dr. EB	On	C	D	F	F	D	D
--	Basic	E	E	F	F	E	E
Jeffrey Rd.	Off	E	E	F	F	E	E
--	Basic	F	D	F	E	F	D
Jeffrey Rd.	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	E	E	E	E	D	D
SR-133 NB	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	E	D	E	D	D	C
Sand Canyon Ave.	Off	E	E	E	E	D	C
--	Basic	D	D	D	D	D	C

**Table 2.5.4: 2030 Peak Hour Level of Service Summary: I-5
Southbound General Purpose Lanes and Ramps**

Location Description	Type	Existing		2030 No Build		2030 Build (Build Alternative)	
		AM	PM	AM	PM	AM	PM
Sand Canyon Ave.	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	D	D	D	D	D	D
SR-133 SB	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	D	D	D	E	C	C
SR-133 SB	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	E	D	E	D	D	D
Alton Pkwy./Fortune Dr.	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	D	E	D	E	C	D
CD/Truck Bypass	On ¹	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	C	D	C	D	C	D
Alton Pkwy./Fortune Dr.	On	C	C	C	C	C	C
South of Alton Pkwy.	Basic	C	F	C	F	C	F

Source: AECOM. *Final Traffic/Circulation Impact Report* (January 2017).

¹ Single-lane addition/drop; HCM methodology applied for analysis.

CD = collector distributor

EB = eastbound

HCM = Highway Capacity Manual

I-5 = Interstate 5

N/A = Not applicable

NB = northbound

SB = southbound

SR-133 = State Route 133

WB = westbound

**Table 2.5.5: 2030 Peak Hour Level of Service Summary: Intersections
(HCM Methodology)**

Intersection		Existing		2030 No Build		2030 Build (Build Alternative)		2030 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
1	Enterprise Dr./I-5 SB Ramps/Fortune Dr.	D	D	D	D	D	D	N/A	N/A
2	Enterprise Dr./Alton Pkwy.	F	F	F	F	F	F	N/A	N/A
3	Alton Pkwy./I-5 NB Ramps	C	C	B	B	C	B	N/A	N/A
4	Alton Pkwy./Technology Dr.	D	D	F	F	D	F	N/A	N/A
5	Barranca Pkwy./I-5 HOV Ramps	A	B	B	B	B	B	N/A	N/A
6	Sand Canyon Ave./Burt Rd.	D	F	B	B	F	B	N/A	N/A
7	Sand Canyon Ave./I-5 SB Ramps	E	F	E	C	E	C	N/A	N/A
8	Sand Canyon Ave./Marine Wy.	A	A	A	A	A	A	N/A	N/A
9	Sand Canyon Ave./I-5 NB Ramps	C	E	D	C	E	D	N/A	N/A
10	I-5 SB Ramps/Walnut Ave.*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	Jeffrey Rd./Walnut Ave.	E	F	F	F	F	F	N/A	N/A
12	Jeffrey Rd./I-5 NB Ramps	B	D	E	E	D	E	N/A	N/A
13	Jeffrey Rd./Roosevelt	D	F	F	F	F	F	N/A	N/A
14	Culver Dr./Scottsdale Dr.	A	B	D	D	B	D	N/A	N/A
15	Culver Dr./I-5 SB Ramps	B	B	C	C	B	C	N/A	N/A
16	Culver Dr./Trabuco Rd.	B	B	C	C	B	C	N/A	N/A
17	I-5 NB Ramps/Trabuco Rd.	D	D	D	D	D	D	N/A	N/A
18	Jamboree Rd./Michelle Dr.	F	F	F	F	F	F	N/A	N/A
19	Jamboree Rd./I-5 SB Ramps	B	C	D	C	C	D	N/A	N/A
20	Jamboree Rd./I-5 NB Ramps	C	C	D	D	C	D	N/A	N/A
21	Jamboree Rd./El Camino Real	D	F	F	F	F	F	N/A	N/A
22	Tustin Ranch Rd./Walnut Ave.	F	F	F	F	F	F	N/A	N/A
23	Tustin Ranch Rd./I-5 SB Ramps	D	F	D	C	F	D	N/A	N/A
24	Tustin Ranch Rd./I-5 NB Ramps	B	E	C	C	E	C	N/A	N/A
25	Tustin Ranch Rd./Auto Center Dr.	A	B	B	B	B	B	N/A	N/A
26	Red Hill Ave./Nissan Rd.	C	D	D	D	D	D	D	D
27	Red Hill Ave./I-5 SB Ramps	D	D	C	C	D	C	D	C
28	Red Hill Ave./I-5 NB Ramps	C	C	C	B	C	C	C	C
29	Red Hill Ave./El Camino Real	D	E	D	E	E	D	E	D
30	Newport Rd./Mitchell Ave.	F	F	F	F	F	F	F	F
31	Newport Rd./I-5 SB Ramps	C	C	D	D	C	D	C	D
32	Newport Rd./I-5 NB Ramps*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
33	Newport Rd./El Camino Real	D	F	E	E	F	E	F	E
34	Orange St./El Camino Real	A	A	A	A	A	A	D	C

**Table 2.5.5: 2030 Peak Hour Level of Service Summary: Intersections
(HCM Methodology)**

Intersection		Existing		2030 No Build		2030 Build (Build Alternative)		2030 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
35	Barranca Pkwy./Irvine Center Dr.	D	D	E	E	D	E	D	E
36	Barranca Pkwy./Technology Dr.	C	F	F	F	F	F	F	F
37	Barranca Pkwy./SR-133 NB Ramps*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
38	Barranca Pkwy./SR-133 SB Ramps	F	F	D	D	F	D	F	D
39	Irvine Blvd./Jeffrey Rd.	D	E	E	E	E	E	D	E
40	Irvine Blvd./Sand Canyon Ave.	E	E	E	F	E	E	E	E
41	Irvine Blvd./SR-133 SB Ramps	B	C	B	B	C	B	C	B
42	Irvine Blvd./SR-133 NB Ramps	B	B	C	C	B	C	B	C
43	Trabuco Rd./Jeffrey Rd.	D	E	E	E	E	E	E	D
44	Trabuco Rd./Sand Canyon Ave.	B	D	D	D	D	D	D	D
45	Trabuco Rd./SR-133 SB Ramps**	N/A	C	B	B	C	B	C	B
46	Trabuco Rd./SR-133 NB Ramps**	N/A	C	F	F	C	F	C	F
47	Sand Canyon Ave./Laguna Canyon Ave.	B	B	F	F	B	F	B	F
48	Sand Canyon Ave./Irvine Center Dr.	D	D	D	D	D	D	D	D
49	Sand Canyon Ave./Barranca Pkwy.	D	D	F	F	D	F	D	F

Source: AECOM. *Final Traffic/Circulation Impact Report* (January 2017).

*Unsignalized Intersection

**Future Intersection

EB = eastbound

HCM = Highway Capacity Manual

I-5 = Interstate 5

N/A = Not applicable

NB = northbound

SB = southbound

SR-133 = State Route 133

WB = westbound

**Table 2.5.6: 2030 Peak Hour Level of Service Summary: Intersections
(ICU Methodology)**

Intersection		Existing		2030 No Build		2030 Build (Build Alternative)		2030 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
1	Enterprise Dr./I-5 SB Ramps/Fortune Dr.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	Enterprise Dr./Alton Pkwy.	B	B	C	C	C	C	N/A	N/A
3	Alton Pkwy./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	Alton Pkwy./Technology Dr.	B	B	C	C	C	C	N/A	N/A
5	Barranca Pkwy./I-5 HOV Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	Sand Canyon Ave./Burt Rd.	C	A	F	D	F	D	N/A	N/A
7	Sand Canyon Ave./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	Sand Canyon Ave./Marine Wy.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	Sand Canyon Ave./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	I-5 SB Ramps/Walnut Ave.*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	Jeffrey Rd./Walnut Ave.	C	E	F	F	E	F	N/A	N/A
12	Jeffrey Rd./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13	Jeffrey Rd./Roosevelt	B	A	D	B	D	B	N/A	N/A
14	Culver Dr./Scottsdale Dr.	B	C	B	D	B	D	N/A	N/A
15	Culver Dr./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16	Culver Dr./Trabuco Rd.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17	I-5 NB Ramps/Trabuco Rd.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18	Jamboree Rd./Michelle Dr.	A	C	B	D	B	D	N/A	N/A
19	Jamboree Rd./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20	Jamboree Rd./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21	Jamboree Rd./El Camino Real	C	C	D	D	C	D	N/A	N/A
22	Tustin Ranch Rd./Walnut Ave.	A	D	C	E	C	E	N/A	N/A
23	Tustin Ranch Rd./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24	Tustin Ranch Rd./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
25	Tustin Ranch Rd./Auto Center Dr.	B	B	F	F	F	F	N/A	N/A
26	Red Hill Ave./Nisson Rd.	B	C	B	C	B	C	B	C
27	Red Hill Ave./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
28	Red Hill Ave./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
29	Red Hill Ave./El Camino Real	C	A	C	B	C	B	C	B
30	Newport Rd./Mitchell Ave.	A	A	B	B	B	B	C	B
31	Newport Rd./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
32	Newport Rd./I-5 NB Ramps*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
33	Newport Rd./El Camino Real	B	B	C	C	C	B	C	E
34	Orange St./El Camino Real	A	A	A	A	A	A	B	B

**Table 2.5.6: 2030 Peak Hour Level of Service Summary: Intersections
(ICU Methodology)**

Intersection		Existing		2030 No Build		2030 Build (Build Alternative)		2030 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
35	Barranca Pkwy./Irvine Center Dr.	A	A	C	D	C	C	C	D
36	Barranca Pkwy./Technology Dr.	A	D	C	E	C	E	C	E
37	Barranca Pkwy./SR-133 NB Ramps*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
38	Barranca Pkwy./SR-133 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
39	Irvine Blvd./Jeffrey Rd.	A	A	B	B	B	B	B	B
40	Irvine Blvd./Sand Canyon Ave.	A	A	B	C	B	C	B	C
41	Irvine Blvd./SR-133 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
42	Irvine Blvd./SR-133 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
43	Trabuco Rd./Jeffrey Rd.	A	A	C	B	C	B	C	B
44	Trabuco Rd./Sand Canyon Ave.	A	A	B	B	B	B	B	C
45	Trabuco Rd./SR-133 SB Ramps**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
46	Trabuco Rd./SR-133 NB Ramps**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
47	Sand Canyon Ave./Laguna Canyon Ave.	A	A	B	B	B	B	B	B
48	Sand Canyon Ave./Irvine Center Dr.	A	A	B	B	A	B	A	B
49	Sand Canyon Ave./Barranca Pkwy.	A	A	A	B	A	B	A	B

*Unsignalized Intersection

**Future Intersection

EB = eastbound

I-5 = Interstate 5

ICU = Intersection Capacity Utilization

N/A = Not applicable

NB = northbound

SB = southbound

SR-133 = State Route 133

WB = westbound

Table 2.5.7: 2030 Ramp Storage Adequacy Summary

No.	Intersection	Movement	Adequate Storage?			
			Existing	2030 No Build	2030 Build (Build Alternative)	2030 Build (Option 3)
1	Enterprise Dr./I-5 SB Ramps/Fortune Dr.	WBL	Yes	Yes	Yes	N/A
		WBT	Yes	Yes	Yes	N/A
		WBR	Yes	Yes	Yes	N/A
3	Alton Pkwy./I-5 NB Ramps	NBL	Yes	Yes	Yes	N/A
		NBR	Yes	Yes	Yes	N/A
5	Barranca Pkwy./I-5 HOV Ramps	SBL	Yes	Yes	Yes	Yes
		SBR	Yes	Yes	Yes	Yes
7	Sand Canyon Ave./I-5 SB Ramps	SBL	Yes	Yes	Yes	Yes
		SBR	Yes	No	Yes	Yes
9	Sand Canyon Ave./I-5 NB Ramps	SBL	Yes	Yes	Yes	Yes
		SBT	Yes	Yes	Yes	Yes
		SBR	Yes	Yes	Yes	Yes
12	Jeffrey Rd./I-5 NB Ramps	NBL	Yes	Yes	Yes	Yes
		NBR	Yes	Yes	Yes	Yes
15	Culver Dr./I-5 SB Ramps	SBL	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
17	I-5 NB Ramps/Trabuco Rd.	EBL	Yes	Yes	Yes	N/A
		EBR	Yes	Yes	Yes	N/A
19	Jamboree Rd./I-5 SB Ramps	SBL	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
20	Jamboree Rd./I-5 NB Ramps	NBL	Yes	Yes	Yes	N/A
		NBR	Yes	Yes	Yes	N/A
23	Tustin Ranch Rd./I-5 SB Ramps	SBL	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
24	Tustin Ranch Rd./I-5 NB Ramps	SBL	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
27	Red Hill Ave./I-5 SB Ramps	SBT	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
28	Red Hill Ave./I-5 NB Ramps	NBL	Yes	Yes	Yes	N/A
		NBT	Yes	Yes	Yes	N/A
		NBR	Yes	Yes	Yes	N/A
31	Newport Ave./I-5 SB Ramps	SBL	Yes	Yes	Yes	N/A
		SBT	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
38	Barranca Pkwy./SR-133 SB Ramps	SBL	Yes	Yes	Yes	N/A
		SBT	Yes	Yes	Yes	N/A
41	Irvine Blvd./SR-133 SB Ramps	WBL	Yes	Yes	Yes	N/A
		WBR	Yes	Yes	Yes	N/A
42	Irvine Blvd./SR-133 NB Ramps	EBL	Yes	Yes	Yes	N/A
		EBR	Yes	Yes	Yes	N/A

EBL = eastbound left
EBR = eastbound right
EBT = eastbound through
ft/in = feet per lane
HOV = high-occupancy vehicle
I-5 = Interstate 5
NB = northbound
NBL = northbound left
NBR = northbound right

NBT = northbound through
SB = southbound
SBL = southbound left
SBR = southbound right
SBT = southbound through
SR-133 = State Route 133
WBL = westbound left
WBR = westbound right
WBT = westbound through

**Table 2.5.8: 2050 Peak Hour Level of Service Summary: I-5
Northbound General Purpose Lanes and Ramps**

Location Description	Type	Existing		2050 No Build		2050 Build (Build Alternative)		2050 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
North of SR-55 SB Off-ramp	Basic	F	F	F	F	F	F	N/A	N/A
SR-55 SB	Off ¹	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	E	F	F	F	E	F	N/A	N/A
SR-55 NB	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	F	F	N/A	N/A
Newport Rd.	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Red Hill Ave.	On	F	D	F	D	F	D	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Red Hill Ave.	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	F	F	N/A	N/A
Tustin Ranch Rd.	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Tustin Ranch Rd.	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	F	F	N/A	N/A
Jamboree Rd. WB	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Jamboree Rd. EB	On ¹	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Jamboree Rd.	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	F	F	N/A	N/A
Culver Dr. WB	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	F	F	F	F	F	N/A	N/A
Trabuco Rd./Culver Dr.	On ¹	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	E	F	F	F	E	N/A	N/A
Culver Dr.	Off	D	D	E	E	D	D	N/A	N/A
--	Basic	E	E	F	F	F	E	N/A	N/A
Jeffrey Rd. WB	On	C	C	D	C	D	C	N/A	N/A
--	Basic	F	E	F	F	F	E	N/A	N/A
Jeffrey Rd. EB	On	C	C	C	C	C	C	C	C
--	Basic	F	D	F	E	F	E	F	E
Jeffrey Rd.	Off	N/A	N/A	N/A	N/A	N/A	N/A	D	D
--	Weave ²	E	D	F	E	E	D	D	D
SR-133 SB	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	D	D	E	E	D	D	N/A	N/A
Sand Canyon Ave.	On	C	C	D	D	C	C	N/A	N/A
--	Basic	D	D	D	D	C	D	D	D

**Table 2.5.8: 2050 Peak Hour Level of Service Summary: I-5
Northbound General Purpose Lanes and Ramps**

Location Description	Type	Existing		2050 No Build		2050 Build (Build Alternative)		2050 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
Sand Canyon Ave.	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	E	E	F	F	E	F	F	F
SR-133 NB	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	D	D	E	E	D	D	N/A	N/A
SR-133 NB	Off	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	D	E	E	E	D	E	N/A	N/A
Alton Pkwy. WB	On	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	D	D	F	E	D	D	N/A	N/A
Alton Pkwy. EB	On	D	D	D	D	D	D	N/A	N/A
--	Basic	D	D	E	D	D	D	N/A	N/A
Alton Pkwy.	Off	E	E	F	E	E	D	N/A	N/A
South of Alton Pkwy. Off-ramp	Basic	E	D	F	D	E	D	N/A	N/A

¹ Single-lane addition/drop; HCM methodology applied for analysis.

² Weave converted to Basic segment in Option 3.

EB = eastbound

HCM = Highway Capacity Manual

I-5 = Interstate 5

N/A = Not applicable

NB = northbound

SB = southbound

SR-133 = State Route 133

WB = westbound

**Table 2.5.9: 2050 Peak Hour Level of Service Summary: I-5
Southbound General Purpose Lanes and Ramps**

Location Description	Type	Existing		2050 No Build		2050 Build (Build Alternative)	
		AM	PM	AM	PM	AM	PM
North of Newport Rd. Off-ramp	Basic	D	D	E	E	F	E
Newport Rd.	Off ¹	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	E	E	F	F	F	F
SR-55 NB	On	D	D	D	F	F	F
--	Basic	F	E	F	F	F	F
SR-55 SB	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	F	F
Red Hill Ave.	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	E	F	F	F	E
Red Hill Ave.	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	E	F	F	F	F
Tustin Ranch Rd.	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	E	F	F	F	E
Tustin Ranch Rd.	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	F	F	F	F	E	F
Jamboree Rd.	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	E	F	F	F	E
Jamboree Rd. WB	On ¹	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	E	D	F	E	F	E
Jamboree Rd. EB	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	E	F	F	F	F	F
Culver Dr.	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	F	E	F	F	F	E
Culver Dr. WB	On	D	D	F	F	D	D
--	Basic	F	E	F	F	F	E
Culver Dr. EB	On	C	D	F	F	D	D
--	Basic	E	E	F	F	F	E
Jeffrey Rd.	Off	E	E	F	F	E	E
--	Basic	F	D	F	F	F	E
Jeffrey Rd.	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	E	E	F	F	E	E
SR-133 NB	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	E	D	E	E	D	D
Sand Canyon Ave.	Off	E	E	F	E	D	C
--	Basic	D	D	D	D	D	D

**Table 2.5.9: 2050 Peak Hour Level of Service Summary: I-5
Southbound General Purpose Lanes and Ramps**

Location Description	Type	Existing		2050 No Build		2050 Build (Build Alternative)	
		AM	PM	AM	PM	AM	PM
Sand Canyon Ave.	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	D	D	E	E	D	D
SR-133 SB	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	D	D	E	E	C	C
SR-133 SB	On	N/A	N/A	N/A	N/A	N/A	N/A
--	Weave	E	D	E	E	E	D
Alton Pkwy./Fortune Dr.	Off	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	D	E	D	E	C	D
CD/Truck Bypass	Off ¹	N/A	N/A	N/A	N/A	N/A	N/A
--	Basic	C	D	C	D	C	D
Alton Pkwy./Fortune Dr.	On	C	C	C	C	C	C
South of Alton Pkwy.	Basic	C	F	C	F	D	F

¹ Single-lane addition/drop; HCM methodology applied for analysis.

CD = collector distributor

EB = eastbound

HCM = Highway Capacity Manual

I-5 = Interstate 5

N/A = Not applicable

NB = northbound

SB = southbound

SR-133 = State Route 133

WB = westbound

**Table 2.5.10: 2050 Peak Hour Level of Service Summary: Intersections
(HCM 2010 Methodology)**

Intersection		Existing		2050 No Build		2050 Build (Build Alternative)		2050 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
1	Enterprise Dr./I-5 SB Ramps/ Fortune Dr.	D	D	D	D	D	D	N/A	N/A
2	Enterprise Dr./Alton Pkwy.	F	F	F	F	F	F	N/A	N/A
3	Alton Pkwy./I-5 NB Ramps	C	B	C	B	C	B	N/A	N/A
4	Alton Pkwy./Technology Dr.	D	E	D	F	D	F	N/A	N/A
5	Barranca Pkwy./I-5 HOV Ramps	A	A	B	B	B	B	N/A	N/A
6	Sand Canyon Ave./Burt Rd.	D	A	F	C	F	C	N/A	N/A
7	Sand Canyon Ave./I-5 SB Ramps	E	B	E	C	E	C	N/A	N/A
8	Sand Canyon Ave./Marine Wy.	A	B	A	A	A	B	N/A	N/A
9	Sand Canyon Ave./I-5 NB Ramps	C	C	F	D	F	D	N/A	N/A
10	I-5 SB Ramps/Walnut Ave.*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	Jeffrey Rd./Walnut Ave.	E	F	F	F	F	F	N/A	N/A
12	Jeffrey Rd./I-5 NB Ramps	B	C	F	F	F	F	N/A	N/A
13	Jeffrey Rd./Roosevelt	D	E	F	F	F	F	N/A	N/A
14	Culver Dr./Scottsdale Dr.	A	D	B	E	B	D	N/A	N/A
15	Culver Dr./I-5 SB Ramps	B	C	B	C	B	C	N/A	N/A
16	Culver Dr./Trabuco Rd.	B	B	C	D	C	C	N/A	N/A
17	I-5 NB Ramps/Trabuco Rd.	D	C	E	D	E	D	N/A	N/A
18	Jamboree Rd./Michelle Dr.	F	F	F	F	F	F	N/A	N/A
19	Jamboree Rd./I-5 SB Ramps	B	C	C	D	C	D	N/A	N/A
20	Jamboree Rd./I-5 NB Ramps	C	C	C	D	D	D	N/A	N/A
21	Jamboree Rd./El Camino Real	D	E	F	F	F	F	N/A	N/A
22	Tustin Ranch Rd./Walnut Ave.	F	F	F	F	F	F	N/A	N/A
23	Tustin Ranch Rd./I-5 SB Ramps	D	C	F	E	F	C	N/A	N/A
24	Tustin Ranch Rd./I-5 NB Ramps	B	B	F	D	F	C	N/A	N/A
25	Tustin Ranch Rd./Auto Center Dr.	A	B	C	B	C	B	N/A	N/A
26	Red Hill Ave./Nissan Rd.	C	D	D	E	D	E	D	E
27	Red Hill Ave./I-5 SB Ramps	D	C	D	C	D	C	D	C
28	Red Hill Ave./I-5 NB Ramps	C	B	C	B	C	C	D	C
29	Red Hill Ave./El Camino Real	D	D	F	E	E	E	E	E
30	Newport Rd./Mitchell Ave.	F	F	F	F	F	F	F	F
31	Newport Rd./I-5 SB Ramps	C	D	C	D	C	D	C	D
32	Newport Rd./I-5 NB Ramps*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
33	Newport Rd./El Camino Real	D	D	F	F	F	E	E	D
34	Orange St./El Camino Real	A	A	A	A	A	A	D	C

**Table 2.5.10: 2050 Peak Hour Level of Service Summary: Intersections
(HCM 2010 Methodology)**

Intersection		Existing		2050 No Build		2050 Build (Build Alternative)		2050 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
35	Barranca Pkwy./Irvine Center Dr.	D	D	E	F	E	E	E	E
36	Barranca Pkwy./Technology Dr.	C	F	F	F	F	F	F	F
37	Barranca Pkwy./SR-133 NB Ramps*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
38	Barranca Pkwy./SR-133 SB Ramps	F	D	F	D	F	D	F	D
39	Irvine Blvd./Jeffrey Rd.	D	D	F	F	F	F	F	F
40	Irvine Blvd./Sand Canyon Ave.	E	D	F	F	F	F	F	F
41	Irvine Blvd./SR-133 SB Ramps	B	A	C	C	C	B	C	B
42	Irvine Blvd./SR-133 NB Ramps	B	B	B	E	B	D	B	D
43	Trabuco Rd./Jeffrey Rd.	D	C	F	F	F	E	F	E
44	Trabuco Rd./Sand Canyon Ave.	B	C	F	E	C	D	C	D
45	Trabuco Rd./SR-133 SB Ramps**	N/A	N/A	C	B	C	B	C	B
46	Trabuco Rd./SR-133 NB Ramps**	N/A	N/A	E	F	E	F	E	F
47	Sand Canyon Ave./Laguna Canyon Ave.	B	F	D	F	D	F	D	F
48	Sand Canyon Ave./Irvine Center Dr.	D	D	D	E	D	D	D	D
49	Sand Canyon Ave./Barranca Pkwy.	D	D	D	F	D	F	D	F

*Unsignalized Intersection

**Future Intersection

EB = eastbound

HCM - Highway Capacity Manual

HOV = high-occupancy vehicle

I-5 = Interstate 5

N/A = Not applicable

NB = northbound

SB = southbound

SR-133 = State Route 133

WB = westbound

**Table 2.5.11: 2050 Peak Hour Level of Service Summary: Intersections
(ICU Methodology)**

Intersection		Existing		2050 No Build		2050 Build (Build Alternative)		2050 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
1	Enterprise Dr./I-5 SB Ramps/Fortune Dr.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	Enterprise Dr./Alton Pkwy.	B	B	D	C	D	C	N/A	N/A
3	Alton Pkwy./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	Alton Pkwy./Technology Dr.	B	B	C	D	C	D	N/A	N/A
5	Barranca Pkwy./I-5 HOV Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	Sand Canyon Ave./Burt Rd.	C	A	F	E	F	E	N/A	N/A
7	Sand Canyon Ave./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	Sand Canyon Ave./Marine Wy.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	Sand Canyon Ave./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	I-5 SB Ramps/Walnut Ave.*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	Jeffrey Rd./Walnut Ave.	C	E	F	F	F	F	N/A	N/A
12	Jeffrey Rd./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13	Jeffrey Rd./Roosevelt	B	A	E	C	E	C	N/A	N/A
14	Culver Dr./Scottsdale Dr.	B	C	C	D	C	D	N/A	N/A
15	Culver Dr./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16	Culver Dr./Trabuco Rd.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17	I-5 NB Ramps/Trabuco Rd.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18	Jamboree Rd./Michelle Dr.	A	C	B	D	B	D	N/A	N/A
19	Jamboree Rd./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20	Jamboree Rd./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21	Jamboree Rd./El Camino Real	C	C	D	E	D	D	N/A	N/A
22	Tustin Ranch Rd./Walnut Ave.	A	D	D	F	D	F	N/A	N/A
23	Tustin Ranch Rd./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24	Tustin Ranch Rd./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
25	Tustin Ranch Rd./Auto Center Dr.	B	B	F	F	F	F	N/A	N/A
26	Red Hill Ave./Nisson Rd.	B	C	C	D	C	C	B	D
27	Red Hill Ave./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
28	Red Hill Ave./I-5 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
29	Red Hill Ave./El Camino Real	C	A	D	C	C	B	D	C
30	Newport Rd./Mitchell Ave.	A	A	C	C	B	B	C	B
31	Newport Rd./I-5 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
32	Newport Rd./I-5 NB Ramps*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
33	Newport Rd./El Camino Real	B	B	D	C	C	C	C	D
34	Orange St./El Camino Real	A	A	A	A	A	A	B	B

**Table 2.5.11: 2050 Peak Hour Level of Service Summary: Intersections
(ICU Methodology)**

Intersection		Existing		2050 No Build		2050 Build (Build Alternative)		2050 Build (Option 3)	
		AM	PM	AM	PM	AM	PM	AM	PM
35	Barranca Pkwy./Irvine Center Dr.	A	A	D	D	D	D	D	D
36	Barranca Pkwy./Technology Dr.	A	D	C	F	C	F	C	F
37	Barranca Pkwy./SR-133 NB Ramps*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
38	Barranca Pkwy./SR-133 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
39	Irvine Blvd./Jeffrey Rd.	A	A	C	C	C	C	C	C
40	Irvine Blvd./Sand Canyon Ave.	A	A	C	D	C	C	C	C
41	Irvine Blvd./SR-133 SB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
42	Irvine Blvd./SR-133 NB Ramps	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
43	Trabuco Rd./Jeffrey Rd.	A	A	D	C	D	C	D	C
44	Trabuco Rd./Sand Canyon Ave.	A	A	C	C	C	C	C	C
45	Trabuco Rd./SR-133 SB Ramps**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
46	Trabuco Rd./SR-133 NB Ramps**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
47	Sand Canyon Ave./Laguna Canyon Ave.	A	A	C	C	C	C	C	C
48	Sand Canyon Ave./Irvine Center Dr.	A	A	B	C	B	C	B	C
49	Sand Canyon Ave./Barranca Pkwy.	A	A	A	C	A	C	A	C

*Unsignalized Intersection

**Future Intersection

EB = eastbound

HOV = high-occupancy vehicle

I-5 = Interstate 5

ICU = Intersection Capacity Utilization

N/A = Not applicable

NB = northbound

SB = southbound

SR-133 = State Route 133

WB = westbound

Table 2.5.12: 2050 Ramp Storage Adequacy Summary

No.	Intersection	Movement	Adequate Storage?			
			Existing	2050 No Build	2050 Build (Build Alternative)	2050 Build (Option 3)
1	Enterprise Dr./I-5 SB Ramps/Fortune Dr.	WBL	Yes	Yes	Yes	N/A
		WBT	Yes	Yes	Yes	N/A
		WBR	Yes	Yes	Yes	N/A
3	Alton Pkwy./I-5 NB Ramps	NBL	Yes	Yes	Yes	N/A
		NBR	Yes	Yes	Yes	N/A
5	Barranca Pkwy./I-5 HOV Ramps	SBL	Yes	Yes	Yes	Yes
		SBR	Yes	Yes	Yes	Yes
7	Sand Canyon Ave./I-5 SB Ramps	SBL	Yes	Yes	Yes	Yes
		SBR	Yes	No	Yes	Yes
9	Sand Canyon Ave./I-5 NB Ramps	SBL	Yes	Yes	Yes	Yes
		SBT	Yes	Yes	Yes	Yes
		SBR	Yes	Yes	Yes	Yes
12	Jeffrey Rd./I-5 NB Ramps	NBL	Yes	Yes	Yes	Yes
		NBR	Yes	Yes	Yes	Yes
15	Culver Dr./I-5 SB Ramps	SBL	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
17	I-5 NB Ramps/Trabuco Rd.	EBL	Yes	Yes	Yes	N/A
		EBR	Yes	Yes	Yes	N/A
19	Jamboree Rd./I-5 SB Ramps	SBL	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
20	Jamboree Rd./I-5 NB Ramps	NBL	Yes	Yes	Yes	N/A
		NBR	Yes	Yes	Yes	N/A
23	Tustin Ranch Rd./I-5 SB Ramps	SBL	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
24	Tustin Ranch Rd./I-5 NB Ramps	SBL	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
27	Red Hill Ave./I-5 SB Ramps	SBT	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
28	Red Hill Ave./I-5 NB Ramps	NBL	Yes	Yes	Yes	N/A
		NBT	Yes	Yes	Yes	N/A
		NBR	Yes	Yes	Yes	N/A
31	Newport Ave./I-5 SB Ramps	SBL	Yes	Yes	Yes	N/A
		SBT	Yes	Yes	Yes	N/A
		SBR	Yes	Yes	Yes	N/A
38	Barranca Pkwy./SR-133 SB Ramps	SBL	Yes	Yes	Yes	N/A
		SBT	Yes	Yes	Yes	N/A
41	Irvine Blvd./SR-133 SB Ramps	WBL	Yes	Yes	Yes	N/A
		WBR	Yes	Yes	Yes	N/A
42	Irvine Blvd./SR-133 NB Ramps	EBL	Yes	Yes	Yes	N/A
		EBR	Yes	Yes	Yes	N/A

EB = eastbound
EBL = eastbound left
EBR = eastbound right
EBT = eastbound through
ft/lN = feet per lane
HOV = high-occupancy vehicle
I-5 = Interstate 5
ICU = Intersection Capacity Utilization
N/A = Not applicable
NB = northbound
NBL = northbound left

NBR = northbound right
NBT = northbound through
SB = southbound
SBR = southbound right
SBL = southbound left
SBT = southbound through
SR-133 = State Route 133
WB = westbound
WBL = westbound left
WBR = westbound right
WBT = westbound through