

Chapter 1. Proposed Project

1.1. Introduction

The California Department of Transportation (Caltrans), District 12, is proposing managed lanes (ML) improvements in both directions on Interstate (I) 5. The improvements would modify the existing high-occupancy vehicle (HOV) lanes within the proposed Project limits to address operational deficiencies. The proposed Project limits on I-5 extend from Red Hill Avenue (12-ORA-5 Post Mile [PM] 28.9) to just north of the Orange/Los Angeles County line (12-ORA-5 PM 44.4) in the cities of Irvine, Tustin, Santa Ana, Orange, Anaheim, Fullerton, Buena Park, La Mirada, and Santa Fe Springs. Project improvements on the SR-55, SR-57, and SR-91 corridors, as well as north of the Orange/Los Angeles County line, include implementing associated signage and tolling infrastructure required by some of the Build Alternatives. Caltrans, as assigned by the Federal Highway Administration (FHWA), is the Lead Agency for compliance under the National Environmental Policy Act (NEPA). The Department is the lead agency under California Environmental Quality Act (CEQA).

The Build Alternatives are listed in the 2023 Federal Transportation Improvement Program (FTIP) under ID No. ORA210604. The Build Alternatives are currently included in the future commitments section of the Southern California Association of Governments (SCAG) *2020–2045 Regional Transportation Plan/Sustainable Communities Strategy: A Plan for Mobility, Accessibility, Sustainability, and High Quality of Life* (2020–2045 RTP/SCS), also referred to as Connect SoCal 2024 [RTP IDs 7120013]. However, the Build Alternatives are not captured in future regional models and efforts to incorporate the Build Alternatives into such models are being taken. Once updated later in 2023 the 2020–2045 RTP/SCS and the FTIP will capture the Build Alternatives in regional models. SCAG approved the 2020–2045 RTP/SCS on September 3, 2020 and the 2023 FTIP on October 6, 2022. FHWA approved Amendment No. 2 to the 2020–2045 RTP/SCS on December 16, 2022 and Amendment No. 23-01 to the 2023 FTIP and determined that it conforms to the SIP on January 27, 2023. A copy of the 2023 FTIP Project Listing for the Build Alternatives as well as the page showing the Build Alternatives in the future commitments portion of the 2020-2045 RTP/SCS is provided in Appendix D, 2023 FTIP Project Listing.

California participated in the “Surface Transportation Project Delivery Pilot Program” (Pilot Program) pursuant to 23 United States Code (USC) 327, for more than 5 years, beginning July 1, 2007, and ending September 30, 2012. MAP-21 (P.L. 112-141), signed by President Obama on July 6, 2012, amended 23 USC 327 to establish a permanent Surface Transportation Project Delivery Program. As a result, Caltrans entered into a Memorandum of Understanding pursuant to 23 USC 327 (NEPA Assignment MOU) with FHWA. The NEPA Assignment MOU became effective October 1, 2012, and was renewed on May 27, 2022, for a term of 10 years. In summary, Caltrans continues to assume FHWA responsibilities under NEPA and other federal environmental laws in the same manner as was assigned under the Pilot Program, with minor changes. With NEPA Assignment, FHWA assigned and Caltrans assumed all of the United States Department of Transportation (USDOT) Secretary’s responsibilities under NEPA. This assignment includes projects on the State Highway System and Local Assistance Projects off of the State Highway System within the State of California, except for certain categorical exclusions that FHWA assigned to Caltrans under the 23 USC 326 Categorical Exclusion Assignment MOU, projects excluded by definition, and specific project exclusions.

1.1.1. Existing Facility

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 linkage connecting Orange County to Los Angeles County. Within the project Study Area (refer to Figure 1-1), I-5 serves the cities of Irvine, Tustin, Santa Ana, Orange, Anaheim, Fullerton, Buena Park, La Mirada, and Santa Fe Springs. There are several State Routes (SRs) that connect to I-5, including SR-55, SR-22, SR-39 (Beach Boulevard), SR-57, and SR-91. In addition, there are several major arterials and local roadways paralleling I-5 that provide alternative routes to commuters wishing to avoid peak-hour congestion on the freeway.

Regional postwar development and settlement came as a result of the expanding road systems throughout Orange County. In the early 20th century, with the advent of automotive travel, the demand for good roads grew. As large ranch lands were broken up and sold off, the county developed in a decentralized, sprawling pattern. The cities of Irvine, Tustin, Santa Ana, Orange, Anaheim, Fullerton, Buena Park, La Mirada, and Santa Fe Springs were largely developed along I-5 during the early 1950s to the late 1960s with commercial, light industrial, and manufacturing businesses that began locating along the I-5 corridor and within the project limits. The development of this

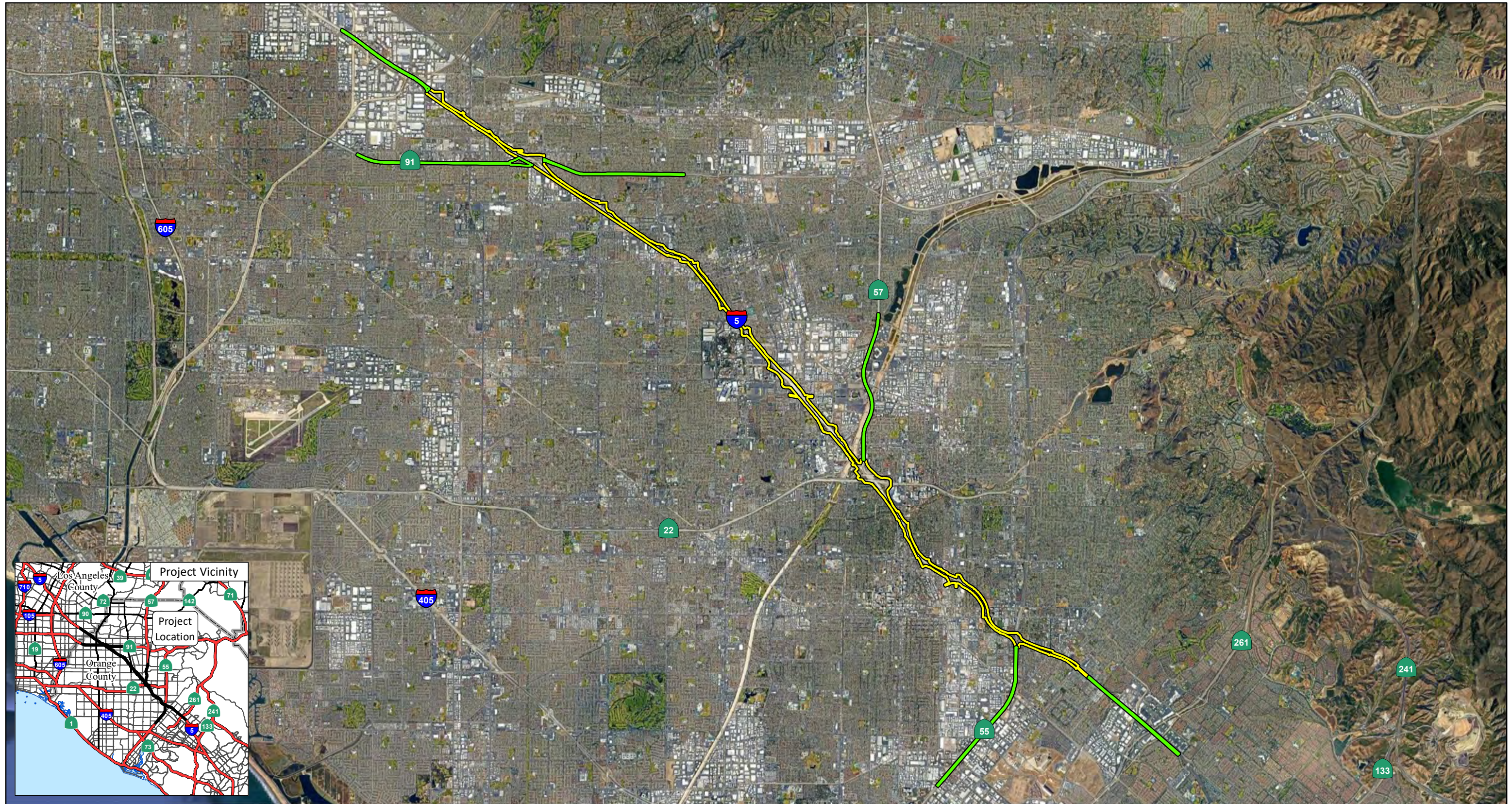
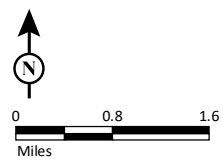


FIGURE 1-1

LEGEND

- Project Area
- Advanced Signage Only



SOURCE: Google (2022)

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*I-5 Managed Lanes Project
(Red Hill Avenue to Orange County/Los Angeles County Line)*

Project Location and Vicinity

EA No. 00950

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area is representative of larger demographic trends associated with postwar residential development. As suburbanization continued, populations and amenities increasingly moved from the city centers to the peripheries, increasingly adding to the use of I-5.

I-5 currently has at least one HOV lane in each direction within the proposed Project limits that is separated with limited ingress/egress buffer openings. In mid-2021, the construction of an additional HOV lane in each direction and removal of the existing northbound and southbound direct-access ramps (DARs) at Main Street was completed within the section of I-5 south of SR-55 at Red Hill Avenue and SR-57. The second HOV lanes were added from south of SR-55 to SR-57.

1.2. Purpose and Need

1.2.1. Purpose

The purpose of the proposed Project is to improve overall movement of people and goods along this section of I-5 by:

- Improving the ML network operations
- Improving mobility and trip reliability
- Maximizing person throughput by facilitating efficient movement of bus and rideshare users
- Applying technology to help manage traffic demand

1.2.2. Need

The need, or deficiency, of the project is the existing I-5 HOV lanes between Red Hill Avenue and the OC/LA County line experience:

- HOV lane degradation (does not meet the federal performance standards)
- Demand that exceeds existing capacity
- Operational deficiencies

1.2.2.1. Capacity, Transportation Demand, and Safety

Capacity and Transportation Demand in the I-5 Corridor

Levels of Service and Travel Times

With the current configuration within the Project limits, there is insufficient capacity on I-5 to accommodate existing travel demands. Several areas along the I-5 corridor, both the general-purpose (GP) and HOV lanes, are currently operating at oversaturated conditions (LOS F) and are anticipated to further deteriorate in the future without improvements. The peak-hour volumes and levels of service (LOS) for

existing (2022) and future (2035 and 2055) No Build Alternative conditions for freeway GP and HOV lanes in both the northbound and southbound directions are summarized in Tables 1.1 and 1.2. The corridor is projected to grow by approximately 6 to 12 percent in the a.m. peak hour and 7 to 12 percent in the p.m. peak hour over the next 30 years.

Freeway traffic flow can be defined in terms of LOS. For freeways, there are six defined levels, ranging from LOS A to LOS F. LOS A represents free traffic flow with low traffic volumes and high speeds, and LOS F represents traffic volumes that exceed the facility capacity and result in forced-flow operations at low speeds, as shown on Figure 1-2. As shown on that figure, traffic volumes on a facility such as I-5 substantially affect travel speeds and times.

LOS	Density (pc/mi/ln)
A	≤11
B	>11–18
C	>18–26
D	>26–35
E	>35–45
F	Demand exceeds capacity OR density > 45

Figure 1-2: LOS Criteria for a Basic Freeway and Multilane Highway Segments

For existing conditions (2022), in the GP lanes, of the 46 mainline segments in the northbound direction, 25 segments (54 percent) had LOS E or F during the a.m. and/or p.m. peak hour. In the southbound direction, of the 44 mainline segments, 20 segments (45 percent) had LOS E or F during the a.m. and/or p.m. peak hour. For the future conditions, the number of segments operating at LOS E or F is anticipated to increase to 28 segments (61 percent) northbound and 25 segments (57 percent) southbound in 2035. For year 2055, the number of LOS E or F segments is anticipated to increase to 31 segments (67 percent) northbound and 27 segments (61 percent) southbound in 2055.

The existing HOV lanes also experience congestion during the peak hours. For existing conditions (2022), in the HOV lanes, of the 46 HOV segments in the northbound direction, 22 segments (48 percent) had LOS E or F during the a.m. and/or p.m. peak hour. In the southbound direction, of the 44 HOV segments, 20 segments (45 percent) had LOS E or F during the a.m. and/or p.m. peak hour.

Table 1.1: Existing (2022) and Forecast Years (2035 and 2055) No Build Alternative Peak Hour Traffic Volumes

Freeway Segments		Existing (2022)				Opening Year (2035)				Future Year (2055)			
Location		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
From	To	Mainline	HOV	Mainline	HOV	Mainline	HOV	Mainline	HOV	Mainline	HOV	Mainline	HOV
Northbound													
South of Red Hill Ave off-ramp	Red Hill Ave off-ramp	9,119	1,537	10,114	1,512	10,225	1,733	10,570	1,576	10,566	1,777	11,268	1,689
Red Hill Ave off-ramp	Red Hill Ave on-ramp	8,647	1,589	9,280	1,578	9,698	1,791	9,689	1,546	10,019	1,838	10,339	1,762
Red Hill Ave on-ramp	Newport Ave on-ramp	10,551	1,588	11,457	1,603	11,835	1,789	11,998	1,570	12,223	1,837	12,775	1,788
Newport Ave on-ramp	SR-55 NB off-ramp	10,473	1,407	11,388	1,557	11,749	1,586	11,926	1,582	12,133	1,627	12,699	1,737
SR-55 BN off-ramp	SR-55 SB off-ramp	8,252	1,407	7,421	1,557	9,262	1,586	7,762	1,582	9,572	1,627	8,271	1,737
SR-55 SB off-ramp	SR-55 NB on-ramp	7,559	1,485	6,541	1,628	8,486	1,672	6,844	1,588	8,764	1,717	7,291	1,814
SR-55 NB on-ramp	1st/4th St off-ramp	11,145	1,304	9,545	1,570	12,502	1,469	9,989	1,595	12,908	1,507	10,649	1,750
1st/4th St off-ramp	4th St on-ramp/NB SR 55 on-ramp (HOV)	10,177	1,304	8,518	1,570	11,418	1,469	8,906	1,595	11,787	1,507	9,501	1,750
4th St on-ramp/NB SR 55 on ramp (HOV)	Grand Ave off-ramp/Grand Ave off-ramp (HOV)	10,707	1,827	9,678	2,720	12,012	2,052	10,120	2,770	12,398	2,113	10,800	3,033
Grand Ave off-ramp/Grand Ave off-ramp (HOV)	Grand Ave on-ramp	11,891	1,741	11,790	2,717	13,342	1,953	12,324	2,641	13,767	2,017	13,158	3,032
Grand Ave on-ramp	17th St off-ramp	10,898	1,617	10,341	2,627	12,227	1,815	10,796	2,677	12,614	1,875	11,542	2,931
17th St off-ramp	EB 17th St on-ramp	10,382	1,617	9,851	2,488	11,648	1,815	10,272	2,535	12,021	1,875	10,992	2,777
EB 17th St on-ramp	WB 17th St on-ramp	10,524	1,617	9,875	2,488	11,808	1,815	10,297	2,535	12,179	1,875	11,019	2,777
WB 17th St on-ramp	Main St/Broadway off-ramp	10,788	1,617	10,398	2,488	12,106	1,815	10,845	2,535	12,487	1,875	11,603	2,777
Main St/Broadway off-ramp	Main St on-ramp	9,149	1,617	8,790	2,488	10,274	1,815	9,168	2,535	10,584	1,875	9,808	2,777
Main St on-ramp	SR-22 WB off-ramp	10,037	1,617	10,501	2,488	11,270	1,815	10,976	2,535	11,618	1,875	11,720	2,777
SR-22 WB off-ramp	SR-57 NB off-ramp/SR-57 NB off-ramp (HOV)	8,454	1,617	9,329	2,488	9,499	1,815	9,756	2,535	9,786	1,875	10,416	2,777
SR-57 NB off-ramp/SR-57 NB off-ramp (HOV)	SR-22 WB on-ramp	5,184	1,617	5,629	2,488	5,825	1,815	5,919	1,635	6,018	1,875	6,298	2,777
SR-22 WB on-ramp	Chapman Ave off-ramp	7,411	799	9,158	1,622	8,322	896	9,612	1,635	8,603	923	10,239	1,808
Chapman Ave off-ramp	The City Dr off-ramp	6,948	799	8,562	1,622	7,799	896	8,986	1,635	8,069	923	9,580	1,808
The City Dr off-ramp	The City Dr on-ramp	6,606	799	7,380	1,622	7,408	896	7,746	1,635	7,673	923	8,268	1,808
The City Dr on-ramp	Katella Ave off-ramp	7,005	602	8,459	1,333	7,854	665	8,876	1,340	8,135	697	9,475	1,485
Katella Ave off-ramp	Anaheim Way/Orangewood Ave on-ramp	6,031	803	7,087	1,602	6,776	891	7,442	1,433	7,024	928	7,949	1,783
Anaheim Way/Orangewood Ave on-ramp	Katella Ave on-ramp	6,210	732	7,861	1,518	6,974	814	8,255	1,525	7,233	845	8,820	1,690
Katella Ave on-ramp	S Anaheim Blvd on-ramp	6,477	732	8,558	1,518	7,271	814	8,987	1,525	7,541	845	9,600	1,690
S Anaheim Blvd on-ramp	Harbor Blvd off-ramp	6,805	732	9,740	1,518	7,640	814	10,226	1,525	7,921	845	10,925	1,690
Harbor Blvd off-ramp	Harbor Blvd on-ramp	6,746	1,009	10,262	1,735	7,574	1,128	10,764	1,618	7,831	1,170	11,507	1,932
Harbor Blvd on-ramp	Ball Rd on-ramp	6,129	836	9,161	1,643	6,881	935	9,614	1,660	7,118	966	10,286	1,829
Ball Rd on-ramp	Disneyland Dr on-ramp	6,549	836	9,841	1,643	7,349	935	10,325	1,660	7,602	966	11,043	1,829
Disneyland Dr on-ramp	Lincoln Ave off-ramp	6,883	836	10,551	1,643	7,723	935	11,030	1,660	7,987	966	11,833	1,829
Lincoln Ave off-ramp	Lincoln Ave on-ramp	6,528	998	9,529	1,771	7,327	1,117	9,957	1,638	7,574	1,153	10,692	1,973
Lincoln Ave on-ramp	Euclid St off-ramp	6,823	799	9,968	1,601	7,657	891	10,424	1,615	7,915	922	11,181	1,782
Euclid St off-ramp	Euclid St on-ramp	6,176	799	8,662	1,601	6,909	891	9,041	1,615	7,167	922	9,720	1,782
Euclid St on-ramp	Brookhurst St off-ramp	6,709	799	9,401	1,601	7,509	891	9,876	1,615	7,783	922	10,542	1,782
Brookhurst St off-ramp	La Palma Ave off-ramp	5,957	799	7,732	1,601	6,667	891	8,128	1,615	6,914	922	8,676	1,782
La Palma Ave off-ramp	Brookhurst St on-ramp	5,985	931	7,787	1,724	6,700	1,040	8,181	1,550	6,947	1,076	8,737	1,921
Brookhurst St on-ramp	La Palma Ave on-ramp	6,433	770	8,534	1,474	7,200	858	8,963	1,485	7,463	889	9,576	1,644
La Palma Ave on-ramp	SR-91 WB off-ramp	6,680	770	8,804	1,474	7,475	858	9,244	1,485	7,749	889	9,876	1,644
SR-91 WB off-ramp	SR-91 EB off-ramp/SR-91 WB off-ramp (HOV)	4,331	770	5,398	1,474	4,840	858	5,675	1,485	5,026	889	6,071	1,644
SR-91 EB off-ramp/SR-91 WB off-ramp (HOV)	SR-91 WB on-ramp/SR-91 WB on-ramp (HOV)	3,794	551	4,380	832	4,240	610	4,597	830	4,405	636	4,936	925

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Freeway Segments		Existing (2022)				Opening Year (2035)				Future Year (2055)			
Location		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
From	To	Mainline	HOV	Mainline	HOV	Mainline	HOV	Mainline	HOV	Mainline	HOV	Mainline	HOV
SR-91 WB on-ramp/SR-91 WB on-ramp (HOV)	Orangethorpe Ave on-ramp	5,002	946	6,478	1,032	5,593	1,050	6,790	1,608	5,802	1,093	7,278	1,146
Orangethorpe Ave on-ramp	Auto Center Dr off-ramp	5,296	946	6,829	1,032	5,923	1,050	7,155	1,035	6,142	1,093	7,670	1,146
Auto Center Dr off-ramp	Beach Blvd off-ramp	4,655	946	4,951	1,032	5,202	1,050	5,178	1,035	5,399	1,093	5,569	1,146
Beach Blvd off-ramp	Beach Blvd on-ramp	4,169	1,143	4,031	1,144	4,655	1,275	4,205	1,086	4,836	1,325	4,540	1,277
Beach Blvd on-ramp	Artesia Blvd off-ramp	4,308	1,270	4,478	1,241	4,806	1,419	4,671	1,248	4,992	1,472	5,025	1,390
Artesia Blvd off-ramp	North of Artesia Blvd off ramp	3,811	1,270	4,186	1,241	4,251	1,419	4,351	1,248	4,414	1,472	4,699	1,390
Southbound													
Artesia Blvd off-ramp	Artesia Blvd on-ramp	5,196	866	4,375	563	5,653	924	4,595	586	6,049	991	4,802	610
Artesia Blvd on-ramp	Beach Blvd off-ramp	5,967	866	5,200	563	6,490	924	5,492	586	6,942	991	5,703	610
Beach Blvd off-ramp	Beach Blvd on-ramp	5,473	883	4,655	610	5,932	941	4,902	811	6,378	1,010	5,124	659
Beach Blvd on-ramp	SR-91 EB off-ramp/SR-91 EB off ramp (HOV)	6,240	901	5,316	662	6,767	959	5,619	875	7,271	1,031	5,854	711
SR-91 EB off-ramp/SR-91 EB off ramp (HOV)	Magnolia St off-ramp	4,536	720	3,430	513	4,981	772	3,607	680	5,360	830	3,841	551
Magnolia St off-ramp	SR-91 EB on-ramp/SR 91 EB on ramp (HOV)	3,841	720	3,032	513	4,250	772	3,182	680	4,578	830	3,416	551
SR-91 EB on-ramp/SR 91 EB on ramp (HOV)	Magnolia St on-ramp	6,540	1,198	4,920	891	7,176	1,281	5,170	505	7,712	1,374	5,484	961
Magnolia St on-ramp	Brookhurst St off-ramp	7,507	1,198	5,538	891	8,227	1,281	5,827	1,185	8,837	1,374	6,160	961
Brookhurst St off-ramp	Brookhurst St on-ramp	6,867	1,481	4,911	1,006	7,591	1,567	5,191	1,185	8,154	1,682	5,512	1,083
Brookhurst St on-ramp	Euclid St off-ramp	7,748	1,360	5,517	899	8,573	1,433	5,845	1,185	9,206	1,539	6,179	965
Euclid St off-ramp	Lincoln Ave off-ramp	7,357	1,360	4,846	899	8,166	1,433	5,117	1,185	8,765	1,539	5,462	965
Lincoln Ave off-ramp	Euclid St on-ramp	7,223	1,594	4,427	1,000	8,028	1,670	4,662	1,195	8,615	1,793	5,011	1,071
Euclid St on-ramp	Lincoln Ave on-ramp	7,979	1,521	4,903	919	8,829	1,590	5,179	1,205	9,477	1,709	5,524	981
Lincoln Ave on-ramp	Disneyland Dr off-ramp/Disneyland Dr off-ramp (HOV)	9,278	1,521	5,508	919	10,240	1,590	5,819	1,205	10,992	1,709	6,186	981
Disneyland Dr off-ramp/Disneyland Dr off-ramp (HOV)	Disneyland Dr on-ramp	8,759	1,379	4,817	766	9,700	1,442	5,075	1,005	10,411	1,548	5,447	817
Disneyland Dr on-ramp	Harbor Blvd off-ramp	9,392	1,379	5,257	766	10,386	1,442	5,539	1,005	11,148	1,548	5,930	817
Harbor Blvd off-ramp	Harbor Blvd on-ramp	9,154	1,576	4,706	988	10,199	1,576	4,938	1,033	10,945	1,691	5,338	1,059
Harbor Blvd on-ramp	Anaheim Boulevard off-ramp	9,847	1,450	5,011	804	10,941	1,384	5,249	1,060	11,740	1,486	5,659	863
Anaheim Boulevard off-ramp	Katella Avenue off-ramp	9,571	1,450	4,583	804	10,682	1,384	4,790	1,060	11,459	1,486	5,188	863
Katella Avenue off-ramp	Disney Way on-ramp/Gene Autry Way off-ramp (HOV)	8,188	1,450	3,639	804	9,203	1,384	3,804	1,060	9,874	1,486	4,152	863
Disney Way on-ramp/Gene Autry Way off-ramp (HOV)	Katella Ave on-ramp	8,794	1,401	4,167	772	9,766	1,330	4,345	1,020	10,516	1,428	4,716	828
Katella Ave on-ramp	The City Drive off-ramp	9,451	1,401	4,711	772	10,413	1,330	4,904	1,020	11,208	1,428	5,297	828
The City Dr off-ramp	Orangewood Ave on-ramp/Gene Autry Way on ramp (HOV)	9,123	1,488	4,453	896	9,979	1,495	4,630	983	10,750	1,607	5,002	965
Orangewood Ave on-ramp/Gene Autry Way on ramp (HOV)	The City Drive on-ramp	9,743	1,417	4,700	738	10,475	1,504	4,882	975	11,281	1,607	5,257	809
The City Dr on-ramp	Chapman Ave on-ramp	10,066	1,417	5,090	738	10,815	1,504	5,290	975	11,644	1,607	5,674	809
Chapman Ave on-ramp	SR-22 W off-ramp	10,939	1,417	5,924	738	11,685	1,504	6,172	975	12,565	1,607	6,572	809
SR-22 W off-ramp	SR-22 E / La Veta Ave off-ramp	9,995	1,417	5,164	738	10,675	1,504	5,379	975	11,483	1,607	5,734	809
SR-22 E / La Veta Ave off-ramp	Broadway/Main St off-ramp/SB SR 57 on ramp (HOV)	7,637	1,417	3,533	738	8,187	1,504	3,698	975	8,787	1,607	3,981	809
Broadway/Main St off-ramp/SB SR 57 on ramp (HOV)	SR-22 E on-ramp	6,610	2,354	2,883	1,734	7,104	2,475	3,026	2,285	7,633	2,646	3,282	1,872
SR-22 E on-ramp	SR-57 SB/CD Road on-ramp	8,104	2,447	4,025	1,808	8,653	2,573	4,187	2,318	9,286	2,748	4,484	1,951
SR-57 SB/CD Road on-ramp	Main St on-ramp	8,730	2,416	4,383	1,783	9,300	2,542	4,552	2,350	9,978	2,713	4,865	1,927
Main St on-ramp	17th St off-ramp	9,338	2,416	4,949	1,783	9,927	2,542	5,143	2,350	10,691	2,713	5,464	1,927
17th St off-ramp	17th St on-ramp	9,030	2,497	4,604	1,882	9,599	2,628	4,784	2,398	10,346	2,803	5,090	2,033

Table 1.1: Existing (2022) and Forecast Years (2035 and 2055) No Build Alternative Peak Hour Traffic Volumes

Freeway Segments		Existing (2022)				Opening Year (2035)				Future Year (2055)			
Location		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
From	To	Mainline	HOV	Mainline	HOV	Mainline	HOV	Mainline	HOV	Mainline	HOV	Mainline	HOV
17th St on-ramp	Grand Avenue off-ramp	9,834	2,478	5,166	1,856	10,434	2,610	5,364	2,445	11,227	2,780	5,682	2,005
Grand Avenue off-ramp	Grand Avenue on-ramp	9,318	2,593	4,791	1,940	9,892	2,731	4,997	2,473	10,644	2,910	5,280	2,095
Grand Avenue on-ramp/Grand Ave on-ramp (HOV)	4th Street off-ramp/SR 55 SB off-ramp (HOV)	9,625	2,714	5,079	2,032	10,206	2,857	5,296	2,700	10,954	3,051	5,583	2,197
4th St off-ramp	1st St on-ramp	9,084	940	4,591	1,089	9,636	988	4,782	1,455	10,339	1,038	5,058	1,173
1st St on-ramp	SB SR-55 off-ramp	10,153	1,027	5,356	1,117	10,742	1,077	5,564	1,490	11,520	1,137	5,865	1,201
SB SR-55 off-ramp	Newport Ave off-ramp	6,926	1,027	3,291	1,117	7,338	1,077	3,435	1,490	7,882	1,137	3,645	1,201
Newport Ave off-ramp	NB SR-55 on-ramp	6,446	1,027	2,666	1,117	6,828	1,077	2,785	1,490	7,329	1,137	2,969	1,201
SR-55 N on-ramp	SR-55 S on-ramp	7,333	1,027	3,191	1,117	7,742	1,077	3,322	1,490	8,325	1,137	3,517	1,201
SR-55 S on-ramp	Red Hill Ave off-ramp	10,706	1,149	6,501	1,240	11,240	1,206	6,698	1,422	12,075	1,274	7,014	1,334
Red Hill Ave off-ramp	Red Hill Ave on-ramp	10,467	1,000	5,999	1,011	10,985	1,052	6,174	1,354	11,808	1,113	6,471	1,093
Red Hill Ave on-ramp	South of Red Hill Ave on-ramp	11,222	963	6,740	915	11,764	1,019	6,936	1,230	12,645	1,079	7,250	993

Source: Traffic Operations Analysis Report (May 2023)

Notes: Ave = Avenue; Blvd = Boulevard; Dr = Drive; E = East; HOV = high-occupancy vehicle; LOS = level of service; N = North; NB = Northbound; Rd = Road; S = South; SB = Southbound; St = Street; SR = State Route; W = West

Table 1.2: Existing (2022) and Forecast Years (2035 and 2055) No Build Alternative Peak Hour Level of Service

Freeway Segments		Existing (2022)								Opening Year (2035)								Future Year (2055)							
		General Purpose Lanes				HOV Lanes				General Purpose Lanes				HOV Lanes				General Purpose Lanes				HOV Lanes			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
From	To	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS
Northbound																									
South of Red Hill Ave off-ramp	Red Hill Ave off-ramp	33	E	39	F	38	F	67	F	39	E	58	F	41	F	62	F	42	F	58	F	41	F	77	F
Red Hill Ave off-ramp	Red Hill Ave on-ramp	30	D	55	D	36	E	65	F	29	D	35	C	36	D	68	F	30	D	27	C	39	E	71	F
Red Hill Ave on-ramp	Newport Ave on-ramp	33	E	94	F	31	D	61	F	32	D	109	F	30	D	74	F	33	D	109	F	31	D	56	E
Newport Ave on-ramp	SR-55 NB off-ramp	37	E	41	E	26	D	61	F	43	F	42	E	29	D	61	F	45	F	43	F	30	D	74	F
SR-55 BN off-ramp	SR-55 SB off-ramp	32	E	23	C	26	D	61	F	37	E	23	C	29	D	61	F	40	E	23	C	30	D	74	F
SR-55 SB off-ramp	SR-55 NB on-ramp	32	E	29	D	31	D	38	F	37	E	30	D	35	E	44	F	38	E	31	D	36	E	39	F
SR-55 NB on-ramp	1st/4th St off-ramp	56	F	49	F	28	D	51	F	67	F	52	F	32	D	55	F	70	F	58	F	33	D	47	F
1st/4th St off-ramp	4th St on-ramp/NB SR 55 on ramp (HOV)	32	E	28	D	28	D	51	F	36	E	29	D	32	D	55	F	36	E	31	D	33	D	47	F
4th St on-ramp/NB SR 55 on ramp (HOV)	Grand Ave off-ramp/Grand Ave off-ramp (HOV)	31	D	37	E	16	B	25	C	35	E	38	E	18	B	25	C	36	E	41	E	18	B	43	C
Grand Ave off-ramp/Grand Ave off-ramp (HOV)	Grand Ave on-ramp	28	D	31	D	26	D	32	D	31	D	32	D	30	D	31	D	31	D	33	D	30	D	42	E
Grand Ave on-ramp	17th St off-ramp	35	E	40	E	13	B	52	B	40	E	42	E	15	B	49	C	40	E	45	F	15	B	85	F
17th St off-ramp	EB 17th St on-ramp	29	D	31	D	27	D	31	D	31	D	32	D	29	C	31	C	31	D	34	D	30	D	45	F
EB 17th St on-ramp	WB 17th St on-ramp	26	D	24	C	15	B	77	F	46	F	25	C	16	B	81	F	58	F	26	C	17	B	86	F
WB 17th St on-ramp	Main St/Broadway off-ramp	39	F	40	E	15	B	77	F	54	F	41	E	16	B	81	F	62	F	44	F	17	B	86	F
Main St/Broadway off-ramp	Main St on-ramp	28	D	41	E	15	B	77	F	54	F	41	E	16	B	81	F	67	F	48	F	17	B	86	F
Main St on-ramp	SR-22 WB off-ramp	38	E	59	D	15	B	77	F	41	E	58	D	16	B	81	F	42	E	59	D	17	B	86	F
SR-22 WB off-ramp	SR-57 NB off-ramp/SR-57 NB off-ramp (HOV)	34	E	37	E	15	B	77	F	37	D	37	E	16	B	81	F	34	D	37	E	17	B	86	F
SR-57 NB off-ramp/SR-57 NB off-ramp (HOV)	SR-22 WB on-ramp	19	C	20	C	14	B	97	F	20	C	19	C	16	B	97	F	19	C	20	C	16	B	102	F
SR-22 WB on-ramp	Chapman Ave off-ramp	21	C	34	D	14	B	97	F	24	C	35	E	16	B	97	F	24	C	38	E	16	B	102	F
Chapman Ave off-ramp	The City Dr off-ramp	17	C	69	F	14	B	97	F	19	C	73	F	16	B	97	F	19	C	73	F	16	B	102	F
The City Dr off-ramp	The City Dr on-ramp	22	C	54	D	14	B	97	F	24	C	55	D	16	B	97	F	24	C	59	F	16	B	102	F
The City Dr on-ramp	Katella Ave off-ramp	25	C	56	F	12	B	56	F	27	C	57	F	13	B	60	F	27	C	57	F	14	B	72	F
Katella Ave off-ramp	Anaheim Way/Orangewood Ave on-ramp	22	C	70	F	21	C	59	F	25	C	68	F	23	C	63	F	25	C	68	F	23	C	65	F
Anaheim Way/Orangewood Ave on-ramp	Katella Ave on-ramp	27	D	63	F	12	B	69	F	29	D	65	F	13	B	70	F	30	D	66	F	14	B	72	F
Katella Ave on-ramp	S Anaheim Blvd on-ramp	29	C	52	F	12	B	69	F	32	C	52	F	13	B	70	F	32	C	52	F	14	B	72	F
S Anaheim Blvd on-ramp	Harbor Blvd off-ramp	27	D	63	F	22	C	57	F	30	D	64	F	25	C	56	F	30	D	65	F	25	C	59	F
Harbor Blvd off-ramp	Harbor Blvd on-ramp	24	C	69	F	14	B	34	D	26	C	69	F	15	B	34	D	27	C	70	F	16	B	41	F
Harbor Blvd on-ramp	Ball Rd on-ramp	27	C	38	D	14	B	34	D	29	C	38	D	15	B	34	D	30	D	38	D	16	B	41	F
Ball Rd on-ramp	Disneyland Dr on-ramp	26	D	38	E	14	B	34	D	29	D	38	E	15	B	34	D	30	D	38	E	16	B	41	F
Disneyland Dr on-ramp	Lincoln Ave off-ramp	22	C	30	D	20	C	30	D	24	C	31	D	22	C	36	E	24	C	31	D	22	C	45	F
Lincoln Ave off-ramp	Lincoln Ave on-ramp	21	C	32	D	13	B	33	D	23	C	38	E	15	B	33	D	24	C	41	F	15	B	60	F
Lincoln Ave on-ramp	Euclid St off-ramp	27	D	44	F	13	B	33	D	30	D	63	F	15	B	33	D	31	D	63	F	15	B	60	F

Table 1.2: Existing (2022) and Forecast Years (2035 and 2055) No Build Alternative Peak Hour Level of Service

Freeway Segments		Existing (2022)								Opening Year (2035)								Future Year (2055)							
		General Purpose Lanes				HOV Lanes				General Purpose Lanes				HOV Lanes				General Purpose Lanes				HOV Lanes			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
From	To	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS
Euclid St off-ramp	Euclid St on-ramp	24	D	31	D	13	B	33	D	26	C	91	F	15	B	33	D	27	D	88	F	15	B	60	F
Euclid St on-ramp	Brookhurst St off-ramp	27	D	44	F	13	B	33	D	30	D	44	F	15	B	33	D	31	D	46	F	15	B	60	F
Brookhurst St off-ramp	La Palma Ave off-ramp	24	D	29	E	13	B	33	D	26	D	28	D	15	B	33	D	27	D	28	E	15	B	60	F
La Palma Ave off-ramp	Brookhurst St on-ramp	23	C	34	D	22	C	32	D	26	C	33	D	24	C	32	D	27	C	35	D	25	C	33	D
Brookhurst St on-ramp	La Palma Ave on-ramp	20	C	26	C	13	B	24	C	22	C	25	C	14	B	24	C	23	C	26	C	14	B	24	C
La Palma Ave on-ramp	SR-91 WB off-ramp	25	C	33	D	13	B	24	C	27	C	32	D	14	B	24	C	28	D	34	D	14	B	24	C
SR-91 WB off-ramp	SR-91 EB off-ramp/SR-91 WB off-ramp (HOV)	18	D	22	E	13	B	24	C	20	D	21	E	14	B	24	C	20	E	22	E	14	B	24	C
SR-91 EB off-ramp/SR-91 WB off-ramp (HOV)	SR-91 WB on-ramp/SR-91 WB on-ramp (HOV)	15	B	17	B	9	A	12	B	16	B	16	B	10	A	12	B	17	B	31	D	10	A	12	B
SR-91 WB on-ramp/SR-91 WB on-ramp (HOV)	Orangethorpe Ave on-ramp	13	B	17	B	16	B	16	B	14	B	17	B	18	C	16	B	15	B	130	F	19	C	16	B
Orangethorpe Ave on-ramp	Auto Center Dr off-ramp	15	B	21	C	16	B	16	B	17	B	21	C	18	C	16	B	18	B	21	C	19	C	16	B
Auto Center Dr off-ramp	Beach Blvd off-ramp	14	B	16	B	16	B	16	B	16	B	16	B	18	C	16	B	16	B	16	B	19	C	16	B
Beach Blvd off-ramp	Beach Blvd on-ramp	23	C	24	C	21	C	21	C	26	C	24	C	24	C	22	C	27	C	25	C	25	C	23	C
Beach Blvd on-ramp	Artesia Blvd off-ramp	21	C	23	C	21	C	18	B	24	C	24	C	24	C	18	C	25	C	26	C	25	C	19	C
Artesia Blvd off-ramp	North of Artesia Blvd off ramp	21	C	23	C	21	C	18	B	23	C	24	C	24	C	18	C	24	C	25	C	25	C	19	C
Southbound																									
Artesia Blvd off-ramp	Artesia Blvd on-ramp	22	C	16	B	13	B	9	A	23	C	17	B	29	F	9	A	26	C	18	B	132	F	10	A
Artesia Blvd on-ramp	Beach Blvd off-ramp	26	C	20	B	13	B	9	A	29	C	21	C	29	F	9	A	31	D	22	C	132	F	10	A
Beach Blvd off-ramp	Beach Blvd on-ramp	23	C	17	B	22	C	17	B	26	C	18	B	61	F	17	B	28	C	19	B	156	F	18	B
Beach Blvd on-ramp	SR-91 EB off-ramp/SR-91 EB off ramp (HOV)	25	C	19	B	14	B	11	A	28	C	20	B	75	F	11	A	30	D	21	B	156	F	12	B
SR-91 EB off-ramp/SR-91 EB off ramp (HOV)	Magnolia St off-ramp	20	C	13	B	21	C	8	A	23	C	14	B	131	F	8	A	26	C	15	B	174	F	9	A
Magnolia St off-ramp	SR-91 EB on-ramp/SR 91 EB on ramp (HOV)	18	B	11	B	21	C	8	A	29	D	12	B	131	F	8	A	33	D	13	B	174	F	9	A
SR-91 EB on-ramp/SR 91 EB on ramp (HOV)	Magnolia St on-ramp	38	C	12	C	59	F	21	C	57	F	13	C	102	F	23	C	59	F	14	C	143	F	24	C
Magnolia St on-ramp	Brookhurst St off-ramp	38	D	14	B	59	F	21	C	46	E	15	B	102	F	23	C	44	E	16	B	143	F	24	C
Brookhurst St off-ramp	Brookhurst St on-ramp	96	F	22	C	58	F	21	C	97	F	23	C	71	F	23	C	91	F	25	C	110	F	24	C
Brookhurst St on-ramp	Euclid St off-ramp	66	F	21	F	71	F	15	F	66	F	22	F	72	F	16	F	64	F	24	F	93	F	16	F
Euclid St off-ramp	Lincoln Ave off-ramp	56	F	18	B	71	F	15	F	58	F	20	C	72	F	16	F	60	F	21	C	93	F	16	F
Lincoln Ave off-ramp	Euclid St on-ramp	63	F	17	B	60	F	17	B	67	F	18	B	48	F	18	B	68	F	20	B	80	F	20	B
Euclid St on-ramp	Lincoln Ave on-ramp	64	F	20	C	31	D	15	B	65	F	21	C	58	F	15	B	66	F	23	C	83	F	16	B
Lincoln Ave on-ramp	Disneyland Dr off-ramp/Disneyland Dr off-ramp (HOV)	70	F	19	B	31	D	15	B	71	F	20	B	58	F	15	B	71	F	22	C	83	F	16	B
Disneyland Dr off-ramp/Disneyland Dr off-ramp (HOV)	Disneyland Dr on-ramp	38	E	18	B	27	C	13	B	38	E	19	C	67	F	13	B	38	E	21	C	92	F	14	B
Disneyland Dr on-ramp	Harbor Blvd off-ramp	36	D	20	B	27	C	13	B	41	E	21	B	13	F	13	B	44	E	23	C	92	F	14	B

Table 1.2: Existing (2022) and Forecast Years (2035 and 2055) No Build Alternative Peak Hour Level of Service

Freeway Segments		Existing (2022)								Opening Year (2035)								Future Year (2055)							
		General Purpose Lanes				HOV Lanes				General Purpose Lanes				HOV Lanes				General Purpose Lanes				HOV Lanes			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
From	To	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS
Harbor Blvd off-ramp	Harbor Blvd on-ramp	38	E	18	B	36	E	18	B	54	F	19	B	54	F	19	B	54	F	21	C	80	F	21	B
Harbor Blvd on-ramp	Anaheim Boulevard off-ramp	35	D	17	B	29	C	13	B	36	E	18	B	66	F	14	B	37	E	19	B	82	F	14	B
Anaheim Boulevard off-ramp	Katella Avenue off-ramp	35	D	14	B	29	C	13	B	35	D	15	B	66	F	14	B	35	D	16	C	82	F	14	B
Katella Avenue off-ramp	Disney Way on-ramp/Gene Autry Way off-ramp (HOV)	30	D	14	B	29	C	13	B	30	D	14	B	13	F	14	B	30	D	16	B	82	F	14	B
Disney Way on-ramp/Gene Autry Way off-ramp (HOV)	Katella Ave on-ramp	38	D	17	B	33	D	13	B	37	D	18	B	73	F	13	B	38	D	19	C	84	F	14	B
Katella Ave on-ramp	The City Drive off-ramp	39	E	17	B	33	D	13	B	40	E	18	B	13	F	13	B	38	E	19	B	84	F	14	B
The City Dr off-ramp	Orangewood Ave on-ramp/Gene Autry Way on ramp (HOV)	39	E	17	B	37	E	17	B	40	E	18	B	65	F	18	B	80	F	19	B	78	F	19	B
Orangewood Ave on-ramp/Gene Autry Way on ramp (HOV)	The City Drive on-ramp	36	D	14	B	70	F	17	B	35	D	14	B	64	F	17	B	38	E	16	B	65	F	18	B
The City Dr on-ramp	Chapman Ave on-ramp	27	D	13	B	70	F	17	B	28	D	13	B	64	F	17	B	29	D	14	B	65	F	18	B
Chapman Ave on-ramp	SR-22 W off-ramp	35	D	16	B	70	F	17	B	35	D	17	B	64	F	17	B	38	E	18	B	65	F	18	B
SR-22 W off-ramp	SR-22 E / La Veta Ave off-ramp	28	D	14	C	70	F	17	B	28	D	14	C	64	F	17	B	29	D	15	C	65	F	18	B
SR-22 E / La Veta Ave off-ramp	Broadway/Main St off-ramp/SB SR 57 on ramp (HOV)	25	E	11	C	70	F	17	B	25	E	12	C	64	F	17	B	26	E	12	C	65	F	18	B
Broadway/Main St off-ramp/SB SR 57 on ramp (HOV)	SR-22 E on-ramp	27	C	11	A	70	F	17	B	34	D	11	A	64	F	17	B	39	D	12	B	65	F	18	B
SR-22 E on-ramp	SR-57 SB/CD Road on-ramp	82	F	16	B	19	C	13	B	99	F	16	B	105	F	13	B	106	F	17	B	109	F	14	B
SR-57 SB/CD Road on-ramp	Main St on-ramp	71	F	17	B	45	C	16	B	71	F	18	B	43	E	16	B	71	F	19	B	43	E	17	B
Main St on-ramp	17th St off-ramp	77	F	19	B	122	F	15	B	77	F	20	B	106	F	15	B	78	F	21	C	108	F	54	F
17th St off-ramp	17th St on-ramp	128	F	15	B	56	F	15	B	128	F	15	B	57	F	15	B	128	F	16	B	59	F	41	F
17th St on-ramp	Grand Avenue off-ramp	38	E	15	B	105	F	14	B	39	E	16	B	105	F	14	B	40	E	17	B	108	F	78	F
Grand Avenue off-ramp	Grand Avenue on-ramp	26	C	15	B	50	F	15	B	26	C	16	B	51	F	16	B	27	C	15	B	53	F	44	F
Grand Avenue on-ramp/Grand Ave on-ramp (HOV)	4th Street off-ramp/SR 55 SB off-ramp (HOV)	34	C	14	B	16	B	12	B	38	E	15	B	17	B	13	B	42	E	19	B	17	B	78	F
4th St off-ramp	1st St on-ramp	115	F	15	B	107	F	21	C	115	F	65	F	106	F	64	F	114	F	144	F	106	F	136	F
1st St on-ramp	SB SR-55 off-ramp	34	D	15	B	19	C	24	C	35	D	14	B	20	C	26	C	36	E	15	B	21	C	63	F
SB SR-55 off-ramp	Newport Ave off-ramp	18	C	9	A	19	C	24	C	19	C	9	A	20	C	26	C	19	C	9	A	21	C	63	F
Newport Ave off-ramp	NB SR-55 on-ramp	24	C	12	B	22	C	11	B	25	C	12	B	23	C	11	B	26	C	12	B	24	C	12	B
SR-55 N on-ramp	SR-55 S on-ramp	37	E	13	B	20	C	21	C	37	E	13	B	20	C	22	C	35	E	13	B	20	C	21	C
SR-55 S on-ramp	Red Hill Ave off-ramp	75	F	25	C	20	C	21	C	77	F	22	C	20	C	22	C	73	F	23	C	20	C	21	C
Red Hill Ave off-ramp	Red Hill Ave on-ramp	76	F	19	B	71	F	19	B	94	F	17	B	88	F	16	B	94	F	17	B	88	F	17	B
Red Hill Ave on-ramp	South of Red Hill Ave on-ramp	33	D	17	B	16	B	16	B	33	D	17	B	17	B	17	B	33	D	18	B	18	B	16	B

Source: Traffic Operations Analysis Report (May 2023)

Notes: Bolded cells indicate LOS E or F.

Ave = Avenue; Blvd = Boulevard; Dr = Drive; E = East; HOV = high-occupancy vehicle; LOS = Level of Service; N = North; Rd = Road; S = South; St = Street; SR = State Route; W = West

For the future conditions, the number of segments operating at LOS E or F is anticipated to increase to 23 segments (50 percent) northbound and 37 segments (84 percent) southbound in 2035. For year 2055, the number of LOS E or F segments is anticipated to increase to 34 segments (74 percent) northbound and 40 segments (91 percent) southbound in 2055.

Overall, nearly half of the corridor currently experiences poor operating conditions in both directions, and the number of segments operating at LOS E or F is expected to increase without improvements to the corridor.

The I-5 end-to-end corridor travel time within the proposed Project limits for existing conditions (2022) and future conditions (2035 and 2055) under the No Build Alternative is summarized in Table 1.3. For existing conditions, end-to-end travel time through the I-5 corridor within the proposed Project limits ranges from 15 minutes during the off-peak p.m. peak hour in the southbound direction to 20 minutes during the peak p.m. peak hour in the northbound direction. In the future, travel time increases by 1 to 5 minutes without improvements to the corridor.

Table 1.3: Corridor Travel Time

I-5 Facility	Peak Period	2022 Existing (Minutes)	2035 Alternative 1 (No Build) (Minutes)	2055 Alternative 1 (No Build) (Minutes)
Northbound GP+HOV	AM	16	16	16
	PM	20	21	22
Southbound GP+HOV	AM	21	24	26
	PM	15	15	16

Source: *Traffic Operations Analysis Report* (May 2023)

GP = general-purpose
 HOV = high occupancy vehicle
 I-5 = Interstate 5

If an HOV lane is considered degraded by the federal definition, the State must limit or discontinue the use of the lane by exempted vehicles (such as low-emission vehicles, certain gasoline/electric plug-in hybrid vehicles, and toll-paying vehicles to access HOV lanes without meeting occupancy requirements) or take other actions that would bring the operational performance up to the federal standard within 180 days after identification of the lane as being degraded.

The *2017 California HOV Lane Degradation Determination Report* (Caltrans 2018) and subsequent California HOV Lane Degradation Determination Reports (Caltrans 2019, 2020, 2021, 2022), developed to report the performance of the HOV lane

network, listed this section of HOV facility as degraded, with portions of the proposed Project listed as extremely degraded. Following the completion of the *HOV Lane Degradation Determination Report*, the *2017 California HOV Lane Degradation Action Plan* was developed to identify strategies for addressing the reported degraded HOV lanes. Analysis of the I-5 suggests that factors contributing to degradation include:

- Demand exceeding capacity;
- Recurrent congestion on the freeway and high speed differential between GP and HOV lanes with no buffer separation;
- Vehicle weaving conflict at ingress/egress locations;
- Multiple HOV lane bottlenecks along the corridor; and
- Bottlenecks at the I-5/SR-55 HOV Direct Connector and I-5/SR 57 Direct Connector

According to the *HOV Lane Degradation Determination Report*, remediation for this facility includes: increasing the minimum occupancy of vehicles; enhancing the available capacity of the HOV lane facility; and/or improving traffic demand management through a conversion of HOV lanes to Express Lanes (ELs).

In 2016, Caltrans District 12 developed the *Orange County Managed Lanes Network Study*. The I-5 portion between south of SR-55 at Red Hill Avenue and SR-91 was designated as a Priority 1 Facility. Districts have prioritized their ML projects using different combinations of factors, including performance, cost, constructability, and revenues. A Priority 1 Facility shows the greatest benefit by converting HOV lanes to ELs.

In order to address some of the HOV degradation, the Orange County Transportation Authority (OCTA) has sponsored the addition of an HOV lane on I-5 between SR-55 and SR-57 through local Measure M2 funding. While the performance of I-5 between SR-55 and SR-57 would be improved, the future operational issues in that segment would not be resolved. The SR-55 southbound and SR-57 northbound system interchanges would continue to be the main bottlenecks. Through the implementation of ELs, the system operators can better control the demand and manage congestion.

Consistent with traffic volumes shown in Table 1.1, volumes are expected to increase during the a.m. and p.m. peak hours along both northbound and southbound lanes under existing conditions, and under the No Build condition in years 2035 and 2055. As a result, the majority of the study segments on northbound and southbound I-5

would operate at LOS E and F during a.m. and p.m. peak hours by 2035 and 2055 under the No Build condition, as shown in Table 1.2.

Collisions and Safety within the Corridor

Collision data for the proposed Project limits were provided using the Caltrans Traffic Accident Surveillance and Analysis System (TASAS) for the 3-year period from January 1, 2017, to December 31, 2019. The TASAS information, which was collected from Caltrans, summarizes collision histories along Caltrans facilities and provides information such as collision rates, number of collisions, potential collision investigation locations, primary collision factor, and collision type.

Table 1.4 summarizes the collision rates on the freeway mainline (GP lanes) segments. In the northbound direction, on I-5, a total of 13 GP segments had an actual collision rate that is higher than the statewide average collision rate. In the southbound direction on I-5 GP lanes, a total of three GP segments had an actual collision rate that is higher than the statewide average collision rate.

Table 1.5 summarizes the freeway collision types. Based on a review of the detailed collision data, the predominant collision types are sideswipes and rear-ends, and the most common contributing factor is speeding or improper turn. Most of the collisions are taking place in the right, interior, and left lanes of the freeway GP lanes. These are considered congestion-related collisions that occur due to the formation of vehicular queues resulting from congested traffic operating conditions and stop-and-go traffic flow patterns.

Table 1.6 summarizes the collision rates for the freeway-to-freeway ramp and the freeway-to-arterial ramp interchanges. In the northbound direction, a total of 61 freeway-to-freeway and freeway-to-arterial ramps were evaluated. Of these, 32 ramp locations had an actual collision rate that is higher than the statewide average collision rate. In the southbound direction, a total of 60 freeway-to-freeway and freeway-to-arterial ramps were evaluated. Of these, 32 ramp locations had an actual collision rate that is higher than the statewide average collision rate.

Table 1.4: Traffic Collision Data (January 2017 to December 2019)

Location Description	From Post Mile	To Post Mile	Total Collision	Collision Rates					
				Actual			Statewide Average		
				FAT	F+I	TOT	FAT	F+I	TOT
Northbound									
South of SR-55 to North of SR-55	30.0	30.5	175	0.000	0.67*	2.14*	0.004	0.43	1.37
SR-55 to Fourth St	30.5	31.0	165	0.000	0.50*	1.73*	0.004	0.44	1.42
Fourth St to Grand Ave	31.0	31.5	117	0.009	0.35	1.10	0.004	0.45	1.46
Off-ramp to Grand Ave to On-ramp from Grand Ave	31.5	32.0	109	0.000	0.36	1.00	0.004	0.46	1.47
On-ramp from Grand Ave to 17 th Street	32.0	32.5	132	0.000	0.40	1.19	0.004	0.46	1.47
17 th Street to Main St	32.5	33.0	217	0.000	0.75*	2.15*	0.004	0.45	1.44
Main St to WB SR-22/La Veta Ave/Bronson St	33.0	33.5	167	0.000	0.53*	1.68*	0.004	0.43	1.38
WB SR-22/La Veta/Bronson St to SR-57	33.5	34.0	84	0.010*	0.24	0.83	0.004	0.41	1.30
SR-57 to Chapman Ave	34.0	34.5	41	0.000	0.10	0.50	0.004	0.43	1.39
Chapman Ave to State College/The City Dr	34.5	35.0	69	0.013*	0.28	0.89	0.004	0.42	1.35
State College/The City Dr to Gene Autry/Disney Way	35.0	35.5	22	0.000	0.10	0.31	0.005	0.41	1.29
Gene Autry/Disney Way to Anaheim Way	35.5	36.0	43	0.000	0.25	0.62	0.004	0.40	1.29
Anaheim Way to Gene Autry Way	36.0	36.5	44	0.014*	0.13	0.62	0.004	0.38	1.21
Gene Autry Way to Harbor Blvd	36.5	37.0	32	0.000	0.14	0.43	0.004	0.42	1.34
Harbor Blvd to Ball Rd	37.0	37.5	50	0.000	0.22	0.67	0.004	0.40	1.27
Ball Rd to Disneyland/Ball Rd	37.5	38.0	43	0.000	0.14	0.56	0.004	0.40	1.29
Disneyland/Ball Rd to Lincoln Ave	38.0	38.5	26	0.000	0.08	0.34	0.004	0.39	1.25
Lincoln Ave to Euclid St	38.5	39.0	28	0.027*	0.15	0.37	0.004	0.42	1.34
Euclid St to Euclid St	39.0	39.5	43	0.027*	0.16	0.57	0.004	0.40	1.27

Table 1.4: Traffic Collision Data (January 2017 to December 2019)

Location Description	From Post Mile	To Post Mile	Total Collision	Collision Rates					
				Actual			Statewide Average		
				FAT	F+I	TOT	FAT	F+I	TOT
Euclid St to Brookhurst St	39.5	40.0	20	0.000	0.09	0.27	0.004	0.40	1.28
Brookhurst St to La Palma Ave	40.0	40.5	26	0.027*	0.15	0.35	0.004	0.42	1.34
La Palma Ave to La Palma/SB Brookhurst	40.5	41.0	45	0.000	0.24	0.62	0.004	0.39	1.26
La Palma/SB Brookhurst to SR-91	41.0	41.5	35	0.000	0.20	0.50	0.004	0.41	1.33
SR-91 to EB SR-91/Magnolia	41.5	41.8	39	0.000	0.13	0.81	0.004	0.41	1.33
Orangethorpe Ave to Stanton/Manchester	42.5	43.0	24	0.000	0.11	0.45	0.004	0.36	1.14
Stanton/Manchester to Manchester/Beach Blvd	43.0	43.5	73	0.000	0.44*	1.40*	0.005	0.37	1.15
Manchester/Beach Blvd to Artesia/Manchester	43.5	44.0	69	0.000	0.39*	1.42*	0.007	0.45	1.36
Artesia/Manchester to Los Angeles County Line	44.0	44.4	71	0.000	0.45*	1.89*	0.007	0.45	1.37
Southbound									
Newport Ave to First St	30.0	30.5	99	0.000	0.42	1.21	0.004	0.43	1.37
First St to Fourth St	30.5	31.0	220	0.000	0.64*	2.32*	0.004	0.44	1.42
Fourth St to Grand Ave	31.0	31.5	184	0.000	0.66*	1.72*	0.004	0.45	1.46
Grand Ave to Penn Way	31.5	32.0	65	0.000	0.17	0.60	0.004	0.46	1.47
Penn Way to Main St	32.0	32.5	68	0.009	0.23	0.61	0.004	0.46	1.47
Main St to Main/Santa Clara	32.5	33.0	53	0.000	0.17	0.53	0.004	0.45	1.44
Main/Santa Clara to Main/Broadway	33.0	33.5	107	0.000	0.32	0.32	0.004	0.43	1.38
Main/Broadway to Main/Broadway	33.5	34.0	62	0.000	0.23	0.61	0.004	0.41	1.30
Main/Broadway to Chapman Ave	34.0	34.5	88	0.000	0.31	1.08	0.004	0.43	1.39
Chapman Ave to State College	34.5	35.0	119	0.013*	0.57*	1.53*	0.004	0.42	1.35
State College to Gene Autry Way	35.0	35.5	63	0.000	0.38	0.89	0.005	0.41	1.28
Gene Autry Way to Katella/Manchester	35.5	36.0	41	0.000	0.20	0.60	0.004	0.40	1.29

Table 1.4: Traffic Collision Data (January 2017 to December 2019)

Location Description	From Post Mile	To Post Mile	Total Collision	Collision Rates					
				Actual			Statewide Average		
				FAT	F+I	TOT	FAT	F+I	TOT
On From Katella/Manchester to Katella/Manchester	36.0	36.5	34	0.000	0.11	0.48	0.004	0.38	1.21
Katella/Manchester to Harbor Blvd	36.5	37.0	39	0.000	0.14	0.53	0.004	0.42	1.34
On From Harbor Blvd to Harbor Blvd	37.0	37.5	30	0.000	0.05	0.40	0.004	0.40	1.27
Harbor Blvd to Disneyland Dr	37.5	38.0	38	0.000	0.10	0.49	0.004	0.40	1.29
Disneyland Dr to Lincoln Ave	38.0	38.5	43	0.000	0.18	0.56	0.004	0.39	1.25
Lincoln Ave to Euclid St	38.5	39.0	81	0.000	0.31	1.08	0.004	0.42	1.34

Source: Caltrans TASAS

Notes: Values marked with a (*) indicates that the accident rate is higher than statewide averages.

FAT = Fatalities; F+I = Fatal + Injury ; TOT = Total ; Ave = Avenue; Blvd = Boulevard; Dr = Drive; EB = Eastbound; NB = Northbound; Rd = Road; SB = Southbound; St = Street; SR = State Route; WB = Westbound

Table 1.5: Collision Type (January 2017 to December 2019)

Location Description	From Post Mile	To Post Mile	Head On	Sideswipe	Rear End	Broadside	Hit Object	Overturn	Auto/Peds	Other	Not Stated
Northbound											
South of SR-55 to North of SR-55	30.0	30.5	1%	19%	75%	0%	4%	0%	0%	0%	0%
SR-55 to Fourth St	30.5	31.0	1%	29%	60%	2%	6%	1%	0%	1%	0%
Fourth St to Grand Ave	31.0	31.5	0%	23%	65%	3%	6%	2%	1%	0%	0%
Off-ramp to Grand Ave to On-ramp from Grand Ave	31.5	32.0	0%	26%	64%	2%	5%	4%	0%	0%	0%
On-ramp from Grand Ave to 17 th St	32.0	32.5	0%	18%	79%	0%	3%	0%	0%	0%	0%
17 th St to Main St	32.5	33.0	0%	18%	77%	0%	5%	0%	0%	0%	0%
Main St to WB SR-22/La Veta Ave/Bronson St	33.0	33.5	0%	19%	74%	1%	6%	1%	0%	0%	0%
WB SR-22/La Veta/Bronson St to SR 57	33.5	34.0	1%	33%	57%	1%	7%	0%	0%	0%	0%
SR-57 to Chapman Ave	34.0	34.5	0%	29%	43%	0%	24%	2%	0%	2%	0%
Chapman Ave to State College/The City Dr	34.5	35.0	1%	39%	42%	0%	17%	0%	0%	0%	0%
State College/The City Dr to Gene Autry/Disney Way	35.0	35.5	0%	27%	36%	0%	32%	0%	0%	5%	0%
Gene Autry/Disney Way to Anaheim Way	35.5	36.0	0%	21%	60%	0%	12%	2%	0%	5%	0%
Anaheim Way to Gene Autry Way	36.0	36.5	0%	18%	66%	0%	11%	2%	0%	2%	0%
Gene Autry Way to Harbor Blvd	36.5	37.0	0%	34%	56%	0%	9%	0%	0%	0%	0%
Harbor Blvd to Ball Rd	37.0	37.5	0%	24%	60%	4%	12%	0%	0%	0%	0%
Ball Rd to Disneyland/Ball Rd	37.5	38.0	0%	21%	65%	0%	9%	0%	0%	5%	0%
Disneyland/Ball Rd to Lincoln Ave	38.0	38.5	0%	35%	38%	4%	19%	4%	0%	0%	0%
Lincoln Ave to Euclid St	38.5	39.0	0%	25%	43%	0%	21%	0%	7%	4%	0%
Euclid St to Euclid St	39.0	39.5	0%	26%	47%	2%	16%	5%	5%	0%	0%
Euclid St to Brookhurst St	39.5	40.0	0%	20%	40%	5%	20%	10%	5%	0%	0%
Brookhurst St to La Palma Ave	40.0	40.5	0%	38%	35%	0%	27%	0%	0%	0%	0%

Table 1.5: Collision Type (January 2017 to December 2019)

Location Description	From Post Mile	To Post Mile	Head On	Sideswipe	Rear End	Broadside	Hit Object	Overturn	Auto/Peds	Other	Not Stated
La Palma Ave to Palma/SB Brookhurst	40.5	41.0	5%	32%	45%	2%	16%	0%	0%	0%	0%
La Palma/SB Brookhurst to SR-91	41.0	41.5	0%	9%	74%	3%	9%	6%	0%	0%	0%
SR-91 to EB SR-91/Magnolia	41.5	41.8	0%	59%	38%	0%	3%	0%	0%	0%	0%
EB SR-91/Magnolia to WB SR-91 HOV	41.8	42.0R	0%	25%	25%	8%	42%	0%	0%	0%	0%
WB SR-91 HOV to Orangethorpe Ave	42.0	42.5R	0%	25%	10%	10%	50%	5%	0%	0%	0%
Orangethorpe Ave to Manchester/Beach Blvd	42.5	43.0	0%	54%	25%	0%	17%	4%	0%	0%	0%
Southbound											
Newport Ave to First St	30.0	30.5	0%	25%	55%	2%	16%	2%	0%	0%	0%
First St to Fourth St	30.5	31	0%	29%	65%	1%	5%	0%	0%	0%	0%
Fourth St to Grand Ave	31.0	31.5	0%	21%	72%	1%	5%	1%	0%	1%	0%
Grand Ave to Penn Way	31.5	32	0%	18%	77%	0%	3%	2%	0%	0%	0%
Penn Way to Main St	32.0	32.5	1%	24%	63%	3%	7%	1%	0%	0%	0%
Main St to Main/Santa Clara	32.5	33	0%	34%	55%	2%	9%	0%	0%	0%	0%
Main St/Santa Clara to Main/Broadway	33.0	33.5	1%	16%	77%	1%	6%	0%	0%	0%	0%
Main St/Broadway to Main St/Broadway	33.5	34	0%	29%	58%	0%	11%	0%	0%	2%	0%
Main St/Broadway to Chapman Ave	34.0	34.5	0%	30%	53%	0%	13%	2%	1%	1%	0%
Chapman Ave to State College	34.5	35	0%	27%	60%	3%	10%	1%	0%	0%	0%
State College to Gene Autry Way	35.0	35.5	0%	30%	63%	2%	2%	3%	0%	0%	0%
Gene Autry Way to Katella/Manchester	35.5	36.0	0%	22%	73%	0%	0%	2%	0%	2%	0%
On-ramp from Katella to Katella/Manchester	36.0	36.5	0%	29%	50%	3%	15%	3%	0%	0%	0%
Katella/Manchester to Harbor Blvd	36.5	37.0	0%	46%	33%	3%	18%	0%	0%	0%	0%
On-ramp from Harbor Blvd to Harbor Blvd	37.0	37.5	0%	37%	57%	0%	7%	0%	0%	0%	0%
Harbor Blvd to Disneyland Dr	37.5	38.0	0%	24%	63%	5%	5%	3%	0%	0%	0%
Disneyland Dr to Lincoln Ave	38.0	38.5	0%	23%	58%	5%	14%	0%	0%	0%	0%

Table 1.5: Collision Type (January 2017 to December 2019)

Location Description	From Post Mile	To Post Mile	Head On	Sideswipe	Rear End	Broadside	Hit Object	Overturn	Auto/Peds	Other	Not Stated
Lincoln Ave to Euclid St	38.5	39.0	0%	26%	67%	1%	6%	0%	0%	0%	0%
On-ramp from Euclid St to Off-ramp to Euclid St	39.0	39.5	0%	25%	63%	0%	13%	0%	0%	0%	0%
Euclid St to Brookhurst St	39.5	40.0	0%	18%	73%	0%	8%	1%	0%	0%	0%
On-ramp from Brookhurst St to Brookhurst St	40.0	40.5	0%	30%	56%	4%	4%	7%	0%	0%	0%
Brookhurst St to On-ramp from Magnolia Ave	40.5	41.0	0%	15%	68%	5%	10%	2%	0%	0%	0%
On-ramp from Magnolia Ave to Magnolia Ave	41.0	41.5	0%	24%	54%	0%	20%	2%	0%	0%	0%
Magnolia Ave to On-ramp from EB HOV SR-91	41.5	42.5	0%	35%	39%	1%	23%	0%	1%	0%	0%
SR-91 to Beach Blvd	42.5	43.0	7%	48%	30%	0%	15%	0%	0%	0%	0%

Source: Caltrans TASAS

Notes: Auto = Automobile; Peds = Pedestrians; Ave = Avenue; Blvd = Boulevard; Dr = Drive; EB = Eastbound; HOV = High-Occupancy Vehicle; Rd = Road; SB = Southbound; St = Street; SR = State Route; WB = Westbound

**Table 1.6: Collision Type (January 2017 to December 2019)
(Freeway-to-Freeway Ramp and Freeway-to-Arterial Ramp Interchanges)**

Location Description	Post Mile	On/Off-Ramp	Total Collisions	Collision Rates					
				Actual			Statewide Average		
				FAT	F+I	TOT	FAT	F+I	TOT
Northbound									
NB On from Red Hill Ave	29.228	On-Ramp	9	0.000	0.35*	0.79*	0.002	0.23	0.63
NB On from Newport Ave	29.728	On-Ramp	5	0.000	0.15	0.38	0.002	0.23	0.63
NB Off-Ramp to SR-55/ Fourth St	30.185	Off-Ramp	9	0.000	0.03	0.24	0.002	0.10	0.31
Seg NB Off-Ramp to Fourth Street	30.186	Off-Ramp	1	0.000	0.91*	0.91*	0.004	0.15	0.45
NB Off-Ramp to SB SR- 55	30.323	Off-Ramp	10	0.041*	0.08	0.41	0.006	0.35	1.15
NB Off-Ramp to First/Fourth St	30.927	Off-Ramp	3	0.000	0.00	0.20	0.002	0.10	0.31
Seg NB Off-Ramp to Fourth St	31.023	Off-Ramp	2	0.000	0.91*	1.83*	0.003	0.38	1.04
Seg NB Off-Ramp to First St	31.024	Off-Ramp	4	0.000	2.74*	3.65*	0.006	0.41	1.26
NB On-Ramp from Fourth St	31.194	On-Ramp	3	0.000	0.00	0.22	0.002	0.23	0.63
NB On-Ramp HOV Connector from NB SR-55	31.310	On-Ramp	5	0.059*	0.12	0.29	0.004	0.17	0.55
NB HOV Off-Ramp to Grand Ave	31.571	Off-Ramp	2	0.000	0.45*	0.91	0.003	0.38	1.04
NB Off-Ramp to Grand Ave	31.627	Off-Ramp	3	0.000	0.00	0.38	0.003	0.38	2.04
NB On-Ramp from Grand Ave	31.775	On-Ramp	10	0.000	0.21	0.70	0.002	0.26	0.76
NB Off-Ramp to 17 th St	32.276	Off-Ramp	3	0.000	0.00	0.39	0.007	0.42	1.37
NB On-Ramp from EB 17 th St	32.502	On-Ramp	0	0.000	0.00	0.00	0.002	0.23	0.77
NB On-Ramp from WB 17 th St	32.556	On-Ramp	1	0.000	0.18	0.18	0.004	0.23	0.70
NB Off-Ramp to NB Main/Broadway	32.952	Off-Ramp	1	0.000	0.00	0.91	0.002	0.10	0.31
Seg NB Off-Ramp to NB Main St	33.047	Off-Ramp	2	0.000	0.17	0.35	0.006	0.31	0.90
Seg NB Off-Ramp to NB Broadway	33.048	Off-Ramp	1	0.000	0.19	0.19	0.006	0.31	0.90
NB On-Ramp from Main/Santa Clara	33.210	On-Ramp	11	0.000	0.22*	0.60*	0.002	0.18	0.57
NB HOV On-Ramp from Main/Edgewood	33.307	On-Ramp	2	0.000	0.39*	0.78*	0.002	0.18	0.57

**Table 1.6: Collision Type (January 2017 to December 2019)
(Freeway-to-Freeway Ramp and Freeway-to-Arterial Ramp Interchanges)**

Location Description	Post Mile	On/Off-Ramp	Total Collisions	Collision Rates					
				Actual			Statewide Average		
				FAT	F+I	TOT	FAT	F+I	TOT
NB Off-Ramp to WB SR-22/La Veta Ave/Bronson St	33.680	Off-Ramp	24	0.000	0.12	0.73*	0.005	0.17	0.51
Seg NB Off-Ramp La Veta Ave/Bristol	33.681	Off-Ramp	1	0.000	0.00	0.91*	0.006	0.31	0.90
NB HOV Off-Ramp to NB SR-57	34.112	Off-Ramp	2	0.000	0.13	0.26	0.004	0.15	0.45
NB On-Ramp from WB/EB SR-22	34.386	On-Ramp	2	0.000	0.00	0.07	0.004	0.17	0.55
NB Off-Ramp to Chapman Ave	34.817	Off-Ramp	8	0.000	0.48*	0.95	0.003	0.38	1.04
NB Off-Ramp State College/The City Dr	35.023	Off-Ramp	7	0.122*	0.61*	0.86	0.003	0.38	1.04
Seg NB On-Ramp from Chapman Ave	35.173	On-Ramp	2	0.000	0.00	1.83*	0.004	0.23	0.70
Seg NB On-Ramp State College/The City Dr	35.174	On-Ramp	6	0.000	4.56*	5.47*	0.002	0.26	0.76
NB On-Ramp from State College/Chapman	35.399	On-Ramp	2	0.000	0.00	0.14	0.002	0.08	0.30
NB Off-Ramp HOV Gene Autry/Disney Way	35.590	Off-Ramp	0	0.000	0.00	0.00	0.002	0.10	0.31
Seg NB Off-Ramp HOV to Gene Autry Way	35.717	Off-Ramp	0	0.000	0.00	0.00	0.006	0.31	0.90
Seg NB Off-Ramp HOV to Disney Way	35.718	Off-Ramp	4	0.000	2.74*	3.66*	0.005	0.17	0.51
NB Off-Ramp Anaheim/Katella	35.974	Off-Ramp	2	0.000	0.11	0.11	0.002	0.11	0.30
NB On-Ramp from Anaheim Way	36.222	On-Ramp	4	0.000	0.17*	0.68*	0.002	0.15	0.40
NB On-Ramp from Katella Ave	36.491	On-Ramp	2	0.167*	0.33*	0.33	0.002	0.23	0.63
NB On-Ramp HOV from Gene Autry Way	36.516	On-Ramp	0	0.000	0.00	0.00	0.004	0.23	0.70
NB On-Ramp from Anaheim Blvd	36.740	On-Ramp	20	0.000	0.90*	2.24*	0.002	0.23	0.63
NB Off-Ramp to Harbor Blvd	37.280	Off-Ramp	20	0.000	0.34	1.34*	0.003	0.38	1.04
NB On-Ramp from Harbor Blvd	37.397	On-Ramp	6	0.000	0.25	0.75	0.002	0.26	0.76
NB On-Ramp from WB Ball Rd	37.682	On-Ramp	5	0.000	0.27*	0.68	0.004	0.23	0.70
Seg NB/SB On-Ramp from Disneyland	37.993	On-Ramp	12	0.000	0.19*	1.14*	0.002	0.08	0.30

**Table 1.6: Collision Type (January 2017 to December 2019)
(Freeway-to-Freeway Ramp and Freeway-to-Arterial Ramp Interchanges)**

Location Description	Post Mile	On/Off-Ramp	Total Collisions	Collision Rates					
				Actual			Statewide Average		
				FAT	F+I	TOT	FAT	F+I	TOT
NB On-Ramp from Disneyland/Ball Rd	38.256	On-Ramp	12	0.000	0.26*	1.03*	0.004	0.17	0.55
NB Off-Ramp to Lincoln Ave	38.690	Off-Ramp	4	0.000	0.10	0.41	0.003	0.38	1.04
NB On-Ramp from Lincoln Ave	38.857	On-Ramp	2	0.000	0.00	0.34	0.002	0.26	0.76
NB Off-Ramp to Euclid St	39.307	Off-Ramp	14	0.000	0.41*	0.95	0.003	0.38	1.04
NB On-Ramp from Euclid St	39.688	On-Ramp	8	0.000	0.41*	0.82*	0.002	0.23	0.63
NB Off-Ramp to Brookhurst St	40.357	Off-Ramp	13	0.000	0.31	0.80	0.003	0.38	1.04
NB Off-Ramp to EB La Palma Ave	40.556	Off-Ramp	3	0.000	1.38*	2.06*	0.003	0.38	1.04
NB On-Ramp from EB La Palma/NB Brookhurst	40.716	On-Ramp	7	0.000	0.23	0.81*	0.002	0.23	0.77
NB On-Ramp from WB La Palma/SB Brookhurst	41.011	On-Ramp	4	0.000	0.28*	1.12*	0.004	0.23	0.70
NB Off-Ramp to WB SR-91	41.705	Off-Ramp	17	0.000	0.06	0.27	0.005	0.17	0.51
NB Off-Ramp to EB SR-91/Magnolia	41.848	Off-Ramp	22	0.000	0.35	1.94*	0.007	0.42	1.37
NB Off-Ramp HOV to WB SR-91 HOV	42.037	Off-Ramp	0	0.000	0.00	0.00	0.005	0.17	0.51
NB On-Ramp from WB SR-91 HOV	42.415	On-Ramp	0	0.000	0.00	0.00	0.005	0.15	0.46
NB On-Ramp from Orangethorpe Ave	42.561	On-Ramp	2	0.000	0.19	0.38	0.004	0.23	0.70
NB Off-Ramp to Auto Ctr/Stanton	42.968	Off-Ramp	7	0.000	0.22	0.52	0.007	0.42	1.37
NB Off-Ramp Auto Ctr/Beach Blvd	43.531	Off-Ramp	14	0.000	0.72*	1.68*	0.007	0.42	1.37
NB On-Ramp from Auto Ctr/Western	43.658	On-Ramp	4	0.000	0.47*	0.62*	0.002	0.18	0.57
NB Off-Ramp to Artesia Blvd	44.089	Off-Ramp	11	0.000	0.36	1.97*	0.003	0.38	1.04
NB On-Ramp from Artesia Blvd	44.209	On-Ramp	0	0.000	0.00	0.00	0.002	0.26	0.76

**Table 1.6: Collision Type (January 2017 to December 2019)
(Freeway-to-Freeway Ramp and Freeway-to-Arterial Ramp Interchanges)**

Location Description	Post Mile	On/Off-Ramp	Total Collisions	Collision Rates					
				Actual			Statewide Average		
				FAT	F+I	TOT	FAT	F+I	TOT
Southbound									
SB Off-Ramp to Red Hill Ave	29.255	OFF RAMP	14	0.000	0.45*	1.26*	0.003	0.38	1.04
Seg SB Off-Ramp I-5/55 to Newport Ave	29.863	OFF RAMP	2	0.000	0.00	0.18	0.002	0.10	0.31
SB On-Ramp From SR-55/4th St	29.864	ON RAMP	11	0.000	0.13	0.48	0.004	0.17	0.55
SB Off-Ramp to Newport Ave	30.261	OFF RAMP	0	0.000	0.00	0.00	0.004	0.15	0.45
SB Off-Ramp to SB SR-55	30.403	OFF RAMP	30	0.000	0.11	0.48*	0.004	0.15	0.45
SB On-Ramp from First St	30.828	ON RAMP	20	0.000	0.57	1.42*	0.002	0.23	0.63
SB Off-Ramp to Fourth St	31.246	OFF RAMP	1	0.000	0.06	0.06	0.00	0.38	1.04
SB Off-Ramp HOV Connector to SB SR-55	31.311	OFF RAMP	5	0.000	0.13	0.33	0.005	0.17	0.51
SB HOV On-Ramp from Grand Ave	31.549	ON RAMP	0	0.000	0.00	0.00	0.002	0.23	0.63
SB On-Ramp from Santa Ana Blvd	31.847	ON RAMP	2	0.000	0.18	0.35	0.002	0.18	0.57
SB Off-Ramp to Santa Ana Blvd	31.985	OFF RAMP	1	0.000	0.00	0.10	0.007	0.42	1.37
SB On-Ramp from Penn Way	32.321	ON RAMP	8	0.000	0.37*	0.99*	0.002	0.18	0.57
SB Off-Ramp to Penn Way	32.490	OFF RAMP	3	0.000	0.13	0.40	0.007	0.42	1.37
SB On-Ramp from Main St	32.868	ON RAMP	4	0.000	0.11	0.46	0.002	0.18	0.57
Seg SB Off-Ramp SB Main/St Cl	33.207	OFF RAMP	2	0.000	0.00	0.28	0.006	0.31	0.90
SB On-Ramp from EB SR-22	33.225	ON RAMP	4	0.000	0.06	0.06	0.002	0.08	0.30
SB Off-Ramp HOV to Main St/Edgewood	33.312	OFF RAMP	7	0.000	0.56*	3.91*	0.007	0.42	1.37
Seg SB Off-Ramp to SB Broadway	33.328	OFF RAMP	10	0.093*	0.28	0.93*	0.006	0.31	0.90
Seg SB/NB Off-Ramp at La Veta/Bristol	33.682	OFF RAMP	5	0.000	0.91*	4.56*	0.002	0.10	0.31
Seg SB Off-Ramp at Main St/Broadway	33.760	OFF RAMP	23	0.000	9.12*	20.99*	0.002	0.12	0.37
SB On-Ramp from SR-22	33.789	ON RAMP	0	0.000	0.00	0.00	0.005	0.15	0.46

**Table 1.6: Collision Type (January 2017 to December 2019)
(Freeway-to-Freeway Ramp and Freeway-to-Arterial Ramp Interchanges)**

Location Description	Post Mile	On/Off-Ramp	Total Collisions	Collision Rates					
				Actual			Statewide Average		
				FAT	F+I	TOT	FAT	F+I	TOT
Seg SB On-Ramp from Bristol St	33.986	ON RAMP	0	0.000	0.00	0.00	0.002	0.23	0.63
SB Off-Ramp to Main St/Broadway	34.162	OFF RAMP	11	0.123*	0.74*	1.36*	0.002	0.12	0.37
Seg SB Off-Ramp at La Veta/Bristol	34.297	OFF RAMP	0	0.000	0.00	0.00	0.004	0.15	0.45
Seg SB Off-Ramp to EB SR-22	34.298	OFF RAMP	8	0.000	0.91*	7.30*	0.005	0.17	0.51
SB Off-Ramp EB SR-22/La Veta/Bristol	34.394	OFF RAMP	6	0.000	0.19*	0.28	0.002	0.10	0.31
SB Off-Ramp to WB SR-22	34.487	OFF RAMP	5	0.000	0.17*	0.28	0.004	0.15	0.45
SB On-Ramp from Chapman Ave	34.887	ON RAMP	15	0.000	0.87*	1.31*	0.002	0.23	0.63
SB On-Ramp from SB State College	35.264	ON RAMP	1	0.000	0.26*	0.26	0.002	0.23	0.77
SB On-Ramp from Orangwood/Manchester	35.379	ON RAMP	1	0.000	0.00	0.16	0.002	0.15	0.40
SB On-Ramp HOV from Gene Autry Way	35.542	ON RAMP	0	0.000	0.00	0.00	0.002	0.23	0.63
SB Off-Ramp at State College/The City Dr	35.684	OFF RAMP	38	0.000	2.94*	4.14*	0.003	0.38	1.04
SB On-Ramp from Katella/Manchester	36.088	ON RAMP	6	0.000	0.11	0.66*	0.002	0.15	0.40
SB Off-Ramp HOV to Gene Autry Way	36.171	OFF RAMP	0	0.000	0.00	0.00	0.003	0.38	1.04
SB On-Ramp at Disney Way/Anaheim Blvd	36.347	ON RAMP	5	0.000	0.36*	0.60	0.002	0.23	0.63
Seg SB Off-Ramp to Katella Ave	36.385	OFF RAMP	4	0.000	0.00	0.67	0.006	0.41	1.26
Seg SB Off-Ramp to Manchester	36.386	OFF RAMP	2	0.000	0.00	1.83*	0.002	0.11	0.30
SB Off-Ramp at Katella/Manchester	36.556	OFF RAMP	0	0.000	0.00	0.00	0.002	0.10	0.31
SB Off-Ramp to Disney Way	36.772	OFF RAMP	2	0.000	0.15	0.29	0.007	0.42	1.37
SB On-Ramp from Harbor Blvd	37.396	ON RAMP	9	0.000	0.33*	0.74	0.002	0.26	0.76
SB Off-Ramp to Harbor Blvd	37.530	OFF RAMP	8	0.000	0.53*	0.84	0.003	0.38	1.04
SB On-Ramp from Disneyland Dr/Ball Rd	37.929	ON RAMP	8	0.000	0.11	0.86*	0.005	0.15	0.46
Seg SB Off-Ramp to Disneyland Dr	38.039	OFF RAMP	5	0.000	0.08	0.41*	0.002	0.10	0.31

**Table 1.6: Collision Type (January 2017 to December 2019)
(Freeway-to-Freeway Ramp and Freeway-to-Arterial Ramp Interchanges)**

Location Description	Post Mile	On/Off-Ramp	Total Collisions	Collision Rates					
				Actual			Statewide Average		
				FAT	F+I	TOT	FAT	F+I	TOT
SB Off-Ramp to Disneyland Dr/Manchester	38.305	OFF RAMP	4	0.000	0.17*	0.34	0.004	0.15	0.45
SB HOV Off-Ramp to Disneyland Dr	38.409	OFF RAMP	2	0.000	0.00	0.70*	0.005	0.17	0.51
SB On-Ramp from Lincoln Ave	38.986	ON RAMP	8	0.000	0.40*	0.80*	0.002	0.18	0.57
SB On-Ramp from Euclid St	39.226	ON RAMP	11	0.000	0.47*	0.86*	0.002	0.23	0.63
SB Off-Ramp to Lincoln/Manchester	39.433	OFF RAMP	3	0.000	0.19	0.56	0.003	0.38	1.04
SB Off-Ramp to Euclid St	39.830	OFF RAMP	13	0.000	0.82*	1.52*	0.003	0.38	1.04
SB On-Ramp from Brookhurst St	40.480	ON RAMP	13	0.000	0.10	0.62	0.002	0.23	0.63
SB Off-Ramp to Brookhurst St	40.908	OFF RAMP	14	0.000	0.53*	1.49*	0.003	0.38	1.04
SB On-Ramp from Magnolia Ave	41.745	ON RAMP	22	0.000	0.34*	1.85*	0.002	0.23	0.63
SB On-Ramp from EB SR-91	41.964	ON RAMP	4	0.000	0.00	0.12	0.005	0.15	0.46
Seg SB Off-Ramp to Magnolia Ave	41.979	OFF RAMP	11	0.000	1.82*	10.04*	0.003	0.38	1.04
SB Off-Ramp to Magnolia Ave	42.169	OFF RAMP	5	0.000	0.23*	1.17*	0.004	0.23	0.70
SB Off HOV to EB SR- 91	42.436	OFF RAMP	1	0.000	0.12	0.12	0.005	0.17	0.51
SB Off-Ramp to EB SR-91	42.671	OFF RAMP	11	0.000	0.10	0.36	0.005	0.17	0.51
SB On-Ramp from Beach Blvd	43.280	ON RAMP	5	0.000	0.22	1.12*	0.002	0.23	0.63
SB Off-Ramp to Beach Blvd	43.642	OFF RAMP	4	0.000	0.14	0.56	0.003	0.38	1.04
SB On-Ramp from Artesia Blvd	44.157	ON RAMP	4	0.000	0.16	0.63	0.002	0.23	0.63

Source: Caltrans TASAS

Notes: (*) symbol indicates that the collision rate is higher than statewide average

FAT = Fatalities; F+I = Fatal + Injury; TOT = Total; Ave = Avenue; Blvd = Boulevard; Dr = Drive; EB = Eastbound; NB = Northbound; Rd = Road; SB = Southbound; St = Street; SR = State Route; WB = Westbound

Based on a review of the detailed collision data, most of the collisions occur on the ramp or at the ramp exit area. The ramp exit area is located near or at the ramp terminus intersection for off-ramps and near or at the gore of the merger area for on-ramps. The predominant collision type is rear-ends, and the most common contributing factor is speeding. These are considered congestion-related collisions that occur due to vehicular queuing because of slowing down and stop-and-go traffic flow conditions.

1.2.2.2. Roadway Deficiencies

The I-5 corridor within the Project limits currently serves a low of 66,000 average daily traffic (ADT) south of the I-5/SR-91 interchange and a high of 140,000 ADT south of the I-5/SR-22 interchange in the GP lanes in the northbound direction under existing conditions. The I-5 corridor within the Project limits serves a low of 71,000 ADT south of the I-5/SR-91 interchange and a high of 154,000 ADT north of the I-5/SR-55 interchange in the GP lanes in the southbound direction. In the I-5 HOV lanes within the Project limits, the northbound direction carries a low of 11,000 ADT north of SR-91 and a high of 36,000 ADT south of SR-22, while the southbound carries a low of 11,000 ADT south of SR-91 and a high of 42,000 ADT north of SR-55.

In 2035, the corridor within the proposed Project limits is forecast to carry 200,000 to 350,000 ADT in GP lanes and 12,000 to 52,000 ADT in both northbound and southbound directions along the ELs. There is approximately 4 to 10 percent truck volume in the corridor. The directional split is projected to be 40 percent northbound and 60 percent southbound in the a.m. peak hour, and 60 percent northbound and 40 percent southbound in the p.m. peak hour in 2035. By 2055, daily traffic will increase to 210,000 to 362,000 and 19,000 to 63,000 in the GP lanes and ELs, respectively. The truck percentage is assumed to remain about the same in 2055. The directional split is projected to be 40 percent northbound and 60 percent southbound in the a.m. peak hour, and 63 percent northbound and 37percent southbound in the p.m. peak hour in 2055.

Under existing conditions, recurring congestion on I-5 occurs at multiple freeway bottlenecks. In the southbound direction, bottlenecks regularly occur on GP lanes during the a.m. peak period at the I-5/SR-55 interchange, at Main Street near the I-5/SR-57 interchange, and at Euclid Street. The southbound HOV lanes have similar bottlenecks in the same locations.

Under existing conditions in the northbound direction, additional bottlenecks are distributed throughout the southern portion of the corridor during the p.m. peak period, with regularly occurring GP lane and HOV bottlenecks in the city of Anaheim approaching Harbor Boulevard. Another regularly occurring bottleneck occurs at the northern end of the corridor in Orange County, where GP lanes and HOV lanes queue behind a bottleneck at the Orange/Los Angeles County line, where I-5 has historically had fewer GP lanes and no HOV lanes. The addition of GP and HOV lanes to I-5 within southern Los Angeles County as part of the Caltrans District 7 I-5 South Corridor Freeway Widening Project (EA 07-2159U4), currently under construction, may shift this bottleneck further to the north.

Average travel speed in the northbound direction currently falls below 50 miles per hour (mph) in the p.m. peak period in both the GP and HOV lanes under existing conditions. In the southbound direction, in both the GP and HOV lanes, the average speed falls below 40 mph during the a.m. peak period under existing conditions.

The improvements proposed under the Build Alternatives are needed to address the identified problems and deficiencies along the I-5 corridor within the MLs. The proposed improvements would improve capacity of the MLs that allows for more flexibility in traffic movement and higher efficiencies, enabling the corridor to maximize productivity and travel reliability.

Regional VMT from the OCTA Travel Demand Forecast Model (OCTAM) shows that the average vehicle miles traveled (VMT) in 2016 (base model year) was 388,701,701 and is projected to be 460,449,975 in 2045 without the Build Alternatives, which is an increase of 18.46 percent. The increased demand on the already congested freeway and HOV lane would lead to further congestion and delay experienced by motorists.

1.2.2.3. Air Quality Improvements

The proposed project improvements on I-5 freeway mainline include MLs and improving ramps. These improvements would contribute to emissions reductions during operation of the Build Alternatives because they are projected to improve reliability, HOV degradation, as well as operational improvements along the Project corridor. In addition, TSM/TDM features as proposed below that include ramp metering, ITS, and park-and-ride facilities would also reduce emissions.

1.2.2.4. Social Demands and Economic Development

A review of SCAG regionally adopted growth projections in the 2020–2045 RTP/SCS (Connect SoCal) indicates that continuing growth is forecast in the subregion served by I-5 (SCAG 2020). The 2055 projected population levels were forecasted by assuming straight-line population growth beyond 2045 based on the average annual growth rate forecast by SCAG for each city and county. The population of Orange County is expected to increase approximately 12 percent between 2020 to 2055. New housing units would also increase approximately 18 percent between 2016 and 2055.¹ Job opportunities are also projected to increase (on average, approximately 22 percent across all sectors of employment) in the county between 2016 and 2055, outpacing the growth rate and housing availability in the county. These trends indicate that Orange County must improve vital transportation corridors in the county (including I-5) to meet existing and future transportation demands for employees traveling from outside Orange County to work, in addition to population growth occurring within the county.

Additionally, within Los Angeles County, the City of La Mirada’s population is expected to increase by approximately 8 percent between 2016 and 2055. Job opportunities are also projected to increase (on average, approximately 12 percent across all sectors of employment), and households are projected to increase by approximately 14 percent during the same period.² For the City of Santa Fe Springs, between 2016 and 2055, population is expected to increase by approximately 20 percent, job opportunities are projected to increase (on average, approximately 9 percent across all sectors of employment), and households are projected to increase by approximately 29 percent.³

Although employment and population growth are anticipated in Orange County, the General Plan documents for the cities of Tustin, Santa Ana, Orange, Anaheim, Fullerton, Buena Park, and La Mirada account for this anticipated growth in the

¹ Southern California Association of Governments. 2020. Connect SoCal – Table 13: County Forecast Population, Households, and Employment.

² Southern California Association of Governments. 2020. Connect SoCal – Table 14: Jurisdiction-Level Growth Forecast.

³ While the proposed Project limits include the cities of La Mirada and Santa Fe Springs (Los Angeles County) for advanced signage locations, the statistics provided for purposes of this analysis from SCAG’s Connect SoCal 2020–2045 RTP-SCS are only shown for these two cities due to their minimal inclusion within the Project limits, compared to the statistics of Los Angeles County as a whole.

vicinity of the Study Area. Table 1.7, below, showcases the population increases expected for the proposed Project cities within Orange County during the 2016–2055 period.

**Table 1.7 – Population Growth in Proposed Project Limit Cities—
Orange County (2016–2055)⁴**

City	Population (2016)	Population (2055)	Approximate Difference (%)
Los Angeles County			
La Mirada	49,400	53,434	+8%
Santa Fe Springs	17,700	21,600	+20%
Orange County			
Tustin	82,100	96,221	+17%
Santa Ana	340,200	366,962	+8%
Orange	140,900	158,517	+12%
Irvine	261,600	350,493	+29%
Anaheim	356,700	437,524	+22%
Fullerton	141,900	163,955	+15%
Buena Park	83,400	100,614	+20%

Source: *Community Impact Assessment* (May 2023)

1.2.2.5. Modal Interrelationships and System Linkages

I-5 is an integral component of the transportation system in Orange County. I-5 provides a key linkage throughout California, extending from as far south as San Diego to the State of Washington to the north. Locally, I-5 connects Orange County to San Diego County to the south and Los Angeles County to the north.

In addition, I-5 has several interchanges with a number of other freeways, providing access to the countywide and regional freeway systems. The Build Alternatives would enhance mobility in the I-5 corridor, thereby improving mobility in this part of Orange County.

The Union Pacific Railroad (UPRR) crosses I-5 at the UPRR Underpass (Bridge No. 55-0846, PM 38.50/38.66) in Anaheim, just south of the I-5/West Broadway interchange. The Southern California Regional Rail Authority (SCRRA)/Metrolink crosses I-5 at the Lincoln Avenue Underpass (Bridge No. 55-672, PM 32.06/32.07) in Santa Ana, just north of the I-5/SR-55 interchange.

I-5 directly serves the rail transfer yards in Los Angeles County and is a major corridor for goods movement in Southern California via I-405, SR-22, SR-91, and

⁴ The 2055 population projections assume straight-line population growth beyond 2045 based on the average annual growth rate forecast by the Southern California Association of Governments for each city and county.

I-110. Although I-5 does not directly serve the Ports of Los Angeles and Long Beach, I-5 provides a connection to the Ports of Long Beach and Los Angeles via I-710 in Los Angeles County. In addition, I-5 provides a connection with John Wayne Airport (JWA) via SR-55, I-405, SR-133, and Jamboree Road.

Amtrak and Metrolink

As stated above, two major rail lines (UPRR and SCRRA) serve the Study Area and are used by Amtrak and Metrolink, a regional commuter rail service. The two railroad stations within the Study Area are the Anaheim-Regional Transportation Intermodal Center (ARTIC), and the Santa Ana Regional Transportation Center (SARTC). As of May 2022, Amtrak's Pacific Surfliner makes 10 northbound and southbound stops at both ARTIC and SARTC daily. As of April 2022, Metrolink's Orange County Line provides daily service to both ARTIC and SARTC, and Metrolink's Inland Empire-Orange County Line provides daily service to SARTC.

OCTA

Bus service in the Study Area is primarily operated by OCTA and provides access to employment centers, shopping, and recreational areas within Orange County. OCTA operates multiple bus routes within the Study Area jurisdictions. No Orange County Transit Centers are located within the Study Area. The two regional transportation centers where OCTA buses can be accessed within the Study Area are the ARTIC and SARTC.

Anaheim Regional Transportation

The City of Anaheim operates the Anaheim Regional Transportation (ART) system within the Anaheim Resort District and the surrounding areas. ART provides 19 public routes that connect to Knott's Berry Farm in Buena Park; Downtown Anaheim, the Disneyland Resort, the Anaheim Convention Center, Angel Stadium, ARTIC, and the Honda Center in Anaheim; The Outlets in Orange; the Segerstrom Center in Costa Mesa; and Union Station in Los Angeles.

Los Angeles Metro

Metro Express Line 460 connects downtown Los Angeles to the Disneyland Resort in Anaheim via I-110, I-105, and I-5. Both La Mirada and Santa Fe Springs are served by Metro.

The HOV lanes on I-5 are used by private transit companies, taxis, carpools, and vanpools. All the transit and shared ride modes would continue to use I-5 during the construction of the Build Alternatives and in the long term. OCTA would also

continue to identify opportunities to improve transit services in the I-5 corridor as part of its transit planning activities throughout Orange County. The capacity and operational improvements provided by the proposed Build Alternatives would support these transit and shared ride modes in the future.

1.2.2.6. Independent Utility and Logical Termini

Federal regulations (23 Code of Federal Regulations [CFR] 771.111 [f]) require that “independent utility” and “logical termini” be established for a transportation improvement project evaluated under NEPA. The following discusses the specific criteria listed in 23 CFR 771.111(f) and how the Build Alternatives satisfy these criteria in separate analysis:

- a) *Connect logical termini and be of sufficient length to address environmental matters on a broad scope;*
- b) *Have independent utility or independent significance (be usable and require a reasonable expenditure event if no additional transportation improvements in the area are made); and*
- c) *Not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.*

The Project limits for the Build Alternatives were defined based on providing a logical and independent set of improvements. Logical termini are defined as rational end points for transportation improvement and analysis of the potential environmental impacts of a proposed project. A project is defined as having independent utility if it meets the project purpose in the absence of other improvements in the project limits or in other parts of the corridor.

Logical Termini

The Build Alternatives provide logical termini for the proposed improvements to I-5 because it connects to other major transportation facilities (SR-57, SR-91, and SR-39 [Beach Boulevard]), which themselves are destinations for major traffic volumes. The improvements under the Build Alternatives terminate approximately at the Orange/Los Angeles County line to the north and at the I-5/SR-55 interchange to the south.

Independent Utility

The Build Alternatives would have independent utility. The ELs and weaving lanes included in the Build Alternatives would provide benefits to the traveling public without requiring or being dependent on the provision of other improvements on I-5 or other freeways or arterials. Those improvements would benefit travelers as they

enter/exit the freeway or travel in the GP and HOV lanes. The Build Alternatives represent a reasonable expenditure even if no additional transportation improvements are made in the corridor; they can be implemented in the absence of any other improvements; and they do not restrict consideration of alternatives for other reasonably foreseeable transportation improvements in the I-5 corridor and other corridors in the project limits. Because the Build Alternatives meet the proposed Project purpose in the absence of other improvements in the I-5 corridor, the Build Alternatives would have independent utility.

1.3. Project Description

This section describes the proposed action and proposed Project alternatives that were developed to meet the identified purpose and need of the project while avoiding or minimizing environmental impacts and right-of-way acquisitions. The alternatives include Alternative 1 (No Build Alternative), Alternative 2: Modify Existing HOV 2+ Lanes to HOV 3+ Lanes, Alternative 3: Convert Existing HOV Lanes to Express Lanes, and Alternative 4: Convert Existing HOV Lanes to Express Lanes and Construct Additional Express Lanes.

1.3.1. Project Alternatives

The No Build Alternative and the Build Alternatives (Alternative 2, 3, and 4) are evaluated in this environmental document and are described in this section.

The Build Alternatives contain a number of standardized Project Features that are employed on most, if not all, Caltrans projects and were not developed in response to any specific environmental impact resulting from the Build Alternatives. These features are addressed in more detail in the Environmental Consequences sections found in Chapter 2. In addition, for the purposes of consistency, these Project Features are included in the Environmental Commitment Record (Appendix E) and referenced in Chapter 2 of this Environmental Impact Report/Environmental Assessment (EIR/EA), as applicable, as Project Features (PFs) (per title of subsection) and numbered. For example, a Project Feature applicable to water quality would be titled and listed as PF-WQ-1.

1.3.1.1. Alternative 1 – No Build

Alternative 1, the No Build Alternative, does not include improvements to the existing lane configuration for I-5. This alternative assumes the independent implementation of the other projects on the fiscally constrained project list in the adopted SCAG 2020–2045 RTP/SCS and the Preferred Plan in the OCTA 2018 Long

Range Transportation Plan (LRTP) within the proposed Project limits. The No Build Alternative would not address the Project purpose and need identified in Section 1.2 of this EIR/EA. It is expected that HOV degradation and operational deficiencies on I-5 would continue to worsen in the future, as shown in Table 1-2 above. The No Build Alternative serves as a basis of comparison for the Build Alternatives and helps decision-makers compare the impacts.

1.3.1.2. Build Alternatives

Common Features of the Build Alternatives (Alternatives 2, 3, and 4)

Figures depicting the Build Alternatives are located in Appendix K of this EIR/EA. Figure K-1 depicts Alternative 2, Figure K-2 depicts Alternative 3, and Figure K-3 depicts Alternative 4.

Park-and-Ride Facilities

No improvements to the existing park-and-ride facilities are proposed as part of the Build Alternatives. However, the Build Alternatives include two proposed park-and-ride facilities within the existing freeway right-of-way. One location would be located east of the SARTC OCTA Bus Rapid Transit (BRT) Station (future) at the Grand Avenue/Santa Ana Boulevard loop on-ramp in Santa Ana and would have 68 parking spaces. The other location would be located near the Gene Autry Way OCTA BRT Station (future) at Disney Way/South Anaheim Boulevard in Anaheim and would have 172 parking spaces.

Permanent Project Components

The Build Alternatives would involve sign replacement and pavement delineation in order to update HOV lane guidance to meet the latest California Manual on Uniform Traffic Control Devices (CA MUTCD) standards. Additionally, the Build Alternatives would need to meet Caltrans Traffic Operations Policy Directive (TOPD 11-02), including but not limited to minimum weaving distances to/from HOV, minimum ingress/egress opening lengths, etc.)

Drainage and Water Quality

Drainage management measures would be included in the Build Alternatives to address the impacts to drainage patterns associated with new construction. Proposed major drainage design features would include:

- Maintaining existing drainage flow patterns and incorporating existing drainage systems to the maximum extent practicable;
- Providing drainage facilities that would accommodate future improvements; and

- Providing drainage facilities that would prevent and/or reduce substantial erosion or siltation on or off site.

Some of the existing systems may be abandoned or removed to accommodate the construction of the build alternatives. All runoff from elevated structures would be collected and carried to the next treatment device or stabilized discharge location. Best Management Practices (BMPs) would be included to address stormwater requirements and treatment of the added impervious area created by the build alternatives. BMPs considered for the build alternatives include biofiltration swales and design pollution prevention areas (DPPIAs). The build alternatives propose to remove/replace 56 inlets and add 137 inlets. Additionally, there are five pump stations within the proposed Project limits. Improvements associated with the build alternatives are not anticipated to impact the pump stations.

Highway Planting

Existing planting and irrigation systems removed during construction of the build alternatives will be replaced wherever space is available. Planting and irrigation for Alternative 2 would be isolated at the park-and-ride facilities. Generally, existing vegetation in and around the interchange areas would be replanted for Alternatives 3 and 4; however, due to limited space between the freeway improvements and right-of-way, planting replacement will not always be possible along the mainline.

Existing planting, existing impacted/protected trees, clearing and grubbing, and proposed landscaping would be properly integrated into the design of the build alternatives during the final design phase. Mature trees over 12 inches in diameter removed within Caltrans right-of-way would adhere to a replacement tree ratio of 1:1. Planting design would be provided during the final design and would consider safety, maintainability, and aesthetic compatibility with adjacent urban communities and would not deviate significantly from the existing planting theme.

Erosion Control

The build alternatives would be required to comply with the terms and conditions of the *NPDES Statewide Construction General Permit* (SWRCB 2020), which includes a written site-specific Construction Site Monitoring Program (CSMP). The CSMP would include implementation of specific stormwater effluent monitoring requirements to ensure that the implemented BMPs are effective in preventing discharges from exceeding any of the water quality standards.

Transportation Management Plan

Each of the Build Alternatives may be implemented in phases and/or segments and procured under one or more contracts, including the option of using design/build. A Transportation Management Plan (TMP) has been prepared for the Build Alternatives and includes elements such as: Public Information/Public Awareness Campaign; Motorist Information Strategies; Incident Management; Construction Strategies; Demand Management; and Alternate Route Strategies.

1.3.1.3. STANDARD PROJECT FEATURES

Common Features of Alternatives 3 and 4

Ramps

Alternatives 3 and 4 would impact several existing ramps within the proposed Project limits. The affected ramps and the proposed improvements are summarized in Table 1.8, below. In general, some existing ramps would be shifted to accommodate outside widening by Alternatives 3 and 4. Alternatives 3 and 4 are not anticipated to impact system interchanges within the proposed Project limits. Within the proposed Project limits, ramp metering is incorporated into the existing local interchange on-ramps, except at the South Anaheim Boulevard northbound on-ramp. Where ramp improvements affect ramp metering, any ramp metering equipment would be reestablished. Existing ramp meters and equipment would be reused where possible.

For the majority of locations, physical modifications of ramp geometry would not be required where the HOV Direct Connector is converted to an EL Connector; however, replacement of signage and addition of tolling equipment would be required accordingly. The incorporation of weave lanes would require physical modifications of the ramp gore where the HOV Direct Connector is converted to an EL Connector at the following locations:

- Northbound Gene Autry Way off-ramp
- Northbound Disney Way off-ramp
- Southbound Gene Autry Way off-ramp
- Southbound Disneyland Drive off-ramp

Impact to Structures

Alternatives 3 and 4 would not impact existing structures or create new structures (e.g., bridges).

Table 1.8: Anticipated Impacts to On- and Off-Ramps within the Proposed Project Limits—Alternatives 3 and 4

Location		Post Mile (Approx.)
On-Ramps		
1	NB SR 55 to NB I-5 Direct Connector	30.472
2	Grand Ave SB Direct On-Ramp	31.794
3	N Main St SB On-Ramp	32.953
4	SB SR 57 to SB I-5 Direct Connector	34.222
5	Gene Autry Way SB Direct Access On-Ramp	35.949
6	Gene Autry Way NB Direct Access On-Ramp	35.949
7	EB CA-91 to SB I-5 Direct Connector	41.928
8	WB CA-91 to NB I-5 Direct Connector	42.42
9	Auto Center Dr NB On-Ramp	42.928
10	Artesia Blvd SB On-Ramp	44.271
Off-Ramps		
1	Grand Ave NB Direct Off-Ramp	31.532
2	Penn Way SB Off-Ramp	32.521
3	NB I-5 to NB SR 57 Direct Connector	33.433
4	Gene Autry Way NB Direct Off-Ramp	35.466
5	Gene Autry Way SB Direct Off-Ramp	36.309
6	Anaheim Blvd NB Direct Access Off-Ramp	36.072
7	Disneyland Dr SB Direct Off-Ramp	38.439
8	NB I-5 to WB CA-91 Direct Connector	41.909
9	SB I-5 to EB CA-91 Direct Connector	42.545
10	Beach Blvd SB Off-Ramp	43.680
11	Artesia Blvd NB Off-Ramp	43.996

Source: *Draft Project Report (May 2023)*

Notes: Ave = Avenue; Blvd = Boulevard; CA = California; Dr = Drive; EB = Eastbound; I = Interstate; N = North; NB = Northbound; SB = Southbound; SR = State Route; St = Street; WB = Westbound

Alternatives 3 and 4 would impact one existing retaining wall to accommodate widening the mainline to avoid right-of-way acquisition. The affected retaining wall is on the southbound side of I-5, north of East 17th Street, at PM 32.521. The maximum length of the extension of this retaining wall would be 793 feet.

Drainage and Water Quality

The same drainage and water quality features noted for all Build Alternatives apply to Alternatives 3 and 4. In addition, for widened sections of the pavement for Alternatives 3 and 4, the existing edge drains will be replaced and reconnected to the drainage system.

Highway Planting

The same highway planting features noted for all Build Alternatives apply to Alternatives 3 and 4. In addition, existing vegetation in and around the interchange areas would be replanted for Alternatives 3 and 4; however, due to limited space

between the freeway improvements and right-of-way, planting replacement will not always be possible along the mainline.

Right-of-Way Data

Additional right-of-way (e.g., full acquisition, partial acquisition, aerial easements, temporary construction easements) is not anticipated for the construction of Alternatives 3 and 4.

Utility and Other Owner Involvement

Underground and aboveground public utility relocations are not anticipated within the proposed Project limits. Relocation or addition of towers is not anticipated for the existing overhead electrical lines.

No test holes are needed to meet Caltrans’ policy regarding high-priority utilities. The test holes summarized in Table 1.9 are required in order to identify any physical conflicts with the utilities in the proposed Project limits that may be in close proximity to or conflict with proposed improvements as determined from as-built plans and utility company records.

Table 1.9: Anticipated Impacts to Utilities within the Proposed Project Limits—Alternatives 3 and 4

No.	Location	Utility Owner and/or Contact Name	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description (Physical / Policy)	No. of Test Holes
1	N Main St SB On-Ramp	AT&T/ Centurylink	D	Telecom	Physical Conflict	2
2	North of N State College Blvd	Pacbell	D	Telecom	Physical Conflict	2
3	North of N State College Blvd	SCE	D	Electric	Physical Conflict	2
4	N Euclid St NB Off-Ramp	City of Anaheim	W	Water	Physical Conflict	2

Source: *Draft Project Report* (May 2023)

Notes: Blvd = Boulevard; N = North; NB = Northbound; SCE = Southern California Edison; SB = Southbound; St = Street

Coordination with the identified utility companies would be carried out during the design and construction phases.

Nonstandard Design Features (Design Standards Risk Assessment)

The major existing nonstandard design features proposed under Alternatives 3 and 4 are included in Table 1.10.

Sound Walls

Alternatives 3 and 4 would impact one existing sound wall (No. 956L) on the southbound side of I-5, north of East 17th Street, at PM 32.521. The maximum extension of this wall under Alternatives 3 and 4 would be 1,226 feet.

Table 1.10: Design Standards Risk Assessment—Alternatives 3 and 4

No.	Design Standard from Highway Design Manual Tables 82.1A and 82.1B	Probability of Design Exception Approval (None, Low, Medium, High)
1	201.1 (Stopping Sight Distance Standards)*	Medium – High
2	301.1 (Lane Width)*	Medium
3	302.1 (Shoulder Width)*	Medium – High
4	305.1 (Median Width Freeways and Expressways-Urban)**	High
5	305.1(3)(a) (Median Width)*	High
6	309.1(3)(a) (Horizontal Clearances for Highways)*	Medium – High
7	504.7 (Minimum Weave Length)*	High

Source: Draft Project Report (May 2023)

*Boldface

**Underline.

Tolled Components

Alternatives 3 and 4 would require both tolling infrastructure and clearly defined business rules. The following subsections provide a summary of toll policies and business rules outlined for the I-5 corridor within the proposed Project limits.

Toll Infrastructure

The transition zone from the HOV lane to and from the EL would be designed in accordance with the latest Caltrans standards (e.g., striping, pavement markings, signage) to present a clear direction to the approaching traffic of the upcoming ML transition. Ingress/egress (enter/exit) access points are being considered at designated locations, as noted in Table 1.11.

Table 1.11: Ingress/Egress Locations within the Proposed Project Limits

Location		Existing				Alternative 3				Alternative 4			
		Ingress	Egress	Post Mile	Length (feet)	Ingress	Egress	Post Mile	Length (feet)	Ingress	Egress	Post Mile	Length (feet)
Northbound	South of Red Hill Ave					X	X	28.86	5,205	X	X	28.86	5,205
	South of Grand Ave	X	X	31.56	4,934								
	North of E 17 th St						X	32.55	1,000		X	32.55	1,000
	Orangewood Ave					X		35.57	1,000	X		35.57	1,000
	Gene Autry Way	X	X	36.61	1,167								
	Harbor Blvd	X	X	37.21	1,305								
	W Broadway	X	X	38.65	1,232								
	North of Lincoln Ave					X	X	38.97	1,999	X	X	38.97	2,000
	N Brookhurst St	X	X	40.50	1,260								
	North of W La Palma						X	41.00	975		X	41.00	975
South of Beach Blvd	X	X	43.42	4,850		X	43.42	3,050		X	43.42	3,050	
Southbound	North of Newport Ave					X	X	29.92	5,598	X	X	29.92	5,598
	North of Grand Ave	X	X	31.91	1,947								
	South of Main St	X	X	32.91	3,592	X		32.93	1,000	X		32.93	1,000
	SB I-5, South of SR 22	X	X	33.84	1,933								
	North of E Orangewood Ave	X	X	35.74	1,285								
	South of Anaheim Blvd						X	36.53 4	1,021		X	36.53	1,021
	North of Harbor Blvd	X	X	37.53	1,183								
	South of Euclid St	X	X	39.44	1,180	X	X	39.33	2,093	X	X	39.33	2,092
	Brookhurst St					X		40.78	993	X		40.78	993
	W La Palma Ave	X	X	40.94	817								
	South of Beach Blvd	X	X	43.29	5,150								
	North of Western Ave					X	X	43.88	2,000	X	X	43.88	2,000

Source: Draft Project Report (May 2023)

Notes: Ave = Avenue; Blvd = Boulevard; E = East; I- = Interstate; St = Street; W = West

At access points, a weaving lane between the No. 1 EL or the No. 2 EL and the No. 1 GP lane is proposed at ingress/egress locations to provide a dedicated lane for speed adjustments between the high-speed through traffic in the EL and the slower speed of the GP lanes during heavily congested peak periods. The weave lane configuration is the same in both Alternatives 3 and 4. There are five weave lane locations proposed in each direction.

Due to geometric constraints, not all access locations provide ingress and egress weave lanes. In the northbound direction, two locations are ingress/egress, one is ingress only, and two are egress only. In the southbound direction, two locations are ingress/egress, two are ingress only, and one is egress only.

The ELs are anticipated to be buffer-separated from the GP lanes via double white striping. Channelizers⁵ would also be analyzed and considered for implementation throughout the corridor to prevent drivers from illegally weaving in and out of the lanes.

Alternative 3 and 4 would incorporate various toll infrastructure, including toll gantries with transponder readers and high-speed digital cameras to verify transactions, read license plates, and automatically collect tolls from customers as part of an electronic toll collection (ETC) program; signage approaching EL ingress/egress points, including variable message signs indicating the current tolls; complete closed-circuit television coverage of the entire Express Facility to provide security and video surveillance for tolling equipment and to enable quick response to breakdowns and other incidents; power service; and fiber optics linking the electronic infrastructure to a centralized toll operations office. Toll gantries would be placed downstream of all ingress locations, as well as at freeway-to-freeway connector ramps and DARs.

The placement of maintenance vehicle pullouts (MVPs) is being considered at designated locations, as noted in Table 1.12, where there is available right-of-way. MVPs would be provided where there is a need for access to toll gantry and changeable message signs (CMS) features. Where available, California Highway Patrol (CHP) areas would be utilized as an MVP.

⁵ Channelizers are traffic safety products used to alert and direct traffic through roadwork or away from hazardous areas. They are often white plastic molded products lined with reflective sheeting.

Table 1.12: MVP, CMS, and Toll Gantry Locations within the Proposed Project Limits

Existing / Proposed	Post Mile (Approx.)	MVP Type	Southbound (Left)	Northbound (Right)
Proposed	27.309	MVP		X
Proposed	27.358	CMS		X
Proposed	28.142	MVP		X
Existing	28.540	CMS		X
Proposed	30.188	Toll Gantry	X	X
Proposed	30.206	MVP		X
Proposed	31.265	Toll Gantry		X
Proposed	31.612	Toll Gantry	X	X
Existing	31.684	MVP		X
Proposed	32.138	Toll Gantry	X	
Existing	32.199	MVP		X
Existing	32.363	CMS		X
Existing	32.448	CMS	X	
Proposed	32.926	Toll Gantry		X
Existing	33.000	MVP		X
Existing	34.335	MVP		X
Proposed	34.879	Toll Gantry		X
Proposed	34.879	MVP		X
Modified-Existing	35.144	MVP		X
Existing	35.171	CMS		X
Proposed	35.816	Toll Gantry	X	X
Proposed	35.881	Toll Gantry	X	
Existing	35.882	MVP		X
Proposed	35.901	MVP	X	
Proposed	35.996	Toll Gantry		X
Proposed	36.072	MVP		X
Proposed	36.174	Toll Gantry	X	X
Existing	36.185	MVP		X
Existing	36.384	MVP	X	
Proposed	36.403	Toll Gantry		X
Existing	36.402	CMS	X	
Modified-Existing	37.057	MVP		X
Proposed	37.076	Toll Gantry		X
Proposed	37.170	Toll Gantry	X	
Proposed	38.278	Toll Gantry	X	
Modified-Existing	38.382	MVP	X	
Existing	38.705	CMS	X	

Table 1.12: MVP, CMS, and Toll Gantry Locations within the Proposed Project Limits

Existing / Proposed	Post Mile (Approx.)	MVP Type	Southbound (Left)	Northbound (Right)
Existing	38.714	MVP	X	
Proposed	38.742	Toll Gantry	X	
Existing	38.818	MVP		X
Modified-Existing	39.623	MVP		X
Proposed	39.917	Toll Gantry		X
Proposed	39.985	Toll Gantry	X	
Modified-Existing	39.983	MVP		X
Existing	40.037	CMS		X
Existing	40.113	MVP	X	
Proposed	40.816	MVP	X	
Proposed	41.498	MVP		X
Proposed	41.507	Toll Gantry	X	
Proposed	42.019	Toll Gantry	X	X
Proposed	42.417	Toll Gantry	X	X
Proposed	43.801	Toll Gantry	X	
Existing	44.233	CMS	X	
Existing	LA 0.324	MVP	X	
Proposed	LA1.240	MVP	X	
Proposed	LA1.244	CMS	X	
Proposed	ORA R8.0	CMS (SR 55)	X	
Proposed	ORA 11.000L	Toll Gantry (SR 57)	X	X
Proposed	ORA R10.2	Toll Gantry (SR 55)	X	X

Source: *Draft Project Report* (May 2023)

Note: CMS = changeable message sign; MVP = maintenance vehicle pullout

The exact locations would be determined during final design but would be within the proposed Project footprint analyzed in the environmental document.

Existing HOV signs for Alternatives 3 and 4 would either need to be removed or modified as a result of the conversion of the HOV system to an EL system. Additionally, existing signage related to the SR-55, SR-57, and SR-91 EL connections would be modified or replaced to conform to CA MUTCD spacing and design guidelines.

Toll Operations Policies

The ELs would require single occupant vehicles to pay a toll. The objective is to open the tolled ELs with some level of HOV occupancy free to encourage rideshare and transit usage. Operational adjustments to the tolled ELs may be implemented based on demand, rates of speed, traffic volumes, and to meet financial covenants, maintenance, and operational obligations. This would be determined based on the traffic and revenue (T&R) analysis, input from the public, and Caltrans business rules. Caltrans has the authority to set the occupancy policy on the I-5 ELs.

Key Caltrans business rules may include, but are not limited to:

- Toll free travel for vehicles that meet minimum vehicle occupancy requirements, motorcycles, and buses.
- Qualifying carpools would continue to be able to access the lanes without a charge; trucks, other than two-axle light-duty trucks, would not be allowed.
- Toll/transit credits available to frequent EL transit riders.
- Emergency vehicles may use the ELs toll free when responding to incidents.
- Qualifying clean-air vehicles (CAVs) would be given a toll discount.
- Equity Assistance Plan.

Toll Operations and Maintenance

At this time, a process is in place to develop a formal maintenance plan as part of the Caltrans and FHWA systems engineering process. It is anticipated that Caltrans would maintain the physical infrastructure, such as pavement, striping, and median barriers, as well as perform general maintenance, such as trash and graffiti removal, paid for from toll revenues. It is anticipated that Caltrans would also manage the tolling infrastructure, while the customer service centers and other back-office support facilities would be contracted to others. However, final agreements and decisions on such responsibilities will be decided in the future phases of the project.

Toll Revenue/Pricing Structure

Time-of-day pricing and dynamic pricing methods are being analyzed for their application as part of the proposed Project. Toll rates would be set in response to vehicle demand and would be adjusted as necessary to regulate volume in the ELs to maintain traffic flow at a predetermined LOS. The pricing structure and details

would be evaluated further during final design. No tolling amount or pricing decisions have been made at this time.

Toll Collection

The I-5 ELs facility is expected to use an all-electronic toll collection system and would not accept cash or credit card payment on the facility. This would eliminate the need for customers to stop and pay tolls at traditional tollbooths. The ETC system would require customers to have pre-paid accounts with a tolling agency and mount a nonstop automated vehicle identification transponder or toll tag on the windshield of a registered vehicle. Tolls would be collected electronically by reading the transponder at highway speeds.

Toll Enforcement

Toll enforcement is an essential element of any successful EL system, ensuring that traffic laws are enforced, customers are charged the appropriate toll based on vehicle occupancy, and toll evasion is minimized. Toll enforcement would be accomplished through CHP patrols, electronic systems, and facility design. The CHP is anticipated to be contracted to conduct routine and supplemental enforcement services on the I-5 ELs facility, including toll infractions, HOV eligibility occupancy infractions, buffer crossing infractions, speeding, and other moving violations. The ETC system is intended to identify both vehicles that do not have a transponder as well as the declared transponder switch setting. Caltrans would incorporate an infrared occupancy detection system into the EL enforcement. The CHP currently provides enforcement on all of the toll roads in southern California under several different institutional arrangements.

CHP Observation and Enforcement Areas

Currently, there are existing CHP observation and enforcement areas along I-5 within the proposed Project limits. Existing and proposed CHP observation and enforcement areas are identified in Table 1.13.

CHP observation and enforcement areas have been incorporated into Alternatives 3 and 4 along the left shoulder for EL enforcement in efforts to minimize the need for additional mainline widening. Where the observation areas do not meet all of the typical dimensions due to limited space for widening, the minimum length provided would be 700 feet. The CHP observation and enforcement areas are ideally located downstream of the access points to provide opportunities for the CHP to observe the ELs' operation, use, and potential violations.

Table 1.13: CHP Observation and Enforcement Areas within the Proposed Project Limits

Existing / Proposed	CHP Zone Type	Post Mile (Approx.)	Westbound (Left)	Eastbound (Right)	Outside Shoulder	Inside Shoulder/ Median
Proposed	Observation and Enforcement	36.773	X			X
Proposed	Observation and Enforcement	37.159		X		X
Proposed	Observation and Enforcement	39.632	X			X
Proposed	Observation and Enforcement	39.964		X		X

Source: *Draft Project Report* (May 2023)
 CHP = California Highway Patrol

Enforcement plans for the I-5 EL operations would be developed jointly with Caltrans and the CHP and will be included in the final environmental document.

Caltrans would program funds for the Freeway Service Patrol Program (FSP), which Caltrans contracts for tow trucks to patrol the freeways to respond to traffic incidents and improve traffic flow. The program utilizes a fleet of roving tow and service trucks designed to reduce traffic congestion by efficiently getting disabled vehicles running again, or by quickly towing those vehicles off the freeway to a designated safe location. Quickly removing motorists and their disabled vehicles from the freeway reduces the chances of further incidents caused by onlookers and impatient drivers. In addition, FSP helps save fuel and reduce air polluting emissions by reducing stop-and-go traffic. The service is free to motorists and includes changing flat tires, jump-starting cars, refilling radiators and taping leaky hoses, providing up to 1 gallon of fuel, and towing disabled vehicles to designated safe locations off the freeway.

Construction Staging

It is anticipated that Alternatives 3 and 4 would be designed and constructed as separate phases to facilitate project delivery based on available funding. Each construction phase would include construction staging to minimize impacts to existing traffic. The same number of existing mainline lanes would be maintained open to traffic during construction whenever feasible.

Transportation System Management/Transportation Demand Management

Transportation system management (TSM) strategies increase the efficiency of existing facilities; they are actions that increase the number of vehicle trips a facility can carry without increasing the number of through lanes. Examples of TSM strategies include: ramp metering, auxiliary lanes, turning lanes, reversible lanes, and traffic signal coordination. TSM also promotes automobile, public and private transit, ridesharing programs, and bicycle and pedestrian improvements as elements of a unified urban transportation system. Modal alternatives integrate multiple forms of transportation modes, such as pedestrian, bicycle, automobile, rail, and mass transit. Transportation demand management (TDM) focuses on regional means of reducing the number of vehicle trips and vehicle miles traveled as well as increasing vehicle occupancy. It facilitates higher vehicle occupancy or reduces traffic congestion by expanding the traveler's transportation options in terms of travel method, travel time, travel route, travel costs, and the quality and convenience of the travel experience. A typical activity would be providing funds to regional agencies that are actively promoting ridesharing, maintaining rideshare databases, and providing limited rideshare services to employers and individuals. A TSM/TDM alternative is not considered a viable stand-alone option because it does not fulfill the project purpose. A TSM/TDM alternative on its own would:

- Provide minimal enhancement of operations and improvement in trip reliability.
- Not increase mobility significantly.
- Not maximize throughput because no additional through lanes are provided.

TSM and TDM are similar in a number of ways, because they may:

- Lessen the number of trips.
- Lessen peak hour travel.
- Conserve energy.
- Reduce emissions.
- Provide more travel alternatives.

Although TSM and TDM measures alone do not satisfy the purpose and need of the project, the following TSM and TDM measures are beneficial and will be incorporated into the Alternatives 3 and 4 for the proposed project:

TSM Features

- Ramp metering
- Intelligent Transportation Systems
- CHP observation and enforcement areas
- As part of VMT mitigation for Alternative 4, VMT impacts would be mitigated through public transit
- Addition of weaving lanes between the EL facility and GP lanes
 - Weaving lanes will mitigate traffic friction between ELs and GP lanes to help relieve congestion.

TDM Measures

- The EL use would be incentivized for carpool, transit users, electric and clean-emissions vehicles (e.g., discounted, partial, or full subsidized fare).
- Potential excess toll revenue would be allocated to fund projects and programs to reduce VMT, such as:
 - Outreach and education regarding ridesharing, transit travel, and multimodal opportunities;
 - Outreach and education regarding alternative work schedule programs and telecommuting;
 - Construction of two park-and-ride facilities; and
 - Generating sustainable funding to support ongoing operations and promoting transit equity programs.

Alternatives 3 and 4 would facilitate travel for commercial buses and tourist buses to and from tourist destinations within the proposed Project area.

Unique Features of the Build Alternatives (Alternatives 2, 3, and 4)

Alternative 2 – Modify Existing HOV 2+ Lanes to HOV 3+ Lanes

Alternative 2 would maintain the existing lane configurations for I-5 with a modification of the minimum HOV-lane occupancy requirement from two-plus (2+) to three-plus (3+) passengers within the current HOV system in each direction, between Red Hill Avenue and the Orange/Los Angeles County line. As a result of this increase in the occupancy requirement and improved trip reliability, through the TSM/TDM elements, it would promote and encourage public and private transit such as BRT and ridesharing. Under this alternative, no additional roadway improvements would occur.

Construction staging is anticipated for the development of the park-and-ride facilities to minimize impacts to existing traffic. Should Alternative 2 be selected as the Preferred Alternative, detailed stage construction and detour plans (if needed) would be developed during final design. Detailed stage construction plans and traffic handling plans would also be developed in the final design stage.

Alternative 3 – Convert Existing HOV Lanes to Express Lanes

Alternative 3 would convert the existing HOV lane to an EL (one in each direction) between Red Hill Avenue and SR-55; convert two existing HOV lanes to ELs in each direction between SR-55 and SR-57; and convert existing HOV lane to an EL in each direction from SR-57 to the Orange/Los Angeles County line. The typical cross-section consists of 12-foot-wide ELs, a 2- to 4-foot buffer, 12-foot-wide GP lanes, 12-foot-wide auxiliary lanes, a 4- to 26-foot-wide inside shoulder, and a 10-foot-wide outside shoulder, and would be provided to accommodate the EL. One 12-foot weave lane is proposed at locations of ingress or egress.

Alternative 4 – Convert Existing HOV Lanes to Express Lanes and Construct Additional Express Lanes

Alternative 4 would convert the existing HOV lane to an EL in each direction between Red Hill Avenue and SR-55; convert two existing HOV lanes to ELs in each direction between SR-55 and SR-57; convert the existing HOV lane to an EL in each direction from SR-57 to the Orange/Los Angeles County line; and construct an additional EL in each direction between SR-57 and SR-91. The typical cross-section consists of 12-foot-wide ELs, a 2- to 4-foot buffer, 12-foot-wide GP lanes, 12-foot-wide auxiliary lanes, a 4- to 14-foot-wide inside shoulder, and a 10-foot-wide outside shoulder, and would be provided to accommodate the ELs. One 12-foot weave lane is proposed at locations of ingress or egress.

Ramp Improvements

In addition to the affected ramps noted in Table 1.8, Alternative 4 would also impact the following ramps:

- West Lincoln Avenue northbound on-ramp at PM 38.913
- Lincoln Avenue southbound off-ramp at PM 39.471
- North Euclid Street northbound off-ramp at PM 39.263

In addition, Alternative 4 would require physical modifications at the ramp gore where the HOV direct connector is converted to an EL connector at the following locations:

- Southbound SR-57 Connector
- Northbound SR-57 Connector
- Southbound Gene Autry Way on-ramp
- Northbound Gene Autry Way on-ramp

Impact to Structures

As stated above under “Common Features of Alternatives 3 and 4,” Alternative 4 would not impact existing structures or create new structures (e.g., bridges).

In addition to the impacted retaining wall noted under “Common Features of Alternatives 3 and 4,” Alternative 4 would impact existing retaining walls and create new retaining walls at the following locations:

- Along northbound I-5 to the northbound SR-57 direct connector at PM 34.117. This retaining wall would be extended a maximum length of 479 feet.
- Along southbound SR-57 to the southbound I-5 direct connector at PM 34.124. This retaining wall would be extended a maximum length of 446 feet.

Utility and Other Owner Involvement

In addition to the affected utilities noted in Table 1.9, Alternative 4 would also impact the utilities noted in Table 1.14.

Table 1.14: Anticipated Impacts to Utilities within the Proposed Project Limits—Alternative 4

No.	Location	Utility Owner and/or Contact Name	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description (Physical / Policy)	No. of Test Holes
1	North of La Veta Ave	OCSD	W	Sewer	Physical Conflict	0
2	North of La Veta Ave	OCSD	W	Sewer	Physical Conflict	0
3	N Euclid St SB	City of Anaheim	W	Water	Physical Conflict	2
4	N Euclid St SB	Sprint	D	Telecom	Physical Conflict	2
5	North of N Euclid St SB	Sprint	D	Telecom	Physical Conflict	2

Source: *Draft Project Report* (May 2023)

Notes: H* denotes high priority utilities based on Chapter 600 of the Caltrans Encroachment Permits Manual. AT&T = American Telephone and Telegraph Company; Blvd = Boulevard; N = North; NB = Northbound; SB = Southbound; SCE = Southern California Edison; St = Street; N/A = Not Applicable

As stated previously, coordination with the identified utility companies would be carried out during the plans, specifications, and estimates (PS&E) and construction phases.

Nonstandard Design Features (Design Standards Risk Assessment)

In addition to the nonstandard design features noted in Table 1.10, Alternative 4 also proposes nonstandard Design Feature 201.7 (Decision Sight Distance) and Design Feature 504.2(2) (Design of Freeways Entrances and Exits), which have a high and medium probability of design exception approval, respectively.

1.3.2. Project Costs and Funding

It has been determined that the Build Alternatives are eligible for federal-aid funding. Funding is expected to be provided through a combination of funds that, while not yet committed, would likely include the following potential federal and State funding sources:

- State Highway Operation Protection Program (SHOPP)
- State Transportation Improvement Program (STIP)
- Senate Bill (SB) 1: Road Repair and Accountability Act (2017)
- As well as toll revenue backed obligations such as Federal Grant Anticipation Revenue Vehicle (GARVEE) bonds

In addition, the Build Alternatives may seek Transportation Infrastructure Finance and Innovation Act (TIFIA) funding to allow TIFIA loan proceeds to be used to pay a portion of the purchase price for the acquisition of the Build Alternatives and defeat all of the outstanding bond indebtedness incurred in connection with the acquisition, design, construction, and refinancing. TIFIA financing would use nonrecourse toll bonds, secured by toll-revenue proceeds from the Alternatives 3 and 4. Approval of TIFIA credit assistance would enhance the financial capacity to construct the future improvements.

In November 2022, USDOT awarded the proposed Project \$211 million funding from the Multimodal Projects Discretionary Grants (MPDG)—National Infrastructure Project Assistance program (Mega).

In June 2023, the proposed Project obtained \$84 million funding from the State’s Solutions for Congested Corridors Program (SCCP) that was made available as part of SB-1. Table 1.15, below, shows the comparison of cost estimates for each proposed Project alternative.

Table 1.15: Comparison of Estimated Costs by Proposed Project Alternative

Alternatives	Alternative 1 – No-Build	Alternative 2 – Build		Alternative 3 – Build		Alternative 4 – Build	
		Current Cost Estimate	Escalated Cost Estimate	Current Cost Estimate	Escalated Cost Estimate	Current Cost Estimate	Escalated Cost Estimate
Capital Outlay Support	\$0	\$1.0M	\$1.1M	\$97.5M	\$109.8M	\$102.2M	\$115.1M
Capital Outlay Construction	\$0	\$4.6M	\$5.4M	\$215.8M	\$252.6M	\$237.2M	\$277.6M
Capital Outlay Right-of-Way	\$0	\$28K	\$35K	\$28K	\$35K	\$28K	\$35K
Funding Source	N/A	Combination of SHOPP and/or STIP		Combination of SHOPP, STIP, SB-1, and/or federal grant, TIFIA, GARVEE			
Funding Year	N/A	2024/2025		2024/2025		2024/2025	

Source: *Draft Project Report* (May 2023)

GARVEE = Grant Anticipation Revenue Vehicle

SB = Senate Bill

SHOPP = State Highway Operation Protection Program

STIP = State Transportation Improvement Program

TIFIA = Transportation Infrastructure Finance and Innovation Act

1.3.3. Construction Schedule

Construction of the Build Alternatives including temporary advanced signage and short-term lane or ramp closures, which may be required during construction, is expected to begin in 2026 and extend for a duration of approximately 3 years.

A tentative more expedited design/build delivery construction method could begin as early as 2026 with an approximately 3-year duration. However, traditional design/build delivery could be implemented instead; therefore, analysis in this document assumes a conservative 2035 opening year. The majority of the work will be conducted during the day behind k-rails, with some supplemental work to be done at night. While short-term ramp closures are anticipated for the Build Alternatives, full freeway nighttime closures will be minimal (to set k-rails and to place falsework).

The contractor will contact the respective Transportation Management Center (TMC) for Caltrans District 12, and the cities of Irvine, Tustin, Santa Ana, Orange, Anaheim, Fullerton, Buena Park, La Mirada, and Santa Fe Springs regarding events taking place and to coordinate timing for construction activities.

Caltrans is the Project Funding and Lead Agency for the project development, design, and construction administration of this Project. The estimated schedule is subject to

change pending installation and testing of toll equipment. The estimated schedule is based on one contract with full construction funding. The Project is currently planned to be procured using the design/build delivery construction method.

1.4. Comparison of Alternatives

Table 1.16 provides information for comparison of the design variations of the Build Alternatives (Alternatives 2, 3, and 4) and the No Build Alternative. The table summarizes the criteria used to evaluate the Project alternatives, including design features, operational improvements, and environmental impacts. These criteria will be used to inform the selection of a preferred alternative for the proposed Project.

After the public circulation period, all comments will be considered, and Caltrans will select a preferred alternative and make the final determination of the Project's effect on the environment. Under the California Environmental Quality Act (CEQA), Caltrans will certify that the Project complies with CEQA, prepare findings for all significant impacts identified, prepare a Statement of Overriding Considerations for impacts that will not be mitigated below a level of significance, and certify that the findings and Statement of Overriding Considerations have been considered prior to Project approval. Caltrans will then file a Notice of Determination with the State Clearinghouse that will identify whether the Project will have significant impacts, if mitigation measures were included as conditions of Project approval, that findings were made, and that a Statement of Overriding Considerations was adopted. Similarly, if Caltrans, as assigned by the Federal Highway Administration (FHWA), determines the National Environmental Policy Act (NEPA) action does not significantly impact the environment, Caltrans will issue a Finding of No Significant Impact (FONSI). If it is determined that the Project is likely to have a significant effect on the environment, an Environmental Impact Statement (EIS) will be prepared.

1.5. Alternatives Considered but Eliminated from Further Consideration

1.5.1. Project Study Report

Caltrans District 12 has reviewed and discussed the alternatives brought forth from the *Project Study Report* (PSR), approved on November 21, 2019, and the Supplemental PSR, approved on January 14, 2020. Project scoping was conducted from May 9, 2022, to June 8, 2022. Alternatives were considered for further

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
Project Features and Design Standards				
Number of Lanes	1 HOV (2 HOV between SR-55 and SR-57), 4 or 5 general-purpose, and auxiliary lanes provided at some locations.	1 HOV (3+) (2 HOV [3+] between SR-55 and SR-57), 4 or 5 general-purpose, and auxiliary lanes provided at some locations.	1 EL (2 ELs between SR-55 and SR-57), separated by a buffer from the 4 or 5 general-purpose lanes, and auxiliary lanes provided at some locations.	2 ELs (2 ELs between SR-55 and SR-57), separated by a buffer from the 4 or 5 general-purpose lanes, and auxiliary lanes provided at some locations.
Travel Lanes consistent with the Caltrans Highway Design Manual?	No	No	No.	No. Contains additional segments of nonstandard lane widths than Alternative 3.
Shoulders consistent with the Caltrans Highway Design Manual?	No	No (spot locations)	No (spot locations)	No (spot locations)
Horizontal clearances consistent with the Caltrans Highway Design Manual?	No	No	No	No
Number of freeway segments (mainline) operating at unacceptable LOS (E or F) in AM/PM peak hours (out of a total 46 segments for NB and 44 for SB in 2055)	<ul style="list-style-type: none"> • 27/46 NB • 27/44 SB 	<ul style="list-style-type: none"> • 32/46 NB • 40/44 SB 	<ul style="list-style-type: none"> • 32/46 NB • 36/44 SB 	<ul style="list-style-type: none"> • 30/46 NB • 33/44 SB
Number of Parcels Impacted	None	None	None	None
Total Project Cost	None	\$5.65 million (construction, right-of-way, and support costs)	\$314 million (construction, right-of-way, and support costs)	\$340 million (construction, right-of-way, and support costs)
Construction Duration	None	Up to 1 year	3 years	3 years

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
Potential Environmental Impacts				
Land Use	No temporary or permanent impacts associated with existing or future land use.	Alternative 2 is consistent with the majority of the goals and policies identified. However, Alternative 2 is not included in the future regional models for the SCAG 2020-2045 RTP/SCS, nor is it included in the SCAG 2023 FTIP.	Alternative 3 is consistent with the majority of the goals and policies identified. However, Alternative 3 is not included in the future regional models for the SCAG 2020-2045 RTP/SCS, nor is it included in the SCAG 2023 FTIP.	Alternative 4 is consistent with the majority of the goals and policies identified. However, Alternative 4 is not included in the future regional models for the SCAG 2020-2045 RTP/SCS, nor is it included in the SCAG 2023 FTIP.
Parks and Recreational Facilities	No temporary or permanent impacts associated with existing or future parks and recreational facilities.	Alternative 2 would not result in any temporary or permanent impacts to parks or recreational facilities.	Alternative 3 would not result in any temporary or permanent impacts to parks or recreational facilities.	Alternative 4 would not result in any temporary or permanent impacts to parks or recreational facilities.
Farmlands and Timberlands	No temporary or permanent impacts associated with existing or future farmlands or timberlands.	Alternative 2 would not result in any temporary or permanent impacts to farmlands or timberlands.	Alternative 3 would not result in any temporary or permanent impacts to farmlands or timberlands.	Alternative 4 would not result in any temporary or permanent impacts to farmlands or timberlands.
Growth	The No Build Alternative would not influence the rate, type, or amount of growth and would not result in unplanned growth.	Alternative 2 would not influence the rate, type, or amount of growth and would not result in unplanned growth.	Alternative 3 would not influence the rate, type, or amount of growth and would not result in unplanned growth.	Alternative 4 would not influence the rate, type, or amount of growth and would not result in unplanned growth.
Community Impacts	Community Character and Cohesion: The continuance or worsening of HOV degradation and congestion levels along I-5 could negatively affect the ability of the public to travel easily within Orange and Los Angeles counties and may result in other permanent impacts to community character and cohesion factors.	Community Character and Cohesion: <ul style="list-style-type: none"> • No temporary or permanent impacts to existing pedestrian and bicycle facilities are anticipated. • Would improve traffic safety and could reduce congestion and HOV lane degradation along the I-5 corridor within the Study Area. • Would not create a physical or geographic barrier between communities. 	Community Character and Cohesion: <ul style="list-style-type: none"> • Temporary impacts to the community related to short-term closures of local ramps. Access to the freeway may be limited intermittently during construction due to improvements to on- and off-ramps in the Project Area. • No temporary or permanent impacts to existing pedestrian and bicycle facilities are anticipated. • Would address HOV lane degradation along I-5 within the 	Community Character and Cohesion: <ul style="list-style-type: none"> • Temporary impacts to the community related to 55-hour weekend closures of the SR-57 HOV connectors as well as short-term closures of local ramps. Access to the freeway may be limited intermittently during construction due to improvements to on- and off-ramps in the Project Area. • No temporary or permanent impacts to existing pedestrian and bicycle facilities are anticipated.

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
			<p>Study Area.</p> <ul style="list-style-type: none"> Alternative 3 would positively affect community character and cohesion in the Study Area by reducing travel times on I-5 and improving trip reliability on I-5 for local residents, as well as making it easier for local residents to reach community services and facilities. 	<ul style="list-style-type: none"> Would address HOV lane degradation along I-5 within the Study Area. Alternative 4 would positively affect community character and cohesion in the Study Area by reducing travel times and improving trip reliability on I-5 for local residents, as well as making it easier for local community residents to reach community services and facilities. The addition of ELs would improve public accessibility to community services and facilities in the Study Area.
	<p>Acquisitions: The No Build Alternative would not result in any right-of-way acquisitions (e.g., full acquisition, partial acquisition, aerial easements, temporary construction easements).</p>	<p>Acquisitions: Alternative 2 is not anticipated to require additional right-of-way (e.g., full acquisition, partial acquisition, aerial easements, temporary construction easements).</p>	<p>Acquisitions: Alternative 3 is not anticipated to require additional right-of-way (e.g., full acquisition, partial acquisition, aerial easements, temporary construction easements).</p>	<p>Acquisitions: Alternative 4 is not anticipated to require additional right-of-way (e.g., full acquisition, partial acquisition, aerial easements, temporary construction easements).</p>
	<ul style="list-style-type: none"> Environmental Justice: Existing operation and capacity constraints on the current I-5 mainline and its HOV lanes would remain, which may affect the overall population in the Study Area, including environmental justice populations. Equity: The No Build Alternative would not result in temporary adverse effects 	<ul style="list-style-type: none"> Environmental Justice: Study Area census tracts immediately adjacent to I-5 currently experience poorer air quality; however, compliance with Caltrans Standard Specifications would ensure that low-income and minority populations would not be disproportionately adversely affected. Emissions from Alternative 2 are less than both the existing scenario and the 	<ul style="list-style-type: none"> Environmental Justice: Study Area census tracts immediately adjacent to I-5 currently experience poorer air quality. However, compliance with Caltrans Standard Specifications and implementation of an Equity Assistance Plan (EAP) that would provide assistance to individuals who meet certain income and demographic characteristics would ensure that 	<ul style="list-style-type: none"> Environmental Justice: Study Area census tracts immediately adjacent to I-5 currently experience poorer air quality. However, compliance with Caltrans Standard Specifications and implementation of an EAP that would provide assistance to individuals who meet certain income and demographic characteristics would ensure

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
	<p>on the overall population in the Study Area (including underserved population groups).</p>	<p>corresponding No Build Alternative.</p> <p>Low-income and minority populations would not be disproportionately adversely affected.</p> <ul style="list-style-type: none"> Equity: There would be potential impacts to underserved population groups who are unable to have the minimum three vehicle occupants to use the HOV lanes. 	<p>low-income and minority populations would not be disproportionately adversely affected.</p> <p>Low-income and minority populations would not be disproportionately adversely affected.</p> <ul style="list-style-type: none"> Equity: There would be potential impacts to underserved population groups related to income or language barriers in acquiring a FastTrak account/transponder and/or maintaining adequate toll funds. 	<p>that low-income and minority populations would not be disproportionately adversely affected.</p> <p>Low-income and minority populations would not be disproportionately adversely affected.</p> <ul style="list-style-type: none"> Equity: There would be potential impacts to underserved population groups related to income or language barriers in acquiring a FastTrak account/transponder and/or maintaining adequate toll funds.
<p>Utilities/Emergency Services</p>	<p>No temporary or permanent impacts associated with existing or future utilities or emergency services.</p>	<ul style="list-style-type: none"> Alternative 2 would not require the relocation or construction of new utility facilities. Additionally, there would be no substantial disruption of utility services resulting in temporary adverse effects. There are no expected permanent adverse effects on utility facilities and providers. 	<ul style="list-style-type: none"> Alternative 3 may affect four existing surface or subsurface utility facilities requiring protection in-place. Completion of utility work may result in temporary service disruptions to some utility users in the vicinity of the Study Area. During operation, improvements in traffic flow of the ELs are likely to improve emergency response times within the Study Area. There are no expected permanent adverse effects on utility facilities and providers. 	<ul style="list-style-type: none"> Alternative 4 may affect nine existing surface or subsurface utility facilities requiring protection in-place. Completion of utility work may result in temporary service disruptions to some utility users in the vicinity of the Study Area. During operation, improvements in traffic flow of the ELs are likely to improve emergency response times within the Study Area. There are no expected permanent adverse effects on utility facilities and providers.

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
Traffic and Transportation/ Pedestrian and Bicycle Facilities	<ul style="list-style-type: none"> The number of LOS E or F GP segments is anticipated to increase from the existing condition (2022) to 31 segments (67 percent) NB and 27 segments (61 percent) SB in 2055. The number of LOS E or F HOV segments is anticipated to increase to 38 segments (83 percent) NB and 38 segments (86 percent) SB in 2055. In 2055, travel time is projected to increase by 1 to 5 minutes without improvements to the corridor. 	<ul style="list-style-type: none"> Temporary effects to freeway and local street traffic during construction. No temporary or permanent impacts to existing pedestrian and bicycle facilities are anticipated. Alternative 2 would not increase capacity and would therefore result in minimal impacts to VMT. Overall, Alternative 2 does not improve travel time, VHD, freeway LOS, person throughput, average speed, or average intersection delay compared to the No Build Alternative. 	<ul style="list-style-type: none"> Temporary effects to freeway and local street traffic during construction. No temporary or permanent impacts to existing pedestrian and bicycle facilities are anticipated. Alternative 3 would not increase capacity and would therefore result in minimal impacts to VMT. Overall, Alternative 3 would result in a slight improvement to travel time, VHD, freeway LOS, person throughput, average speed, and average intersection delay. 	<ul style="list-style-type: none"> Temporary effects to freeway and local street traffic during construction. No temporary or permanent impacts to existing pedestrian and bicycle facilities are anticipated. Alternative 4 would increase capacity and would therefore result in significant impacts to VMT. Overall, Alternative 4 would improve travel time, VHD, freeway LOS, person throughput, and average speed but would not improve intersection delay.
Visual/Aesthetics	No temporary or permanent impacts associated with visual/aesthetic resources.	<ul style="list-style-type: none"> Alternative 2 would result in temporary impacts to visual/aesthetic resources during construction. Alternative 2 would add visual elements to the existing highway corridor but in most cases would not substantially change viewer exposure, quantity, or duration. All proposed elements would be compatible and unified with the existing visual environment. 	<ul style="list-style-type: none"> Alternative 3 would result in temporary impacts to visual/aesthetic resources during construction. Alternative 3 would add visual elements to the existing highway corridor but in most cases would not substantially change viewer exposure, quantity, or duration. All proposed elements would be compatible and unified with the existing visual environment. 	<ul style="list-style-type: none"> Alternative 4 would result in temporary impacts to visual/aesthetic resources during construction. Alternative 4 would add visual elements to the existing highway corridor but in most cases would not substantially change viewer exposure, quantity, or duration. All proposed elements would be compatible and unified with the existing visual environment.

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
Cultural Resources	No temporary or permanent impacts associated with cultural resources.	<ul style="list-style-type: none"> Alternative 2 would have the potential to encounter unknown cultural resources during construction. Alternative 2 would not result in long-term impacts to cultural resources. 	<ul style="list-style-type: none"> Alternative 3 would have the potential to encounter unknown cultural resources during construction. Alternative 3 would not result in long-term impacts to cultural resources. 	<ul style="list-style-type: none"> Alternative 4 would have the potential to encounter unknown cultural resources during construction. Alternative 4 would not result in long-term impacts to cultural resources.
Hydrology and Floodplains	No temporary or permanent impacts associated with hydrology or floodplain resources.	<ul style="list-style-type: none"> Alternative 2 would have no impact on beneficial floodplain values or result in changes to 100-year floodplains. Alternative 2 would not impact channel hydraulics or water surface elevations. Climate change impacts in the form of future 100-year storm precipitation are not anticipated to have a major impact on hydrology and floodplains within the Project Area. 	<ul style="list-style-type: none"> Alternative 3 would have no impact on beneficial floodplain values or result in changes to 100-year floodplains. Alternative 3 would not impact channel hydraulics or water surface elevations. Climate change impacts in the form of future 100-year storm precipitation are not anticipated to have a major impact on hydrology and floodplains within the Project Area. 	<ul style="list-style-type: none"> Alternative 4 would have no impact on beneficial floodplain values or result in changes to 100-year floodplains. Alternative 4 would not impact channel hydraulics or water surface elevations. Climate change impacts in the form of future 100-year storm precipitation are not anticipated to have a major impact on hydrology and floodplains within the Project Area.
Water Quality and Stormwater Runoff	No temporary or permanent impacts associated with water quality resources.	<ul style="list-style-type: none"> No adverse water quality impacts are anticipated during construction of Alternative 2. Temporary impacts from construction activities include the potential increase of pollutants (soils, chemicals, debris, nuisance water, etc.) in stormwater runoff that could affect water quality. Alternative 2 would construct two park-and-ride facilities; therefore, under the CGP, preparation of a SWPPP and implementation of construction BMPs would be required. 	<ul style="list-style-type: none"> No adverse water quality impacts are anticipated during construction of Alternative 3. Temporary impacts from construction activities include the potential increase of pollutants (soils, chemicals, debris, nuisance water, etc.) in stormwater runoff that could affect water quality. Alternative 3 would construct two park-and-ride facilities; therefore, under the CGP, preparation of a SWPPP and implementation of construction BMPs would be 	<ul style="list-style-type: none"> No adverse water quality impacts are anticipated during construction of Alternative 4. Temporary impacts from construction activities include the potential increase of pollutants (soils, chemicals, debris, nuisance water, etc.) in stormwater runoff that could affect water quality. Alternative 4 would construct two park-and-ride facilities; therefore, under the CGP, preparation of a SWPPP and implementation of construction

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
		<ul style="list-style-type: none"> Alternative 2 would not result in adverse long-term impacts to water quality during operation. Alternative 2 would result in a permanent increase of 2.1 acres of impervious surface area that would increase the volume of stormwater runoff. Permanent BMPs in the form of pollution prevention, treatment, full trash capture, and maintenance will be implemented to manage and treat stormwater runoff from impervious surfaces. Treatment BMPs for Alternative 2 include infiltration areas and biofiltration swales. 	<p>required.</p> <ul style="list-style-type: none"> Alternative 3 would not result in adverse long-term impacts to water quality during operation. Alternative 3 would result in a permanent increase of 6.88 acres of impervious surface area that would increase stormwater runoff. Alternative 3 would implement permanent BMPs similar to those described under Alternative 2. 	<p>BMPs would be required.</p> <ul style="list-style-type: none"> Alternative 4 would not result in adverse long-term impacts to water quality during operation. Alternative 4 would result in a permanent increase of 21.82 acres of impervious surface area that would increase stormwater runoff. Alternative 4 would implement permanent BMPs similar to those described under Alternative 2.
Geology/Soils/ Seismic/ Topography	No temporary or permanent impacts associated with geology, soils, seismicity, and topography conditions.	<ul style="list-style-type: none"> Impacts during construction resulting in liquefaction are considered long-term and permanent. Alternative 2 has the potential to result in long-term impacts related to liquefaction due to the construction of the proposed park-and-ride facilities since half of the total Project limits are mapped by the California Geological Survey as being in a zone that is susceptible to earthquake-induced liquefaction. Alternative 2 would not result in substantial long-term impacts to geology, soils, seismicity, and topography since proposed Project features will be designed to current standards. 	<ul style="list-style-type: none"> Impacts during construction resulting in liquefaction are considered long-term and permanent. Alternative 3 has the potential to result in long-term impacts related to liquefaction due to construction since half of the total Project limits are mapped by the California Geological Survey as being in a zone that is susceptible to earthquake-induced liquefaction. Alternative 3 would not result in substantial long-term impacts to geology, soils, seismicity, and topography since proposed Project features will be designed to current standards. 	<ul style="list-style-type: none"> Impacts during construction resulting in liquefaction are considered long-term and permanent. Alternative 4 has the potential to result in long-term impacts related to liquefaction due to construction since half of the total Project limits are mapped by the California Geological Survey as being in a zone that is susceptible to earthquake-induced liquefaction. Alternative 4 would not result in substantial long-term impacts to geology, soils, seismicity, and topography since proposed Project features will be designed to current standards.

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
Paleontology	No temporary or permanent impacts associated with paleontological resources.	Alternative 2 has no potential to impact paleontological resources during construction because ground disturbance associated with Alternative 2 is limited in aerial extent and to a depth of 5 feet, which would not reach deposits with high paleontological sensitivity.	Alternative 3 would have the potential to encounter unknown paleontological resources during construction because the depth of excavation would be more than 25 feet in some locations.	Alternative 4 would have the potential to encounter unknown paleontological resources during construction because the depth of excavation would be more than 25 feet in some locations.
Hazardous Waste/ Materials	No temporary or permanent impacts associated with hazardous materials and wastes.	<ul style="list-style-type: none"> • Ground disturbance associated with Alternative 2 (park-and-ride facilities) could result in potential effects related to unknown hazardous materials and wastes. • Operation would not result in adverse permanent impacts related to hazardous wastes or materials. 	<ul style="list-style-type: none"> • Ground disturbance associated with Alternative 3 could result in potential effects related to unknown hazardous materials and wastes. • Operation would not result in adverse permanent impacts related to hazardous wastes or materials. 	<ul style="list-style-type: none"> • Ground disturbance associated with Alternative 4 could result in potential effects related to unknown hazardous materials and wastes. • Operation would not result in adverse permanent impacts related to hazardous wastes or materials.
Air Quality	The air quality improvements realized under the build alternatives would not occur under the No Build Alternative.	<ul style="list-style-type: none"> • During construction, emissions from construction equipment include CO, NO_x, VOCs, directly emitted particulate matter (PM₁₀ and PM_{2.5}), diesel exhaust particulate matter (PM₁₀ and PM_{2.5}), soot particulates (PM₁₀ and PM_{2.5}), SO₂, dust, and odor. • Emissions of CO, ROG, NO_x, PM₁₀, and PM_{2.5} from Alternative 2 are less than both the existing scenario and the corresponding No Build Alternative. • Alternative 2 is not a project of air quality concern under 40 CFR 93.123(b)(1). 	<ul style="list-style-type: none"> • During construction, emissions from construction equipment include CO, NO_x, VOCs, directly emitted particulate matter (PM₁₀ and PM_{2.5}), diesel exhaust particulate matter (PM₁₀ and PM_{2.5}), soot particulates (PM₁₀ and PM_{2.5}), SO₂, dust, and odor. • Emissions of CO, ROG, NO_x, PM₁₀, and PM_{2.5} from Alternative 3 are less than both the existing scenario and the corresponding No Build Alternative. • Alternative 3 is not a project of air quality concern under 40 CFR 93.123(b)(1). 	<ul style="list-style-type: none"> • During construction, emissions from construction equipment include CO, NO_x, VOCs, directly emitted particulate matter (PM₁₀ and PM_{2.5}), diesel exhaust particulate matter (PM₁₀ and PM_{2.5}), soot particulates (PM₁₀ and PM_{2.5}), SO₂, dust, and odor. • Emissions of CO, ROG, NO_x, PM₁₀, and PM_{2.5} from Alternative 4 are less than both the existing scenario and the corresponding No Build Alternative. • Alternative 4 is not a project of air quality concern under 40 CFR 93.123(b)(1).

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
Noise and Vibration	No temporary or permanent impacts associated with noise and vibration.	<ul style="list-style-type: none"> • Temporary construction noise impacts would be unavoidable at areas immediately adjacent to the Project Area. • Temporary increases in vibration would likely occur in some locations. • No permanent impacts associated with noise and vibration. 	<ul style="list-style-type: none"> • Temporary construction noise impacts would be unavoidable at areas immediately adjacent to the Project Area. • Temporary increases in vibration would likely occur in some locations. • Future predicted traffic noise levels would approach or exceed the NAC for Activity Categories B and C at four locations within the Project Area under Alternative 3; therefore, consideration of noise abatement is required. 	<ul style="list-style-type: none"> • Temporary construction noise impacts would be unavoidable at areas immediately adjacent to the Project Area. • Temporary increases in vibration would likely occur in some locations. • Future predicted traffic noise levels would approach or exceed the NAC for Activity Categories B and C at four locations within the Project Area under Alternative 4; therefore, consideration of noise abatement is required.
Natural Communities	No temporary or permanent impacts associated with natural communities.	<ul style="list-style-type: none"> • Alternative 2 would not result in temporary impacts to natural communities during construction. • Alternative 2 would not result in permanent impacts to riparian habitat in the form of freshwater marsh, and no permanent barriers would be placed within any known wildlife movement corridors. 	<ul style="list-style-type: none"> • Alternative 3 would result in temporary impacts to the entirety (0.04 acre) of the freshwater marsh land cover, with most impacts affecting developed and landscaped land covers. • Alternative 3 would not result in permanent impacts to riparian habitat in the form of freshwater marsh, and no permanent barriers would be placed within any known wildlife movement corridors. 	<ul style="list-style-type: none"> • Alternative 4 would result in temporary impacts to the entirety (0.04 acre) of the freshwater marsh land cover, with most impacts affecting developed and landscaped land covers. • Alternative 4 would not result in permanent impacts to riparian habitat in the form of freshwater marsh, and no permanent barriers would be placed within any known wildlife movement corridors.

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
Wetlands and Other Waters	No temporary or permanent impacts associated with wetlands and other waters.	Construction of Alternative 2 would not result in temporary or permanent impacts to jurisdictional features as jurisdictional features are absent from the impact area.	<ul style="list-style-type: none"> • Alternative 3 would result in 4.46 acres of temporary impacts to nonwetland waters and 0.33 acre of wetland waters subject to USACE and RWQCB jurisdiction. • Alternative 3 would result in 5.69 acres of temporary impacts to aquatic resources subject to CDFW jurisdiction. • Alternative 3 would result in permanent impacts to 0.59 acre of nonwetland waters and 0.03 acre of wetland waters subject to USACE and RWQCB jurisdiction. • Alternative 3 would result in 0.90 acre of permanent impacts to aquatic resources subject to CDFW jurisdiction. 	<ul style="list-style-type: none"> • Alternative 3 would result in 4.46 acres of temporary impacts to nonwetland waters and 0.33 acre of wetland waters subject to USACE and RWQCB jurisdiction. • Alternative 4 would result in 7.08 acres of temporary impacts to drainages subject to CDFW jurisdiction. • Alternative 4 would result in permanent impacts to 0.59 acre of nonwetland waters and 0.03 acre of wetland waters subject to USACE and RWQCB jurisdiction. • Alternative 4 would result in 0.90 acre of permanent impacts to aquatic resources subject to CDFW jurisdiction.
Plant Species	No temporary or permanent impacts associated with special-status plant species.	Alternative 2 would not result in temporary or permanent impacts on special-status plant species.	<ul style="list-style-type: none"> • Alternative 3 would temporarily impact marginally suitable habitat for 10 special-status plant species. However, Alternatives 3 and 4 are not likely to result in temporary impacts to individuals. • Alternative 3 would not result in permanent impacts on special-status plant species. 	<ul style="list-style-type: none"> • Alternative 4 would temporarily impact marginally suitable habitat for 10 special-status plant species. However, Alternatives 3 and 4 are not likely to result in temporary impacts to individuals. • Alternative 4 would not result in permanent impacts on special-status plant species.
Animal Species	No temporary or permanent impacts associated with special-status animal species.	Alternative 2 is not expected to have any temporary or long-term effects on nonlisted special-status animal species.	Alternative 3 is not expected to have any temporary or long-term effects on nonlisted special-status animal species.	Alternative 4 is not expected to have any temporary or long-term effects on nonlisted special-status animal species.

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
Threatened and Endangered Species	No temporary or permanent impacts associated with threatened and endangered species.	Alternative 2 is not expected to have any temporary or long-term effects on threatened and endangered species.	Alternative 3 is not expected to have any temporary or long-term effects on threatened and endangered species.	Alternative 4 is not expected to have any temporary or long-term effects on threatened and endangered species.
Invasive Species	No temporary or permanent impacts associated with invasive species.	Alternative 2 would not result in adverse impacts related to invasive species.	Alternative 3 would not result in adverse impacts related to invasive species.	Alternative 4 would not result in adverse impacts related to invasive species.
Cumulative Impacts	No impact.	Current or planned projects would be subject to discretionary environmental review to ensure that individual traffic, public service impacts, and other environmental concerns would not be compounded with the build alternatives. The I-5 Irvine Tustin Project, located immediately south of the Project limits and currently in the PS&E phase, may coincide with this Project's construction timeframe. However, construction under Alternative 2 is considered minor and would not contribute to a temporary cumulative impact.	Current or planned projects would be subject to discretionary environmental review to ensure that individual traffic, public service impacts, and other environmental concerns would not be compounded with the Build Alternatives. The I-5 Irvine Tustin Project, located immediately south of the Project limits and currently in the PS&E phase, may coincide with this Project's construction timeframe, which may result in possible cumulative but temporary effects.	Current or planned projects would be subject to discretionary environmental review to ensure that individual traffic, public service impacts, and other environmental concerns would not be compounded with the Build Alternatives. The I-5 Irvine Tustin Project, located immediately south of the Project limits and currently in the PS&E phase, may coincide with this Project's construction timeframe, which may result in possible cumulative but temporary effects.
Climate Change	The No Build Alternative would result in a net decrease in CO ₂ emissions in 2035 and 2055 compared to the existing (2022) condition.	<ul style="list-style-type: none"> Alternative 2 would result in GHG emissions during construction. Alternative 2 would result in reduced GHG emissions under both the Opening Year (2035) and Future Year (2055) scenarios compared to the No Build Alternative. Due to the Alternative 2 being located outside of a coastal zone, it is not within an area subject to sea level rise. Therefore, any direct impacts to transportation 	<ul style="list-style-type: none"> Alternative 3 would result in GHG emissions during construction. Alternative 3 would result in reduced GHG emissions under both the Opening Year (2035) and Future Year (2055) scenarios compared to the No Build Alternative. Due to the Alternative 3 being located outside of a coastal zone, it is not within an area subject to sea level rise. 	<ul style="list-style-type: none"> Alternative 4 would result in GHG emissions during construction. Alternative 4 would result in reduced GHG emissions under both the Opening Year (2035) and Future Year (2055) scenarios compared to the No Build Alternative. Due to the Alternative 4 being located outside of a coastal zone, it is not within an area subject to sea level rise.

Table 1.16: Summary of Alternatives and Impacts

Environmental Issue	Alternative 1 (No Build Alternative)	Alternative 2	Alternative 3	Alternative 4
		<p>facilities due to sea level rise are not expected.</p> <ul style="list-style-type: none"> The Project Area does not traverse any Fire Hazard Severity Zones, as designated by the California Department of Forestry and Fire Protection and is therefore not subject to any risk from Wildfires with the implementation of the Alternative 2. Although the Project Area has five major flood control facilities that cross I-5 along the proposed Project corridor, there are no proposed physical improvements at these locations; therefore, the Alternative 2 would not create any increased flooding risks within the study area. 	<p>Therefore, any direct impacts to transportation facilities due to sea level rise are not expected.</p> <ul style="list-style-type: none"> The Project Area does not traverse any Fire Hazard Severity Zones, as designated by the California Department of Forestry and Fire Protection and is therefore not subject to any risk from Wildfires with the implementation of the Alternative 3. Although the Project Area has five major flood control facilities that cross I-5 along the proposed Project corridor, there are no proposed physical improvements at these locations; therefore, the Alternative 3 would not create any increased flooding risks within the study area. 	<p>Therefore, any direct impacts to transportation facilities due to sea level rise are not expected.</p> <ul style="list-style-type: none"> The Project Area does not traverse any Fire Hazard Severity Zones, as designated by the California Department of Forestry and Fire Protection and is therefore not subject to any risk from Wildfires with the implementation of the Alternative 4. Although the Project Area has five major flood control facilities that cross I-5 along the proposed Project corridor, there are no proposed physical improvements at these locations; therefore, the Alternative 4 would not create any increased flooding risks within the study area.

BMPs = best management practices
 CDFW = California Department of Fish and Wildlife
 CFR = Code of Federal Regulations
 CGP = Construction General Permit
 CO = carbon monoxide
 CO₂ = carbon dioxide
 GP = general purpose
 HOV = high-occupancy vehicle
 I = Interstate
 LOS = level(s) of service
 NAC = noise abatement criteria
 NB = northbound
 NO_x = nitrogen oxides
 PM₁₀ = particulate matter less than 10 microns in size

PM_{2.5} = particulate matter less than 2.5 microns in size
 PS&E = plans, specifications, & estimates
 ROG = reactive organic gases
 RTP/SCS = 2020–2045 Regional Transportation Plan/Sustainable Communities Strategy: A Plan for Mobility, Accessibility, Sustainability, and High Quality of Life
 RWQCB = Regional Water Quality Control Board
 SB = southbound
 SO₂ = sulfur dioxide
 SWPPP = Stormwater Pollution Prevention Plan
 USACE = United States Army Corps of Engineers
 VHD = vehicle hours delay
 VMT = vehicle miles traveled
 VOCs = volatile organic compounds

evaluation based on whether or not the alternative (1) failed to meet the most basic project objectives; (2) was infeasible, per CEQA Guidelines Section 1512.6(f)(1); or (3) was unable to avoid significant environmental impacts.

Alternatives considered during the Project development process that were determined not to be studied further include the following.

1.5.1.1. ALTERNATIVE 4B – CONVERT EXISTING HOV LANES TO TWO EXPRESS LANES AND CONSTRUCT ADDITIONAL EXPRESS LANE

Alternative 4B would have converted the existing HOV lane to an EL in each direction between Red Hill Avenue and SR-55; converted two existing HOV lanes to ELs in each direction between SR-55 and SR-57; converted the existing HOV lane to an EL in each direction from SR-57 to the Orange/Los Angeles County line; and constructed an additional EL in each direction between SR-57 to just north of the Orange/Los Angeles County line along I-5 with standard lane and shoulder widths (12-foot-wide ELs, 12-foot-wide GP lanes, 12-foot-wide auxiliary lanes, 10-foot-wide inside and outside shoulders, and a 4-foot buffer, respectively).

Associated freeway widening for Alternative 4B would have required major relocation/reconstruction of retaining walls, drainage systems and dewatering and control wells, ramp and system interchanges, structure crossings, and sound walls; construction of new retaining walls, structure crossings, and sound walls; and modification/installation of overhead signage. Additionally, installation of toll and communication infrastructure and new fiber optics and relevant equipment under proposed shoulders would have been required, as well as associated right-of-way acquisitions.

Screening Results

Alternative 4B was ultimately eliminated from further consideration after the public scoping period, as it would have resulted in unavoidable and significant impacts, as described below.

Alternative 4B would have required the replacement of approximately 26 existing structures. Bridge replacements would have caused major traffic delays on SR-22, SR-57, SR-91, and I-5 for the duration of construction. The replacement of the Lincoln Avenue Underpass would have also caused delays to the Metrolink, Amtrak Pacific Surfliner, and freight rail services.

In addition, Alternative 4B would have resulted in increased greenhouse gas (GHG) emissions associated with an increase in VMT within the proposed Project corridor, which would have ultimately negatively contributed to climate change.

Full or partial right-of-way acquisition of approximately 47 parcels would have been required for the construction of Alternative 4B. At this preliminary stage, the anticipated right-of-way acquisition has been estimated to be \$215 million. Alternative 4B would have resulted in the highest right-of-way impact without obtaining the corresponding level of mobility benefits.

After the project scoping period and reviewing the proposed Project alternatives along with screening criteria, Caltrans District 12 held meetings on June 20, 2022, and June 21, 2022, and determined to remove Alternative 4B from further consideration. With the removal of Alternative 4B, Alternative 4A from the PSR has been retitled to the current Alternative 4. The following screening criteria were used to assess the effects of Alternative 4B and community feedback regarding those effects as considerations for removing Alternative 4B from further evaluation:

- Right-of-way acquisitions
- Project right-of-way costs
- Public input received during scoping period
- Community impacts
- Visual, air quality, and noise impacts
- Access to businesses/parks, etc.
- Impacts to bike/pedestrian facilities (permanent and temporary)
- Impacts to railroads
- Hazardous materials
- Major utilities relocations

1.5.2. Construction of Additional HOV Lanes

An additional alternative was proposed following the scoping period that would maintain the existing lane configurations for I-5 with the minimum HOV lane occupancy requirement of two-plus (2+) in each direction between Red Hill Avenue and the Orange/Los Angeles County line; and construct an additional HOV lane in each direction between SR-57 and SR-91.

An existing 22-foot inside shoulder between the I-5/SR-57 and I-5/SR-91 interchanges would accommodate this additional HOV lane without major freeway

widening. However, much of the existing inside shoulder was constructed using a minimal asphalt-concrete overlay; therefore, replacement of most of the inside shoulder would be required. There is also an existing pinch point at the Disney Way northbound and southbound DARs that would require removal and reconstruction of existing concrete barriers and safety devices.

1.5.2.1. SCREENING RESULTS

The alternative to construct additional HOV lanes was initially considered; however, it was eliminated from further consideration, as it did not adequately meet the proposed Project's purpose and need or overall goals and objectives.

Additional HOV lanes do not provide a means to dynamically manage demand to ensure reliable trip times through the Project corridor. A one-lane section through the I-5/SR-57 interchange would see future degradation due to lack of capacity and create bottlenecks within the HOV system. Also, without the potential excess toll revenue generated by toll lanes, there is no mechanism to fund additional corridor improvements to offset VMT produced by the added lanes, as required by SB 743.

1.5.3. Conversion of Existing HOV Lanes to ELs and Construct Additional ELs North of SR-57

An additional alternative was proposed following the scoping period that would maintain the existing lane configurations for I-5 with the minimum HOV lane occupancy requirement of two-plus (2+) in each direction between Red Hill Avenue and SR-57; convert the HOV lane and construct an additional EL in each direction between SR-57 and SR-91; and convert the existing HOV lane to an EL in each direction from SR-57 to the Orange/Los Angeles County line.

1.5.3.1. SCREENING RESULTS

The alternative to adjust the proposed Project's southerly limit north to SR-57 was initially considered; however, it was eliminated from further consideration, as it did not adequately meet the proposed Project's purpose and need or overall goals and objectives.

Analysis of the future No Build conditions shows declining operations and eventual degradation of the HOV facility, even within the recently expanded two-lane HOV segment south of SR-57. Maintaining existing Caltrans HOV policy in this segment does not improve future operations or resolve future HOV degradation. As the Build Alternatives seek to improve operations and trip reliability by managing the lanes with technology through the complex I-5 corridor, it is necessary to include all

facilities and connections in the price-managed system to the logical termini of SR-55.

Caltrans recognizes that the HOV facility in this segment from SR-55 to SR-57 was expanded in 2019 and that expectations remain for continued benefits to regular HOV users until the lanes become degraded. Therefore, Caltrans is planning to provide additional reductions in toll fees for HOV 2+ users through this segment through lane management.

1.5.4. Reversible Lanes

The proposed Project is required to demonstrate that reversible lanes were considered when submitting a capacity-increasing project or a major street or highway lane realignment project by Caltrans or a regional transportation planning agency to the California Transportation Commission (CTC) for approval, per Assembly Bill (AB) 2542, signed into law on September 23, 2016 and effective as of January 1, 2017 (Senate Rules Committee, Office of Senate Floor Analysis, Senate Floor Analysis AB 2542, 2016).

The purpose of AB 2542 is “to encourage the use of reversible lanes when they are the best option. Reversible lanes reduce congestion and prevent unnecessary road expansions. Road expansions can exacerbate our infrastructure backlog and have detrimental effects on the environment.” As described by the California Senate Floor Analysis on AB 2542, “Reversible lanes add peak-direction capacity to a two-way road and decrease congestion by utilizing available lane capacity from the other (off-peak) direction. The lanes are particularly beneficial where the cost to increase capacity is especially expensive (e.g., bridges, dense urban areas).”

Reversible-flow lanes are most appropriate on facilities that experience large directional traffic imbalances. Reversible facilities are best suited for long-distance trips with limited intermediate access needs along the affected route to minimize traffic disruptions (*Freeway Management and Operations Handbook* [FHWA 2011]). All freeway reversible lanes must be separated by “Jersey” barriers in a high-speed roadway setting. They are typically constructed in the median of freeway facilities and may be one, two, or more lanes wide.

Potential benefits of the reversible lanes include a reduction in capital cost of construction because reversible lanes would be implemented within the existing freeway median, as well as a reduction in environmental impacts because the

reversible lanes would be mostly constructed within the existing freeway right-of-way.

1.5.4.1. Screening Results

Caltrans data indicate that the peak-hour directional split for I-5 is between 54 and 63 percent under both a.m. and p.m. peak-hour conditions. The forecast in years 2035 and 2055 for any of the Build Alternatives also indicates that the split would not exceed 63 percent under both a.m. and p.m. peak-hour conditions. The data are based on field observations north of SR-55 and near Main Street. FHWA's guidance to warrant reversible lanes is that peak-period traffic volumes should exhibit or be anticipated to exhibit significant direction imbalance (such as a 70/30 percent split). As the I-5 direction split is within a balanced range, it was determined that the reversible lane was not a viable option, and it was removed from consideration.

1.5.5. Value Analysis

A Value Analysis that identifies improvements or solves problems that improve value and reduce overall cost, is required for all National Highway System facilities costing \$25 million or more. In cooperation with Caltrans District 7, a Value Analysis Study was conducted via virtual meetings between the dates of November 14, 2022, and November 18, 2022, in support of the proposed Project.

The objectives of the Value Analysis study were to: analyze the current proposed Project design, estimate, and schedule; provide possible cost and/or schedule-saving recommendations; and provide performance improvement recommendations. As a result of these factors, the Value Analysis team developed one Value Analysis strategy for Alternatives 3 and 4 that represents their opinion of the best combination of alternatives for the proposed Project to assist the decision makers in their evaluation of the Value Analysis alternatives. The Value Analysis strategies are based on factors that include improved performance, likelihood of implementation, least community impact, cost savings, or any combination of the proposed Project's performance attributes. This information is a guide and is not intended to reject alternatives from project stakeholder consideration.

Table 1.17 provides a summary of the *Final Value Analysis Study Report* (Value Management Strategies, Inc., January 2023) alternatives developed by the Value Analysis team for consideration and implementation decisions by the Project Development Team (PDT).

Table 1.17: Value Analysis Strategies Recommended within the Proposed Project Limits

Value Analysis Alternative		Strategy Recommended for Consideration		Initial Implementation Decision	
No.	Description	Alternative 3	Alternative 4	Alternative 3	Alternative 4
1	Place HMA in lieu of JPCP in shoulders	X	X	X	X
2	Construct slope paving in lieu of retaining wall #1325B (Along Lincoln Ave NB On-Ramp)	N/A	X	N/A	X
3	Implement six 55-hour weekend closures for connector work during the proposed 1,044 working days	N/A	X	N/A	X

Source: *Final Value Analysis Study Report* (Value Management Strategies, Inc., 2023)

Notes: Ave = Avenue; HMA = hot mix asphalt; JPCP = Jointed Plain Concrete Pavement; N/A = Not Applicable

A structured review and evaluation for all of the concepts proposed as part of the Value Analysis was conducted. During that time, the PDT identified which Value Analysis alternatives are accepted, which are rejected and the rationale for rejection, and which Value Analysis alternatives are conditionally accepted with further study required, accordingly. Value Analysis alternatives that are accepted would be properly integrated into the project design of the appropriate build alternative during the final design phase.

1.6. Permits and Approvals Needed

Table 1.18 lists the permits, licenses, agreements, and certifications (PLACs) required for the proposed Project’s construction.

Table 1.18: Permits/Approvals Anticipated within Project Limits

No.	Permits/Approvals	Agency	Status
1	Clean Water Act Section 404 Nationwide Permit*	USACE	After approval of the Final Environmental Document, Caltrans will submit a preconstruction notification (PCN) to the USACE and will obtain authorization under Nationwide Permit (NWP) 14 – Linear Transportation Projects. Caltrans will obtain concurrence with the USACE that project activities are covered under NWP 14 prior to impacting areas under the jurisdiction of the USACE, the CDFW, and the RWQCB. Caltrans will implement all General Conditions within NWP 14 following concurrence
2	Clean Water Act Section 401 Water Quality Certification and Waste Discharge Requirements	RWQCB	Caltrans will submit the application to the RWQCB after approval of the Final Environmental Document. Caltrans will coordinate with the RWQCB to obtain water quality certification during final design. The RWQCB will provide comments on the application. Meetings between Caltrans and the RWQCB will be held if necessary during final design. Caltrans will obtain the certification or waiver from the RWQCB during final design and will implement the requirements included in the certification or waiver.
3	NPDES Statewide Storm Water Permit and Waste Discharge Requirements [Order No. 2012-0011-DWQ, NPDES No. CAS000003 (effective July 1, 2013), as amended by Order WQ No. 2014-0006-EXEC (effective January 17, 2014), Order No. 2014-0077-DWQ (effective July 1, 2014), Order No. 2015-0036-EXEC (effective April 17, 2015), and Order No. 2017-0026-EXEC (effective November 27, 2017)]	SWRCB	General discharge permit has already been issued for all discharges on Caltrans projects, and the Project must comply with the requirements.
4	NPDES Statewide Construction General Permit (Order No. 2009-0009-DWQ, NPDES No. CAS000002 [effective July 1, 2010], as amended by Order No. 2010-0014-DWQ [effective February 14, 2011] and Order No. 2012-0006-DWQ [effective July 17, 2012], as amended by Order No. 2022-0057-DWQ [effective September 1, 2023])	SWRCB	Application and Notice of Intent will be submitted prior to construction.

Table 1.18: Permits/Approvals Anticipated within Project Limits

No.	Permits/Approvals	Agency	Status
5	General Waste Discharge Requirements [SWRCB, Order No. R8-2020-0006, NPDES No. CAG998001 (effective July 1, 2020); Santa Ana RWQCB, Order No. No. R8-2015-0004, NPDES No. CAG998001 (effective July 1, 2015); and/or Los Angeles RWQCB, Order No. R4-2018-0125, NPDES No. CAG994004 (effective February 24, 2021)]	SWRCB/Santa Ana RWQCB/Los Angeles RWQCB	General discharge permit has already been issued for all discharges on Caltrans projects, and the Project must comply with the requirements.
6	Section 1602 Lake or Streambed Alteration Agreement*	CDFW	After approval of the Final Environmental Document, Caltrans will submit a 1600 Streambed Alteration Agreement (SAA) permit application to CDFW. Caltrans will coordinate with CDFW and obtain a final signed SAA prior to impacting areas under jurisdiction of CDFW. Any specific conditions and measures identified in the SAA will be implemented.
7	Air Quality Conformity Approval Letter	FHWA	The <i>Air Quality Conformity Report</i> will be submitted to FHWA after selection of the Preferred Alternatives. FHWA will make a conformity determination prior to final approval of the Final EIR/EA.
8	CTC Application for Toll Facility (AB 194)	CTC/Caltrans	Application to be submitted after approval of the environmental document and prior to construction.
9	CTC Application Design/Build Authorization (AB 401)	CTC/Caltrans	Application to be submitted after approval of environmental document and prior to construction.
10	Toll Operating Agreement	Caltrans	To be submitted prior to construction.
11	Operations and Maintenance Agreement	Caltrans	To be submitted prior to construction.
12	Enforcement Agreements	CHP/Caltrans	To be submitted prior to construction.
13	Approvals to relocate, protect-in-place, or remove utility facilities	Affected Utilities	Prior to any construction within utility conflict areas.
14	Construction Encroachment Permit	Cities of Irvine, Tustin, Santa Ana, Orange, Anaheim, Fullerton, Buena Park, La Mirada, and Santa Fe Springs	Application for construction encroachment permits for temporary access onto public rights-of-way will be submitted prior to construction.

Notes: * Not anticipated at this stage, coordination would be required if impacts are found during subsequent phases of the proposed Project.

Caltrans = California Department of Transportation
CDFW = California Department of Fish and Wildlife
CHP = California Highway Patrol
CTC = California Transportation Commission
EA = Environmental Approval
ED = Environmental Document
EIR = Environmental Impact Report
FHWA = Federal Highway Administration
LOP = Letter of Permission

NPDES = National Pollutant Discharge Elimination System
OCFCD = Orange County Flood Control District
PS&E = Plans, Specifications, and Estimate
ROD = Record of Decision
RWQCB = Regional Water Quality Control Board
SAMP = Special Area Management Plan
SWRCB = State Water Resources Control Board
USACE = United States Army Corps of Engineers
WQ = Water Quality