

Project Study Report–Project Development Support (PSR-PDS)

To
Request Approval to Proceed to the Project Approval and Environmental
Document Phase for a Locally Funded Project

On Route 405
Between Wilmington Avenue (PM 9.6)
And Main Street (PM 12.6)

APPROVAL RECOMMENDED:



16 SEP 2020

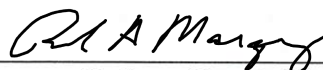
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11/06/2020

Date



Vicinity Map

This Project Study Report-Project Development Support has been prepared under the direction of the following registered civil engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

Kanogporn S. Tiberi

9/16/2020

REGISTERED CIVIL ENGINEER

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ACRONYMS AND ABBREVIATIONS

<u>TERM</u>	<u>DESCRIPTION</u>
ACM	Asbestos-Containing Material
ADA	Americans with Disabilities Act
ADL	Aerially Deposited Lead
ADT	Average Daily Traffic
a/mvm	Accidents per Million Vehicle Miles
APN	Assessor's Parcel Number
APS	Advance Planning Studies
Aux	Auxiliary Lane
BMPs	Best Management Practices
Br	Bridge
Caltrans	California Department of Transportation
CB	Concrete Barrier
CDFW	California Department of Fish and Wildlife
CE	Categorical Exclusion
CEQA	California Environmental Quality Act
CHP	California Highway Patrol
COA	Corridor Operational Analysis
CSMP	Corridor System Management Plan
CSS	Context Sensitive Solution
CTC	California Transportation Commission
CWA	Clean Water Act
D	Divided
DPGR	District Preliminary Geotechnical Report
DSDD	Design Standard Decision Document
DSMP	District System Management Plan
EA	Expenditure Authorization
ECR	Environmental Commitment Record
ED	Environmental Document
FAI	Federal Air Interstate
FHWA	Federal Highway Administration
FTIP	Federal Transportation Improvement Program
GHG	Greenhouse Gas
GP	General Purpose
GRDs	Geometric Review Drawings
HDM	Highway Design Manual
HOV	High Occupancy Vehicle
HQ	Headquarters
HSM	Highway Safety Manual
I-10	Interstate 10
I-110	Interstate 110
I-405	Interstate 405
I-710	Interstate 710
IS	Initial Study

ISA	Initial Site Assessment
ITS	Intelligent Transportation Systems
kV	Kilovolt
LACDPW	Los Angeles County Department of Public Works
LACFCD	Los Angeles County Flood Control District
LACSD	Los Angeles County Sanitation District
LCCA	Life Cycle Cost Analysis
LCP	Lead Containing Paint
Lt	Left
LOS	Level of Service
Med	Median
Metro	Los Angeles County Metropolitan Transportation Authority
mph	Miles per Hour
MND	Mitigated Negative Declaration
MCP	Multimodal Corridor Plan
MVPs	Maintenance Vehicle Pullouts
MWD	Metropolitan Water District
NAVD 88	North American Vertical Datum of 1988
NB	Northbound
NEPA	National Environmental Policy Act
No.	Number
NP	None Posted
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
OC	Overcrossing
PA/ED	Project Approval/Environmental Document
PCB	Polychlorinated Biphenyls
PCTA	Post Construction Treatment Area
PDT	Project Development Team
PEAR	Preliminary Environmental Analysis Report
PeMS	Performance Measurement System
PER	Paleontological Evaluation Report
PID	Project Initiation Document
PM	Post Mile, Particulate Matter
PM _{2.5}	Particulate Matter of 2.5 microns in diameter or smaller
PM ₁₀	Particulate Matter of 10 microns in diameter or smaller
PMP	Paleontological Mitigation Plan
POAQC	Project of Air Quality Concern
PoDI	Project of Division Interest
PR	Project Report
psig	Pounds per Square Inch Gauge
PSR-PDS	Project Study Report-Project Development Support
RCB	Reinforced Concrete Box
RCP	Reinforced Concrete Pipe
Rt	Right
RTDM	Regional Travel Demand Model
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy

R/W	Right of Way
RW	Retaining Wall
RWQCB	Regional Water Quality Control Board
SB	Southbound
SBCCOG	South Bay Cities Council of Governments
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SCG	Southern California Gas
SED	Social-Economic Data
SHELL	Subsystem of Highway for the Movement of Extralegal Loads
Shld	Shoulder
SHOPP	State Highway Operation and Protection Program
SHPO	State Historic Preservation Officer
SI	Site Investigation
SPGR	Structure Preliminary Geotechnical Report
STAA	Surface Transportation Assistance Act
STIP	State Transportation Improvement Program
STRAHNET	Strategic Highway Network
SWDR	Storm Water Data Report
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TASAS	Traffic Accident Surveillance and Analysis Systems
TBD	To Be Determined
TCE	Temporary Construction Easement
TCR	Transportation Concept Report
TCWG	Transportation Conformity Working Group
TMP	Transportation Management Plan
TEPA	Traffic Engineering Performance Assessment
TSAR	Traffic Accident Surveillance and Analysis Systems, Selective Accident Retrieval
U	Undivided
UC	Undercrossing
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Services
v/c	Volume to Capacity
VMT	Vehicle Miles Traveled

1. INTRODUCTION

The Los Angeles County Transportation Authority (Metro), in cooperation with the California Department of Transportation (Caltrans) and the South Bay Cities Council of Governments (SBCCOG), proposes to add auxiliary lanes between on- and off-ramps along Interstate 405 (I-405) between Wilmington Avenue [Post Mile (PM) 9.6] and Main Street (PM 12.6) in the City of Carson. The proposed project would improve freeway operations and safety along both directions of I-405 through construction of auxiliary lanes between on- and off-ramps to improve weaving, merging, and diverging operations. A project location map is included in **Attachment A** of this Project Study Report-Project Development Support (PSR-PDS).

The project includes a No Build alternative (Alternative 1) and one build alternative (Alternative 2). The build alternative proposes to construct 3 auxiliary lanes along northbound (NB) I-405 and 2 auxiliary lanes along southbound (SB) I-405, including:

- NB between Wilmington Avenue NB on-ramp and Carson Street NB loop off-ramp
- NB between Carson Street NB on-ramp and Avalon Boulevard NB off-ramp
- NB between Weigh Station NB on-ramp and auxiliary lane planned by another project (EA 35710K)
- SB between Avalon Boulevard SB on-ramp and Carson Street SB loop off-ramp
- SB between Carson Street SB on-ramp and Wilmington Avenue SB off-ramp

A summary of the project information is provided in **Table 1.1**.

TABLE 1.1: KEY PROJECT INFORMATION

Project Limits	07-LA-405-PM 9.6/12.6
Number of Alternatives	2 (No Build and Build)
Current Capital Outlay Support Estimate for PA/ED	\$3.5M
Current Capital Outlay Construction Cost Range	\$90M - \$120M
Current Capital Outlay Right of Way Cost Range	\$2M - \$3M
Funding Source	To be determined
Type of Facility	Freeway
Number of Structures	1
Anticipated Environmental Determination or Document	Initial Study/Categorical Exclusion
Legal Description	Construction on State Highway In Los Angeles County, In Carson On Route 405 from Wilmington Avenue to Main Street
Project Development Category	5 (Project does not require substantial new right of way and does not increase traffic capacity)

The remaining capital outlay support, right of way, and construction components of the project are preliminary estimates and are not suitable for programming purposes. The Project Report (PR) will serve as the programming document for the remaining components of the project and as the approval document for the preferred alternative.

The project is anticipated to proceed to the Project Approval/Environmental Document (PA/ED) phase in early 2021 after approval of the PSR-PDS. An Initial Study (IS) is the anticipated environmental document (ED) under the California Environmental Quality Act (CEQA) and a Categorical Exclusion (CE) is the anticipated ED under the National Environmental Policy Act (NEPA). Construction of the project is anticipated to begin in 2024 with opening in 2025.

Metro is the project sponsor along with SBCCOG as funding partner. Metro and Caltrans have an executed Cooperative Agreement 07-5193 dated December 12, 2019 to complete the PSR-PDS. Subsequent cooperative agreements will be needed for future phases of the project. Funding for the PA/ED is expected to be partially funded by Measure R. Funding sources for the final design, right of way, and construction will be determined during the PA/ED phase. The project is not currently included in the Southern California Association of Governments (SCAG) 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) or the latest Federal Transportation Improvement Program (FTIP) and will be added.

2. BACKGROUND

Existing Facility

I-405 (San Diego Freeway) is generally a north-south route with 45 miles in Los Angeles County and is considered a bypass route to Interstate 5 (Santa Ana/Golden State Freeway) providing intra-regional and inter-regional access between Orange and Los Angeles Counties. This I-405 segment was originally constructed in early 1960's with 4 General Purpose (GP) lanes in each direction. The freeway was restriped in 1990's to accommodate a High Occupancy Vehicle (HOV) lane in each direction within the existing pavement. The NB and SB Weigh Stations and associated on/off ramps were constructed in 1963, with additional improvements in 1990's.

Within the project limits, I-405 is a controlled-access freeway trending in the northwest-southeast direction, consisting of 2 HOV lanes and 8 GP lanes, and an auxiliary lane in each direction between Avalon Boulevard and Interstate 110 (I-110). The existing I-405 HOV facility has controlled access with four NB and three SB HOV ingress/egress access points within the project limits (approximately 1-mile interval). The HOV lanes are generally separated from the GP lanes via a striped buffer (1 to 4 feet wide). Currently, there is one bi-directional California Highway Patrol (CHP) enforcement area in the median of I-405 near Del Amo Boulevard.

The existing right of way width along I-405 which was built on fill varies from approximately 200 to 300 feet, and wider at interchanges. The I-405 freeway generally lies on level terrain with gentle slope ranging from approximate elevation of 24 to 47 feet based on the North American Vertical Datum of 1988 (NAVD 88). The NB and SB roadbeds are generally at the same elevations and are separated by a median concrete barrier. This freeway segment typically consists of 11-foot lanes, a 2-foot inside shoulder, and a 10-foot

outside shoulder. The pavement of each roadbed typically has a 1.5% cross slope with the crown point located at 35 feet from the centerline. There is currently one bus route, the LAX Flyaway to/from Long Beach, that travels along this I-405 segment. Pedestrian or bicycle access are prohibited on I-405. The design speed for I-405 is 70 miles per hour (mph). The posted speed limit along the freeway is 65 mph.

Within the project limits, I-405 connects with 4 local street interchanges, listed below from south to north:

1. I-405/Wilmington Avenue interchange
2. I-405/Carson Street interchange
3. I-405/Avalon Boulevard interchange
4. I-405/Main Street interchange

The I-405/Wilmington Avenue interchange was recently reconstructed which widened Wilmington Avenue and interchange ramps as well as added a new NB direct on-ramp, to alleviate congestion and improve the interchange operations (EA 07271). The interchange reconstruction was completed in 2019.

There is a truck weigh station in each direction of the I-405 between the Avalon Boulevard and Main Street interchanges (PM 11.70 NB and PM 12.17 SB) with truck-exclusive on- and off-ramps.

All local interchange ramps along the I-405 project corridor are currently metered and operational. Most interchange on-ramps within the project limits do not have an HOV preferential lane except for the Carson Street SB on-ramp and the Main Street SB on-ramp. The HOV preferential lane is not metered at these locations.

Existing Arterials

Table 2.1 provides a list of local arterials in vicinity of I-405 which may be affected by the project, along with their respective roadway classification, jurisdiction, and general roadway configuration for the roadway sections adjacent to the project corridor.

TABLE 2.1: EXISTING ARTERIALS

No.	Arterial	OC/ UC	Roadway Classification	Thru Lane	Sidewalk	Bike Class	Truck Route	Design Speed (mph)	Posted Speed (mph)	Jurisdiction
1	Wilmington Avenue	UC	Major	4D	NB/SB	-	Yes	45	40	Carson
2	Carson Street	UC	Major	4D	EB/WB	II	Yes	45	40	Carson
3	213 th Street	UC	Secondary	2U	EB/WB	III	No	45	30	Carson
4	Avalon Boulevard	UC	Major	4D	NB	-	Yes	45	35	Carson
5	Del Amo Boulevard	OC	Major	6D	EB/WB	II	Yes	45	45	Carson
6	Main Street	UC	Major	4D	-	III	Yes	45	45	Carson
7	Recreation Road	-	Local	2U	None	-	No	25	NP	Carson
8	E. 220 th Street	-	Collector	2U	SB only	-	No	25	NP	Carson

-Not applicable or not identified;

NP = none posted in vicinity of I-405; U = undivided roadway; D = divided roadway; OC = overcrossing; UC = undercrossing

Existing Structures

Table 2.2 provides a list of existing structures along I-405 within the project limits.

TABLE 2.2: EXISTING STRUCTURES

No.	PM	Structure Name	Bridge No.	City	Vertical Clearance Warning Sign
1	9.56	Wilmington Avenue UC	53-1167	Carson	15'6"
2	9.76	Dominguez Channel	53-1166	Carson	-
3	10.54	Carson Street UC	53-1171	Carson	-
4	10.88	213 th Street UC	53-1263	Carson	14'7"
5	11.22	Avalon Boulevard UC	53-1164	Carson	-
6	11.39	Torrance Lateral Channel	53-1513	Carson	-
7	11.80	Del Amo Boulevard OC	53-2831	Carson	-
8	12.60	Main Street UC	53-1135	Carson	15'4"

According to Caltrans' inventory of structures, the Del Amo Boulevard OC (Bridge #53-2831) is classified as a Category 4 indicating that the bridge has not been evaluated for historical significance. All other bridges within the project limits are classified as Category 5, ineligible for listing in the National Register of Historic Places (NRHP).

Project Sponsor

The project is sponsored by Metro and supported by SBCCOG which is comprised of 16 cities (including the City of Carson) and County of Los Angeles.

Local Agency Involvement

Metro and SBCCOG have coordinated with the City of Carson during the conception of the PSR-PDS process. The City of Carson will be invited to participate as a member of the Project Development Team (PDT) during the PA/ED phase.

Context-Sensitive Solutions and Complete Streets

The project corridor is located entirely within the City of Carson and is generally in an urban setting surrounded by a mix of residential, commercial, recreational, light and heavy industrial, and public use. Notable land uses adjacent to the freeway include Kia, Honda, and Nissan dealerships in vicinity of the Wilmington Avenue interchange; Go Kart track and a residential neighborhood near the Carson Street interchange; a plant nursery along the Southern California Edison (SCE) utility corridor, commercial, and residential neighborhoods (single family and mobile homes) between Carson Street and Avalon Boulevard;

and Porsche auto center and race track and vacant lands between Avalon Boulevard and Main Street. Portions of the project corridor are landscaped and a few outdoor advertisement signs are present along the project corridor.

A new 168-acre development (District at South Bay) located in the current vacant lands along SB I-405 between Del Amo Boulevard and Avalon Boulevard is under construction. The development is planned for commercial, entertainment, and residential uses. Horizontal construction including roadway infrastructures and utilities has mostly been completed and vertical construction of building and facilities is anticipated to be implemented in late 2020. The vacant land along NB I-405 is used by the Goodyear Blimp for takeoff and landing.

Dominguez Channel which is eligible for the NRHP and the California Historical Landmarks, generally runs parallel on the east side of the freeway and has paved Class I bike paths running along both sides of the channel. Class II bike lanes are striped along Carson Street and Del Amo Boulevard, and Class III bike routes are identified along 213th Street and Main Street. Paved sidewalks are typically provided on both sides of cross streets except Avalon Boulevard where paved sidewalk is provided on one side only and Main Street where paved sidewalks do not exist. Marked crosswalks and curb ramps are provided at some ramp terminal intersections.

In the 2004 General Plan, the City of Carson designated Carson Street corridor as a “Main Street”. The City also acknowledged unattractive land uses along freeway corridors and expressed desire to enhance the City’s image through screening, landscaping, and buffering of freeway and major arterial corridors.

Context-sensitive solutions in the project design will be evaluated during the PA/ED phase to balance the transportation needs with aesthetic, historical, and environmental values of the local community into the project design where appropriate. Early public outreach and coordination with the City of Carson during the PA/ED phase will provide inputs on community values.

3. PURPOSE AND NEED

Purpose

The purpose of the project is to improve freeway operations related to traffic time reliability and safety along both directions of I-405 between Wilmington Avenue and Main Street in the City of Carson by reducing congestion and minimizing queuing of confluence areas through improving weaving, merging, and diverging operations between on- and off-ramps.

Need

The need for the project is derived from traffic data that shows declining operational conditions during peak hours and congestion within the project limits. Several freeway mainline segments as well as freeway/ramp junctions within the project limits currently operate at substandard Level of Service (LOS) F during the peak hours. These poor operating conditions are the result of insufficient freeway capacity and turbulence

at the ramp entrances and exits. Under the design year 2045, additional freeway segments and ramp junctions are projected to further decline to LOS F, if no improvements are made.

Traffic congestion along this section of I-405 can also be attributable to geometric deficiencies within the project limits. The nonstandard interchange spacing between the Carson Street and Avalon Boulevard interchanges as well as the close proximity of the Avalon Boulevard and Main Street interchanges to the I-110 system interchange contribute to poor operating conditions in some freeway segments. Nonstandard weaving distances between some of the interchange on- and off-ramps also contribute to disruption of traffic flow resulting in weaving congestion and unsafe operation. Traffic accident data reveals that rear-end collisions are predominant on both NB and SB I-405 mainline, accounting for 57 to 68 percent of all collision types, which are indicative of congested condition.

The above Purpose and Need statements will be reviewed, refined, and approved during the PA/ED phase.

4. TRAFFIC ENGINEERING PERFORMANCE ASSESSMENT

4A. CURRENT AND FORECASTED TRAFFIC

The project study is based on the existing year 2019, opening year 2025, and design year 2045. A Traffic Engineering Performance Assessment (TEPA) for the project has been prepared in August 2020, to analyze the existing (2019) and future year (2025 and 2045) traffic conditions for the highways within the project study limits. Existing traffic volumes along the I-405 mainline and interchange ramps within the project limits were derived from the Caltrans Performance Measurement System (PeMS) database. The traffic forecasts for the opening year 2025 were extrapolated from the 2019 PeMS volumes, using an annualized growth rate of 0.3% for 6 years. The traffic forecasts for the design year 2045 were extrapolated from the 2019 PeMS volumes, using an annualized growth rate of 0.3% for 26 years.

The Socio-Economic Data (SED) from the 2016 SCAG Regional Travel Demand Model (RTDM) Amendment #3, was used in calculating the growth for use in the future traffic forecasts. The RTDM traffic volume forecasts in the project corridor show very little to no growth between 2017 and 2040; as such, the projected growth in SED including population, households, and employment data, were used to compute the growth for the traffic volume projections.

The future traffic forecasts assume that the proposed auxiliary lanes between on- and off-ramps would not create any additional capacity and would not attract additional regional traffic to the corridor. As such, future traffic volumes for the build and no build alternatives are assumed to be the same. Graphical representations of the existing year 2019, opening year 2025, and design year 2045 traffic volumes for I-405 freeway mainline lanes and interchange ramps are included in **Attachment B** of this document.

Current and Forecasted Mainline Analysis

Table 4.1 summarizes the current (2019) and forecasted (design year 2045) Average Daily Traffic (ADT) volumes for the freeway mainline within the project corridor. As shown, the traffic demands on I-405 are projected to increase approximately 8.3 percent between 2019 and 2045.

TABLE 4.1: EXISTING & YEAR 2045 NO BUILD ADT VOLUMES

Freeway Segment		Bi-Directional Mainline ADT Volume*	
		2019 Existing	2045 Build and No Build
Northbound			
1	Wilmington Ave off to Wilmington Ave loop on	149,700	162,155
2	Wilmington Ave loop on to Wilmington Ave on	153,700	166,488
3	Wilmington Ave on to Carson St loop off	161,700	175,153
4	Carson St loop off to Carson St on	154,616	167,480
5	Carson St on to Avalon Blvd off	159,811	173,107
6	Avalon Blvd off to Avalon Blvd on	144,908	156,964
7	Avalon Blvd on to Weigh Station off	156,564	169,590
8	Weigh Station off to Weigh Station on	153,765	166,558
9	Weigh Station on to Main St off	156,564	169,590
Southbound			
1	Main St on to Weigh Station off	150,750	163,292
2	Weigh Station off to Weigh Station on	148,100	160,422
3	Weigh Station on to Avalon Blvd hook off	150,750	163,292
4	Avalon Blvd hook off to Avalon Blvd loop on	137,882	149,354
5	Avalon Blvd loop on to Avalon Blvd on	142,550	154,410
6	Avalon Blvd on to Carson St loop off	145,986	158,132
7	Carson St loop off to Carson St on	142,605	154,470
8	Carson St on to Wilmington Ave off	151,446	164,046
9	Wilmington Ave off to Wilmington Ave on	147,446	159,714

Source: TEPA, Table 5

*Mainline ADT includes passenger cars and truck traffic (approximately 4.4%)

Table 4.2 and **Table 4.3** present existing and future (no build and build) morning and afternoon peak hour volumes as well as volume to capacity (v/c) ratios and LOS for I-405 GP lanes, respectively. As shown, several I-405 freeway segments currently operate at LOS E and F during morning and afternoon peak hours. Of note, LOS F currently exists in 4 NB mainline segments during the morning peak hours and 2 NB mainline segments during the afternoon peak hours. These numbers of mainline segments with LOS F are projected to increase under the design year 2045 No Build condition, to 7 segments (6 NB and 1 SB) during the morning peak hours and 4 NB segments during the afternoon peak hours. Under the design year 2045 Build condition, implementation of the proposed auxiliary lanes is projected to reduce the number of I-405 mainline segments with LOS F to 4 NB segments during the morning peak hours and 2 NB segments during the afternoon peak hours.

Table 4.4 and **Table 4.5** present existing and future (no build and build) morning and afternoon peak hour volumes and LOS for I-405 HOV lanes, respectively. As shown, none of the HOV lanes currently operate at LOS F, but LOS E exists in 5 NB segments during the morning peak hours and 7 segments (5 NB and 2 SB) during the afternoon peak hours. Under the future No Build condition, traffic operations are predicted to degrade during the afternoon peak hours in which LOS F is projected in 9 mainline segments (5 NB and 4 SB). These operational conditions would be the same for the future year Build condition, since the project does not include alterations to the existing managed lanes.

TABLE 4.2: EXISTING & YEAR 2045 GP LANE AM LOS

I-405 Freeway Segment		GP Lane AM Peak Hour								
		2019 Existing			2045 No Build			2045 Build		
		Vol	v/c	LOS	Vol	v/c	LOS	Vol	v/c	LOS
Northbound										
1	Wilmington Ave off to Wilmington Ave loop on	8,138	0.99	E	8,815	>1.00	F	8,815	>1.00	F
2	Wilmington Ave loop on to Wilmington Ave on	8,360	>1.00	F	9,056	>1.00	F	9,056	>1.00	F
3	Wilmington Ave on to Carson St loop off	8,838	>1.00	F	9,573	>1.00	F	9,573	0.90	E
4	Carson St loop off to Carson St on	8,305	>1.00	F	8,996	>1.00	F	8,996	>1.00	F
5	Carson St on to Avalon Blvd off	8,622	>1.00	F	9,339	>1.00	F	9,339	0.88	D
6	Avalon Blvd off to Avalon Blvd on	8,161	0.99	E	8,840	>1.00	F	8,840	>1.00	F
7	Avalon Blvd on to Weigh Station off	8,727	0.85	D	9,453	0.89	E	9,453	0.89	E
8	Weigh Station off to Weigh Station on	8,552	0.81	D	9,264	0.85	D	9,264	0.85	D
9	Weigh Station on to Main St off	8,727	0.85	D	9,453	0.89	E	9,453	0.74	D
Southbound										
1	Main St on to Weigh Station off	8,342	0.67	C	9,036	0.71	C	9,036	0.71	C
2	Weigh Station off to Weigh Station on	8,175	0.78	D	8,855	0.82	D	8,855	0.82	D
3	Weigh Station on to Avalon Blvd hook off	8,342	0.81	D	9,036	0.85	D	9,036	0.85	D
4	Avalon Blvd hook off to Avalon Blvd loop on	7,501	0.91	E	8,125	0.95	E	8,125	0.95	E
5	Avalon Blvd loop on to Avalon Blvd on	7,679	0.93	E	8,318	0.98	E	8,318	0.98	E
6	Avalon Blvd on to Carson St loop off	7,760	0.94	E	8,406	0.99	E	8,406	0.79	D
7	Carson St loop off to Carson St on	7,507	0.91	E	8,132	0.95	E	8,132	0.95	E
8	Carson St on to Wilmington Ave off	8,082	0.98	E	8,754	> 1.00	F	8,754	0.82	D
9	Wilmington Ave off to Wilmington Ave on	7,854	0.95	E	8,507	1.00	E	8,507	1.00	E

Source: TEPA, Table 11, Table 25, and Table 29
Vol = volume (in vehicles per hour); v/c = volume to capacity ratio
Boldface indicates LOS exceeds LOS Criteria

TABLE 4.3: EXISTING & YEAR 2045 GP LANE PM LOS

I-405 Freeway Segment		GP Lane PM Peak Hour								
		2019 Existing			2045 No Build			2045 Build		
		Vol	v/c	LOS	Vol	v/c	LOS	Vol	v/c	LOS
Northbound										
1	Wilmington Ave off to Wilmington Ave loop on	7,706	0.93	E	8,347	0.98	E	8,347	0.98	E
2	Wilmington Ave loop on to Wilmington Ave on	7,923	0.96	E	8,582	>1.00	F	8,582	>1.00	F
3	Wilmington Ave on to Carson St loop off	8,424	>1.00	F	9,125	>1.00	F	9,125	0.86	D
4	Carson St loop off to Carson St on	7,948	0.96	E	8,609	>1.00	F	8,609	>1.00	F
5	Carson St on to Avalon Blvd off	8,321	>1.00	F	9,014	>1.00	F	9,014	0.85	D
6	Avalon Blvd off to Avalon Blvd on	7,857	0.95	E	8,511	1.00	E	8,511	1.00	E
7	Avalon Blvd on to Weigh Station off	8,602	0.83	D	9,318	0.87	D	9,318	0.87	D
8	Weigh Station off to Weigh Station on	8,430	0.80	D	9,132	0.84	D	9,132	0.84	D
9	Weigh Station on to Main St off	8,602	0.83	D	9,318	0.87	D	9,318	0.73	D
Southbound										
1	Main St on to Weigh Station off	6,792	0.55	C	7,357	0.58	C	7,357	0.58	C
2	Weigh Station off to Weigh Station on	6,656	0.63	C	7,210	0.66	C	7,210	0.66	C
3	Weigh Station on to Avalon Blvd hook off	6,792	0.66	C	7,357	0.69	C	7,357	0.69	C
4	Avalon Blvd hook off to Avalon Blvd loop on	6,073	0.74	D	6,578	0.77	D	6,578	0.77	D
5	Avalon Blvd loop on to Avalon Blvd on	6,468	0.78	D	7,006	0.82	D	7,006	0.82	D
6	Avalon Blvd on to Carson St loop off	6,826	0.83	D	7,394	0.87	D	7,394	0.69	C
7	Carson St loop off to Carson St on	6,715	0.81	D	7,274	0.85	D	7,274	0.85	D
8	Carson St on to Wilmington Ave off	7,561	0.92	E	8,190	0.96	E	8,190	0.77	D
9	Wilmington Ave off to Wilmington Ave on	7,353	0.89	E	7,965	0.93	E	7,965	0.93	E

Source: TEPA, Table 12, Table 26, and Table 30
Vol = volume (in vehicles per hour); v/c = volume to capacity ratio
Boldface indicates LOS exceeds LOS Criteria

TABLE 4.4: EXISTING & YEAR 2045 HOV LANE AM LOS

I-405 Freeway Segment		HOV Lane AM Peak Hour								
		2019 Existing			2045 No Build			2045 Build		
		Vol	v/c	LOS	Vol	v/c	LOS	Vol	v/c	LOS
Northbound										
1	Wilmington Ave off to Wilmington Ave loop on	1,440	0.95	E	1,560	1.00	E	1,560	1.00	E
2	Wilmington Ave loop on to Wilmington Ave on	1,440	0.95	E	1,560	1.00	E	1,560	1.00	E
3	Wilmington Ave on to Carson St loop off	1,440	0.95	E	1,560	1.00	E	1,560	1.00	E
4	Carson St loop off to Carson St on	1,440	0.95	E	1,560	1.00	E	1,560	1.00	E
5	Carson St on to Avalon Blvd off	1,440	0.95	E	1,560	1.00	E	1,560	1.00	D
6	Avalon Blvd off to Avalon Blvd on	1,247	0.82	D	1,351	0.86	D	1,351	0.86	D
7	Avalon Blvd on to Weigh Station off	1,247	0.82	C	1,351	0.86	D	1,351	0.86	D
8	Weigh Station off to Weigh Station on	1,247	0.82	C	1,351	0.86	C	1,351	0.86	C
9	Weigh Station on to Main St off	1,247	0.82	C	1,351	0.86	D	1,351	0.86	C
Southbound										
1	Main St on to Weigh Station off	838	0.55	B	908	0.58	B	908	0.58	B
2	Weigh Station off to Weigh Station on	838	0.55	B	908	0.58	B	908	0.58	B
3	Weigh Station on to Avalon Blvd hook off	838	0.55	B	908	0.58	B	908	0.58	B
4	Avalon Blvd hook off to Avalon Blvd loop on	838	0.55	B	908	0.58	B	908	0.58	B
5	Avalon Blvd loop on to Avalon Blvd on	838	0.55	B	908	0.58	B	908	0.58	B
6	Avalon Blvd on to Carson St loop off	1,035	0.68	C	1,121	0.72	C	1,121	0.72	C
7	Carson St loop off to Carson St on	1,035	0.68	C	1,121	0.72	C	1,121	0.72	C
8	Carson St on to Wilmington Ave off	1,035	0.68	C	1,121	0.72	C	1,121	0.72	C
9	Wilmington Ave off to Wilmington Ave on	1,035	0.68	C	1,121	0.72	C	1,121	0.72	C

Source: TEPA, Table 11, Table 25, and Table 29
Vol = volume (in vehicles per hour); v/c = volume to capacity ratio
Boldface indicates LOS exceeds LOS Criteria

TABLE 4.5: EXISTING & YEAR 2045 HOV LANE PM LOS

I-405 Freeway Segment		HOV Lane PM Peak Hour								
		2019 Existing			2045 No Build			2045 Build		
		Vol	v/c	LOS	Vol	v/c	LOS	Vol	v/c	LOS
Northbound										
1	Wilmington Ave off to Wilmington Ave loop on	1,468	0.97	E	1,590	>1.00	F	1,590	>1.00	F
2	Wilmington Ave loop on to Wilmington Ave on	1,468	0.97	E	1,590	>1.00	F	1,590	>1.00	F
3	Wilmington Ave on to Carson St loop off	1,468	0.97	E	1,590	>1.00	F	1,590	>1.00	F
4	Carson St loop off to Carson St on	1,468	0.97	E	1,590	>1.00	F	1,590	>1.00	F
5	Carson St on to Avalon Blvd off	1,468	0.97	E	1,590	>1.00	F	1,590	>1.00	F
6	Avalon Blvd off to Avalon Blvd on	949	0.62	B	1,028	0.66	C	1,028	0.66	C
7	Avalon Blvd on to Weigh Station off	949	0.62	B	1,028	0.66	B	1,028	0.66	B
8	Weigh Station off to Weigh Station on	949	0.62	B	1,028	0.66	B	1,028	0.66	B
9	Weigh Station on to Main St off	949	0.62	B	1,028	0.66	B	1,028	0.66	B
Southbound										
1	Main St on to Weigh Station off	1,339	0.88	C	1,450	0.93	D	1,450	0.93	D
2	Weigh Station off to Weigh Station on	1,339	0.88	C	1,450	0.93	D	1,450	0.93	D
3	Weigh Station on to Avalon Blvd hook off	1,339	0.88	C	1,450	0.93	D	1,450	0.93	D
4	Avalon Blvd hook off to Avalon Blvd loop on	1,339	0.88	C	1,450	0.93	D	1,450	0.93	D
5	Avalon Blvd loop on to Avalon Blvd on	1,339	0.88	C	1,450	0.93	D	1,450	0.93	D
6	Avalon Blvd on to Carson St loop off	1,473	0.97	D	1,596	>1.00	F	1,596	>1.00	F
7	Carson St loop off to Carson St on	1,473	0.97	D	1,596	>1.00	F	1,596	>1.00	F
8	Carson St on to Wilmington Ave off	1,473	0.97	E	1,596	>1.00	F	1,596	>1.00	F
9	Wilmington Ave off to Wilmington Ave on	1,473	0.97	E	1,596	>1.00	F	1,596	>1.00	F

Source: TEPA, Table 12, Table 26, and Table 30
Vol = volume (in vehicles per hour); v/c = volume to capacity ratio
Boldface indicates LOS exceeds LOS Criteria

Current and Forecasted Ramp Analysis

A ramp junction merge/diverge LOS analysis was performed for the interchange ramps along the I-405 project corridor. **Table 4.6** summarizes existing (2019) and projected (2045 no build and build) peak hour volumes as well as merge/diverge LOS for the interchange ramps along NB and SB I-405. As shown, while all of the SB ramps currently operate at acceptable LOS D or better, 6 interchange on- and off-ramps along NB I-405 currently experience unacceptable LOS F during the morning peak hours and 5 during the afternoon peak hours. Traffic operations of the NB and SB ramps are projected to degrade under the future No Build condition without the proposed improvements. As shown, LOS F is projected for 6 NB and 3 SB ramps during the morning peak hours and 6 NB ramps during the afternoon peak hours in 2045, without improvements.

Under the project’s Build condition, the proposed auxiliary lane addition is projected to substantially improve weaving operations between interchanges. As shown, only 2 NB ramps are projected to operate at LOS F during the morning and afternoon peak hours in the design year 2045.

TABLE 4.6: EXISTING & YEAR 2045 RAMP LOS

I-405 Ramp		Ramp Junction Peak Hour Volume & LOS											
		2019 Existing				2045 No Build				2045 Build			
		a.m.	LOS	p.m.	LOS	a.m.	LOS	p.m.	LOS	a.m.	LOS	p.m.	LOS
NB Ramps													
1	Wilmington Ave NB loop on-ramp	222	F	217	D	241	F	235	F	241	F	235	F
2	Wilmington Ave NB on-ramp	478	F	501	F	518	F	543	F	518	D	543	D
3	Carson St NB loop off-ramp	533	F	476	F	577	F	516	F	577	D	516	D
4	Carson St NB on-ramp	317	F	373	F	343	F	404	F	343	E	404	E
5	Avalon Blvd NB off-ramp	461	F	464	F	500	F	503	F	500	E	503	E
6	Avalon Blvd NB on-ramp	566	F	745	F	613	F	807	F	613	F	807	F
7	Weigh station NB off-ramp	175	D	172	D	189	D	186	D	189	D	186	D
8	Weigh station NB on-ramp	175	C	172	C	189	C	186	C	189	C	186	C
9	Main St NB off-ramp	370	D	406	D	401	D	440	D	401	D	440	D
SB Ramps													
1	Main St SB on-ramp	236	D	653	C	256	D	707	C	256	D	707	C
2	Weigh station SB off-ramp	167	D	136	C	181	D	147	C	181	D	147	C
3	Weigh station SB on-ramp	167	C	136	C	181	C	147	C	181	C	147	C
4	Avalon Blvd SB hook off-ramp	841	D	719	C	911	D	779	C	911	D	779	C
5	Avalon Blvd SB loop on-ramp	178	D	395	C	193	D	428	C	193	D	428	C
6	Avalon Blvd SB on-ramp	81	D	358	C	88	D	388	D	88	E	388	D
7	Carson St SB loop off-ramp	253	D	111	D	274	F	120	D	274	E	120	D
8	Carson St SB on-ramp	575	D	846	D	623	F	916	D	623	E	916	E
9	Wilmington Ave SB off-ramp	228	D	208	D	247	F	225	D	247	E	225	E

Source: TEPA, Table 15, Table 16, Table 27, Table 28, Table 31, and Table 32

Boldface indicates LOS exceeds LOS Criteria

*Ramp merge/diverge analysis is not applicable. The LOS reported is based on the mainline weaving analysis.

4B. ACCIDENT ANALYSIS

Traffic accident data for the I-405 freeway and interchange ramps within the project study limits were obtained from Caltrans Traffic Accident Surveillance and Analysis Systems (TASAS) Table B and TASAS Selective Accident Retrieval (TSAR).

Mainline Accident Data

Table 4.7 presents the 3-year accident data between April 1, 2016 and March 31, 2019 for the I-405 freeway between Wilmington Avenue and Main Street. As shown, the actual total accident rates for all but one SB freeway segment are lower than the statewide average for similar facilities. During the review period, fatality was reported in two NB segments, resulting in higher actual fatality rates than the statewide average. These locations are shown in boldface in the table.

TABLE 4.7: MAINLINE ACCIDENT RATES

I-405 Freeway Segment		No. of Accidents			Accident Rate (a/mvm)					
					Actual Rate			Average Rate		
		F	F+I	TOT	F	F+I	TOT	F	F+I	TOT
Northbound										
1	Wilmington Ave to Carson St 9.56 – 10.54	1	30	93	0.007	0.22	0.67	0.003	0.32	1.06
2	Carson St to Avalon Blvd 10.54 – 11.22	1	10	42	0.011	0.11	0.44	0.003	0.32	1.05
3	Avalon Blvd to Main St 11.22 – 12.60	0	54	169	0.000	0.26	0.82	0.003	0.29	0.96
Southbound										
1	Main St to Avalon Blvd* 12.60 – 11.22	0	79	280	0.000	0.38	1.36	0.003	0.29	1.04
2	Avalon Blvd to Carson St 11.22 – 10.54	0	16	77	0.000	0.17	0.81	0.003	0.32	1.05
3	Carson St to Wilmington Ave 10.54 – 9.56	0	36	129	0.000	0.26	0.93	0.003	0.32	1.06

a/mvm = accidents per million vehicle miles; F = Fatality; I = Injury; TOT = Total
Boldface indicates that the actual accident rate is higher than the statewide average.
**This segment is denoted as having high accident concentration.*

The breakdown of traffic collisions by type that occurred on NB and SB I-405 during the 3-year review period is summarized in **Table 4.8**. Primary collision factors are presented in **Table 4.9**. As shown, rear end collisions are predominant on both NB and SB I-405 mainline, accounting for more than half of all collisions, followed by sideswipe collisions. These type of collisions, combined with heavy traffic volume, are indicative of congested condition. In both directions, speeding is reported as the leading primary collision factor in all segments.

TABLE 4.8: MAINLINE COLLISION TYPES

Location		No. of Collisions and Percent by Type									
		Head-On	Side-swipe	Rear End	Broad-side	Hit Object	Over-turn	Auto-Ped	Other	Not Stated	Total
Northbound											
1	Wilmington Ave to Carson St	0	25	53	3	11	1	0	0	0	93
		0%	27%	57%	3%	12%	1%	0%	0%	0%	100%
2	Carson St to Avalon Blvd	0	13	28	0	0	0	1	0	0	42
		0%	31%	67%	0%	0%	0%	2%	0%	0%	100%
3	Avalon Blvd to Main St	0	31	114	1	21	2	0	0	0	169
		0%	18%	68%	1%	12%	1%	0%	0%	0%	100%
Southbound											
1	Main St to Avalon Blvd	1	79	185	1	14	0	0	0	0	280
		0.5%	28%	66%	0.5%	5%	0%	0%	0%	0%	100%
2	Avalon Blvd to Carson St	0	26	45	0	6	0	0	0	0	77
		0%	34%	58%	0%	8%	0%	0%	0%	0%	100%
3	Carson St to Wilmington Ave	0	36	80	2	10	1	0	0	0	129
		0%	28%	62%	1.5%	8%	0.5%	0%	0%	0%	100%

TABLE 4.9: MAINLINE PRIMARY COLLISION FACTORS

Location		Primary Collision Factors									
		Under Influence Alcohol	Follow Too Close	Fail to Yield	Improper Turn	Speeding	Other Violations	Improper Drive	Other Than Driver	Unknown or Not Stated	Total
Northbound											
1	Wilmington Ave to Carson St	7	0	0	3	51	27	0	5	0	93
		8%	0%	0%	3%	55%	29%	0%	5%	0%	100%
2	Carson St to Avalon Blvd	2	0	1	0	28	11	0	0	0	42
		5%	0%	2%	0%	67%	26%	0%	0%	0%	100%
3	Avalon Blvd to Main St	6	0	2	8	115	30	0	7	1	169
		3%	0%	1%	5%	68%	18%	0%	4%	1%	100%
Southbound											
1	Main St to Avalon Blvd	6	0	0	4	187	78	0	4	1	280
		2%	0%	0%	1.5%	66.5%	28%	0%	1.5%	0.5%	100%
2	Avalon Blvd to Carson St	4	0	0	1	48	23	0	1	0	77
		5%	0%	0%	1.5%	62%	30%	0%	1.5%	0%	100%
3	Carson St to Wilmington Ave	5	0	0	8	78	37	0	0	1	129
		4%	0%	0%	6%	60%	29%	0%	0%	1%	100%

Ramp Accident Data

Table 4.10 summarizes a 3-year accident history between April 1, 2016 and March 31, 2019 for the interchange ramps along the I-405 corridor within the study limits. The accident history reveals that 5 out of 8 NB ramps and 5 out of 8 SB ramps have actual combined fatality/injury and/or total accident rates that are higher than the statewide average accident rates for similar facilities. These locations are shown in boldface in the table.

TABLE 4.10: RAMP ACCIDENT RATES

I-405 Ramps			No. of Accidents			Accident Rate (a/mvm)					
						Actual Rate			Average Rate		
			F	F+I	TOT	F	F+I	TOT	F	F+I	TOT
Northbound											
1	9.507	Wilmington Ave NB loop on-ramp	0	0	4	0.000	0.00	1.29	0.001	0.23	0.67
2	9.748	Wilmington Ave NB on-ramp*	-	-	-	-	-	-	-	-	-
3	10.587	Carson St NB loop off-ramp	0	0	3	0.000	0.00	0.32	0.002	0.31	0.92
4	10.700	Carson St NB on-ramp	0	0	6	0.000	0.00	0.95	0.002	0.21	0.60
5	11.120	Avalon Blvd NB off-ramp	0	2	10	0.000	0.31	1.53	0.003	0.24	0.69
6	11.390	Avalon Blvd NB on-ramp	0	6	31	0.000	0.40	2.08	0.002	0.21	0.60
7	11.702	Weigh station NB off-ramp	0	0	1	0.000	0.00	7.94	0.001	0.06	0.61
8	11.897	Weigh station NB on-ramp	0	0	0	0.000	0.00	0.00	0.000	0.02	0.23
9	12.471	Main St NB off-ramp	0	0	2	0.000	0.00	0.39	0.004	0.32	0.92
Southbound											
1	12.439	Main St SB on-ramp	0	5	14	0.000	0.98	2.73	0.002	0.21	0.60
2	12.166	Weigh station SB off-ramp	0	2	4	0.000	1.83	3.65	0.001	0.06	0.61
3	11.972	Weigh station SB on-ramp	0	0	0	0.000	0.00	0.00	0.000	0.02	0.23
4	11.409	Avalon Blvd SB hook off-ramp	0	2	8	0.000	0.11	0.44	0.004	0.32	0.92
5	11.276	Avalon Blvd SB loop on-ramp	0	5	13	0.000	0.94	2.45	0.001	0.23	0.67
6	11.2	Avalon Blvd SB on-ramp**	-	-	-	-	-	-	-	-	-
7	10.530	Carson St SB loop off-ramp	0	0	4	0.000	0.00	1.12	0.002	0.31	0.92
8	10.407	Carson St SB on-ramp	0	2	9	0.000	0.23	1.02	0.002	0.21	0.60
9	9.715	Wilmington Ave SB off-ramp	0	0	3	0.000	0.00	0.75	0.004	0.32	0.92

a/mvm = accidents per million vehicle miles; F = Fatality; I = Injury; TOT = Total

Boldface indicates that the actual accident rate is higher than the statewide average.

**The Wilmington Avenue NB on-ramp was recently constructed (2019) and therefore, does not have 3-year accident data.*

***Data not available in Caltrans system*

The breakdown of collisions by type that occurred on each ramp during the 3-year review period is summarized in **Table 4.11**. Primary collision factors are presented in **Table 4.12**. As shown, the predominant types of collisions on the I-405 interchange ramps were distributed among sideswipe, rear end, broadside, and hit object collisions. Speeding and other violations were listed as leading primary collision factors in the majority of the collisions. Ramp collisions may be attributed to traffic congestion on the ramp and at the ramp terminal intersection as well as weaving/lane changing activities at the freeway junctions.

TABLE 4.11: RAMP COLLISION TYPES

I-405 Ramps			No. of Collisions and Percent by Type									
			Head-On	Side-swipe	Rear End	Broad-side	Hit Object	Over-turn	Auto-Ped	Other	Not Stated	Total
NB Ramps												
1	9.507	Wilmington Ave NB loop on-ramp	0	1	2	0	1	0	0	0	0	4
			0%	25%	50%	0%	25%	0%	0%	0%	0%	100%
2	9.748	Wilmington Ave NB on-ramp*	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-
3	10.587	Carson St NB loop off-ramp	0	0	0	0	2	1	0	0	0	3
			0%	0%	0%	0%	67%	33%	0%	0%	0%	100%
4	10.700	Carson St NB on-ramp	0	2	3	1	0	0	0	0	0	6
			0%	33%	50%	17%	0%	0%	0%	0%	0%	100%
5	11.120	Avalon Blvd NB off-ramp	0	1	2	7	0	0	0	0	0	10
			0%	10%	20%	70%	0%	0%	0%	0%	0%	100%
6	11.390	Avalon Blvd NB on-ramp	1	20	6	4	0	0	0	0	0	31
			3%	65%	19%	13%	0%	0%	0%	0%	0%	100%
7	11.702	Weigh station NB off-ramp	0	0	0	0	1	0	0	0	0	1
			0%	0%	0%	0%	100%	0%	0%	0%	0%	100%
8	11.897	Weigh station NB on-ramp	0	0	0	0	0	0	0	0	0	0
			0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9	12.471	Main St NB off-ramp	0	1	1	0	0	0	0	0	0	2
			0%	50%	50%	0%	0%	0%	0%	0%	0%	100%
SB Ramps												
1	12.439	Main St SB on-ramp	2	1	1	9	1	0	0	0	0	14
			14%	7%	7%	65%	7%	0%	0%	0%	0%	100%
2	12.166	Weigh station SB off-ramp	0	0	0	0	3	1	0	0	0	4
			0%	0%	0%	0%	75%	25%	0%	0%	0%	100%
3	11.972	Weigh station SB on-ramp	0	0	0	0	0	0	0	0	0	0
			0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	11.409	Avalon Blvd SB hook off-ramp	0	2	1	1	3	1	0	0	0	8
			0%	25%	12.5%	12.5%	37.5%	12.5%	0%	0%	0%	100%
5	11.276	Avalon Blvd SB loop on-ramp	0	1	11	1	0	0	0	0	0	13
			0%	8%	84%	8%	0%	0%	0%	0%	0%	100%
6	11.020	Avalon Blvd SB on-ramp**	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-
7	10.530	Carson St SB loop off-ramp	0	1	2	0	1	0	0	0	0	4
			0%	25%	50%	0%	25%	0%	0%	0%	0%	100%
8	10.407	Carson St SB on-ramp	0	3	2	0	3	0	1	0	0	9
			0%	33.5%	22%	0%	33.5%	0%	11%	0%	0%	100%
9	9.715	Wilmington Ave SB off-ramp	0	0	2	0	1	0	0	0	0	3
			0%	0%	67%	0%	33%	0%	0%	0%	0%	100%

*The Wilmington Avenue NB on-ramp was recently constructed (2019) and therefore, does not have 3-year accident data.
**Data not available in Caltrans system

TABLE 4.12: RAMP PRIMARY COLLISION FACTORS

I-405 Ramps			Primary Collision Factors									
			Influ- ence Alcohol	Follow Too Close	Fail to Yield	Impro- per Turn	Speed- ing	Other Viola- tions	Impro- per Drive	Other Than Driver	Un- known or Not Stated	Total
NB Ramps												
1	9.507	Wilmington Ave NB loop on-ramp	0	2	0	1	0	1	0	0	0	4
			0%	50%	0%	25%	0%	25%	0%	0%	0%	100%
2	9.748	Wilmington Ave NB on-ramp*	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-
3	10.587	Carson St NB loop off-ramp	0	0	0	0	2	1	0	0	0	3
			0%	0%	0%	0%	67%	33%	0%	0%	0%	100%
4	10.700	Carson St NB on-ramp	0	0	0	0	3	3	0	0	0	6
			0%	0%	0%	0%	50%	50%	0%	0%	0%	100%
5	11.120	Avalon Blvd NB off-ramp	0	0	0	0	4	5	0	0	1	10
			0%	0%	0%	0%	40%	50%	0%	0%	10%	100%
6	11.390	Avalon Blvd NB on-ramp	1	2	10	0	7	9	0	0	2	31
			3%	6.5%	32%	0%	23%	29%	0%	0%	6.5%	100%
7	11.702	Weigh station NB off-ramp	0	0	0	0	1	0	0	0	0	1
			0%	0%	0%	0%	100%	0%	0%	0%	0%	100%
8	11.897	Weigh station NB on-ramp	0	0	0	0	0	0	0	0	0	0
			0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9	12.471	Main St NB off-ramp	0	0	0	1	0	1	0	0	0	2
			0%	0%	0%	50%	0%	50%	0%	0%	0%	100%
SB Ramps												
1	12.439	Main St SB on-ramp	0	0	1	2	1	7	0	0	3	14
			0%	0%	7%	14%	7%	50%	0%	0%	22%	100%
2	12.166	Weigh station SB off-ramp	0	0	0	2	2	0	0	0	0	4
			0%	0%	0%	50%	50%	0%	0%	0%	0%	100%
3	11.972	Weigh station SB on-ramp	0	0	0	0	0	0	0	0	0	0
			0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	11.409	Avalon Blvd SB hook off-ramp	0	0	0	1	4	2	0	1	0	8
			0%	0%	0%	12.5%	50%	25%	0%	12.5%	0%	100%
5	11.276	Avalon Blvd SB loop on-ramp	0	1	0	0	10	2	0	0	0	13
			0%	8%	0%	0%	77%	15%	0%	0%	0%	100%
6	11.020	Avalon Blvd SB off-ramp**	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-
7	10.530	Carson St SB loop off-ramp	1	0	0	0	2	1	0	0	0	4
			25%	0%	0%	0%	50%	25%	0%	0%	0%	100%
8	10.407	Carson St SB on-ramp	1	0	0	2	5	1	0	0	0	9
			11%	0%	0%	22%	56%	11%	0%	0%	0%	100%
9	9.715	Wilmington Ave SB off-ramp	0	0	0	0	2	1	0	0	0	3
			0%	0%	0%	0%	67%	33%	0%	0%	0%	100%

*The Wilmington Avenue NB on-ramp was recently constructed (2019) and therefore, does not have 3-year accident data.

**Data not available in Caltrans system

The project would add 3 NB and 2 SB auxiliary lanes on the freeway mainline between interchange ramps. All interchange ramps within the project limits would generally be maintained. The addition of these auxiliary lanes is anticipated to facilitate merge/diverge and weaving maneuvers which may alleviate congestion and lead to a decrease in collisions on the freeway mainline and at the freeway/ramp junctions.

4C. TRAFFIC STUDIES DURING PA/ED

The Traffic Operations Analysis Report (TOAR) to be performed during the PA/ED phase will incorporate Senate Bill 743 requirements. It is recommended that traffic counts be performed during the PA/ED phase to supplement the existing condition data. For future year traffic forecasts, the latest SCAG model should be used. The mainline study limits should be extended to adjacent interchanges upstream and downstream of the project limits. Recommended traffic analyses to be performed during the PA/ED phase include the following:

- Freeway mainline basic segment LOS analysis
- Freeway weaving analysis
- Ramp junction merge/diverge LOS analysis
- Ramp intersection LOS and queue analyses
- Freeway on-ramp meter queue analysis
- Freeway off-ramp queue analysis
- Intersection queue analysis
- Vehicle Miles Traveled (VMT) analysis per guidelines specified in California Senate Bill 743
- Microsimulation
- Safety Analysis

5. DEFICIENCIES

5A. PRIMARY DEFICIENCIES

Traffic Operations

This segment of I-405 currently experiences, and will continue to experience, capacity and operational problems as reflected in degraded LOS in several freeway segments. Population within the project study area is projected to increase which in turn will result in an increase in traffic utilizing this freeway, exacerbating freeway operations and safety. As discussed in Section 4A, LOS analysis for the I-405 freeway mainlines indicates that LOS F currently exists in 4 NB mainline segments during the morning peak hours and 2 NB mainline segments during the afternoon peak hours. These numbers of mainline segments with LOS F are projected to increase under the design year 2045 No Build condition, to 7 segments (6 NB and 1 SB) during the morning peak hours and 4 NB segments during the afternoon peak hours.

Similarly, LOS analysis for freeway/ramp junctions shows 6 out of 9 NB ramps within the project limits currently operating at LOS F during the morning peak hours and 5 NB ramps operating at LOS F during the afternoon peak hours. Under the future forecast year 2045, traffic operations of the NB and SB ramps are expected to degrade, with LOS F projected for 6 NB and 3 SB ramps during the morning peak hours and 6 NB ramps during the afternoon peak hours.

Traffic Safety

According to data collected from Caltrans over a three-year period (April 1, 2016 to March 31, 2019), the total actual traffic accident rates along the NB and SB mainline segments of I-405 are generally lower than the statewide average for similar highway facilities, except for the SB segment between Main Street and Avalon Boulevard where the total actual accident rate is higher than the statewide average, and is denoted as having high concentration of accidents. Two NB mainline segments also have actual fatality rates that are higher than statewide average. In general, traffic accident data reveals that rear-end collisions are predominant on both NB and SB I-405 mainline, accounting for 57 to 68 percent of all collision types, which are indicative of congested condition. For interchange ramps, the accident history reveals that 5 out of 8 NB ramps and 5 out of 8 SB ramps have actual combined fatality/injury and/or total accident rates that are higher than the statewide average accident rates for similar facilities.

5B. SECONDARY DEFICIENCIES

The existing freeway has geometric features which do not meet current Caltrans Highway Design Manual (HDM) standards such as nonstandard interchange spacing and weaving distances, nonstandard lane and inside shoulder widths, as well as nonstandard horizontal and vertical stopping sight distances. These features consequently have adverse effects on speed, capacity, and safety in the project corridor. Existing nonstandard geometric features which will remain under the project, are documented in the design standards risk assessment included in **Attachment H** of this document.

Specifically, the Carson Street and Avalon Boulevard interchanges are spaced 0.69 miles apart with 1,709 feet of weaving distance in the NB direction, which does not meet the current interchange spacing standard of 1 mile and the weaving distance standard of 2,000 feet. The nonstandard interchange spacing and weaving section between interchange ramps may contribute to traffic congestion at the freeway merges and diverges along the I-405 corridors.

The spacing between the Avalon Boulevard and I-110 interchanges as well as between the Main Street and I-110 interchanges also do not meet the current standard of 2 miles. Some weaving sections between these interchanges also do not meet the standard of 5,000 feet. However, there is currently an auxiliary lane in each direction of I-405 between Avalon Boulevard and I-110 branch connections, which help to alleviate some congestion and improve traffic operations in these segments.

6. CORRIDOR AND SYSTEM COORDINATION

6A. IDENTIFY SYSTEMS

I-405 (San Diego Freeway) is part of the Federal Air Interstate (FAI) system, which is a subset of the National Highway System and is designated in the Federal Functional Classification as an Urban Principal Arterial. I-405 is also part of the Federal Surface Transportation Assistance Act (STAA) route network for oversized trucks and the Subsystem of Highways for the Movement of Extralegal Permit Loads (SHELL). It is also part of the Interstate System Strategic Highway Network (STRAHNET), the California Freeway

and Expressway System and National Highway Freight Network. I-405 is also designated a Goods Movement Route in the Interregional Transportation Strategic Plan.

6B. STATE PLANNING

District System Management Plan (DSMP)

The Caltrans' DSMP is a long-range, 20 to 25-year, policy planning document that describes how the District envisions the transportation system will be maintained, managed, and developed over the next 20 years and beyond. The DSMP contains a list of planned and partially programmed transportation projects. The I-405 Auxiliary Lanes from Wilmington Avenue to Main Street Project is currently not included in the 2010 District 7 DSMP project listing and should be added to the next update of the DSMP.

Corridor System Management Plan (CSMP)

The Caltrans' CSMP is a multi-jurisdictional planning document that identifies future needs within the corridor that is experiencing or expected to experience high levels of congestions through operational strategies in addition to the already funded expansion projects. The I-405 Auxiliary Lanes from Wilmington Avenue to Main Street Project is currently not included in the Caltrans' 2010 CSMP for I-405 in Los Angeles County and should be added to the next update of the CSMP.

I-405 Corridor Operational Analysis (COA)

The draft I-405 COA, dated September 2018 is being developed by Caltrans to address current and future transportation needs on a transportation corridor in a more comprehensive manner in response to new Federal and State policies (MAP-21, effective July 2012). This planning document provides recommendations for congestion reduction via three categories:

- Reduce non-recurring congestion by upgrading Intelligent Transportation Systems (ITS) to better monitor, detect, and manage incidents.
- Reduce recurring congestion by building auxiliary lanes to minimize weaving and merge conflicts, as well as widening ramps to increase storage and installing ramp meters to control traffic flow onto the freeway.
- Reduce HOV degradation by implementing Active Traffic Management technology, creating a more dynamic and adaptable managed lane system.

The COA identifies bottlenecks and recommends improvement projects from the DSMP project lists to be considered for implementation including ramp improvements, auxiliary lanes, ITS, and managed lane projects. Within the project limits, the COA identifies a segment of SB I-405 near Avalon Boulevard (PM 11.2) as a bottleneck during the afternoon peak hours, ranking number 18, with an average of 5.4 miles of backup and recommends considering improvement projects as follows:

- Implement Integrated Corridor Management, PM 0.0 to 12.95 through State Highway Operation and Protection Program (SHOPP)

- Convert existing HOV to HOT lane, PM 0.0 to 48.60 (SHOPP ID 20212)

Additionally, the COA recommends adding a NB auxiliary lane on I-405 from PM 9.98 to 13.85 (Wilmington Avenue to Normandie Avenue). The proposed addition of auxiliary lanes in this project is consistent with recommendations made in the COA.

I-405 Multimodal Corridor Plan (MCP)

The I-405 MCP for District 7 dated February 2020 is a planning document that summarizes District 7's vision of the development of multimodal transportation systems for the I-405 corridor over the next 10 years. The goal of the MCP is to develop a strategy and identify a list of transportation projects that will alleviate congestion, reduce greenhouse gas emissions, and improve livability. The proposed project is consistent with the I-405 MCP which identifies the I-405 Auxiliary Lanes from Wilmington Avenue to I-110 Project as a strategy to achieve congestion reduction along the I-405 corridor over the next decade.

Transportation Concept Report (TCR)

The project corridor currently consists of 8 GP and 2 HOV lanes in each direction. The I-405 Transportation TCR, dated 2013, calls for 9 GP and 2 HOV lanes to attain the concept LOS F0 for this segment of I-405. It is noted in the TCR that the odd number of GP lanes reflects the needed auxiliary lanes, which are given half capacity. The No Build alternative would not meet the TCR while the Build Alternative would meet the I-405 TCR concept through the addition of auxiliary lanes.

HOV Lane Degradation Report

The 2017 California HOV Facilities Degradation Report and Action Plan (Degradation Report and Action Plan) prepared by Caltrans to evaluate the performance of HOV lanes statewide and identifies potential remediation strategies, finds that the I-405 HOV lanes in both directions within the project limits currently experience significant congestion and are considered “degraded”. The Degradation Report and Action Plan identified several probable causes for the HOV lane degradations including:

- Demand exceeding capacity
- GP lane drop at the I-110 interchange
- Weaving conflicts at HOV ingress/egress locations at the system interchange
- Construction activities within the project limits
- Change in traffic pattern due to reconfiguration of the I-405/Avalon Boulevard interchange
- Possible non-metered on-ramps allowing platoons of vehicles to enter the freeway
- Damage to electrical systems from widespread copper wire thefts

The Degradation Report and Action Plan recommended the repair of electrical systems and metering of the HOV preferential lanes at interchange on-ramps as potential remediations for the I-405 HOV lane degradation. Consideration of metering the existing HOV preferential lanes at the Carson Street SB on-ramp and the Main Street SB on-ramp will be made in the PA/ED phase.

SHOPP Projects

Caltrans has proposed 2020 SHOPP projects along this section of I-405, including:

- EA 35320: Pavement Rehabilitation project from the Orange County Line to I-110 (PM 0.0/12.8) would rehabilitate pavement, culvert, and bridges; upgrade signs and lighting; rehabilitate Transportation Management System elements; and replace copper cabling with fiber as well as upgrade facilities to Americans with Disabilities Act (ADA) standards. The project is programmed for year 2023/2024.
- EA 32180: Roadside Safety Improvements/Freeway Maintenance Access to construct access roads would pave around gore areas, construct Maintenance Vehicle Pullouts (MVPs), place minor/patterned concrete paving on slope, upgrade guardrail and end treatment, and perform vegetation management control between Interstate 710 (I-710) and I-110 (PM 7.0/12.9). The project is programmed for year 2021/2022.

Construction of these SHOPP projects would not adversely affect implementation of the I-405 Auxiliary Lanes Project; however, coordination will be needed during the PA/ED phase to minimize throw-away costs in both projects.

6C. REGIONAL PLANNING

This segment of I-405 is identified in the Metro's Countywide Express Lanes Strategic Plan (Strategic Plan) adopted in March 2017 as a Tier 1 project with recommended implementation within 5 to 10 years. Consideration and accommodation for future express lanes within the I-405 Auxiliary Lanes project limits, where feasible, such as construction of new retaining walls at an offset distance, is consistent with the Strategic Plan.

6D. LOCAL PLANNING

The City of Carson General Plan defers freeway improvements to Metro's and Caltrans' transportation planning programs. The proposed auxiliary lanes along I-405 would not be in conflict with the City's General Plan.

6E. TRANSIT OPERATOR PLANNING

Transit operators within the project area include Metro, Carson Circuit, Torrance Transit, and LAX Flyaway. Transit routes are typically along major arterials, some of which cross I-405. Only the LAX Flyaway – Long Beach route traverses along I-405.

7. ALTERNATIVES

7A. ALTERNATIVE 1 – NO BUILD

Alternative 1 represents the No Build scenario and would not result in any project improvements on I-405 within the project limits. Existing freeway, ramp, and arterial roadway configurations would remain unchanged. Since there is no construction proposed under this alternative, there are no construction or right of way costs associated with this alternative.

Without infrastructure improvements, traffic operations along I-405 will continue to decline with additional freeway segments and ramp junctions projected to operate at LOS F. The future operating condition for the design year 2045 associated with the No Build Alternative is discussed earlier in Section 4A of this report. Additionally, the No Build Alternative is inconsistent with the I-405 lane configuration called for in the TCR.

7B. ALTERNATIVE 2 – BUILD ALTERNATIVE

Alternative 2 proposes to widen I-405 to add an auxiliary lane between interchange on- and off-ramps at five locations along NB and SB I-405 between Wilmington Avenue and Main Street. Where retaining walls are required, the project would provide additional widening and construct retaining walls at an offset from the freeway centerline to accommodate the future I-405 ExpressLanes project. Conceptual drawings of Alternative 2 are included in **Attachment C**.

Alternative 2 would meet the project purpose and need in facilitating the traffic merge/diverge and weave operations between interchanges, thus improving the freeway operations and safety. As shown in Section 4A, operational LOS for mainline weaving and ramp merge/diverge are projected to improve from the existing conditions. The proposed auxiliary lanes would also mitigate the existing nonstandard interchange spacing and weaving distances. The Build Alternative would be consistent with State, regional, and local planning by meeting the route concept of providing 9 GP lanes identified in the TCR and in improving mobility, freeway operations and safety.

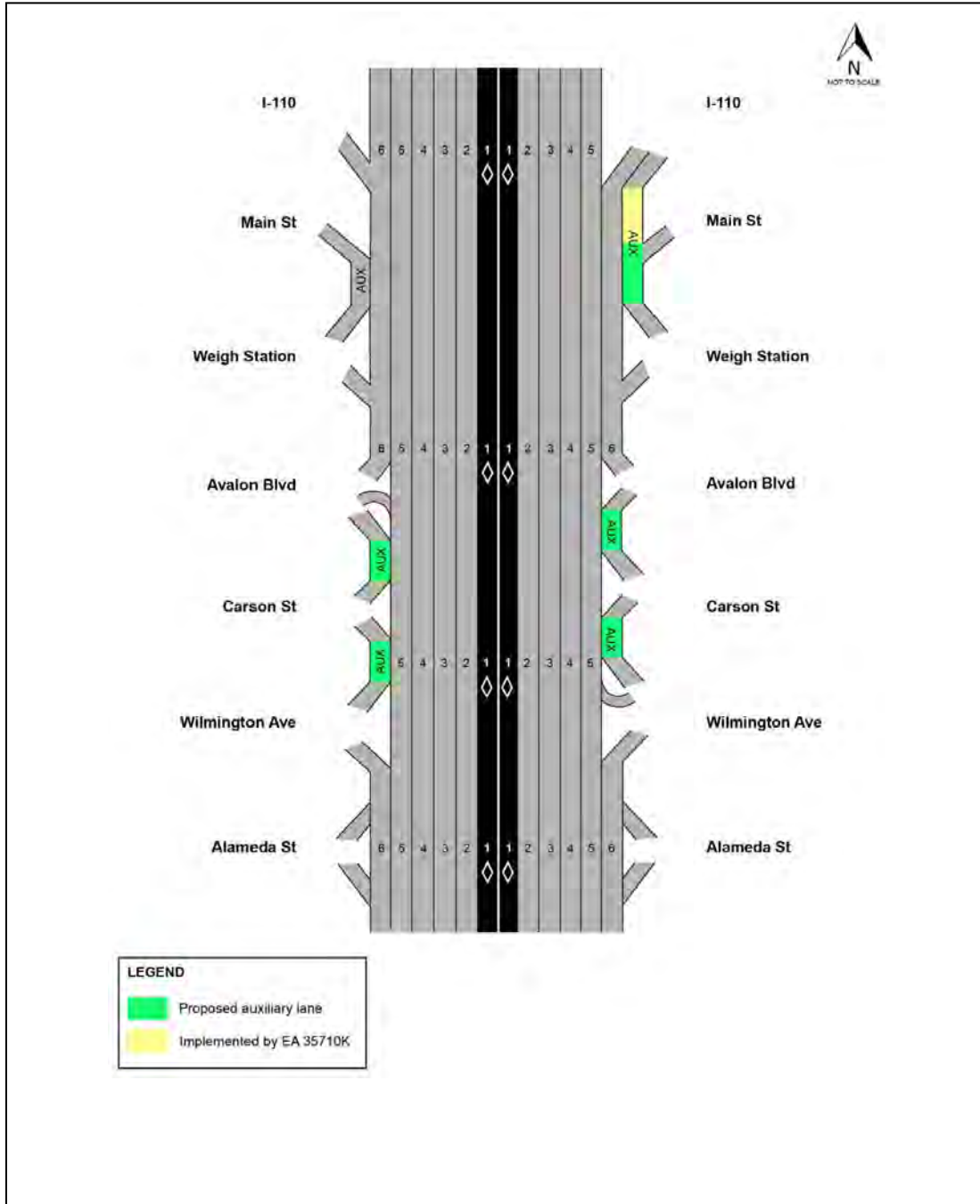
The estimated construction cost for Alternative 2 is \$90 to \$120 million. The right of way capital cost is estimated between \$2 and \$3 million. The Capital Outlay Cost Estimate is included in this document as **Attachment D**.

Proposed Engineering Features

This alternative would add a 12-foot wide auxiliary lane to the existing geometric cross section at the following 5 locations and as shown in **Figure 7.1**:

- NB between Wilmington Avenue NB on-ramp and Carson Street NB loop off-ramp
- NB between Carson Street NB on-ramp and Avalon Boulevard NB off-ramp
- NB between Weigh Station NB on-ramp and auxiliary lane planned by another project (EA 35710K)
- SB between Avalon Boulevard SB on-ramp and Carson Street SB loop off-ramp
- SB between Carson Street SB on-ramp and Wilmington Avenue SB off-ramp

FIGURE 7.1: PROPOSED AUXILIARY LANES SCHEMATICS



Implementation of Alternative 2 would necessitate the following improvements:

- Widening on both sides of 213th Street UC to accommodate an additional 12-foot lane in each direction;
- Additional widening and construction of 5 retaining walls within the State right of way between 100 and 115 feet offset from the freeway centerline to accommodate the future I-405 ExpressLanes, as summarized in **Table 7.1**;
- Replacement of an existing soundwall on SB I-405 near and on 213th Street UC; and
- Potentially a new soundwall along SB I-405 between Wilmington Avenue and Carson Street.

TABLE 7.1: PROPOSED RETAINING WALLS

No.	Status	Side of I-405		Proposed Retaining Wall Location	Approx. Average Wall Height (feet)	Approx. Wall Length (feet)
		NB	SB			
1	New	x		Between Wilmington Ave NB on-ramp and Carson St NB loop off-ramp	14	3,330
2	New	x		Between Carson St NB on-ramp and Avalon Blvd NB off-ramp	16	1,460
3	New	x		Approaching Main St NB off-ramp	10	600
4	Replace		x	Between Avalon Blvd SB on-ramp and Carson St SB loop off-ramp	14	1,880
5	Replace		x	Between Carson St SB on-ramp and Wilmington Ave SB off-ramp	12	2,960

It is assumed that a standard half-width cross sectional width for dual express lanes along I-405 would be 107 feet wide, consisting of a 1-foot half barrier, a 10-foot left shoulder, two 12-foot express lanes, a 2-foot buffer, four 12-foot GP lanes, a 12-foot auxiliary lane, and a 10-foot right shoulder. As such, where there is sufficient right of way, construction of retaining walls and soundwalls is proposed at 107 feet offset from the freeway centerline. Where the right of way is less than 107 feet such as in the NB direction between Wilmington Avenue and Carson Street, construction of retaining walls and soundwalls are proposed along the right of way at 100 feet offset from the freeway centerline. Between the Weigh Station NB on-ramp and Main Street NB off-ramp, where there are two proposed auxiliary lanes, construction of the new retaining wall is proposed along the right of way at 115 feet offset from the freeway centerline.

Structure Advance Planning Studies (APS) for the bridge widening will be prepared in the PA/ED phase to define the scope and cost of the structure work, as well as, examine conceptual stage construction and falsework requirements.

HDM Design Exceptions

Table 7.2 and **Table 7.3** provide a summary of proposed design exceptions from the July 1, 2020 HDM Boldface and Underlined standards, respectively, that have been identified to date for Alternative 2. Additional design exceptions may be discovered during the PA/ED and the final design phases. The design

standards risk assessment has been performed for Alternative 2 and is included in **Attachment H**. Boldface and Underlined design exceptions will be documented in a Design Standard Decision Document (DSDD) during the PA/ED phase.

TABLE 7.2: ALTERNATIVE 2 DESIGN EXCEPTIONS FROM BOLDFACE STANDARDS

HDM	Location and Description	HDM Standard	Existing	Proposed	(1)
201.1 & 203.2 Horizontal SSD ⁽²⁾	1. NB I-405 508+80 - 534+91 (R=2000' Rt) to CB on RW	750' (70 mph)	N/A (No CB)	732' (69 mph)	H
	2. SB I-405 507+05 - 536+00 (R=2000' Rt) to Med CB	750' (70 mph)	347' (44 mph)	347' (44 mph)	H
	3. SB I-405 503+34 - 513+00 (Exit) to Br rail	750' (70 mph)	750' (70 mph)	565' (59 mph)	M
201.1 Vertical SSD ⁽²⁾	1. NB & SB I-405 583+00 - 585+00 (200' crest)	750' (70 mph)	708' (67 mph)	708' (67 mph)	H
202.2 Super- elevation Rate ⁽²⁾	1. NB & SB I-405 512+66 - 530+41 (R=2000' Rt)	9.4% (70 mph)	6% (53 mph)	6% (53 mph)	H
	2. NB & SB I-405 615+60 - 625+05 (R=10000' Rt)	2.2% (70 mph)	1.5% (65 mph)	1.5% (65 mph)	H
203.2 Standards for Curvature ⁽²⁾	1. NB & SB I-405 512+66 - 530+41 (e=6%)	3,400' (70 mph)	2,000' (53 mph)	2,000' (53 mph)	H
	2. NB & SB I-405 615+60 - 625+05 (e=1.5%)	10,900' (70 mph)	10,000' (65 mph)	10,000' (65 mph)	H
301.1 Lane Width ⁽²⁾	1. NB & SB I-405 HOV & GP 1-4 lanes 507+00 - 647+05	12'	11'	11'	H
	2. SB I-405 Aux lane 507+31 - 512+65	12'	N/A	11' - 12'	M
	3. SB I-405 Aux lane 549+73 - 551+20	12'	N/A	11' - 12'	M
301.3(2)(a) Cross Slope ⁽²⁾	1. NB & SB I-405 HOV & GP lanes 530+41 - 574+62	2%	0.5% - 2%	0.5% - 2%	H
	2. NB & SB I-405 HOV & GP lanes 649+09 - 647+05	2%	0.5% - 2%	0.5% - 2%	H
302.1 309.1(3)(a) 1102.2 Shoulder Width ⁽²⁾ , Minimum Horizontal Clearance & Lateral Clearance to Noise Barriers	1. NB I-405 507+00 - 616+52 - Lt Med Shld (CB)	10'	0' - 2'	0' - 2'	H
	2. NB I-405 633+25 - 647+05 - Lt Med Shld (CB)	10'	0' - 2'	0' - 2'	H
	3. SB I-405 507+00 - 601+56 - Lt Med Shld (CB)	10'	0' - 2'	0' - 2'	H
	4. SB I-405 616+52 - 647+05 - Lt Med Shld (CB)	10'	1' - 2'	1' - 2'	H
	5. NB I-405 509+49 - 512+51 - Rt Shld (SW on Br rail)	10'	10'	5.4' - 10'	H
	6. NB I-405 542+22 - 546+22 - Rt Shld	10'	2' - 10'	2' - 10'	H
	7. NB I-405 629+30 - 630+50 - Lt Med Shld (CB/OH sign)	10'	9' - 10'	9' - 10'	H
	8. SB I-405 507+30 - 514+56 - Rt Shld	10'	2' - 10'	0' - 10'	M
	9. SB I-405 549+73 - 555+20 - Rt Shld	10'	1' - 10'	0' - 10'	M
305.1(3)(a) Median Width	1. I-405 507+00 - 647+05	22'	5' - 20'	5' - 20'	H

HDM	Location and Description	HDM Standard	Existing	Proposed	(1)
309.2(1)(c) Vertical Clearance ⁽²⁾	1. 213th St UC	15'	14' - 7"	14' - 7"	H
501.3 Interchange Spacing	1. I-405 between Alameda St & Wilmington Ave	1 mile	0.77 mile	0.77 mile	H
	2. I-405 between Wilmington Ave & Carson St	1 mile	0.99 mile	0.99 mile	H
	3. I-405 between Carson St & Avalon Blvd	1 mile	0.69 mile	0.69 mile	H
	4. I-405 between Avalon Blvd & I-110	2 miles	1.72 miles	1.72 miles	H
	5. I-405 between Main St & I-110	2 miles	0.34 mile	0.34 mile	H
504.7 Weaving Section	1. NB I-405 between Carson St on & Avalon Blvd off	2,000'	1,709'	1,709'	H
	2. NB I-405 between Avalon Blvd on & Weigh Station off	2,000'	1,243'	1,243'	H
	3. NB I-405 between Weigh Station on & N405-N/S110 off	5,000'	3,723'	3,723'	H
	4. SB I-405 between Main St on & Weigh Station off	2,000'	1,369'	1,369'	H
	5. SB I-405 between S110-S405 on & Weigh Station off	5,000'	2,421'	2,421'	H

(1) Probability of design exception approval: H=High, M=Medium, L=Low

(2) Federal Highway Administration (FHWA) Controlling Criteria

CB = concrete barrier; Br = bridge; Med = median; Shld = shoulder; OH = overhead; RW = retaining wall; Lt = left; Rt = right

TABLE 7.3: ALTERNATIVE 2 DESIGN EXCEPTIONS FROM UNDERLINED STANDARDS

HDM	Location and Description	HDM Standard	Existing	Proposed	(1)
201.7 Decision Sight Distance	1. SB I-405 to Wilmington Ave SB off-ramp	1,105'	917'	573'	H
	2. NB I-405 to Carson St NB loop on-ramp	1,105'	996'	630'	H
	3. SB I-405 to Carson St SB loop off-ramp	1,105'	814'	495'	H
202.5(1) 202.5(2) Super-elevation Trans	1. NB/SB I-405, entering 2,000' R	L = 510' SE = 6.27%	L = 450' SE = 3.80%	L = 450' SE = 3.80%	H
	2. NB/SB I-405, exiting 2,000' R	L = 510' SE = 6.27%	L = 475' SE = 4.06%	L = 475' SE = 4.06%	H
	3. NB/SB I-405, entering 10,000' R	L = 240' SE = 1.47%	L = 225' SE = 2.00%	L = 225' SE = 2.00%	H
	4. NB/SB I-405, exiting 10,000' R	L = 300' SE = 1.47%	L = 275' SE = 1.06%	L = 275' SE = 1.06%	H
204.3 Minimum Grade	1. NB & SB I-405 508+94 - 528+15	0.3%	0.28%	0.28%	H
	2. NB & SB I-405 558+59 - 583+04	0.3%	0.17%	0.17%	H
	3. NB & SB I-405 603+41 - 604+72	0.3%	0.22%	0.22%	H
	4. NB & SB I-405 617+05 - 640+86	0.3%	0.01% - 0.18%	0.01% - 0.18%	H

(1) Probability of design exception approval: H=High, M=Medium, L=Low

SE = superelevation rate at the BC or EC of a curve

7C. PROJECT FEATURES

Context-Sensitive Solutions and Complete Streets

The project's build alternative would improve the safe mobility of vehicles through addition of auxiliary lanes (with standard lane and adjacent shoulder widths) to improve weaving, merging, and diverging operations. Procedurally, the project team has considered Complete Streets as part of the PSR-PDS process. However, due to the project not impacting local arterials or ramp termini, improvements relating to pedestrians or bicyclists are not proposed with this auxiliary lane improvements project. Bridge structures and existing slope may be impacted, which require construction activities that affect the local roads crossing the State right of way. Opportunities to correct deficient sidewalks or lack of sidewalks may exist within the project.

Climate Change

Preliminary assessment indicates that the project's build alternative would provide long-term benefits of reducing vehicle congestion; and therefore, a long-term reduction of greenhouse gas (GHG) emissions is anticipated. Construction of the project is expected result in short-term increases in GHG emissions and are anticipated to be less than significant.

Drainage

The I-405 corridor is located within the Dominguez Watershed which is part of the West Coast Hydrologic Sub-Area and is within jurisdiction of the Los Angeles Regional Water Quality Control Board (RWQCB) Region 4.

The onsite drainage within the project area is generally captured and conveyed via a combination of open channel flows and underground storm drain systems, which discharge to the Dominguez Channel and ultimately into the Los Angeles Harbor. The existing on-site drainage system is made up by a large network of drainage inlets, cross culverts, dikes, overside drains, channels, and water quality treatment facilities. There is also an underground drainage system along portions of the I-405 median with drainage inlets located in the left shoulders adjacent to the median concrete barrier with scuppers.

The proposed freeway widening would require modification or replacement of existing on-site drainage systems including drainage inlets, storm drains, cross culverts, dikes, ditches, channels, and overside drains. Existing cross culverts and outlets would need to be extended, removed, abandoned, or relocated to accommodate the proposed project improvements. During the final design phase, new drainage systems or upgrades of existing storm drain systems would be provided where necessary to accommodate the increase in on-site runoff. Storm water treatment systems would also be provided to meet the water quality requirements. The proposed drainage design would generally maintain existing flow patterns within the project limits and maintain existing outlets to the Dominguez Channel and ultimately into the Los Angeles Harbor.

There are two major flood control facilities in the vicinity of the project corridor, which are owned and operated by the Los Angeles County Flood Control District (LACFCD), as discussed below:

- Dominguez Channel (F01003006) – this channel runs parallel the east side of I-405 through most of the project corridor and crosses I-405 just north of Wilmington Avenue. The channel generally flows from north to south and eventually outlets at the Los Angeles Harbor and the Pacific Ocean. The Dominguez Channel is an open trapezoidal channel with rip-rap lined sides and soft clay-lined bottom. At the I-405 crossing, the channel is typically 90 feet wide at the bottom and 20 feet deep with 1.5:1 side slopes.
- Torrance Lateral Channel (F02000467) – this channel, also known as Torrance Carson Channel, crosses I-405 north of Avalon Boulevard and connects to the Dominguez Channel. The channel flows from west to east and drains to the Dominguez Channel. The Torrance Lateral Channel is a trapezoidal open channel with side slopes partially lined with concrete and partially with rip-rap. At I-405 crossing, the channel is typically 20 feet wide and 8 feet deep, with 1.5:1 side slopes.

The offsite storm drain systems are conveyed across the project limits through a series of pipe culverts and box culverts which drain to the Dominguez Channel. Major offsite drainage facilities which cross the project area are listed below. Both facilities are owned and operated by the LACFCD.

- South Torrance Drain (F01003847) is a 8'-10" by 10'-5" reinforced concrete box (RCB) which runs along Carson Street.
- 213th Street Drain (F01002129) is a 45-inch reinforced concrete pipe (RCP) which runs along 213th Street.

The project will not alter the offsite drainage tributary watersheds and thus, will not increase the amount of storm water runoff to the existing offsite cross culverts. Offsite cross culverts will be protected in place and/or extend in kind where they cross under the proposed freeway widening.

Stormwater Best Management Practices (BMPs)

A Storm Water Data Report (SWDR) has been prepared in August 2020 to support the PSR-PDS and its cover page is included as **Attachment F**. The anticipated storm water project risk level is Level 1 for the build alternative.

The project is estimated to result in a total disturbed soil area of approximately 17.52 acres and the post construction treatment area (PCTA) identified for this project is 15.95 acres. The SWDR recommends implementing 5 out of 16 permanent BMPs identified in the I-405 Corridor Storm Water Managed Study, dated 2009, which include biofiltration swales and media filters. The project also proposes to incorporate one additional Treatment BMP. These proposed 6 BMPs are estimated to treat 18.01 acres of impervious area and 2.53 acres of pervious area. Additionally, there are two existing Treatment BMPs constructed by other contracts that will be impacted due to the proposed project improvements including a bioswale along the NB I-405 shoulder north of Dominguez Channel and another bioswale located between the Carson Street NB on-ramp and the Avalon Boulevard NB off-ramp. These existing bioswales provide treatment to approximately 3.87 acres of impervious surface area and will be modified and incorporated into the project. A Storm Water Pollution Prevention Plan (SWPPP), Temporary Construction Site BMPs, and Job

Site Management are also anticipated to be implemented during construction and their costs have been included in the Capital Outlay Cost Estimate in **Attachment D**.

The SWDR will be updated during the PA/ED and final design phases to confirm the project data and calculations as well as the risk level assigned during the Project Initiation Document (PID) phase. Mitigation measures, if required, will be identified during the PA/ED phase.

Constructability

The project construction is estimated to take approximately 16 months. Construction of the auxiliary lane pavement between Wilmington Avenue and Avalon Boulevard is anticipated to require nighttime closure of the adjacent freeway lane (i.e. GP No. 4) to facilitate saw cutting at the existing edge of traveled way to remove existing shoulder pavement and construct new auxiliary lane pavement. This lane closure is anticipated to be nighttime or possibly in combination with a 55-hour weekend closure. Construction of the second NB auxiliary lane between Weigh Station NB on-ramp and Main Street NB off-ramp is not anticipated to require mainline lane closure but would require closure of the existing auxiliary lane. Proposed retaining walls and soundwalls are anticipated to be constructed without closure of the freeway mainline lanes, as they are typically offset from the freeway traveled lanes.

It is anticipated that widening of the 213th Street UC would be performed without closure of the freeway mainline lanes. The existing 10-foot wide outside shoulders would be reduced to allow placement of temporary railings and provide room for construction of the bridge widening and soundwall. Periodic nighttime closure of the 213th Street; however, may be necessary to accommodate removal of existing soundwall on the bridge and girder placement over the local roadway. Detours would be provided during closure via Carson Street, Avalon Boulevard, and Perry Street. A Transportation Management Plan (TMP) will be developed to address measures to minimize construction impacts and detours including consideration of pedestrian and bicycle travels on local streets.

Related Projects

There are several projects currently under study within or adjacent to the project limits which would need to be further coordinated during the PA/ED phase, including:

- EA 35710: I-405 Auxiliary Lanes (PM 12.4/14.6) from Main Street to Western Avenue is currently in the PID phase to add auxiliary lanes along both sides of I-405 from Main Street to Western Avenue and provide improvements at the I-110 connectors. This project has been considered and coordinated in this PSR-PDS to ensure consistency at the join location. Further coordination will be needed during the PA/ED phase to confirm the work limits and timeframe for implementation of both projects.
- EA 35432: I-405 ExpressLanes from the Orange County Line to Interstate 10 (I-10) is currently in the PID phase (as part of the Metro's ExpressLanes Network PSR-PDS) to provide express lanes along the I-405 corridor. The I-405 ExpressLanes have been considered to the extent feasible in this PSR-PDS with respect to preliminary planning of proposed retaining wall and soundwall locations. It is assumed that for an alternative with two express lanes in each direction, a typical half-width

cross section of 107 feet may be required to accommodate a 1-foot half barrier, a 10-foot left shoulder, two 12-foot express lanes, a 2-foot buffer, four 12-foot GP lanes, a 12-foot auxiliary lane, and a 10-foot right shoulder. However, where right of way constrained, a narrower cross section may be proposed. Further coordination with the future I-405 ExpressLanes will be needed during the PA/ED phase to confirm the final locations of retaining walls and sound walls.

- EA 35320: Pavement Rehabilitation project from the Orange County Line to I-110 (PM 0.0/12.8) would rehabilitate pavement, culvert, and bridges; upgrade signs and lighting; rehabilitate Transportation Management System elements; and replace copper cabling with fiber as well as upgrade facilities to ADA standards. The project is programmed for year 2023/2024.
- EA 32180: Roadside Safety Improvements/Freeway Maintenance Access to construct access roads would pave around gore areas, construct MVPs, place minor/patterned concrete paving on slope, upgrade guardrail and end treatment, and perform vegetation management control between I-710 and I-110 (PM 7.0 to 12.9). The project is programmed for year 2021/2022.
- EA 32540: Sign panel replacement project from the Orange County Line to Route 118 (PM 0.0/45.6).
- EA 29360: I-405 Crenshaw Boulevard Ramp Improvements (PM 14.4/15.6) to improve interchange ramps and add auxiliary lanes between Western Avenue and Crenshaw Boulevard, with construction anticipated to begin in late 2020.
- EA 33870: Roadside Safety Improvements to construct MVPs, access road, rock blanket at islands and between ramps, and upgrade irrigation systems along I-405 (PM 12.9/R21.5). The project is programmed for year 2021/2022.
- EA 35310: I-405 Auxiliary Lanes (PM 16.4/R20.2) to add auxiliary lanes along both sides of I-405 from Artesia Boulevard to I-105. The PA/ED was recently completed in 2020.
- EA 35390: Seismic Retrofit for Route 405/107 Separation (PM 17.6).
- EA 36750: NB I-405 Auxiliary Lane Improvement (PM 20.2/21.2) to add a NB auxiliary lane on I-405 from El Segundo Boulevard to Imperial Highway .
- EA 34070: Widening of I-405 SB La Cienega Boulevard off-ramp (PM 22.5) as well as improvements to the on-ramp and intersection modification.
- EA 35070: Active Traffic Management and Corridor Management Systems to upgrade ITS elements at various locations along I-405 including the Los Angeles Airport Hub on I-105.

Engineering Studies Required during PA/ED

Recommended engineering technical studies to support the PA/ED phase include the following:

- Advance Planning Studies (APS) for bridges and nonstandard retaining walls
- Design Exception from Ramp Metering Policy (potential)
- Design Standard Decision Documents (DSDD)
- District Preliminary Geotechnical Report (DPGR)
- Geometric Review Drawings (GRDs)
- Highway Safety Manual (HSM) Analysis (potential)
- Life Cycle Cost Analysis (LCCA) for pavement
- Noise Abatement Decision Report
- Preliminary Drainage Report
- Preliminary Materials Report
- Right of Way Data Sheets
- Safety Analysis
- Storm Water Data Report (PA/ED level)
- Structure Preliminary Geotechnical Report (SPGR)
- Traffic Operational Analysis Report
- Transportation Management Plan (TMP) Data Sheet and preliminary construction staging concept
- Utility Investigation
- Value Analysis

7D. ALTERNATIVE CONSIDERED BUT DROPPED FROM FURTHER STUDIES

A full standard alternative was considered early in the PSR-PDS process but was withdrawn from further consideration due to significant right of way and environmental impacts. This alternative would widen the I-405 freeway to upgrade the existing nonstandard lane and shoulder widths to standard before adding the auxiliary lane in each direction. This alternative; however, would require realignment of all interchange ramps within the project limits; reconstruction of ramp terminal intersections; relocation of weigh stations in both directions of I-405; replacement of the Del Amo Boulevard OC; as well as, substantial widening of all UC and channel crossing bridges along the project corridor, and in some cases, replacement of UC structures to provide the standard vertical clearance over the cross streets. Significant right of way acquisition would be necessary to accommodate ramp realignments and intersection reconstruction. There would also be significant construction and environmental impacts stemming from replacement of the Del Amo Boulevard OC and widening of the bridge over Dominguez Channel which is eligible for listing in the NRHP. Furthermore, the required ramp and bridge reconstruction would result in significant construction impacts to the traveling public on I-405 and local arterials as well as the surrounding communities.

8. RIGHT OF WAY

No permanent right of way acquisitions are anticipated in this project. However, temporary construction easements (TCE) are anticipated to be required along portions of NB and SB I-405 to accommodate retaining wall construction adjacent to the State right of way. **Table 8.1** presents a summary of parcels potentially subject to TCE. The right of way cost estimate for the build alternative is included in **Attachment E**.

TABLE 8.1: IMPACTED PARCELS

No.	APN	Property Owner	Property Type
1	7328-001-021	Kia of Carson	commercial/industrial
2	7328-001-020	Kia of Carson	commercial/industrial
3	7339-017-003	Watson Land Company	vacant
4	Recreation Road	City of Carson	public
5	E 220 th Street	City of Carson	public

TCEs from these properties may result in temporary parking impacts as follows:

- Temporary removal of off-street parking spaces (approximately 109 out of 566 off-street parking spaces) in Kia Dealership along NB I-405. Replacement parking spaces may be available onsite. If onsite spaces are not available, temporary storage at an offsite location may be necessary. A Relocation Impact Memorandum would be needed if temporary storage is required at an offsite location.
- Temporary lane width reduction in combination with on-street parking restriction (approximately 20 out of 120 on-street parking spaces) on Recreation Road along NB I-405 between Wilmington Avenue and Carson Street.
- Temporary lane width reduction in combination with on-street parking restriction on East 220th Street along SB I-405 between Wilmington Avenue and Carson Street.

Utilities

Existing utilities within the project area include overhead and underground electrical, natural gas, oil and petroleum, benzene, hydrogen, nitrogen, chlorine and chemical, anpirtoline hydrochloride, telephone and communication, cable TV, water, recycled water, and sewer. The following agencies/companies have utilities within or adjacent to the study limits:

Electrical/Power	Southern California Edison (SCE) Los Angeles Department of Water and Power
Natural Gas	Southern California Gas Company (SCG)

Oil/Gas/Chemical	Air Products and Chemicals Inc. Chevron Pipe Line Company Crimson Pipeline Kinder Morgan Marathon Pipe Line PBF Energy Plains All American Pipeline Phillips 66 Pipeline Praxair Inc. Shell Pipeline Company
Sewer	City of Carson Los Angeles County Sanitation District (LACSD) Los Angeles County Department of Public Works (LACDPW)
Telecomm	AT&T Charter Communications Crown Castle Frontier Communications Level 3 Communications MCI Communications Pacific Bell Telephone Company (now owned by AT&T) Verizon Zayo Group
Water	California Water Service Metropolitan Water District of Southern California (MWD)

A preliminary utility investigation for the project indicates that the project has the potential to impact approximately 71 utilities. Potential impacted utilities include overhead and underground electrical, natural gas, oil and petroleum, benzene, telecommunication, water, and sewer. Potential impacts would require existing underground utility encasement to be extended. The cost for the utility work is included in the Conceptual Cost Estimate - Right of Way in **Attachment E**.

There are power transmission lines within the project limits which are considered regional facilities critical to national or regional interests and are regulated under federal jurisdictions. These regional facilities include:

1. OH power transmission lines crossing I-405 north of Carson Street
2. OH power transmission lines crossing I-405 north of Del Amo Boulevard

High priority utilities (per California Government Code) within the project area include natural gas pipelines great than 6 inches in diameter or with normal operating pressures greater than 60 pounds per square inch gauge (psig), petroleum pipelines, and high-voltage electric supply lines equal to or over 60 kilovolt (kV), and hazardous materials pipelines. Detailed investigation of potential affected utilities including survey and potholing for high priority utilities to provide positive identification will be undertaken during the final design to determine the final dispositions and required actions.

Several utilities within the State right of way run parallel to the freeway or cross with a skew angle of 30 degrees or more and are considered longitudinal encroachments. Further discussion and coordination will be needed between Caltrans and the utility companies during the final design phase to determine options for protecting in place or relocating these utilities to eliminate utility encroachments. Utility relocations to eliminate encroachments may result in service disruption and require additional right of way. Approval from Caltrans Headquarters (HQ) for exceptions to the Caltrans' utility encroachment policy will be required for any utilities proposed to remain within the State right of way as part of this project and will be sought during the final design phase of the project.

Railroad

There are no railroad facilities within the project limits.

9. STAKEHOLDER INVOLVEMENT

The PSR-PDS process includes participation and coordination with Metro, SBCCOG, and the City of Carson. All agencies are in general accord with the project.

Public and agency outreach efforts will be undertaken during the PA/ED phase and may be in formal and/or informal formats such as:

- Monthly PDT meetings that include representatives from Caltrans, Metro, SBCCOG, and the City of Carson
- Periodic briefings to the Metro Board of Directors and SBCCOG
- Project briefings to elected officials of the City of Carson
- Coordination meetings and project design workshops with the City of Carson staff
- Informational meetings with stakeholder groups

10. ENVIRONMENTAL COMPLIANCE

A Preliminary Environmental Analysis Report (PEAR) has been prepared in August 2020 for this project to provide an initial assessment of the project, summarize key environmental issues, and identifies the environmental document that may be required for the project. The PEAR is included with this report as **Attachment M**.

The project is being undertaken by a public agency and has the potential to result in a direct physical change to the environment. Therefore, the project requires an environmental determination under CEQA. An environmental determination is also required under NEPA since federal funds may be sought to implement the project. The PEAR indicates that the appropriate level of documentation for this project is an IS with Mitigated Negative Declarative (MND) under CEQA and a Categorical Exclusion (CE) under NEPA. It is estimated that approval of the environmental document would require approximately 24 months. Caltrans would be the lead agency under both CEQA and NEPA.

Special Environmental Considerations

Preliminary assessment of the Build Alternative has identified a number of potential environmental impacts that may require special considerations. The following environmental issues have been identified:

- Utilities – There are several utilities in the project area, and intermittent disruptions and relocation of utilities could be required to complete the project.
- Emergency Services – The project area includes a CHP weigh station and constructing an auxiliary lane from the weigh station.
- Cultural Resources – The project area has a moderate level of sensitivity for cultural resources. A total of 10 previously-documented resources (4 prehistoric sites, 1 protohistoric site, and 5 historic-age built environment resources) were identified within 1 mile of the project footprint. Two potentially historic-age resources were identified adjacent to the southern extent of the project: one irrigation feature (R200225-68-01) and one railroad spur (R200225-68-02). In addition, the Dominguez Channel Historic District, which Caltrans has identified as eligible for listing, is within the project area.
- Paleontological Resources – The project would be located on deposits identified as having high paleontological sensitivity at the surface and there are previously documented fossil localities in similar nearby deposits.
- Hydrology and Water Quality – The project is located within or adjacent to flood hazard areas; however, no structures would be constructed within these areas. Although the Dominguez Channel and the Torrance Carson Channel are Clean Water Act Section 303(d) Impaired Waters, the project would not require any work within these channels.
- Hazardous Waste/Materials – This segment of I-405 was built across a landfill (Envirostor Sites Nos. 5, 6 and 7), and Cal Compact Landfill is on the Cortese List. Several adjacent parcels have been identified as handling hazardous materials, generating hazardous wastes, or subject to historic or existing soil or groundwater contamination. Thus, there is a potential for methane gas, polychlorinated biphenyls (PCB), volatile organic compounds, and total petroleum hydrocarbons from the former landfill, which will be better determined upon completion of the Initial Site Assessment (ISA) in the PA/ED phase. Other potential impacts within the project area include aerially deposited lead (ADL) in soils with areas of unpaved slopes. Lane markings in the area (i.e., thermoplastics and paints) along the I-405 may contain chromium and lead in yellow paint striping. In addition, widening of bridges along I-405 may involve the disturbance of concrete bridges, expansion joints, gaskets related to guard rails, mastics for road markers and crack repairs, asphaltic materials, utility pipes, and other bridge components that may potentially contain asbestos. In addition, lead based paint may be encountered when widening bridge structures. Wooden utility poles are located at scattered locations along I-405, and these poles may be coated with creosote. Transformer-bearing poles are also present along I-405, and the transformers may contain PCBs. If transformer-bearing poles would be relocated or removed, the presence of PCBs will have to be confirmed to determine proper handling, removal, and disposal measures.

- Air Quality – This project is not currently included in the regional emissions model for the latest conforming RTP/SCS or the latest FTIP. Unless determined to be exempt, regional air quality conformity requirements must be satisfied prior to the completion of the PA/ED phase.
- Biological Environment – The project could have potential impacts on migratory birds and bats, if they were to be nesting or roosting in the trees or vegetation to be removed or in the bridge to be widened. Protocol surveys will be required for burrowing owls during the PA/ED phase. No federal or state listed threatened or endangered species are anticipated to be within the project area.

Anticipated Environmental Commitments

The following are anticipated environmental commitments for the Build Alternative:

- Utilities – Any disruptions to utility service would be scheduled and coordinated to ensure they would not adversely affect the surrounding community.
- Emergency Services – Coordination with local emergency service providers, including CHP, and communication with the surrounding community would be conducted to minimize traffic impacts during construction.
- Visual/Aesthetics – Landscaping and aesthetic treatments would be considered to enhance the aesthetic appearance of the interchanges. Context Sensitive Solutions (CSS) would be implemented to plan, design, construct, maintain, and operate the transportation system.
- Cultural Resources – Measures to avoid impacts on cultural resources would be implemented and would include avoiding known and potential cultural resources to the extent feasible, implementing a cultural resources monitoring plan, monitoring sensitive areas, providing education to construction crew, delineating environmentally sensitive areas, treating inadvertent discoveries, and identifying human remains if found in the project area during construction.
- Hydrology and Floodplain – Design and treatment BMPs would be incorporated into the final project design to capture pollutants and storm water runoff, and to avoid impacts on local hydrology.
- Water Quality and Storm Water Runoff – The project would need to be designed and constructed to the requirements of Caltrans’ Statewide National Pollutant Discharge Elimination System (NPDES) Storm Water Permit (Order Number [No.] 2012-0011-DWQ, NPDES No. CAS 000003 as amended by Order WQ 2014-0006-EXEC, Order WQ 2014-0077-DWQ, Order WQ 2015-0036-EXEC and Order WQ 2017-0026-EXEC) and the Construction General Permit Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ and 2012-006-DWQ, NPDES No. CAS 000002), Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity, and the Statewide Storm Water Management Plan. BMPs would be developed and implemented according to the Los Angeles RWQCB and NPDES requirements.
- Geology, Soils, Seismic, and Topography – Potential impacts would be minimized by incorporating appropriate project design features and constructing the project in conformance with the California

Building Code and Caltrans HDM. Temporary erosion control measures and project design elements to address slope stability, pile driving, soils, seismicity, and topography would be developed and finalized during final project design.

- Paleontological Resources – Depending on the results of the Paleontological Evaluation Report (PER), a Paleontological Mitigation Plan (PMP) may be required to provide guidance to reduce potential impacts on paleontological resources to a less than significant level.
- Hazardous Waste/Materials – Evaluation of surface soils will be conducted to identify the potential presence of ADL, pesticides, total petroleum hydrocarbons, volatile organic compounds, hydrogen sulfide, and methane that could be disturbed during construction. Development of management and disposal options for soil containing potentially hazardous concentrations of materials would be required. In addition, lead containing paint (LCP) and asbestos containing material (ACM) surveys of guardrails and concrete in bridge structures would be needed, and treated wood waste would be generated if any wood posts are unable to be reused. It is assumed that groundwater remediation is not required, underground storage tanks will not need to be removed, and the top 1.5 feet of soil will be removed as hazardous material. Site investigation (SI) will be done during the PS&E phase to determine the required hazardous material specifications in soil and groundwater. If groundwater is encountered during excavation or drilling, dewatering may be necessary, which will require an NPDES permit under Clean Water Act (CWA) Section 402. Work plans, health and safety plans, and potentially lead compliance plans and excavation and transportation plans would be needed to protect workers from exposure. Coordination with the South Coast Air Quality Management District would be required for bridge demolition components of the project. Coordination with the California Department of Toxic Substances Control would be required if the results of the ADL survey indicate that soil containing elevated concentrations of lead within Caltrans right of way would be disturbed during construction. Depending on the results of the additional studies, coordination with additional regulatory agencies, potentially including the Los Angeles County Fire Department and the Los Angeles RWQCB may be required to ensure the remediation of contaminated sites.
- Air Quality – The project would be constructed in compliance with Caltrans’ Standard Specifications, including, but not limited to, Section 14-9 “Air Quality.” Additional measures may be developed in coordination with the local air district to minimize potential impacts during construction.
- Noise and Vibration – Implementation of abatement measures (typically in the form of soundwalls) may be required to comply with state and federal guidelines. The plans and specifications would include measures to minimize or eliminate adverse construction noise and vibration impacts on nearby land uses or activities. The project would be constructed in compliance with Caltrans’ Standard Specifications, Section 14-8.02 “Noise Control” and the City’s noise ordinance. Coordination with the City would be needed prior to starting construction if overnight or weekend work is required.
- Biological Environment – Measures to avoid and minimize impacts on nesting migratory birds and raptors, special-status species, and bats would be implemented, including BMPs to prevent construction debris and dust from entering waterways, pre-construction surveys, and reduced work areas. To avoid impacts to migratory birds, a nesting survey would likely be needed within three days prior to any vegetation disturbance or modification to any bridge or structure where migratory birds may be nesting

during the migratory bird breeding season (February 1 to September 1). If an active migratory bird nest is discovered, the area would likely need to be avoided during the breeding season with an adequate buffer (depending on the species). There may be additional avoidance, minimization, and/or mitigation measures for burrowing owls depending on the survey results. Construction and exclusionary measures and avoidance areas may be needed for bats. During the summer months (June to August) in the year prior to construction, a thorough bat roosting habitat assessment would be conducted of all potential bat roosting habitat, including trees, swallow nests, and structures within 100 feet of the construction area. In the event that a maternal colony of bats is found, the California Department of Fish and Wildlife (CDFW) would be consulted, and no work would be conducted within 100 feet of the maternal roosting site until the maternal season is over or the bats have left the site, or as otherwise directed by the CDFW. In addition, tree removal may have to occur in October, which is outside the bats' maternal and non-active seasons.

- Transportation Management Plan (TMP) will develop measures to minimize construction impacts on local traffic and circulation. These measures will include project phasing, alternative routes and/or detours, and a public information campaign, as necessary. It is not advisable that full lane closures for extended periods of time be implemented, as any significant delays may prompt additional construction-related emissions analyses. Seek guidance from the Caltrans Office of District Traffic Management early in the design phase to ensure that most optimum TMP is being implemented and construction-related traffic delays are kept to a minimum.
- An Environmental Commitments Record (ECR) documenting all avoidance, minimization, and mitigation measures from the technical studies will be prepared and attached to the environmental document during the PA/ED phase. The ECR will need to have a column that calls out mitigation under CEQA. An updated ECR will be prepared during PS&E if any changes to avoidance, minimization, and mitigation measures were made during design.

Environmental Studies during PA/ED

Preparation of the following environmental technical reports would be required during the PA/ED phase:

- Community Impacts - Relocation Impact Memorandum (potentially)
- Visual/Aesthetics - Visual Impact Assessment (Abbreviated)
- Cultural Resources - Area of Potential Effects Map, Archaeological Survey Report, Historic Resource Evaluation Report, Historic Property Survey Report, and potentially Finding of Effect and Memorandum of Agreement
- Water Quality - Water Quality Assessment Report
- Geotechnical Engineering - DPGR and SPGR
- Paleontology - Paleontological Evaluation Report/Paleontological Mitigation Plan

- Hazardous Waste/Materials - ISA, Work Plan for SI, Health and Safety Plan for Site Investigation, and ADL Survey, and Preliminary Site Investigation (depending on ISA recommendations)
- Air Quality - Transportation Conformity Working Group (TCWG) Hot Spot Form, Air Quality Study Report, and potentially Air Quality Conformity Analysis Report unless exempt
- Noise and Vibration - Noise Study Report and potentially Noise Abatement Decision Report
- Biology Environmental - Natural Environmental Study (Minimal Impacts), Burrowing Owl Survey Report
- Recreation - Section 4(f) Memo (potentially)

Key environmental issues to consider during the PA/ED include:

- Hazardous Waste – The ISA and SI will likely require remediation of soil and/or groundwater contamination due to historic land uses of adjacent properties.

11. FUNDING

It has not been determined if the project is eligible for Federal-aid funding. Determination will be based upon coordination with FHWA during the PA/ED phase. At this time, no funding sources have been identified for this project. The PA/ED phase will be partially funded through local Measure R funds.

Capital Outlay Project Estimate

The capital outlay cost estimates are included in this document as **Attachment D. Table 11.1** provides a summary of the capital outlay project estimates for the project.

TABLE 11.1: CAPITAL OUTLAY COST ESTIMATES

Alternative	Range of Estimates		STIP Funds		Other Funds	
	Construction	Right of Way	Construction	Right of Way	Construction	Right of Way
Alternative 1 (No Build)	\$0	\$0	\$0	\$0	\$0	\$0
Alternative 2 (Build)	\$90M-\$120M	\$2M-\$3M	TBD	TBD	TBD	TBD

*The capital outlay project estimates are based on 2020 dollars.
 STIP = State Transportation Improvement Program
 TBD = to be determined*

The level of detail available to develop these capital outlay project estimates is only accurate to within the above ranges and is useful for long-range planning purposes only. The capital outlay project estimates should not be used to program or commit State-programmed capital outlay funds.

Capital Outlay Support Estimate

The capital outlay support estimate for programming PA/ED for this project is \$3.5 million.

Congestion Mitigation and Air Quality Program Funding

The project is not eligible for Congestion Mitigation and Air Quality Program funding.

12. DELIVERY SCHEDULE

Tentative milestones for the subsequent PA/ED phase of the project are as shown in **Table 12.1**.

TABLE 12.1: PROJECT MILESTONES

Project Milestone		Milestone Date
Program Project	M015	12/2020
Begin PA&ED	M020	01/2021
PA&ED	M200	11/2023

13. RISKS

A Level 2 Risk Register has been developed as part of the PID phase and is included as **Attachment G** of this report. The risk register identifies the potential areas of risk and ways to monitor or mitigate these risks to minimize their impacts on the project. This risk register is based on the Caltrans Project Risk Management Handbook and will be an on-going process to ensure the schedule, budget, and quality of the project.

A total of 27 potential risks, all threats, have been identified for the project including:

- Organizational risks such as project funding and execution of cooperative agreement
- Environmental risks such as new SCAG traffic model, property access for studies, and discovery of hazardous materials
- Design risks such as additional ramp and intersection improvements, approval for proposed design exceptions, new or revised design standards, and discovery of additional utility conflicts and relocation
- Right of way risks such as delay in obtaining TCEs for construction
- Construction risks such as closure of mainline lanes, construction duration longer than anticipated, and quality or deficiency issues

14. EXTERNAL AGENCY COORDINATION

The project may require approval from the California Transportation Commission (CTC) for funding.

FHWA

Per the current Joint Stewardship and Oversight Agreement (Agreement) between Caltrans and FHWA, dated May 28, 2015, FHWA/Caltrans consider this project Delegated. The project does not meet any of the Project of Division Interest (PoDI) criteria. If any future situation/circumstance arises potentially changing the classification of the project to a PoDI, Caltrans shall notify FHWA. Further involvement from FHWA is expected to occur during the PA/ED phase and may include:

- Regional air quality conformity determination
- Project-level conformity determination for Particulate Matter of 10 microns in diameter or smaller (PM₁₀) and Particulate Matter of 2.5 microns in diameter or smaller (PM_{2.5}), unless determined to not be a Project of Air Quality Concern (POAQC) and therefore, exempt from Particulate Matter (PM) Hot Spot Analysis
- Approval of programming of state funds

The project requires the following coordination:

USACE, RWQCB, and CDFW

It is not anticipated that the project will require a Section 404 permit from USACE, a Section 401 Water Quality Certification from Los Angeles RWQCB, or a 1602 Streambed Alteration Agreement from CDFW. If required, coordination with USACE, RWQCB, CDFW, and others would be needed during the PS&E phase for work within jurisdictional waters. If jurisdictional impacts would be greater than 0.5 acre or over 300 linear feet, an Individual 404 Permit could be required.

State Historic Preservation Officer (SHPO)

- Section 106 Consultation for Dominguez Channel

Native American Heritage Commission

- Assembly Bill 52 Consultation

State Water Resource Control Board (SWRCB)

- California Statewide NPDES Storm Water Permit (Order No. 2012-0011-DWQ, NPDES No. CAS00003), as amended by Order WQ 2014-0006-EXEC, Order WQ 2014-0077-DWQ, Order WQ 2015-0036-EXEC, and Order WQ 2017-0026-EXEC

- NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ, as amended by Order No. 2010-0014-DWQ and 2012-006-DWQ, NPDES No. CAS00002)
- General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (*De Minimis*) Threat to Water Quality, Order No. R8-2015-0004, NPDES No. CAG998001

Local Agencies

- Cooperative Agreements with the City of Carson
- LACFCD encroachment permit
- Los Angeles County MS4 (Order No. R4-2012-0175)

Utilities

- Utility Agreements with various agencies

15. PROJECT REVIEWS

HQ Project Delivery Coordinator	<u>John Roccanova</u>	Date	<u>July 2020</u>
Project Manager	<u>Mohammed Chowdhury</u>	Date	<u>July 2020</u>
Design/FHWA Liaison	<u>N/A</u>	Date	<u>-</u>
HQ Managed Lane Reviewer	<u>N/A</u>	Date	<u>-</u>
Design Branch A	<u>Joseph Reynoza</u>	Date	<u>April 2020</u>
District Design Liaison	<u>Susan Chau</u>	Date	<u>April 2020</u>
Traffic Operations	<u>Danny Luong</u>	Date	<u>May 2020</u>
Caltrans Quality Review	<u>PDT Members</u>	Date	<u>May 2020</u>

16. PROJECT PERSONNEL

Name	Organization	Role	Phone
Mohammed Chowdhury	Caltrans	Project Manager	213-760-7180
Marco Ruano	Caltrans	Chief, Office of Project & Special Studies	213-897-9863
James Vu	Caltrans	PID Design Manager	213-897-0116
Dania Almordaah	Caltrans	PID Design Oversight	213-897-0479
Siew Mei Tan	Caltrans	Corridor Manager	213-897-0070
Joseph Reynoza	Caltrans	Design A Senior	213-266-6121
Karl Price	Caltrans	Environmental Office Chief/Manager	213-897-1839
John Roccanova	Caltrans	HQ Project Delivery Coordinator	916-654-6776
Roberto Machuca	Metro	Project Manager, Highway Program	213-418-3467
Sam Ekrami	Parsons	Project Manager	949-333-4476
Bob Scales	Parsons	Traffic Lead	408-656-1232
Patti Tiberi	Parsons	Engineering Lead	949-333-4541
Richard Galvin	GPA	Environmental Lead	310-792-2690
George Gorman	GPA	Senior Environmental Planner	310-792-2690

17. ATTACHMENTS

- Attachment A – Project Location Map (1)
- Attachment B – Traffic Volume Diagrams (6)
- Attachment C – Conceptual Plans (17)
- Attachment D – Capital Outlay Cost Estimate (10)
- Attachment E – Conceptual Cost Estimate - Right of Way (5)
- Attachment F – Storm Water Data Report Cover Page (1)
- Attachment G – Level 2 Risk Register (3)
- Attachment H – Design Standards Risk Assessment Matrix (4)
- Attachment I – Design Scoping Index (7)
- Attachment J – Transportation Planning Scoping Information Sheet (8)
- Attachment K – PSR-PDS Survey Needs Questionnaire (1)
- Attachment L – Division of Engineering Services PSR-PDS Scoping Checklist (5)
- Attachment M – Preliminary Environmental Analysis Report (188)

ENGINEERING SUPPORTING DOCUMENTS

Traffic Engineering Performance Assessment, August 2020
Storm Water Data Report, August 2020