

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

To

Request Approval for Locally Funded Project to Proceed to the Project Approval and Environmental Document (PA&ED) Phase and Authorize Preparation of a Cooperative Agreement

On Route US 101 and I-280

Between South of US 101 / I-380 Interchange in San Mateo County

And 5th and King Streets in San Francisco County

APPROVAL RECOMMENDED:



Tilly Chang, SFCTA Executive Director


Joseph M. Hurley, SMCTA Director

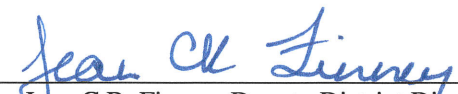

Sandy Wong, C/CAG Executive Director

Accepts Risks Identified in this PSR-PDS and Attached Risk Register

APPROVAL RECOMMENDED:


Nidal Tuqan, Project Director

APPROVAL RECOMMENDED:


Jean C.R. Finney, Deputy District Director
Transportation Planning and Local Assistance

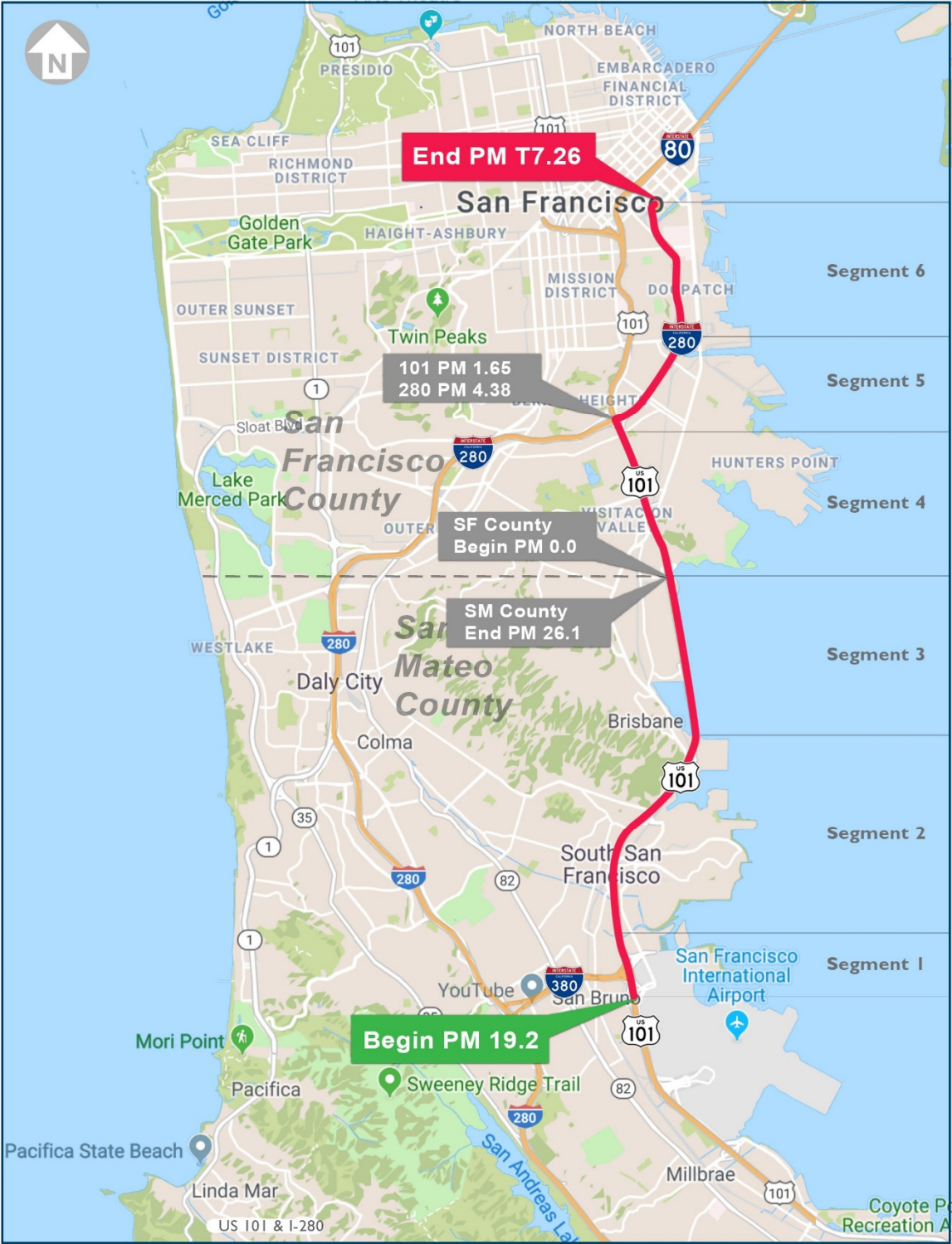
APPROVED:


Tony Tavares, District Director (or delegated authority)

10/18/19

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.

Timothy Lee

REGISTERED CIVIL ENGINEER

July 24, 2019

DATE



Reviewed by:

Celia McCuaig

CELIA MCCUAIG, OFFICE CHIEF, ADVANCE PLANNING

Table of Contents

1. INTRODUCTION	6
2. BACKGROUND	7
3. PURPOSE AND NEED.....	12
A. Purpose.....	12
B. Need	12
4. TRAFFIC ENGINEERING PERFORMANCE ASSESSMENT (TEPA) ..	13
A. Existing Conditions Assessment.....	13
B. Collision Data	15
C. Local Street Opportunities	20
D. TEPA Results Summary	21
E. Recommended Scope of Work for Traffic Studies for PA&ED.....	21
5. DEFICIENCIES.....	23
6. CORRIDOR AND SYSTEM COORDINATION.....	24
A. Identify Systems.....	24
B. State Planning	24
C. Regional Planning.....	26
D. Transit Operator Planning.....	26
E. Local Planning	28
7. ALTERNATIVES.....	30
A. No Build Alternative.....	30
B. Build Alternatives	30
8. RIGHT OF WAY.....	51
A. Right of Way.....	51
B. Utilities.....	51
C. Railroad.....	51
9. STAKEHOLDER INVOLVEMENT	52
10. ENVIRONMENTAL DETERMINATION AND DOCUMENTATION	53
11. FUNDING.....	53
12. DELIVERY SCHEDULE.....	55
13. RISKS	56
14. EXTERNAL AGENCY COORDINATION	56
15. PROJECT REVIEWS	57
16. PROJECT PERSONNEL.....	58
17. ATTACHMENTS.....	58
A. Location Map.....	58
B. Build Alternatives – Line Diagrams, Layouts, and Typical Sections.....	58
C. Other Alternatives Considered.....	58
D. Preliminary Cost Estimates	58
E. Preliminary Environmental Analysis Report (PEAR)	58
F. Traffic Engineering Performance Assessment (TEPA).....	58
G. Transportation Planning Scoping Information Sheet.....	58
H. Right-of-Way Conceptual Cost Estimate Component.....	58
I. Risk Register.....	58
J. Not Used	58
K. Quality Management Plan.....	58

L.	Storm Water Data Report.....	58
M.	Survey Needs Questionnaire.....	58
N.	DES Scoping Checklist.....	58
O.	Design Scoping Index	58

1. INTRODUCTION

The San Francisco County Transportation Authority (SFCTA), the San Mateo County Transportation Authority (SMCTA) and the City/County Association of Governments of San Mateo (C/CAG) propose to provide a Managed Lanes (ML) facility, defined as high-occupancy vehicle (HOV) lanes and/or high-occupancy toll (HOT) lanes, in the northbound and southbound directions of United States Highway 101 (US 101) from 1 mile south of the US 101/Interstate 380 (I-380) Interchange in San Mateo County to the US 101/Interstate 280 (I-280) Interchange in San Francisco County. The project continues on I-280 from the US 101/I-280 Interchange to the I-280 terminus at 5th & King Streets in San Francisco. At the south end of the project, the ML facility will connect to the planned San Mateo US 101 Express Lane Project currently in the Design and Construction phases (EA 1J5600, Project Number 0413000206). At the north end of the project, the ML facility will tie into a local project, currently in development, which will provide ML or Transit-Only lanes along King Street and 3rd Street. The Project would implement approximately 11.4 miles of Managed Lanes in each direction.

US 101 is one of the most congested freeways in the region with the segment in San Francisco from the Cesar Chavez Interchange to I-80 (extending to the Treasure Island Tunnel) being ranked as the most congested freeway section in MTC's 2018 Vital Signs report. Congestion is projected to worsen as a result of continued expansion of commercial and residential development adversely affecting the economic vitality and sustainability of San Francisco and San Mateo Counties.

Project Limits	04-SM-101, PM 19.2/26.1 04-SF-101, PM 0.0/2.0 04-SF-280, PM R4.2/T7.26
Number of Alternatives:	2 Build Alternatives, 1 No-Build Alternative
Current Capital Outlay Support Estimate for PA&ED	\$15.1 million
Current Capital Outlay Construction Cost Range	\$285 million to \$817 million (2025 dollars)
Current Capital Outlay Right-of-Way Cost Range	\$0 million to \$66 million (2025 dollars)
Funding Source:	Federal, State, and Local Funds
Type of Facility	Freeway: Managed Lanes, Widening
Number of Structures:	Modify 7 Bridges, 1 New Viaduct, and retaining walls
Anticipated Environmental Determination or Document:	Environmental Impact Report / Environmental Assessment (EIR/EA)
Legal Description	In San Mateo County and the City and County of San Francisco on Route 101 from 1 mile south of Route 101/380 Separation to Route 101/280 Separation and on Route 280 from Route 101/280 Separation to 5 th Street
Project Development Category	3

Attachment D contains a preliminary cost estimate for specific work items included in this project. The remaining support, right-of-way, and construction components of the project are preliminary estimates and are not suitable for programming purposes. A Project Report would serve as approval of the “selected” alternative and the programming document for the remaining support and capital components of the project.

This PSR-PDS serves as the authorizing document to initiate the Project Approval and Environmental Document (PA&ED) phase. SFCTA, SMCTA and C/CAG are the sponsoring, funding, and implementing agencies for this Project Initiation Document (PID) phase. Caltrans, SFCTA, SMCTA and C/CAG have formally agreed to divide the Project by County after the completion of the PID phase. SMCTA and C/CAG will be the sponsoring, funding and implementing agencies for the PA&ED phase of the Project within San Mateo County. SFCTA will be the sponsoring, funding and implementing agency for the PA&ED phase of the Project within San Francisco County.

2. BACKGROUND

A. Existing Facility

US 101 is primarily a north-south freeway with the entire length extending from the City of Los Angeles, California in the south to the City of Olympia, Washington in the north. It is on the Federal Aid Primary System, but is not part of the Rural and Single Interstate Routing System. Within Caltrans District 4, US 101 begins at the San Benito/Santa Clara County line (PM 0.0) and terminates at the Sonoma/Mendocino County line (PM 56.94).

I-280 is primarily a north-south freeway that extends from the City of San Jose, California to the terminus in the City of San Francisco, California.

To simplify differences in existing and proposed conditions within the study limits, the project is divided into six segments (See Attachment A) with the characteristics described in Table 2.1. Segments are longitudinal portions of freeway – each with consistent cross section attributes such as shoulder width, number of lanes, elevation, and/or right of way width. The method of proposed freeway widening varies by segment and includes combinations of outside widening and shoulder conversion (re-striping an existing shoulder to a travel lane).

Table 2.1: Segments

Segment	Description
Segment #1 (US 101 PM 19.2 to PM 21.6)	Extends from 1 mile south of the US 101/I-380 separation to the San Bruno Canal along US 101. Consists of 4 mixed-flow or general purpose (GP) lanes (12-feet in width) in each direction, a paved 30-foot median, and 10-foot outside shoulders. This segment is completely within San Mateo County.
Segment #2 (US 101 PM 21.6 to PM 24.2)	Extends from the San Bruno Canal to 0.5 miles north of the Sierra Point Overhead. Consists of 4 GP lanes (12-feet wide) in each direction, a paved median (varying from 6 feet to 12 feet), and 10-foot outside shoulders. This segment is completely within San Mateo County.

Segment	Description
Segment #3 (US 101 PM 24.2 to PM 26.1)	Extends from 0.5 miles north of the Sierra Point Overhead to the San Mateo/San Francisco County Line. Consists of 4 GP lanes (12-feet in width) in each direction, a paved median (36 feet wide), and 10-foot outside shoulders. This segment is completely within San Mateo County.
Segment #4 (US 101 PM 0.0 to PM 1.4)	Extends from the San Mateo/San Francisco County Line to the south end of the double decker viaduct connector between US 101 and I-280. Consists of 4 to 5 GP lanes (12-feet in width) in each direction, a paved median (6 feet wide), and 10-foot outside shoulders. This segment is completely within City and County of San Francisco.
Segment #5 (US 101 PM 1.4 to I- 280 PM R6.6)	Extends from the south end of the double decker viaduct structure to the north end of the twin I-280 bridges over Islais Creek. This segment is entirely on elevated structure and consists of 2 GP lanes on the connector and 3 GP lanes on I-280 in each direction (12 feet in width). Outside shoulders are 2 feet and 8 feet, on the left and right sides, respectively. This segment is completely within City and County of San Francisco.
Segment #6 (I-280 PM R6.6 to PM T7.26)	Extends from the north end of the twin I-280 bridges over Islais Creek to the terminus of I-280 at its signalized intersection at 5th Street where it transitions to King Street. It consists of 3 GP lanes (12-feet in width) in each direction, a paved median (varying from 32 feet to 46 feet in width), and 10-foot outside shoulders. This segment is completely within City and County of San Francisco.

There is no High Occupancy Vehicle Lane or Managed Lane within the study segments. Auxiliary lanes per Table 2.4 are also present within the segments.

There are a total of 39 existing structures within the project limits:

Table 2.2: US 101 Structures within the Project Limits

PM	Bridge #	Segment	Structure	Minimum Vertical Clearance (ft)
R20.39	#35-0264	1	San Bruno Avenue OC	16.8
R20.39	#35-0128Y	1	San Bruno Canal	N/A
R20.52	#35-0262G	1	N101-W380 Connector OC	15.6
R20.63	#35-0280	1	North Channel	N/A
R20.65	#35-0256F	1	S101-W380 Connector OC	15.7
R20.69	#35-0271F	1	W380-N&S101 Connector OC	15.6
R20.69	#35-0272H	1	N&S101-E380 Connector OC	15.6
R20.72	#35-0255L	1	Route 380/101 Separation	15.7
R20.72	#35-0255R	1	Route 380/101 Separation	16.1
21.61	#35-0118	1	Colma Creek	N/A
21.69	#35-0119	2	Colma Road UC	14.4

PM	Bridge #	Segment	Structure	Minimum Vertical Clearance (ft)
21.80	#35-0121	2	South SF Belt Railway OH	24.6
21.92	#35-0094L	2	South San Francisco OH	20.7
21.92	#35-0094R	2	South San Francisco OH	15.6
22.70	#35-0318K	2	Oyster Point Boulevard On-Ramp Separation	19.8
22.78	#35-0317K	2	Oyster Point Boulevard Off-Ramp Separation	24.6
22.82	#35-0316	2	Oyster Point Boulevard OC	17.4
23.39	#35-0131S	2	Sierra Point Off-Ramp Separation	14.7
23.66	#35-0130	2	Sierra Point OH	20.2
0.03	#34-0111	3	Candlestick Park UC	15.9
0.18	#34-0061	3	Blanken Avenue UC	14.8
0.56	#34-0103	4	Bayshore Boulevard OC	15.0
0.77	#34-0030S	4	Third Street UC	16.0
1.11	#34-0056	4	Paul Avenue UC	14.7
1.14	#34-0104	4	Bayshore Boulevard Viaduct	N/A
1.41	#34-0057L	4	Bacon Street UC	15.1
1.41	#34-0057R	4	Bacon Street UC	15.0
1.48	#34-0070H	5	280/101 IC - NB280 & SB280	14.1
1.63	#34-0070	5	280/101 IC - 280 TO S101 (Upper)	14.1
1.77	#34-0032	5	Silver Avenue OC	15.2
1.79	#34-0135G	5	280/101 IC - NB101 TO SB280 (W	15.1
1.98	#34-0132R	5	280/101 IC - I-280 Separation	15.1

Table 2.3: I-280 Structures within the Project Limits

PM	Bridge #	Segment	Structure	Min. Vert. Clear.
R4.40	#34-0046	5	Southern Freeway Viaduct	15
R6.39	#34-0098	6	20th Street OC	16.6
R6.57	#34-0099	6	18th Street OC	15
R6.61	#34-0100	6	China Basin Viaduct	N/A
R6.66	#34-0105	6	Mariposa Street RR Separation	Unknown
R7.18	#34-0123L	6	China Basin Viaduct On-Ramp	Unknown
R7.18	#34-0123R	6	China Basin Viaduct Off-Ramp	19.4

Within the study area, existing auxiliary lanes are provided at the following locations:

Table 2.4: Auxiliary Lane Locations

Direction	Segment	Auxiliary Lane
NB	1	SFO On-ramp to San Bruno Ave. Off-ramp
SB	1	I-380 Connector to Millbrae Ave. Off-ramp
NB	2	I-380 Connector to Airport Blvd Off-ramp
NB	2	Airport Blvd On-ramp to Grand Ave. Off-ramp
SB	2	Produce Ave. On-ramp to I-380 Connector
NB	2	Grand Ave. On-ramp to Oyster Point Blvd Off-ramp
SB	2	Oyster Point Blvd On-ramp to Grand Ave. Off-ramp
NB	2	Oyster Point Blvd On-ramp to Bayshore Blvd/Cow Palace
NB	3	0.5 miles south of Alanna/Harney off-ramp to Alanna/Harney off-ramp
NB	6	25th Street On-ramp to Mariposa Street Off-ramp
NB	6	18 th Street On-ramp to Sixth Street off-ramp
SB	6	Sixth Street On-ramp to 18 th Street off-ramp

The San Bruno BART station and South San Francisco Caltrain stations provide the nearest park-and-ride lots in the project area. There are no state-owned park-and-ride lots within the project limits.

US 101, just south the I-280 Separation, is characterized by the close proximity of bridge bents, narrow lane and shoulder widths, and constrained right-of-way widths that preclude widening to accommodate a Managed Lane facility toward the downtown area. For this reason, I-280 within Segments 5 and 6 is considered a more viable route for a Managed Lane facility connecting to the downtown area.

B. Project Development History

The addition of Managed Lanes on US 101 and I-280 was identified in the 2013 San Francisco Transportation Plan, which included a policy recommendation to “Set a Vision for Managing the City’s Freeway Network”. As a result, a feasibility study known as the Freeway Corridor Management Study (FCMS) was developed and completed in 2017.

The purpose of the FCMS was to recommend a set of Managed Lanes and complementary system management strategies for the US 101 and I-280 corridors in San Francisco that will help achieve economic competitiveness, environmental, social and equity goals while maximizing person throughput, through a performance-based analysis and stakeholder consultation. Phase 1 of the FCMS development was completed in February 2015, which established a goals-based performance framework and recommended a broad set of potential technology- and demand-related strategies to consider in Phase 2. Shortly after Phase 2 began in November 2015, interest arose from both the Governor’s Office and local partner agencies to extend the San Mateo US 101 Express Lane Project northerly into San Francisco to alleviate severe congestion occurring on US 101 as a result of continued expansion of commercial and residential development in San Francisco and along the Peninsula and in the South Bay. As a result, the SFCTA agreed to shift the focus of FCMS Phase 2 to assessing the feasibility of providing a continuous Managed Lanes facility through San Mateo County and into San Francisco by connecting to the planned Managed Lanes on US 101 south of I-380 cosponsored by SMCTA and C/CAG, and implemented by Caltrans and SMCTA. The technology related strategies recommended in FCMS were also assessed in the context of providing complementary system management and operations capabilities to the Managed Lanes corridor.

SFCTA collaborated with SMCTA and C/CAG on strategies to extend the Managed Lanes north of I-380 into San Francisco. The initial planning studies determined that extending Managed Lanes into San Francisco was feasible, and could meet the project purpose and need with a variety of different approaches. The parties decided to jointly fund this PSR-PDS as cosponsors to study the Managed Lane concepts from I-380 to downtown San Francisco through US 101 in San Mateo and San Francisco Counties, and I-280 in San Francisco County.

3. PURPOSE AND NEED

During the PA&ED phase, the Purpose and Need Statement may be refined to provide additional details and analyses regarding the existing and future needs.

A. Purpose

The purpose of the proposed project is to provide a managed facility in each direction of US 101 and I-280 from the northern terminus of the San Mateo US 101 Express Lane Project at I-380 to the I-280 terminus at 5th and King Streets in San Francisco that fulfills the following:

- Create a facility that extends the benefits of the San Mateo US 101 Express Lane Project into San Francisco;
- Increase person throughput;
- Encourage carpooling and transit use;
- Improve travel time and reliability for HOV and transit users;
- Minimize degradation to general purpose lanes and local streets; and
- Optimize freeway system management and traffic operations.

B. Need

All lanes on US 101 and I-280 experience congestion resulting in an overall degradation of operations throughout the corridor. Traffic flow is constrained at several bottlenecks where vehicular demand exceeds the capacity of the facility. All users traveling on US 101 and I-280, whether they are in single or multiple occupant vehicles or in buses, experience delays in both the northbound and southbound directions in the AM and PM peak hours, and at other periods during the week.

4. TRAFFIC ENGINEERING PERFORMANCE ASSESSMENT (TEPA)

A Traffic Engineering Performance Assessment (TEPA) for the project was prepared by Fehr & Peers Associates (see Attachment F). The TEPA presents an assessment of existing traffic operating conditions and the scope for detailed traffic studies to be conducted during the PA&ED phase. The key findings of the TEPA include:

A. Existing Conditions Assessment

A qualitative peak hour operations analysis was performed for mainline and ramp segments based on field observations using available count data and field monitoring systems (PeMS, INRIX). The study area included in the TEPA includes: US 101 Mainline Segments, between I-380 interchange and the Cesar Chavez Street interchange and I-280 Mainline Segments, between Ocean Avenue interchange and King Street.

AM Peak Hour Bottlenecks – US 101

The primary northbound bottlenecks occur just north of the US 101/I-380 interchange between the Grand Avenue off-ramp and the Airport Boulevard on-ramp in San Mateo County. This is likely a result of the weaving from vehicles entering the mainline and the heavy off-ramp traffic leaving US 101 for the east of US 101 area in South San Francisco. North of the Airport Boulevard bottleneck, traffic is generally free of congestion up to the San Francisco/San Mateo (SF/SM) county line. Under existing conditions, the Hospital Curve (between 17th Street and 22nd Street in San Francisco) bottleneck almost extends back to the SF/SM county limits at the Third Street/Bayshore Boulevard interchange. The bottleneck is likely a result of the addition of I-280 northbound traffic onto the US 101 corridor, resulting in an over-capacity segment. North of the Hospital Curve bottleneck, conditions are generally free of congestion north of the US 101/I-80 junction except at the approach to the lower deck of the Bay Bridge.

The primary southbound bottleneck occurs between Bayshore Boulevard on-ramp in San Francisco and Alana Way off-ramp in the City of Brisbane primarily due to the lane drop just south of the Bayshore Boulevard on-ramp. The queue from this bottleneck extends beyond the extent of the study limits to the I-80 interchange. Traffic conditions are generally free flowing south of the Alana Way/Harney Way interchange through the remainder of the study area.

AM Peak Hour Bottlenecks – I-280

The primary northbound bottleneck along I-280 occurs at the I-280/US 101 interchange due to the demand exceeding the capacity of the two-lane connectors between I-280 northbound and US 101 northbound. At the I-280 terminus, queues typically form at the ramp interface with signalized local street intersections at King Street/5th Street and 6th Street/Brannan Street, that spill back to the Mariposa Street interchange.

In the southbound direction, traffic is generally under-capacity as traffic volumes entering the freeway are constrained by the capacity of the King Street at 5th Street and 6th Street at Brannan Street intersections.

PM Peak Hour Bottlenecks – US 101

The eastbound I-80 traffic at the approach to the Bay Bridge exceeds the available capacity resulting in a queue which extends into the study area limits near the US 101/I-280 interchange. This controlling queue likely hides the bottleneck formed by Hospital Curve which typically operates near or at capacity. In addition, northbound US 101 segments around the San Francisco/San Mateo County line typically operate at near-capacity conditions. South of the county line a bottleneck is observed near the Sierra Point Parkway on-ramp, resulting in a queue that extends through South San Francisco and back to the I-380 interchange.

In the southbound US 101 direction, the primary bottleneck is at the Hospital Curve with queues extending beyond the study limits to the Bay Bridge terminus in San Francisco. South of Hospital Curve, traffic conditions are typically less congested until South San Francisco near the Grand Avenue and Oyster Point Boulevard interchanges.

PM Peak Hour Bottlenecks – I-280

Similar to the AM peak hour, the primary northbound bottleneck in the PM peak hour occurs at the I-280 terminus where queues typically form due to the freeways interface with signalized local street intersections at King Street/5th Street and 6th Street/Brannan Street that spill back to the Mariposa Street interchange.

In the southbound direction, a bottleneck is typically formed near the Alemany Boulevard and Monterey Boulevard off-ramps. Queues typically spillback onto I-280/US 101 connector; however, the queues do not typically extend beyond the US 101 interchange. Within the project study limit, congestion typically occurs on I-280 between the 25th Street and 18th Street interchanges. However, the freeway queue does not extend back into the local streets at the termini of I-280.

During the PA&ED phase, the study limits will be refined to accommodate queues that spill back beyond the current study area.

B. Collision Data

Caltrans staff provided collision data for US 101 and I-280 through the study area for the period between January 2014 and December 2017 (the most recent four years of complete data). Table 4.1 summarizes the data for the entire study corridor. Tables 4.2 and 4.3 describe the Collision History by Corridor.

Table 4.1: Collision History by Facility Type

Location	Segment	Number of Collisions		
		Total	Fatal	F + I
Mainline - US 101	1 - 4	2,600	7	933
Ramps along US 101	1 - 4	337	1	133
Mainline – I-280	5 - 6	793	3	322
Ramps – I-280	5 - 6	228	0	101
<i>Source: Caltrans TASAS data (1/1/14-12/31/17)</i>				

Table 4.2: US 101 Collision History by Location

Facility	Number of Collisions			Collision Rate (collisions/million vehicle miles)					
				Actual			State Average		
	Total	Fatal	Fatal + Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Tot.
US 101 Mainline									
Between PM 0.00 to PM 4.132	1,963	5	683	0.004	0.50	1.43	0.006	0.42	1.30
US 101/Harney Way/Alana Way Interchange Ramps									
Southbound Off to Harney Way	4	0	0	0.000	0.00	0.87	0.002	0.23	0.78
US 101 /Third Street/Bayshore Boulevard Interchange Ramps									
Northbound Off to Third St	0	0	0	0.000	0.00	0.00	0.003	0.84	0.69
Northbound Off to Bayshore Blvd	3	0	1	0.000	0.24	0.73	0.003	0.24	0.00
Southbound On from Third St/ Bayshore Blvd	2	0	1	0.000	0.10	0.20	0.003	0.10	0.28
Northbound On from Bayshore Blvd	3	0	1	0.000	0.04	0.12	0.003	0.10	0.28
Southbound On from Third St	0	0	0	0.000	0.00	0.00	0.003	0.19	0.56
Southbound On from Bayshore Blvd	1	0	0	0.000	0.00	0.68	0.003	0.19	0.56
Southbound Off to Bayshore Blvd	8	0	8	0.000	0.43	0.43	0.003	0.24	0.69
US 101/San Bruno Avenue/Paul Street Interchange Ramps									
Southbound Off to San Bruno/Paul	11	0	2	0.000	0.17	0.93	0.002	0.23	0.78
US 101/I-280 Interchange Connector Ramps									
Southbound On from I-280	9	0	5	0.000	0.08	0.15	0.001	0.06	0.20
Northbound Off to I-280	13	0	7	0.000	0.12	0.23	0.002	0.08	0.25
US 101/Bayshore Boulevard Interchange Ramps									
Northbound Off to Bayshore Blvd	8	0	2	0.000	0.43	1.71	0.002	0.23	0.78

Table 4.2: US 101 Collision History by Location

Facility	Number of Collisions			Collision Rate (collisions/million vehicle miles)					
				Actual			State Average		
	Total	Fatal	Fatal + Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Tot.
<i>US 101/San Bruno Avenue Interchange Ramps</i>									
Southbound On from San Bruno Ave	0	0	0	0.000	0.00	0.00	0.001	0.14	0.48
Southbound Off to San Bruno Ave	8	0	5	0.000	0.46	0.74	0.002	0.23	0.78
<i>US 101/Alemaný Boulevard Interchange Ramps</i>									
Southbound Off to Alemaný Blvd	7	0	2	0.000	0.56	1.96	0.002	0.23	0.78
Northbound Off to Alemaný Blvd/ Industrial	7	0	3	0.000	0.38	0.89	0.004	0.32	0.92
Southbound On from Alemaný Blvd	5	0	3	0.000	0.51	0.86	0.002	0.13	0.39
Northbound On from Alemaný Blvd	2	0	1	0.000	0.09	0.19	0.002	0.13	0.39
Southbound Off to Southbound I- 280/Alemaný Blvd	17	0	12	0.000	0.17	0.24	0.002	0.08	0.25
<i>US 101/Cesar Chavez Interchange Ramps</i>									
Northbound Off to Cesar Chavez	10	0	3	0.000	0.10	0.34	0.003	0.09	0.25
Southbound On from Potrero Ave/ Cesar Chavez	10	0	6	0.000	0.14	0.24	0.001	0.03	0.20
Southbound On from Eastbound Cesar Chavez	4	0	1	0.000	0.06	0.23	0.003	0.19	0.56
Southbound On from Southbound Potrero Ave	4	0	3	0.000	0.12	0.16	0.003	0.10	0.28
Southbound Off to Bayshore Blvd	3	0	1	0.000	0.09	0.27	0.003	0.15	0.45
Southbound Off to Eastbound Cesar Chavez	7	0	4	0.000	0.30	0.53	0.003	0.15	0.45
Southbound Off to Cesar Chavez/ Bayshore Blvd	2	0	1	0.000	0.04	0.08	0.002	0.08	0.25
Southbound Off to Cesar Chavez/ Potrero Ave	2	0	0	0.000	0.00	0.18	0.003	0.24	0.69
Northbound On from Bayshore Blvd	6	0	1	0.000	0.05	0.31	0.003	0.19	0.56
Northbound On from Cesar Chavez	6	0	1	0.000	0.10	0.60	0.002	0.21	0.60
Southbound Off to Cesar Chavez/ Potrero Ave	7	0	3	0.000	0.08	0.20	0.002	0.08	0.25
Northbound On from Cesar Chavez/ Bayshore Blvd	17	0	4	0.000	0.14	0.58	0.001	0.06	0.20
<i>US 101/Vermont Street Interchange Ramps</i>									
Northbound Off to Vermont St/ Mariposa St	7	0	1	0.000	0.09	0.61	0.003	0.18	0.50
<i>US 101 Mainline</i>									
Between PM 20.977 to PM 26.03	637	2	250	0.001	0.15	0.39	0.004	0.32	1.02
<i>US 101/I-380 Interchange Connector Ramps</i>									
Northbound On from I-380	0	0	0	0.000	0.00	0.00	0.001	0.06	0.20

Facility	Number of Collisions			Collision Rate (collisions/million vehicle miles)					
				Actual			State Average		
	Total	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Fatal	Fatal + Injury	Tot.
Southbound Off to Westbound I-380	13	0	5	0.000	0.18	0.47	0.003	0.12	0.37
<i>US 101/Produce Avenue/Airport Boulevard Interchange Ramps</i>									
Southbound On from Produce Ave/ Airport Blvd	8	0	2	0.000	0.08	0.30	0.002	0.12	0.33
Northbound Off to S Airport Blvd	11	0	1	0.000	0.06	0.67	0.002	0.23	0.78
Northbound On from S Airport Blvd	2	0	0	0.000	0.00	0.29	0.001	0.14	0.48
Southbound Off to Produce Ave/ Airport Blvd	6	0	3	0.000	0.33	0.66	0.002	0.23	0.78
<i>US 101/Grand Avenue/Airport Boulevard/Industrial Way Interchange Ramps</i>									
Northbound Off to Industrial Way	4	1	3	0.071	0.21	0.29	0.003	0.24	0.69
Northbound On from Grand Av/Airport	12	0	3	0.000	0.23	0.92	0.001	0.23	0.68
Southbound Off to Airport/Miller	9	0	2	0.000	0.18	0.81	0.002	0.23	0.78
<i>US 101/Oyster Point Boulevard Interchange Ramps</i>									
Southbound On from Oyster Point Blvd	8	0	5	0.000	0.41	0.66	0.001	0.14	0.48
Northbound Off to Oyster Point Blvd	0	0	0	0.000	0.00	0.00	0.002	0.23	0.78
Northbound On from Oyster Point Blvd	13	0	4	0.000	0.29	0.93	0.002	0.21	0.60
Southbound Off to Oyster Point Blvd	3	0	1	0.000	0.68	2.05	0.003	0.15	0.45
<i>US 101/Bayshore Boulevard Ramps</i>									
Southbound On from Bayshore Blvd	8	0	5	0.000	3.42	5.47	0.002	0.12	0.33
Southbound Off to Old Bayshore Blvd	19	0	3	0.000	0.47	2.99	0.003	0.18	0.50
Northbound Off to Old Bayshore Blvd	4	0	2	0.000	0.14	0.29	0.003	0.15	0.45
<i>US 101/Sierra Point Parkway</i>									
Northbound Off to Marina Boulevard	2	0	2	0.000	0.86	0.86	0.004	0.32	0.92
Northbound On from Sierra Pt Pkwy/Marina Blvd	5	0	1	0.000	0.69	3.46	0.002	0.21	0.60
Southbound On from Sierra Pt Pkwy/Marina Blvd	1	0	0	0.000	0.00	0.33	0.001	0.14	0.48
Southbound Off to Marina Blvd/Sierra Pt Pkwy	2	0	1	0.000	0.27	0.54	0.002	0.23	0.78
<i>US 101/Harney Way/Alana Way Interchange Ramps</i>									
Northbound Off to Harney Way	11	0	7	0.000	1.88	2.95	0.003	0.24	0.69
Northbound On from Harney Way	1	0	1	0.000	0.21	0.21	0.003	0.23	0.71
Southbound On from Harney Way	2	0	0	0.000	0.00	0.47	0.001	0.14	0.48

Note: Gray bold cell indicates actual average is greater than the state average

Source: Caltrans District TASAS data between 1/1/2014 and 12/31/2017

Table 4.3: I-280 Collision History by Location

Facility	Number of Collisions			Collision Rate (collisions/million vehicle miles)					
				Actual			State Average		
	Total	Fatal	Fatal + Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Tot.
<i>I-280 Mainline</i>									
PM R1.708 to PM T7.26	793	3	322	0.002	0.25	0.61	0.005	0.31	0.96
<i>I-280/Ocean Avenue/Geneva Avenue Interchange Ramps</i>									
Southbound Off to Westbound Ocean Ave	0	0	0	0.000	0.00	0.00	0.003	0.24	0.69
Southbound Off to Geneva Ave	12	0	6	0.000	0.51	1.03	0.004	0.32	0.92
Northbound On from Geneva Ave	3	0	2	0.000	0.20	0.30	0.002	0.21	0.60
Northbound On from Ocean Ave	6	0	4	0.000	0.30	0.46	0.002	0.21	0.60
Northbound On from Ocean Ave/ Geneva Ave	1	0	1	0.000	0.04	0.04	0.001	0.06	0.20
Southbound Off to Ocean Ave/ Geneva Ave	2	0	1	0.000	0.04	0.09	0.002	0.08	0.25
<i>I-280/San Jose Avenue Interchange Ramps</i>									
Southbound On from San Jose Ave	13	0	5	0.000	0.16	0.42	0.003	0.19	0.56
Northbound Off to San Jose Ave	5	0	2	0.000	0.07	0.18	0.003	0.15	0.45
<i>I-280/Monterey Avenue Interchange Ramps</i>									
Northbound On from Monterey Ave	3	0	0	0.000	0.00	0.17	0.002	0.21	0.60
Southbound Off to Monterey Ave	4	0	2	0.000	0.10	0.20	0.004	0.32	0.92
<i>I-280/Alemaný Boulevard Interchange Ramps</i>									
Northbound Off to Northbound Alemaný Blvd	6	0	3	0.000	0.23	0.47	0.003	0.09	0.25
Southbound On from Southbound Alemaný Blvd	4	0	2	0.000	0.12	0.23	0.003	0.10	0.28
Northbound On from Northbound Alemaný Blvd	9	0	4	0.000	0.21	0.46	0.003	0.10	0.28
Southbound Off to Southbound Alemaný Blvd	2	0	0	0.000	0.00	0.13	0.003	0.09	0.25
<i>I-280/US 101 Interchange Connector Ramps</i>									
Northbound Off to Southbound US 101	10	0	5	0.000	0.30	0.61	0.003	0.15	0.45
Northbound Off to Northbound US 101	36	0	19	0.000	0.25	0.47	0.003	0.15	0.45

Facility	Number of Collisions			Collision Rate (collisions/million vehicle miles)					
				State Average			State Average		
	Total	Fatal	Fatal + Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Tot.
Northbound On from Northbound US 101	4	0	1	0.000	0.02	0.08	0.002	0.11	0.32
Northbound Off to Cesar Chavez	14	0	10	0.000	0.59	0.82	0.004	0.32	0.92
Southbound On from Southbound US 101	2	0	0	0.000	0.00	0.02	0.002	0.11	0.32
Northbound On from Northbound US 101	3	0	1	0.000	0.07	0.21	0.002	0.13	0.39
Southbound Off to Southbound US 101	21	0	6	0.000	0.20	0.69	0.003	0.15	0.45
<i>I-280/Cesar Chavez/25th Street Interchange Ramps</i>									
Southbound On from 25 th St/Cesar Chavez	8	0	6	0.000	0.42	0.56	0.001	0.14	0.48
Southbound Off to 25 th St/Cesar Chavez	4	0	1	0.000	0.11	0.44	0.002	0.23	0.78
Northbound On from Indiana St	0	0	0	0.000	0.00	0.00	0.003	0.19	0.56
<i>I-280/Mariposa Street Interchange Ramps</i>									
Northbound Off to Mariposa St	15	0	1	0.000	0.09	1.33	0.004	0.32	0.92
Southbound On from Mariposa St	2	0	0	0.000	0.00	0.19	0.002	0.21	0.60
Southbound Off To Mariposa	0	0	0	0.000	0.00	0.00	0.002	0.31	0.92
<i>I-280/18th Street Interchange Ramps</i>									
Southbound Off to 18th St	0	0	0	0.000	0.00	0.00	0.004	0.32	0.92
Northbound On from 18th St	0	0	0	0.000	0.00	0.00	0.002	0.21	0.60
Southbound Off to 18th/Mariposa	7	0	3	0.000	0.55	1.28	0.002	0.31	0.92
<i>I-280/King Street Interchange Ramps</i>									
Northbound Off to King/5th St	28	0	14	0.000	0.36	0.71	0.003	0.24	0.69
Southbound On from King/5th St	4	0	2	0.000	0.07	0.15	0.003	0.19	0.56

Note: Gray bold cell indicates actual average is greater than the state average

Source: Caltrans District TASAS data between 1/1/2014 and 12/31/2017

As indicated in Table 4.1, there were a total of 2,600 collisions reported on US 101, while 337 collisions were reported on the ramps between the I-380 interchange and Vermont Street interchange between 2014 and 2017. Seven fatal collisions occurred on the mainline, with one on the ramps. The San Mateo County segment of the US 101 mainline (Segments 1-3) exhibits a collision rate lower than the statewide average for similar facilities; however, the San Francisco County segment of US 101 mainline exhibits a collision rate higher than the statewide average. 33 out of the 41 ramps within the study area reported collisions rates, either fatal, fatal plus injury, or total, which exceeded the statewide average for similar facilities.

Rear-end and side-swipe type collisions, which are generally due to driver's inattention, unsafe speeds, or lane changing in recurring traffic congestion, accounted for 85.8% of all reported collisions on the US 101 mainline. Collisions that were a result of hitting an object accounted for 9.4% of all collisions, and 1.8% of the reported collisions were due

to overturned vehicles. The primary reported collision factors included improper turns, speeding, and other violations.

793 collisions were reported along I-280 while 228 collisions were reported on the ramps between 2014 and 2017. Three fatal collisions were reported along the mainline and none reported on the ramps. I-280 mainline exhibits a collision rate lower than the statewide average for similar facilities. 14 of the 26 ramps within the study area reported collisions rates that exceeded the statewide average for similar facilities.

Similar to US 101, the primary type of collision reported along mainline I-280 were rear-end and side-swipe collisions, which accounted for 74.9% of all reported collisions. Collisions that were a result of hitting an object accounted for 18.8% of all collisions, and 2.3% of the reported collisions were due to overturned vehicles. The primary reported collision factors included improper turns, speeding, and other violations.

The highest number of collisions occur around the US 101/I-280 connector with over 100 collisions occurring over the four-year analysis period. The concentration in collision in this area is nearly four times higher than other segments along the study corridor.

C. Local Street Opportunities

The Managed Lane facilities provide a unique opportunity to improve mainline throughput as well as local street operations. The following local street opportunities were discussed with SFMTA staff and will be further evaluated during PA&ED phase.

- I-280 Terminus: Consider terminating the Managed Lane before the freeway terminus and provide a transit only lane (public and private) that prioritizes transit access to the local street network.
- HOV bypass lanes for on-ramps: To maximize transit usage on the freeway, the project should consider HOV bypass lanes on on-ramps which would provide transit vehicles a queue jump to the freeway mainline and/or Managed Lane.
- Planned Corridor Improvements: Several streets around the I-280 terminus may be modified to improve transit operations by providing transit only lanes and increasing pedestrian safety. Corridors planned for improvements include 6th Street, 5th Street, 4th Street, 3rd Street, Townsend Street, and Brannan Street. The project should consider what impact these corridor projects have on freeway operations as many of them result in a decrease in local street capacity.
- I-80 Bypass Traffic: Currently some drivers use I-280 and local streets in the SoMA neighborhood to bypass congestion on US 101 and I-80. The project should consider opportunities to disincentivize drivers from using local streets, such as ramp metering and other traffic management strategies.
- Transit Travel Time Improvements: The addition of the Managed Lane system would provide a dedicated lane for HOV vehicles, including transit. Transit use of the Managed Lane system would likely lead to improved travel times, reliability, and person throughput. The project should consider metrics associated with the change in travel time for various users, including transit (public and private).

D. TEPA Results Summary

This TEPA provides a qualitative evaluation of the existing operating conditions within the vicinity of the US 101/I-280 Managed Lanes study in San Francisco and San Mateo County, specifically denoting existing bottlenecks, length of queues, and collision profiles. It also included a discussion of recommendations for the scope of more detailed traffic studies to be conducted as part of the PA&ED phase. Although this analysis is only based on readily available information, the following general conclusions can be made:

- The current roadway system operates under congested conditions and will likely continue to degrade and does not include sufficient capacity to serve additional traffic; therefore, freeway improvements that extend the benefits anticipated from the San Mateo US 101 Express Lane Project should be considered.
- The Maximum Build, Alternative 1 proposed Managed Lane would add capacity to segments along US 101 and I-280 via lane addition. The freeways currently operate at over-capacity conditions. The project would likely result in an increase in person through-put and an increase in carpooling and transit use. Lastly, the addition of a Managed Lane would also likely result in improved travel time and reliability for HOV and transit users.
- The Minimum Build, Alternative 2, proposed Managed Lane would decrease capacity (e.g. in the general-purpose lanes) to segments along US 101 and I-280, which currently operate over-capacity. While the project would convert a general purpose lane to a Managed Lane (except on SB I-280 in San Francisco), the project may result in an increase in person through-put as the project would incentive carpooling and transit use along the corridor, such that single occupant users may change their mode choice, and therefore more ‘persons’ can be served through the corridor. Additionally, the Managed Lane would likely improve travel time for HOV and transit users utilizing the Managed Lane.
- More detailed studies to be conducted as part of the PA&ED phase of the work will be important to define the specific geometric improvements associated with each alternative in order to maximize the benefit it can achieve.

E. Recommended Scope of Work for Traffic Studies for PA&ED

A Traffic Operations Analysis Report (TOAR) will be prepared for the project during the PA&ED phase. Below is a list of key elements of the proposed scope of work and technical approach for the PA&ED phase.

- Traffic Operations Analysis Study Area - Based on the initial analysis, the traffic study area should be extended to include additional segments north and south of the existing project limits. The following mainline segments are proposed for the study area:
 - US 101 from south of the Millbrae Avenue to the I-80 Interchange
 - I-280 from the King Street and 6th Street freeway termini to the SR 1/John Daly Boulevard Interchange
- Data Collection – Examine additional data sources including: traffic volume data from PeMS database, Caltrans census count database, Inrix speed data platform, and Caltrans TASAS collision database. Additional data collection will be conducted to supplement available data including: freeway mainline volumes (SOV, HOV, buses,

and trucks), ramp volumes, intersection volumes, auto occupancy, travel speeds, and origin-destination patterns. Data will be used to:

- Establish mainline and ramp demand volumes and HOV/SOV mode splits
 - Establish person through-put
 - Establish freeway travel speed profiles and corridor travel patterns
 - Validate the traffic forecasting model and calibrate the traffic operations tools
 - Establish vehicle volumes and occupancy patterns.
- Existing Conditions Analysis - An Existing Conditions Report outlining the traffic data collected will be completed as part of the PA&ED process. This report will be incorporated into the TOAR for the project. As part of the Existing Conditions analysis, AM and PM peak period microsimulation models will be developed for the study segments described above using the VISSIM software package. The microsimulation models will be calibrated and validated to existing conditions. Measures of Effectiveness (MOEs) to assess person-throughput and reliability for car and transit users could include total vehicle-hours of delay, total vehicle-miles traveled, corridor travel times, corridor travel speeds and corridor maximum individual delays. Level of Service (LOS) outputs will be provided based on 2010 Highway Capacity Manual methodologies. Weave area analysis will be supplemented using the Leisch method.
- Project Alternative Analysis - The existing conditions calibrated/validated VISSIM models will be used for scenario testing. The corridor is currently congested and VISSIM can provide an understanding of the impact and effectiveness of each design scenario. Various project scenarios will be analyzed and may include a combination of geometric changes as well as operational changes i.e., HOV3+, and Express Lane with HOV3+. The changes will not address potential mode shifts as these require travel demand forecasting. The VISSIM model will also be used to investigate ingress/egress options - weave zones, weave lanes, and merge lanes – in terms of congestion and operational characteristics.
- Traffic Forecasts - Three regional models may be used to develop traffic forecasts: SFCTA's SF-Champ model, MTC's Travel Model 1, and San Mateo County's C/CAG model. Typically, because most of the project is in San Francisco, SFCTA's SF-Champ model would be used; however, because the project limits include a substantial portion of San Mateo County, the C/CAG model should be considered. Additionally, future year volumes should correspond to forecast prepared as part of the San Mateo County Express Lanes Project which used the C/CAG model.
- Future Year Operations Analysis - For both the opening year and design year, the VISSIM models will be updated to reflect the expected future conditions, including the forecasted future traffic volumes and any capital improvements anticipated to occur. The models will be used to evaluate the MOEs of the No Build and Build alternatives. Results from the analysis of the Build alternative may be used to define further improvements needed to fulfill the purpose and need of the project (e.g. increased transit service and ramp metering). An assessment of pedestrian, bicycle, and transit facilities will be performed to determine if either of the proposed build alternatives hinder or eliminate existing or proposed bikeways, result in unsafe conditions for bicyclists or pedestrians, or cause a substantial delay in transit service. Travel time delays to cyclists will be evaluated as well.

- Traffic Analysis Report - A draft TOAR will be prepared summarizing the results and findings from the analysis described above.
- Auxiliary Lanes - In addition to the addition of the Managed Lane facility, auxiliary lanes may be proposed to improve weaving operations at ramp locations and Managed Lane access points. The addition of new auxiliary lanes will be analyzed as part of the PA&ED phase through a detailed traffic analysis, described in the TEPA.
- ML Ingress/Egress - Detailed traffic operations analysis will be performed during the PA&ED phase to determine the exact project limits and inform if separate ingress/egress locations are needed to improve operations or address safety.
- Local Street Assessment - A quantitative local street analysis was not completed as part of the TEPA; therefore, supplemental studies should be considered during the PA&ED phase that evaluate how local streets may be improved. In particular, the operation of the I-280 freeway terminus at 5th and King Streets and at 6th and Brannan Streets will be analyzed in detail.

5. DEFICIENCIES

Based on previous traffic analysis completed for the FCMS, the traffic demands on US 101/I-280 corridor within the project limits would far exceed the available capacity during peak periods, adversely affecting travel speeds, increase vehicular delays, and create additional bottlenecks if no improvements are made to the corridor. The forecasted conditions indicate a level of congestion that is also expected to cause substantial diversion of through traffic onto local streets, degrade air quality, reduce transit service reliability, and worsen the collision rate in the corridor.

The planned ML system extends from the Santa Clara County line into San Mateo County to the I-380 interchange. At this point, the northbound HOV users experience the same traffic congestion as other SOV drivers and the southbound HOV users do not receive the HOV benefit until this point. The HOV lane discontinuity diminishes the incentive for drivers to carpool and to use public transit.

6. CORRIDOR AND SYSTEM COORDINATION

A. Identify Systems

US 101 is part of the California Freeway and Expressway System and the National Highway System (NHS). It is also a Strategic Highway Network (STRAHNET) route and a State Highway Extra Legal Load (SHELL) route, which permits transport of loads exceeding limits of length, height, or weight as stated in the California Vehicle Code, Section 15. US 101 is functionally classified as a freeway within the project limits.

Caltrans' Interregional Transportation Plan (ITP) classifies US 101 as a "High Emphasis" and "Focus Route," making this route the highest priority for completion with at least minimum facility standards for a 20-year design period. Focus routes serve as a system of high-volume primary arteries to which other state highway routes can connect for purposes of longer interregional trips and access to statewide gateways.

US 101 is a National Truck Network route, a Surface Transportation Assistance Act (STAA) truck route, and serves as one of the primary north-south freight routes for the San Francisco Bay Area, providing direct access to other Bay Area goods movement corridors. There are no truck advisories on US 101 within the project limits.

I-280 is a major south-north freeway connection between the city of San Jose in Santa Clara County and downtown San Francisco serving mainly regional traffic. I-280 is part of the California Freeway and Expressway System, Interstate Highway System, NHS, and the STRAHNET and functions as a Lifeline Corridor from US 101 in San Jose to US 101 in San Francisco. I-280 is classified as an Interstate highway.

I-280 is a National Truck Network route, a STAA truck route, and a Highway Multimodal Freight Network Route. With I-280 neither traversing an area of significant freight movement or handling nor connecting with major port facilities, there is limited goods movement through the corridor. Industrial uses along the eastern waterfront in San Francisco rely on the route for freight movement. There are no truck advisories on I-280 within the project limits.

B. State Planning

US 101 was adopted into the California State Highway System in 1909. The present alignment within project limits was designated as Route 101 in 1937, and widened into a separated freeway in 1960. Within California, Route 101 is part of the California Freeway and Expressway System in accordance with the Streets and Highways Code. The 1985 Route Concept Report (RCR, 20-year route development planning document) identified the route concept for Route 101 as an 8-lane freeway within the project limits. The 2002 Transportation Corridor Concept Report (TCCR, 4-panel map used to expand on the MTC 2001 RTP to provide year 2025 facility and operational concepts) also identified Route 101 as an 8-lane freeway within project limits. Both the RCR and TCCR have now been replaced by the 2018 US 101 South Comprehensive Corridor Plan (CCP). The CCP provides Caltrans' vision for this route with respect to corridor capacity and operations for a 25-year planning horizon. The Corridor Concept specifies the 25-year concept for this section of US 101 as an 8-lane freeway, but notes that the concept could

be updated to convert HOV to HOT lanes depending on future studies currently being evaluated by Caltrans, MTC, C/CAG and SMCTA.

After passage of Proposition 1B in 2006, Caltrans has implemented the Corridor System Management Plan (CSMP) process statewide for all corridors with projects funded by the Corridor Mobility Improvement Account (CMIA) program. The California Transportation Commission (CTC) requires all corridors with a CMIA-funded project to have a CSMP that is developed with regional and local partners. The CSMP recommends how the congestion-reduction gains from the CMIA projects will be maintained with supporting system management strategies. CTC has also provided guidance in the 2008 RTP Guidelines that state that CSMPs are an important input to the development of the Regional Transportation Plans (RTP 2035).

In December 2010, Caltrans completed the CSMP for US 101 South corridor which revisited the planned future improvements along the corridor. The CSMP studied the mobility and performance of US 101 between the San Mateo/San Francisco County border to the US 101/SR 85 South Interchange in Santa Clara County. The plan recommended corridor management strategies such as Intelligent Transportation Systems (ITS), ramp metering, auxiliary lanes, and construction of HOV lanes to be consistent with a regional plan that can be converted to express lanes. The CSMP emphasized the importance of implementing the SMART Corridor Plan to redirect traffic during emergencies on US 101.

I-280 was adopted into the Interstate Freeway System in 1955. A realignment approved in 1968 took I-280 to its current route. Within California, I-280 is part of the California Freeway and Expressway System in accordance with the Streets and Highways Code. The 1985 Route Concept Report (RCR, 20-year route development planning document) identified the route concept for I-280 as an 8 to 12-lane freeway in San Mateo County and a 6 to 8-lane freeway in San Francisco County within the project limits. The 2002 Transportation Corridor Concept Report (TCCR, 4-panel map) identified I-280 as a 4 to 10-lane freeway within project limits. Both the RCR and TCCR have now been replaced by the 2013 Interstate 280 Transportation Concept Report (TCR). The TCR specifies the 25-year concept for this section of I-280 as a 4 to 8-lane freeway, but notes inclusion of HOV facilities to manage the existing system to the extent feasible to accommodate the long-term goals of the future study area.

Caltrans District 4 Bicycle Plan dated March 2018 identifies five projects within the project study area:

- Minor interchange improvements – Class IIB at US 101 / East Grand Ave.
- Minor interchange improvements – Class IV at US 101 / Sister Cities Blvd.
- Minor interchange improvements – Class I at US 101 / Alemany Blvd.
- Minor interchange improvements – Class IIB at US 101 / Cesar Chavez St.
- Minor interchange improvements – Class IIB at US 101 / Mariposa St.

Refer to Complete Streets discussion in Section 7 for additional information.

C. Regional Planning

The Metropolitan Transportation Commission (MTC) functions as the Metropolitan Planning Organization (MPO) for the nine-county San Francisco Bay Area (a federal designation) and as the Regional Transportation Planning Agency for the Bay Area (a state designation). MTC is responsible for regularly updating the Regional Transportation Plan (RTP), a comprehensive and financially constrained blueprint for the development of highway, mass transit, railroad, airport, seaport, bicycle and pedestrian facilities. MTC also plays a major role in building regional consensus among the region's many transit systems. State and federal laws have also given MTC an important role in financing Bay Area transportation improvements.

MTC and the Association of Bay Area Governments (ABAG) released the Plan Bay Area 2040 adopted on July 26, 2017. Plan Bay Area 2040 is a long-range transportation and land-use strategy and Regional Transportation (RTP) for the Bay Area.

The San Mateo project segment has RTPID 17-06-0008 and is described as follows:

Add northbound and southbound modified auxiliary lanes and/or implementation of Managed Lanes on US 101 from I-380 to San Francisco County line.

The San Francisco project segment has RTPID 17-05-0020 and is described as follows:

Phase 1 (full implementation): Convert an existing mixed traffic lane and/or shoulder/excess ROW in each direction to HOV 3+ lanes on US 101 from SF/SM County line to I-280 interchange and on I-280 from US 101 interchange to 6th Street off ramp to enhance carpool and transit operations during peak periods. Phase 2 (planning and environmental review only): Convert Phase 1 HOV lanes to HOT/Express Lanes. Express transit to be funded with HOT lane revenues.

D. Transit Operator Planning

The CSMP for US 101 identifies multiple transit opportunities that can assist in managing congestion in the corridor — mass transit for the longer distance and local transit specifically in areas where congestion is experienced.

Local bus service is provided by San Francisco Municipal Transportation Agency (SFMTA) and San Mateo County Transit District (SamTrans) which provide express, intercity, and local bus service throughout San Mateo and San Francisco Counties including service to downtown San Francisco and Palo Alto. Many of the express bus services operate along US 101.

The San Francisco Municipal Railway (Muni) transit system, comprised of buses, historic street cars, light rail vehicles, and cable cars, provides local service within the City of San Francisco. Most Muni routes terminate within the city boundaries, with some service available into Daly City terminating at or near the Daly City BART station.

Muni bus lines 8, 8AX, 8BX, 9, 9R, and 14X run from downtown San Francisco to Visitacion Valley parallel to US 101. Of these lines, 8AX, 8BX, and 14X use US 101 and/or I-280 for a portion of their route including 'deadhead' runs.

SamTrans operates fixed-route and paratransit bus services, Peninsula Corridor Joint Powers Board (PCJPB) operates Caltrain fixed-rail service. SamTrans currently operates 79 fixed-route bus routes throughout the twenty municipalities in San Mateo County. Of these routes, 39 are community routes associated with school service, 38 routes are local routes, many of which connect to BART or Caltrain stations, and two are mainline routes providing long-distance transit service. Route 398 currently operates on US 101 and connects San Francisco with the Redwood City Transit Center.

SamTrans has prepared a draft US 101 Express Bus Feasibility Study (EBFS) for public and stakeholder review. The EBFS builds on the express bus Proof of Concept (POC) Study completed in the summer of 2017. The EBFS aims to explore and develop a regional express bus master plan for the Peninsula, including San Mateo, San Francisco, and Santa Clara counties. The EBFS is a more detailed evaluation of the financial and operational needs of a regional express bus network operating on US 101, with and without a potential Managed Lane on the freeway.

Operating by PCJPB, Caltrain is the commuter rail service backbone of the Peninsula, offering a mix of express/baby bullet, limited, and local trains. Caltrain runs train service from San Francisco to Gilroy, with a total of 49 northbound and 49 southbound daily trains during the weekday. In general, the Caltrain tracks run parallel to the west of US 101 along the peninsula, except for a small segment between Grand Avenue and Sierra Point Parkway within Segment 2 and tunnels under US 101 and Bayshore Boulevard within Segment 4. North of Bayshore Boulevard, Caltrain continues its alignment east of US 101 to San Francisco downtown station at 4th and King Streets.

Bay Area Rapid Transit (BART) serves the Peninsula as far south as Millbrae and SFO, providing a regional rail line in the northern US 101 corridor. Generally, BART runs parallel to US 101 and I-280. The Millbrae BART station is within a mile of US 101 in San Mateo County providing access to downtown San Francisco. SamTrans and SFMTA offer routes throughout northern San Mateo County to BART stations.

Employee Shuttles on the US 101 Corridor

As job growth in the 101 Corridor has outpaced the growth in housing units in recent years, the spatial mismatch between housing and jobs has increased. With limited access and capacity in the public transportation network, both large and small employers have pursued various strategies to address commuting challenges, specifically through the provision of private employee shuttles. Employers within the US 101 Corridor provide extensive shuttle services that serve as a transit alternative or transit supportive option on a leg of their employee's journeys. These commuter shuttles are designed to bring employees living in major cities in the San Francisco Bay Area (including but not limited to San Francisco, San Jose, Oakland and other areas of the East and South San Francisco Bay Area) to and from their jobs on the Peninsula. The shuttles are owned and operated under a number of models, including by private charter bus companies in contract with a sole employer, directly by the employer, or by third parties serving multiple employers.

Over the last decade, the *ad hoc* network has grown into what is believed to be the largest

transportation network of its kind in the United States, with all major Silicon Valley tech employers making use of such services¹. The shuttles have become an expected offering for employees and even a recruiting tool, allowing employees to find housing throughout the San Francisco Bay Area knowing they will have a dependable commuting solution provided by their employer. In addition to providing free transportation to employees, the shuttles offer additional advantages over private cars in that they can operate in express or carpool lanes and often offer amenities like Wi-Fi internet. However, the private sector nature of the system makes it difficult to know the exact number of shuttles operating or the exact number of passengers being served. Companies view their shuttle offerings as proprietary, and are reluctant to share basic data such as routes, number of bus trips or ridership.

Potential Benefits of Project for Transit Users

According to the FCMS study, adding Managed Lanes to US 101 and I-280 could result in the following benefits for transit users:

- *Managed Lanes* – Travel times for transit and HOVs could be reduced, making this mode more attractive. This would draw trips primarily from SOVs because express bus service on the freeway would also experience significant improvements in travel time and reliability.
- *Transit* – Express buses operating along US 101 and I-280 could experience reduced travel times, making freeway express bus service more attractive than it is now. The development of this PSR-PDS has coordinated with SFMTA on existing and planned bus routes impacted by the project and as a result, has identified opportunities for improvements in on-ramp preferential lanes at various locations including the Harney Way on-ramp to northbound US 101. Transit operator planning will be developed to be consistent with this Project and the Caltrans Complete Streets Policy.

E. Local Planning

The C/CAG of San Mateo County is the county's Congestion Management Agency (CMA), and is responsible for the coordination, planning, and programming of transportation, land-use, and air quality related programs and projects. C/CAG released the 2017 San Mateo County Congestion Management Program (CMP) which identifies the county's congestion relief plan, and includes elements that are intended to be a comprehensive package of policies and actions that together will make a measurable impact on current congestion. As with Caltrans' CSMP, the CMP focuses on an operational improvement strategy that emphasizes ITS elements such as the SMART Corridor and a ramp metering program. The 2017 San Mateo County CMP is consistent with the MTC Plan Bay Area 2040 RTP, which includes addition of northbound and southbound modified auxiliary lanes and/or implementation of Managed Lanes on US 101 from I-380 to San Francisco County line.

The San Mateo County Transportation Authority (SMCTA) was formed in 1988 with the passage of the voter-approved half-cent sales tax for countywide transportation projects and programs, known as Measure A. The original Measure A expired in 2008. In 2004,

¹ <http://articles.latimes.com/2014/mar/30/business/la-fi-google-bus-20140330>

the county voters overwhelmingly approved a reauthorization of Measure A through 2033. SMCTA's role is to administer the proceeds from Measure A to fund a broad spectrum of transportation-related projects and programs.

The SFCTA was created in 1989 to administer and oversee the delivery of the Proposition K half-cent local transportation sales tax program and the New Expenditure Plan. SFCTA is designated Congestion Management Agency (CMA) for San Francisco and is responsible for developing and administering the CMA. The SFCTA also tracks transportation system performance and investment and prepares the long-range San Francisco Transportation Plan.

Planned and programmed improvements are shown in Table 6.1 below.

Table 6.1: Planned and Programmed Projects

Project Name	Description
US 101 Auxiliary Lanes from Oyster Point to San Francisco County Line (EA# 04-3G860)	Construct auxiliary lanes on US 101 as follows: <ol style="list-style-type: none"> 1) Northbound – Between Sierra Point Parkway on-ramp and Candlestick Point off-ramp 2) Southbound – Between Candlestick Point on-ramp and Sierra Point Parkway off-ramp 3) Southbound – Between Sierra Point Parkway on-ramp and Oyster Point Blvd off-ramp <p>A PSR-PDS has been completed for this project, but there is no funding or current plan to progress the project any further.</p>
US 101 / Produce Avenue Interchange (EA 04-4H3600)	Reconstruct interchange including a new overcrossing
San Mateo US 101 Express Lane Project (EA# 04-1J5601)	Construction of an Express Lane facility on US 101 from Embarcadero Road interchange to US 101/I-380 Interchange
US 101 Candlestick Point Interchange	Modify and reconstruct the US 101/Candlestick Point Interchange

The San Mateo and San Francisco segments of the project are also addressed by the organization Transform which calls for a region-wide network of express lanes to move more people across the region. Strategies include (i) making sure express lanes are fair by including an expansion of high quality affordable transportation choices for low income commuters, coupled with opportunities to reduce the barriers for low income drivers to use the lanes; (ii) development of a 101 Mobility Action Plan to create a profusion of fast, affordable, options for commuters; and (iii) developing a region-wide network that allows conversion of general-purpose lanes to express lanes, and to leverage potential funding sources.

7. ALTERNATIVES

The No-Build and two Build Alternatives were evaluated to determine their viability and effectiveness in meeting the project's Purpose and Need.

A. No Build Alternative

Under this alternative, the existing facility would remain unchanged. Planned and programmed improvements included in Table 6.1 above would be constructed except for 04-3G860 which would be included in all the Build Alternatives except Build Alternative 2C. The No Build Alternative represents the baseline alternative and offers a basis for the analysis and evaluation of the Build Alternatives.

B. Build Alternatives

The Build Alternatives included in this PSR-PDS are intended to provide a range of improvements to evaluate during the PA&ED phase, define an adequate footprint for environmental technical studies, provide opportunities to meet geometric standard to the extent feasible, minimize environmental impacts, and provide cost-effective solutions.

There are two Build Alternatives for the implementation of Managed Lanes on US 101 and I-280 from south of I-380 in San Mateo County to the terminus of I-280 at 5th / King Streets in San Francisco County – a distance of approximately 11 miles.

For study purposes, the project limits are divided into six segments described in Table 7.1. Plans and typical sections for each alternative are provided in Attachment B.

Table 7.1: Project Limit Segments

Segment	Description
1	US 101 from one mile south of the US 101/I-380 Separation to San Bruno Canal
2	US 101 from San Bruno Canal to 0.5 miles north of the Sierra Point Overhead
3	US 101 from 0.5 miles north of the Sierra Point Overhead to the San Mateo/San Francisco County Line
4	US 101 from the San Mateo/San Francisco County Line to the south end of the US 101/I-280 Connector Ramps (double decker viaduct)
5	I-280 from the south end of the double decker viaduct connector between US 101 and I-280 to the north end of the twin I-280 bridges over Islais Creek
6	I-280 from the north end of the twin I-280 bridges over Islais Creek Bridges to the terminus of I-280 at its signalized intersection at 5th Street where it transitions to King Street

Alternative 1 (Maximum Build Design):**San Mateo County**

Alternative 1 would add an additional lane in each direction to US 101 as a Managed Lane (ML). This would require left shoulder conversion in Segments 1 through 3. Outside widening of US 101 in Segment 2 would also be required. Additional outside widening in Segment 3 would be required as well to accommodate auxiliary lanes per Project EA# 04-3G860 (See Table 6.1). Standard lane and shoulder widths will be provided to the extent feasible. Undercrossing structures will be modified and retaining walls will be constructed to minimize right-of-way and environmental impacts while accommodating the widening. New and replacement sound walls will be considered. Existing ramp metering and Traffic Operations Systems (TOS) facilities will be maintained and modified as needed. Auxiliary lanes from EA# 04-3G860 are included in Alternatives 1A, 1B and 1C.

San Francisco County

Several design options are proposed within Segments 4 and 5 as shown in Figure 7.2a:

Table 7.2a: Segment 4 and 5 Features for Alternative 1

Alt.	Southbound	Northbound
1A	A ML would be provided from near 6 th Street on I-280 to the San Mateo / San Francisco County Line on US 101 by shoulder conversion in Segments 4, 5, and 6. Outside widening would be provided in Segment 4. Also, in Segment 5, the upper deck of the double decker viaduct structure of the US 101/I-280 Connector Ramp will be widened to accommodate an additional southbound ML, but the columns of this structure will not be modified.	Extend the northbound US 101 / I-280 connector ramps southward as a barrier-separated collector-distributor (C-D) road to just north of the Bayshore Boulevard Overcrossing. To accommodate the C-D road, US 101 would be widened eastward requiring acquisition and widening of a portion of Bayshore Boulevard. The northbound ML would terminate and transition to a GP lane approximately 1,100 feet south of the Bayshore Boulevard Overcrossing. The ML would then be re-introduced on I-280 from 3,600 feet north of the US 101 / I-280 connector to the I-280 terminus at 5 th / King Streets by shoulder conversion to ML
1B	Same as Alternative 1A	Extend the northbound US 101 ML from the San Mateo / San Francisco County Line to just north of the Bayshore Boulevard Overcrossing by converting approximately 1,500 feet of GP lane. Conversion of the GP lane is required to avoid reconstruction of the Bayshore Boulevard Overcrossing. The ML would then enter an elevated direct connector structure beginning in the median of US 101 then aligning over northbound

Alt.	Southbound	Northbound
		freeway lanes, along a portion of Bayshore Boulevard, and along the right side of the I-280 double-deck viaduct structure before touching down in the median of I-280 near 25 th Street. To accommodate the connector structure, widening of US 101 towards Bayshore Boulevard similar to Alternative 1A would be required. A continuous northbound ML facility would be provided throughout the project limits for this option.
1C	<p>A ML would be provided from near 6th Street on I-280 to the San Mateo / San Francisco County Line on US 101 by the following:</p> <ul style="list-style-type: none"> • Segment 4 - Shoulder conversion, outside widening, and a reversible elevated connector • Segment 5 - The upper deck of the double decker viaduct structure of the US 101/I-280 Connector Ramp will be widened to accommodate an additional southbound GP lane, but the columns of this structure will not be modified. The ML will be accommodated by an elevated reversible direct connector • Segment 6 - Shoulder conversion 	<p>Identical to Alternative 1B except for the following:</p> <ul style="list-style-type: none"> • The ML direct connector structure would serve as a reversible lane facility for the peak direction of traffic. • A moveable barrier facility would be required at each end of the elevated structure to change the flow direction during each peak period. • A continuous ML facility would be provided throughout the project limits for this option in the peak direction only within Segments 4 and 5.

Alternative 2 (Minimum Build Design):San Mateo County

Alternative 2 would provide a ML in both directions on US 101 within Segments 1, 2, and 3 by converting the left GP lane to a ML. Standard lane and shoulder widths would be provided to the extent feasible. Existing ramp metering and TOS facilities will be modified. Auxiliary lanes from EA# 04-3G860 (See Table 6.1) are included in Alternatives 2A and 2B.

San Francisco County

In the southbound direction, a continuous ML would be provided from near 6th Street on I-280 to the San Mateo / San Francisco County Line on US 101 by converting the left GP lane. In Segment 4, the upper deck of the double decker viaduct structure of the US 101/I-280 Connector Ramp will be widened to provide an additional lane, but the columns of this structure will not be modified. In the northbound direction, several sub-options are proposed for the northbound direction as shown in Table 7.2b below.

Three design options are proposed in Segments 3, 4, and 5 as shown in Figure 7.2b:

Table 7.2b: Segment 4 and 5 Features for Alternative 2

Alt.	Southbound	Northbound
2A	<ul style="list-style-type: none"> • Provide a continuous ML by converting a GP lane • Add an additional lane on the connector from SB I-280 to SB US 101 • Add auxiliary lane between Candlestick Point on-ramp and Sierra Point Parkway off-ramp (per 04-3G860) • Add auxiliary lane between Sierra Point Parkway on-ramp and Oyster Point Blvd off-ramp (per 04-3G860) 	<ul style="list-style-type: none"> • ML would terminate and transition to a GP lane approximately 500 feet north of the Bayshore Boulevard Overcrossing. A ML would be re-introduced in the northbound direction from 200 feet north of the 18th Street overcrossing to the I-280 terminus at 5th / King Streets by shoulder conversion to ML • Add auxiliary lane between Sierra Point Parkway on-ramp and Candlestick Point off-ramp (per 04-3G860)
2B	Same as Alternative 2A	<ul style="list-style-type: none"> • North of Bayshore Blvd, Alt. 2B is identical to Alternative 1B (by providing of an elevated direct connector structure at the 101-280 interchange) and therefore widening US 101 towards Bayshore Blvd would be required. As a result, a continuous ML facility would be provided throughout the project limits in each direction.

Alt.	Southbound	Northbound
		<ul style="list-style-type: none"> Add auxiliary lane between Sierra Point Parkway on-ramp and Candlestick Point off-ramp (per 04-3G860)
2C	<ul style="list-style-type: none"> Provide a continuous ML by converting a GP lane Add an additional lane on the connector from SB I-280 to SB US 101 	<ul style="list-style-type: none"> ML would terminate and transition to a GP lane approximately 500 feet north of the Bayshore Boulevard Overcrossing. A ML would be re-introduced in the northbound direction from 200 feet north of the 18th Street overcrossing to the I-280 terminus at 5th / King Streets by shoulder conversion to ML

For Alternative 2 to be viable, State legislation AB No. 798, Chapter 474, Section 64112 (b) of Division 3, Title 6.7 of the Government Code, would need to be changed to allow conversion of a GP lane to a Managed Lane. In addition, US Code Title 23, Section 129 (a) (1) (G) states that Federal participation shall be permitted on the same basis and in the same manner as construction of toll-free highways if the number of toll-free non-HOV lanes, excluding auxiliary lanes, after reconstruction, restoration, or rehabilitation is not less than the number of toll-free non-HOV lanes, excluding auxiliary lanes, before reconstruction, restoration, or rehabilitation. In addition, US Code Title 23, Section 129(a)(1)(H) permits conversion of an HOV lane to a toll lane. Conversion of a GP lane to a toll lane is not included.

Both alternatives will need to conform to the planned San Mateo US 101 Express Lane Project (EA 04-1J5600).

Elements Common to the Build Alternatives

A. Managed Lane Improvements

Build Alternatives will utilize a continuous access design, which means that the Managed Lanes will be non-barrier separated from the GP lanes. With the exception of the direct connector structures for Alternatives 1B, 1C, and 2B, there will be no specific ingress and egress locations unless detailed traffic analysis performed during the PA&ED phase concludes that a separated ingress/egress location must be provided to improve operations or address safety concerns. The Managed Lanes will be 12 feet wide where feasible and designated using a dashed-stripe pavement marking. The limits of the Managed Lanes and the location and type of access will be determined from traffic safety information and detailed traffic studies to be conducted during the PA&ED phase. The determinations of the Managed Lanes limits will be in compliance with the Caltrans *Traffic Operations Policy Directive (TOPD)*, dated March 2011. Traffic operations, traffic safety, and compliance with geometric standards will be analyzed to optimize the operations and safety of the HOV/Express Lanes. A collision analysis will also be performed to assess the impact of adding ML's to US 101 and I-280.

The Concept of Operations Report for the proposed Managed Lanes facility will be prepared during the PA&ED phase. The purpose of this document is to present the proposed toll system design, configuration and operations. Information that will be included in the Concept of Operations Plan will be the design, operations and maintenance of the toll system, the dynamic pricing functionality, the various organizations that will be involved in its' operations and what their roles would be, the back-office processing method, the system enforcement program, etc. The report will include discussion of the administering agency, and operations and maintenance agreement.

Toll System: Installation of static and dynamic signs, electronic tolling equipment, communications fiber backbone, and toll collection system. The electronic toll system (ETS) is a combination of electronic toll collection equipment for detection of traffic in the express and mixed flow lanes, video enforcement system and enhanced highway patrol enforcement. Overhead gantries will have electronic detection controller equipment capable of communicating with a transponder mounted to the windshield of vehicles. Transponders are electronic transceiver devices that enable the unique identification and tolling of vehicles. The operator of the Express Lanes must be determined in order to settle on the selection of a Toll System Integrator.

B. TSMO/ITS and Demand Management Strategies

A range of Traffic Systems Management and Operations (TSMO), Intelligent Transportation System (ITS), and Demand Management strategies are proposed to augment the Managed Lanes strategy by maintaining the performance of the existing US 101 and I-280 corridors within the project limits. Included in this project, on the SM-101, SF-101, and SF-280 corridors, is the development and implementation of adaptive ramp metering. This will also include any necessary enhancements to hardware/software at the Oakland Caltrans District 4, Traffic Management Center (TMC) and to the Advance Transportation Management Systems (ATMS).

Ramp Metering

Within the project limits, there is active ramp metering at the following on-ramps:

Co	Rte	Dir	PM	Interchange	Ramp Type	Status
SM	101	NB	19.29	SFO Domestic Terminals Departures	Diagonal	Active
SM	101	NB	20.70	San Bruno Ave/ SFO International Terminal	Collector	Active
SM	101	NB	20.84	N. Access Rd (WB Rte 380)	Diagonal	Active
SM	101	NB	20.85	EB Rte 380	Connector	Active
SM	101	NB	20.98	S. Airport Blvd/ WB Rte 380	Diagonal	Active
SM	101	NB	21.50	S Airport Blvd	Hook	Active
SM	101	NB	22.14	E. Grand Ave/ Airport Blvd	Diagonal	Active
SM	101	NB	22.92	Oyster Point Blvd	Diagonal	Active
SM	101	NB	23.91	Sierra Point Pkwy/ Marina Blvd	Diagonal	Active
SM	101	NB	25.84	Harney Way/ Alana Way	Hook	Planned
SM	101	SB	19.45	EB Rte 380	Connector	Active
SM	101	SB	20.26	San Bruno Ave	Diagonal	Active
SM	101	SB	20.48	WB Rte 380/ N Access Rd.	Collector	Active
SM	101	SB	21.36	Produce Ave/ San Mateo Ave/ S. Airport Blvd	Diagonal	Active
SM	101	SB	22.44	Oyster Point Blvd/ Dubuque Ave	Diagonal	Active
SM	101	SB	22.77	Bayshore Blvd/ Airport Blvd	Hook	Active
SM	101	SB	24.77	Sierra Point Pkwy/Lagoon Rd.	Hook	Active
SM	101	SB	25.91	Beatty Ave/ Candlestick Park/ Tunnel Ave	Diagonal	Active

Ramp metering equipment will be provided for the Build Alternatives at the following on-ramp locations:

Co.	Rte.	Dir.	PM	Interchange	Ramp Type
SF	101	NB	0.69	NB Bayshore Blvd/ Hester Ave	Diagonal
SF	101	SB	0.60	WB Third St/ SB Bayshore Blvd	Diagonal
SF	101	SB	0.60	WB Third St / SB Bayshore Blvd	Diagonal
SF	101	SB	1.42	Rte 280	Connector
SF	101	SB	1.64	San Bruno Ave/ WB Silliman St	Hook
SF	280	NB	4.52	NB Rte 101	Connector
SF	280	NB	6.06	25 St/ Indiana St	Diagonal
SF	280	NB	6.64	18th St. Minnesota St	Diagonal
SF	280	SB	5.76	Pennsylvania Ave / Cesar Chavez St	Hook
SF	280	SB	6.52	Mariposa St /Pennsylvania St	Diagonal

Existing ramp metering facilities affected by the Project will be relocated, modified, or fully replaced as necessary. Fiber optic communications trunk lines, lateral crossovers to existing and proposed ramp metering facilities, pull boxes, junction boxes, and splice vaults throughout the project limits will be developed and constructed in consultation with District Electrical Systems.

During the PA&ED phase, District Traffic Systems will be consulted to determine if any metered on-ramps need to be widened to accommodate forecast traffic volumes. All on-ramps within the project limits, will consider provision of an HOV preferential lane where ramp metering facilities are installed. Ramp metering operations will be analyzed during PA&ED as part of the detailed traffic studies and locations and timing of ramp meter installations will be discussed and agreed upon at that time.

Traffic Operations Systems (TOS):

All active ramp metering and TOS elements will remain operational throughout construction. Existing and operational TOS elements affected by the Project will be relocated, modified, or fully replaced as necessary. During the PS&E phase, provisions will be made on the plans, specifications, and estimate to maintain existing ramp metering and TOS elements, and keep them operational. If necessary, temporary ramp metering systems will be installed and operated during construction until new facilities are operational.

The following is a preliminary list, subject to refinement, of existing TOS elements that are within or near the project limits with approximate post miles. In subsequent phases, these facilities will be field verified as conditions are subject to change.

Changeable Message Signs (CMS)

Type	County	Route	PM	Direction
CMS	SM	101	24.56	S
CMS	SF	101	0.17	N
CMS	SF	280	5.05	S
CMS	SF	280	7.30	S
CMS	SF	280	T7.50	S
CMS	SF	280	T7.50	S
CMS	SF	280	T7.50	S

Closed Circuit Television (CCTV) Cameras

Type	County	Route	PM	Direction
CCTV	SM	101	0.16	S
CCTV	SF	101	0.56	S
CCTV	SF	101	1.20	N
CCTV	SF	101	2.07	S
CCTV	SF	280	4.15	S
CCTV	SF	280	5.05	S
CCTV	SF	280	5.08	S
CCTV	SF	280	5.62	N
CCTV	SF	280	6.06	N
CCTV	SF	280	6.52	N
CCTV	SF	280	7.01	N
CCTV	SM	101	0.16	N
CCTV	SF	101	0.56	N
CCTV	SF	101	1.20	Median
CCTV	SF	101	2.07	S
CCTV	SF	280	4.15	N
CCTV	SF	280	5.05	N
CCTV	SF	280	5.08	S
CCTV	SF	280	5.62	S
CCTV	SF	280	6.06	N
CCTV	SF	280	6.52	N
CCTV	SF	280	7.01	N

Highway Advisory Radios (HAR)

Type	County	Route	PM	Direction
HAR	SM	101	24.99	S
HAR	SF	280	4.43	S

Extinguishable Message Signs (EMS) for HAR

Type	County	Route	PM	Direction
EMS	SF	101	0.65	S
EMS	SF	101	1.0	N

Traffic Monitoring Stations (TMS) - Mainline

Type	County	Route	PM	Direction
TMS (Loops)	SM	101	19.16	N S
TMS (Loops)	SM	101	19.49	N S
TMS (Loops)	SM	101	19.82	N S
TMS (Loops)	SM	101	20.06	N S
TMS (Loops)	SM	101	20.27	N S
TMS (Loops)	SM	101	20.57	N S
TMS (Loops)	SM	101	20.78	N S
TMS (Loops)	SM	101	20.96	N S
TMS (Loops)	SM	101	21.39	S
TMS (Loops)	SM	101	21.48	N S
TMS (Loops)	SM	101	21.48	N S
TMS (Loops)	SM	101	21.76	N S
TMS (Loops)	SM	101	21.11	N
TMS (Loops)	SM	101	22.56	N S
TMS (WMVDS)	SM	101	22.70	N
TMS (Loops)	SM	101	22.92	N
TMS (Loops)	SM	101	22.93	S
TMS (WMVDS)	SM	101	23.10	N S
TMS (Loops)	SM	101	23.20	N S
TMS (Loops)	SM	101	23.53	N S
TMS (Loops)	SM	101	23.88	N S
TMS (Loops)	SM	101	24.35	N S
TMS (Loops)	SM	101	24.77	N S
TMS (Loops)	SM	101	24.85	N S
TMS (Loops)	SM	101	25.55	N S
TMS (Loops)	SM	101	25.78	N S
TMS (Loops)	SF	101	0.17	N S
TMS (Loops)	SF	101	0.65	N S
TMS (Loops)	SF	101	1.10	N S
TMS (Loops)	SF	101	1.40	N
TMS (Loops)	SF	101	1.90	N S
TMS (Loops)	SF	101	2.07	N S
TMS (Loops)	SF	101	4.17	S
TMS (Mag)	SF	101	4.17	N
TMS (Mag)	SF	101	5.05	N S
TMS (Mag)	SM	101	5.37	N S
TMS (Loops)	SF	101	6.57	N S

TOS improvements are expected to include:

- Replacement of Traffic Monitoring Station (TMS) loops as needed, where pavement grinding or pavement replacement affects inductance loop detectors.
- Generally, TMS for the travel lanes closer to the center median are fed from pull boxes in the center median and may need replacement if modifications to the center median, barriers, shoulders and adjacent lanes change from current

-
- conditions. Certain center median/lane modifications will require replacement of outside lane TMS and lateral crossovers destroyed in the process.
- Outside lane/shoulder modifications may also require replacement of TMS loops, Detector Lead-In Cables (DLC's), conduits, pull boxes, and lateral crossovers. For off-ramps currently without traffic monitoring, off-ramp inductive loop detection (one loop per off-ramp lane) will be added by running conduits and DLC's to the nearest TOS/Ramp Metering control cabinet.
 - Off ramp inductive loop detection for off-ramps affected by widening or other lane modifications will be replaced when necessary.
 - Install a complete replacement inductive loop TMS, where outside widening or other construction activities will displace the access point/pole of existing TMS (Wireless Magnetometer Vehicle Detection System (WMVDS)).

Auxiliary Lanes: During the PA&ED phase, detailed traffic studies will be performed to analyze the benefits of including new auxiliary lanes to improve weaving operations at all ramp locations and Managed Lane access points. The need for additional auxiliary lanes, will also be studied during the PA&ED phase to analyze potential operational improvements.

California Highway Patrol (CHP) Enhanced Enforcement: To accommodate CHP enforcement of the freeway corridor including Managed Lanes, protected observation areas could be provided for officers to safely park their vehicles to conduct occupancy verification and traffic observation. If located in the median, the CHP vehicle would park behind concrete barriers on a raised platform to improve the line of sight. Potential locations to provide median enforcement areas include:

- US 101 – PM 23.66 (SM County) through PM R8.29 (SF County)
- US 101 – PM 1.41 (SF County)
- I-280 – PM R6.57 through T7.20 (SF County)

Other TSMO/ITS Improvements:

- Transit-Specific Strategies (transit signal priority (TSP), bus-only ramps, lanes, service enhancements, etc.)
- Traffic Incident Management
- Traffic Signal Coordination
- Active Traffic Management (e.g. adaptive ramp metering, adaptive traffic signal control, queue warning, and dynamic speed limits)
- Traveler Information
- Park-and-Ride Facilities, including private shuttles
- Coordination with Bicycle Trails and Improved Bike/Ped connectivity (especially to transit)

C. Structures

To accommodate the managed lanes improvements, the structures listed in Table 7.3 will be modified.

Table 7.3: Structures Requiring Modification

Structure	Bridge No.	Alternative					
		1A	1B	1C	2A	2B	2C
Colma Creek	35-0118	W	W	W			
South SF Belt Railway OH	35-0121	W	W	W			
South San Francisco OH	35-0094 (L & R)	W	W	W			
Sierra Point OH	34-0165 (L & R)	W	W	W	W	W	
Oyster Point OC	35-0316	R	R	R			
3 RD Street UC	34-0030S	W	W	W		W	
Paul Avenue UC	34-0056	W	W	W		W	
101-280 Connector	34-0070	W	W	W	W	W	W
101-280 Managed Lane Connector Ramp Separation	TBD		N	N		N	

Notes: W = Widen, N = New, R = Reconstruct

Retaining walls of differing styles, heights, and lengths would be installed in areas where space is restrictive and they can effectively minimize earthwork and right-of-way acquisition requirements. The types of retaining walls proposed will be determined during the PA&ED phase.

The need for new and replacement sound walls will be determined during the PA&ED phase when a detailed noise study will be performed.

D. Roadway and Structure Rehabilitation:

The following improvements are proposed to bring the existing facility into a state of good repair.

- Replace Median Barrier (MASH Compliant)
- Enhanced Lighting
- High Visibility Striping
- Enhanced Signing (including replacement of all existing guide signs with type XI retro-reflective panels and removal of OH sign cat-walks)
- Pavement Rehabilitation (including grind/replace 0.1' of AC for restoration of pavement surface after construction)

- Drainage System modifications
- ITS Upgrade (Detectors, Changeable Message Signs, CCTV, Controllers, SIC, etc.)
- Bridge Rehabilitation (Barriers, joints, deck surfacing)
- Landscaping and shared community/public space improvements

Phased Implementation Approach

Managed Lane improvements along the US 101 corridor are currently being implemented in phases from south to north and in the following sequence:

County	Limits	Status
Santa Clara	Mathilda Ave to SCL/SM County Line	Under construction
San Mateo	SCL/SM County Line to Whipple Ave	Under Construction
San Mateo	Whipple Ave to I-380	Final Design

In order to best meet SFCTA and SMCTA goals of progressing congestion relief along the US 101 and I-280 corridors, the Full Build Alternative will be implemented in independent phases (proceeding from south to north) as funding becomes available. A potential sequence of phased construction is summarized below:

- Phase 1 – Construct ML’s in both directions on US 101 from I-380 to near the Harney Way interchange (or just south of the US 101/I-280 interchange). Construct auxiliary lanes between Oyster Point Boulevard and Harney Way (EA 04-3G860).
- Phase 2 – Construct US 101 / I-280 transition section
- Phase 3 – Construct ML’s in both directions on I-280 between the US 101/I-280 interchange and 5th / King Street intersection

Alternatives Considered But Eliminated from Further Discussion

Full Design Standard Alternative: An alternative that added a Managed Lane in each direction with perpetuation of all existing auxiliary lanes and improvements to existing features to full design standards within the project limits was evaluated. While this alternative provides compliance with design standards, there would be significant environmental, cost and right-of-way impacts. Under this full design standard alternative, five (5) interchanges and eleven (11) structures would need to be reconstructed due to the outside widening and compliance with delegated design standards – particularly interchange spacing requirements. It would also require closure of three partial interchanges. The right-of-way impacts would consist of more than 50 residential and 20 commercial/industrial property takes. The order of magnitude project cost for the full design standard alternative was estimated at \$4 billion.

Extension of Managed Lanes along US 101 North of US 101/I-280 interchange: This alternative would extend the Managed Lanes along US 101 northward through Hospital Curve and to the Central Freeway. It was eliminated from further consideration due to the following:

- The clear width on northbound US 101 below the US 101/I-280 separation is too narrow to accommodate the addition of a Managed Lane.
- A conversion of a GP lane to a ML is expected to degrade GP lanes at existing bottlenecks at Hospital Curve and Central Freeway interchange.

Alternatives 1 and 2 do not preclude this segment for study as a separate project.

Extension of Elevated Connector over the Bayshore Boulevard Overcrossing: This alternative would extend the elevated connector proposed in Alternatives 1B, 1C, and 2B southward across the Bayshore Boulevard Overcrossing before descending to conform to US 101 median near the Harney Way interchange. The alternative was eliminated from further consideration due to the following:

- Additional widening along US 101 to that proposed for Alternatives 1A, 1B, 1C, or 2B would be required to accommodate bents for the elevated connector structure.
- The elevated connector would be excessively high (approximately 60 feet tall) to provide adequate vertical clearance across the light rail tracks on the Bayshore Boulevard Overcrossing.
- Constructability concerns to safely build the structure under active traffic conditions
- Visual impacts to adjacent residential areas.

Direct Connector via Viaduct Widening: This alternative would be similar to Alternative 1B and 1C except that instead of constructing an independent structure, the existing double decker viaduct would be widened. It was eliminated from further discussion due to the structural infeasibility of widening the viaduct because the new cell required would conflict with the existing reinforcement within the column.

Direct Connector via north side of I-280: This alternative would be similar to Alternative 1B and 1C except that the direct connector would be parallel I-280 on the north side instead of the south. It was eliminated from further discussion due to the following:

- Impacts to buildings would be significantly greater than 1B and 1C.
- To crossover I-280, the proposed structure would reach heights of over 90 feet which would be aesthetically and seismically infeasible.

Direct Connector via existing NB US 101 to SB I-280 Connector: This alternative (Alternative 1D) would introduce a diverge point on the connector from NB US 101 to SB I-280 connector and parallel I-280 on its north side before conforming at the same location where Alternatives 1B and 1C conform in the median of I-280. It was eliminated from further discussion due to the following:

- Impacts to buildings would be significantly greater than 1B and 1C.
- To crossover I-280, the proposed structure would reach heights of over 90 feet which would be aesthetically and seismically infeasible.
- The NB ML would transition to a GP land and resume on I-280 in a similar fashion as Alternative 1A.

NB Direct Connector on north side of I-280: This alternative (Alternative 1E) is similar to Alternative 1B along US 101, but similar to Alternative 1D along I-280 as it follows on its north side. It was eliminated from further discussion due to the following:

- Impacts to buildings would be significantly greater than 1B and 1C.
- To crossover I-280, the proposed structure would reach heights of over 90 feet which would be aesthetically and seismically infeasible.

Replace double decker viaduct at US 101/I-280 interchange: This alternative would replace the existing double decker viaduct connector with an elevated structure. It was eliminated from further discussion due to the following:

- A continuous Managed Lane facility would not be provided.
- Extensive right-of-way acquisition and relocation assistance would be required.
- Long term freeway closures during construction would be required.

Boulevard I-280: Developed as part of the Rail Alignments and Benefits Study (RAB), this alternative would convert the elevated freeway structure of I-280, north of Mariposa Street, to an at-grade boulevard with signalized intersections. It was eliminated from further discussion due to the following:

- Traffic analysis conducted as part of the RAB concluded that this would increase congestion on the City street network
-

Analysis of Alternatives

The PA&ED studies will further analyze three alternatives as potentially viable alternatives as part of the traffic operational analysis during the PA&ED phase as follows:

- No Build Alternative for the entire project limits
- Alternative 1: Add managed facility with design variations within Segments 4 and 5
- Alternative 2: Convert GP lanes with design variations within Segments 4 and 5

The alternatives analysis will identify Build Alternatives that would meet the project purpose and need, require the least right of way, and minimize environmental impacts. Analysis of the following is necessary to evaluate the Build Alternatives.

- Local and Through Traffic Degradation: Minimize degradation of local and through traffic using the proposed project facilities as compared to the no-build alternative.
- Environmental Impacts: There is a range of potential environmental impacts for the project as identified in the PEAR (Attachment E), including potential wetlands, biological sensitive habitat areas, historical and archeological sites, and Section 4(f) property. Avoidance and minimization measures will be based upon establishing locations of potential environmental impacts in the PA&ED phase and will serve to define the scope of the Build Alternatives.
- Nonstandard Design Assessment: All nonstandard design features will require evaluation and justification in the PA&ED Phase. These standards include lane widths, median width, inside and outside shoulder widths, vertical clearance, stopping sight distance, decision sight distance, interchange spacing, and weaving length.

Each build alternative has been reviewed for potential exceptions to delegated and non-delegated design standards. Anticipated exceptions are summarized in Table 7.4 and their locations are generally shown on the line diagrams provided in Attachment B. Probabilities of approval were determined during a focus meeting with Robert Effinger (Project Delivery Coordinator) on January 16, 2019.

Table 7.4: Design Standards Risk Assessment

No Build	Alternative			HDM Ref Index	Nonstandard Feature	Prob. Of Design Exception Approval	Justification
	1A, 1B, 1C	2A, 2C	2B				
X	X	X	X	201.1	Stopping Sight Distance	Medium	Right of Way Impacts
	X			301.1	Lane Widths (11' on middle lanes)	Medium	Right of Way Impacts
X	X	X	X	302.1	Left Shoulder Widths (2')	Medium	Right of Way Impacts
	X			302.1	Right Shoulder Widths (6')	Low	Right of Way Impacts
X	X	X	X	305.1	Median Width (6')	Medium	Right of Way Impacts
X	X	X	X	309.1	Horizontal Clearance (2')	Medium	Right of Way Impacts
X	X	X	X	309.2	Vertical Clearance (14.08' Min)	High	Viaduct and Overcrossing Impacts
X	X	X	X	501.3	I/C Spacing	High	Right of Way and Existing Traffic Impacts
X	X	X	X	502.2	Partial Interchange/ Isolated Ramps	High	Right of Way and Existing Traffic Impacts
X	X	X	X	504.2	Ramp Entrance & Exit Geometry	Medium	Right of Way Impacts
X	X	X	X	504.7	Minimum Weave Length	Medium	Right of Way Impacts

Determination for the approval of the nonstandard design features is deferred to the PA&ED phase when more details become available.

Constructability Review

The proposed improvements mainly consist of widening the mainline to the outside. It is anticipated that construction will occur by temporarily narrowing lane widths to 11 feet and placing temporary railing within the existing edge of travel way. Median barrier replacement and installation of tolling infrastructure would also be completed by narrowing lanes to 11 feet and placing temporary railing on the left edge of traveled way.

Construction of the project will require traffic control for an extended period of time, potential long-term closures of freeway lanes, freeway shoulders, freeway off-ramps, freeway on-ramps, local streets, and night time full freeway closures. Extensive delays are anticipated due to the high traffic volumes in the project area, however all efforts will be made to minimize these through mitigation measures defined in the Transportation Management Plan. Detours, traffic shifts and lane restriping would be utilized wherever feasible to maintain access and improve worker safety. Public Information, Motorist Information Strategies and Incident Management TMP elements will be considered and have been accounted for in the preliminary cost estimate.

Highway Planting Replacement

Replacement, re-vegetation, and restoration highway planting work, as a result of construction impacts, will be conducted as a separate follow-on highway planting contract. A three-year plant establishment period would be required as a part of the replacement planting contract.

Water Quality

Because the Project would create more than 1 acre of net new impervious area (NNI) (Alt. 1 NNI, 22.80 acres; Alt. 2 NNI 10.30 acres), the Project is subject to the requirements stated within the State Water Resources Control Board, National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ, NPDES No. CAS000002

Within Caltrans' right-of-way, the Project would comply with the Caltrans Municipal Separate Storm Sewer System (MS4) Permit. This Project's Project Initiation Document phase was not completed prior to July 1, 2013, and so this Project is expected to comply with the new Caltrans MS4 Permit (Order No. 2012-0011-DWQ, NPDES No. CAS000003).

The Project site is located within San Francisco Bay (Region 2) Regional Water Quality Control Board limits. Per a memorandum dated July 21, 2008, from the San Francisco Bay RWQCB, Caltrans is required to comply with local requirements for permanent stormwater treatment and hydromodification, for projects requiring a 401 certification. Therefore, the build alternative would have to adhere to San Francisco Bay Regional Water Quality Control Board Municipal NPDES Permit (No. R2-2009-0074) requirements because a 401 Water Quality Certification from the San Francisco Bay RWQCB is expected to be required for this Project.

To address the temporary water quality impacts resulting from the construction activities on the job site, the project would require preparation and adoption of a Storm Water Pollution Prevention Program (SWPPP). Additionally, the project would be required to file a Notice of Intent (NOI) before commencing any construction activities at the job site. Best Management Practices (BMPs) would be implemented to address the temporary water quality impacts resulting from the construction activities in the project. BMPs would include measures of soil stabilization, sediment control, wind erosion control, tracking control, non-storm water management, and waste management/materials pollution control. Appropriate BMPs and their quantities would be developed during the PS&E phase. Incorporation of the BMP measures outlined in the SWPPP would ensure that the chosen action alternative would not adversely affect water quality in local waterways or groundwater quality.

Because a 401 Water Quality Certification is expected to be required for the build alternative, the stormwater treatment measures would be required to be designed in accordance with the San Francisco Bay RWQCB Municipal Regional Stormwater NPDES Permit (No. R2-2009-0074). If there is work in water bodies, creek diversion may be required. Early discussion with Caltrans Water Pollution Control Branch would be required for any Temporary Creek Diversion Systems. As 401 Water Quality Certification is anticipated, location specific requirements would be determined during the PS&E phase. If a significant amount of groundwater is expected to be encountered in the deep excavations, dewatering would be required. Early discussion would be initiated with the Caltrans Water Pollution Control Branch. Groundwater testing as a part of the Hazardous Waste Site Investigation may be required to determine if contamination exists. If contamination exists, the appropriate contract provisions for handling and disposal during construction would be developed.

Adequate resources are included in the preliminary cost estimate for the project (see Attachment D) for construction and permanent water quality treatment. The construction site water pollution control estimate would be segregated into separate bid items for the BMPs selected and as appropriate to the individual project in the PS&E phase.

Context Sensitive Solutions

During the PA&ED phase, context sensitive solutions would be considered to incorporate the proposed improvements aesthetically into the surroundings consistent with Caltrans policy, available funding, and maintenance considerations.

Context Sensitive Solutions (CSS) are used to integrate and balance community, aesthetic, historic, and environmental values with transportation safety, maintenance, and performance goals. CSS are reached through a collaborative, interdisciplinary approach involving all stakeholders, engaged through early coordination with agencies as well as early outreach to the community.

Context sensitive solutions are expected to include aesthetic treatments to bridge and wall structures.

Complete Streets

A number of the Official San Francisco Bike Routes are designated within the San Francisco portion of the study area. The facilities are a mix of on-street dedicated bike lanes and lanes shared with vehicle traffic. While numerous bicycle routes exist in the area, bicycle travel is complicated by the natural barriers of the topography and including US 101 and I-280. The neighborhoods of Potrero Hill and Bernal Heights, characterized by particularly steep terrain, do not have any designated routes.

The City/County Association of Governments of San Mateo County (C/CAG) adopted the San Mateo County Comprehensive Bicycle and Pedestrian Plan in 2011. The following roadways in the study area are designated as key corridors: Bayshore Boulevard, Airport Boulevard, Gateway Boulevard and US 101 between Sierra Point Parkway and the San Francisco county line.

The San Francisco Bay Trail is a key feature for providing longer distance bicycle travel within the study area. The trail is a planned 500-mile walking and cycling path, separated from vehicle traffic, which runs through all nine Bay Area counties. 345 miles of the path have already been completed, including some portions of path running along the shoreline of the San Francisco Bay within the study area. The trail does not currently have a connection between India Basin and South Basin, but current plans propose to continue the trail around the shoreline of Hunter's Point. In San Mateo County, the trail has been constructed from Belle Air Road just north of I-380 to the intersection of Sierra Point Parkway and Marina Boulevard. The trail follows the shoreline perimeter of the office park developments at Oyster Point and Sierra Point. There is currently no connection between Sierra Point Parkway and the San Francisco County line.

The San Francisco portion of the study area has two major pedestrian network typologies: residential neighborhoods and former industrial sites with emerging residential uses. The residential neighborhoods of the area include Potrero Hill, the Mission District, and Bernal Heights. These areas are comprised of pedestrian-friendly, narrow, slower speed streets encouraging pedestrian access through streetscape elements such as sidewalks, street trees, open spaces, and marked pedestrian crossings. The former industrial sites near the waterfront, including some of the South of Market district, the Design District, Mission Bay, Dogpatch, and the Central Waterfront, are characterized by wider streets with pockets of streets lacking sidewalks. In recently constructed residential projects in these former industrial sites, efforts have been made to enhance the sidewalks and refurbish the streetscape.

Variations in the pedestrian conditions occur where US 101 and I-280 interact with the local street network. Both freeways transition from above grade to below grade structures, creating barriers for pedestrian access. Pedestrian interaction with the freeway occurs at pedestrian-only overcrossings, locations where the local street network continues above or below the freeway, and where the freeway on- and off-ramps connect to the local street network. There are no pedestrian overcrossings for US 101 in the San Mateo portion of the study area, though one has been proposed at about the midpoint between the Oyster Point and Sierra Point interchanges. At this location, the Bay Trail is east of the Caltrain tracks and US 101, while San Bruno Mountain State Park is just west

of US 101. A pedestrian overcrossing at this location would provide a convenient connection between the two recreational facilities.

There are numerous on- and off-ramp intersections with the local street network, creating potential points of conflict between pedestrians and vehicular traffic. In general, the uncontrolled intersections pose the most undesirable and potentially hazardous conditions for pedestrians as pedestrians may unpredictably cross vehicular ramp traffic, and there are no pedestrian markings for crossing.

San Francisco has adopted a Vision Zero goal of no traffic deaths by 2024. Data from the Vision Zero program is the most comprehensive source available for bicycle and pedestrian safety data for intersections within San Francisco in this project's study area. It is recommended that more detailed analyses of bicycle and pedestrian safety conflicts be conducted during subsequent project development phases for intersections that may be affected by the Build Alternatives. As part of the Vision Zero program, the city has identified Vision Zero Priority Projects. These projects include three in the study area on streets that could be affected by Managed Lane alternatives, as listed in Table 7.5.

Table 7.5: Vision Zero Priority Projects in Study Area (San Francisco)

Project Description and Location	Potential Managed Lane Interaction
6 th Street Complete Street Project	Possible route for outbound buses to reach the 6 th and Brannan on-ramp to I-280
Potrero Ave Complete Street Project, Division Street to Cesar	Parallel major arterial that could be affected by spillover traffic
San Jose Ave Road Diet and Cycletrack	Parallel major arterial that could be affected by spillover traffic

Source: Vision Zero Priority Projects. <http://visionzerosf.org/wp-content/uploads/2016/06/Vision-Zero-Priority-Projects-2016-2017.pdf>

The San Mateo County Comprehensive Bicycle and Pedestrian Plan considered bicycle and pedestrian safety issues and included countywide heat maps indicating areas with higher rates of bicycle and pedestrian collisions. This project's study area had low rates of both pedestrian and bicycle collisions. The plan also identified US 101 and Caltrain as major barriers. At barrier crossings, the plan recommends provision of marked crossings at signalized and stop controlled locations on access routes to barrier crossings. At the barrier crossings themselves, the plan recommends paths or detached sidewalks with pedestrian-scale lighting. The plan also identified pedestrian focus areas. These were primarily located in commercial and retail areas, but some were in recreational areas. The location of the proposed pedestrian overcrossing discussed above, which would connect the Bay Trail with San Bruno Mountain Park, was identified as a pedestrian focus area, as was land on both sides of US 101 near the commercial heart of South San Francisco.

Climate Change Considerations

At present, the US 101 and I-280 corridors experience significant congestion; such congestion can in turn increase emissions of carbon dioxide (CO₂), a key greenhouse gas. To the extent a project relieves existing and projected future traffic congestion by enhancing operations and improving travel times in high congestion travel corridors, the action alternatives could result in CO₂ emission reductions. An appropriate greenhouse gas emissions analysis should be prepared as part of the environmental document. The environmental document will include a quantitative analysis of the operation of the project relative to greenhouse gas emission and climate change effects. The analysis will be prepared in accordance with Caltrans' most current guidance at the time the environmental document is prepared. The environmental document will include Caltrans' boilerplate language regarding greenhouse gas emissions and will follow the most current methodology from Caltrans' SER materials.

Sea Level Rise (SLR) impacts are analyzed for Caltrans projects. According to SLR maps from the San Francisco Bay Conservation & Development Commission (BCDC) at (<https://explorer.adaptingtorisingtides.org/explorer>), a portion of the project vicinity along US 101 in San Mateo County exists within a low-lying area that would be vulnerable to sea level rise of 3 to 10 feet, the range expected after 2100.

Caltrans developed the Guidance on Incorporating Sea Level Rise to address sea level rise impacts on existing infrastructure and future projects. The guidance provides screening criteria for construction projects within vulnerable areas to determine whether a range of sea level rise scenarios need to be considered. Since the project area along the US 101 corridor is vulnerable to sea level rise and the design life of the project is beyond 2030, the project is obligated to do an analysis of sea level rise and adaptation for years 2050 and 2100 to assess project vulnerability and to the extent feasible reduce expected risks and increase resiliency to sea level rise. This study will be performed during the PA&ED phase. However, for this PSR-PDS phase, because a large portion of US 101 within the project limit would either require relocation, raising or other large-scale improvements to reduce or avoid the effects of sea level rise, such alternatives would likely involve substantial residential and business relocations and impacts to environmentally sensitive areas. This mitigation is not included in any of the assumptions or cost analysis at this stage and will be determined in the PA&ED phase.

8. RIGHT OF WAY

A. Right of Way

Alternatives 1A, 1B, and 1C will require partial fee take of private property as well as temporary construction easements (TCE) within Segments 2 and 4 (along Bayshore Boulevard). Alternatives 1B and 1C will require additional right of way acquisition within Segment 5, including along Charter Oak Avenue.

For Alternatives 2A and 2B, the addition of southbound auxiliary lanes along 1,000 feet of Segment 2 will require TCE, but no fee acquisition. For the remainder of Alternatives 2A, 2B and 2C, no fee acquisitions or TCE is anticipated. Right of way requirements for Alternative 2B are identical to those for Alternative 1B within Segment 5.

No airspace lease areas were identified within the project limits.

A Conceptual Cost Estimate - Right of Way Component sheet has been prepared and is shown in Attachment H.

Land surveys will be performed during the PS&E phase to accurately locate right of way limits and property boundaries of parcels affected by the proposed improvements.

B. Utilities

During the PA&ED phase, the design team will confirm any impacts with the utility owners through the Caltrans utility relocation process.

For Alternative 1A, impacts to existing utilities are anticipated to occur where widening is proposed in Segments 2, 3, and 4 only. Alternatives 1B and 1C will have these impacts as well, but also have additional impacts in Segment 5.

It is anticipated that Alternatives 2A, 2B, and 2C will have minor impacts requiring relocation of utilities within Segment 3 where widening is proposed to accommodate the addition of auxiliary lanes. Alternative 2B will have utility impacts similar to Alternative 1B.

C. Railroad

In general, Caltrain runs parallel to the west of US 101 along the Peninsula. Caltrain tracks cross under US 101 at the South San Francisco Overhead (Grand Avenue) and Sierra Point Overhead structures and operate a short segment east of US 101 between Grand Avenue and Sierra Point Parkway interchanges. Before it continues to downtown San Francisco through its alignment east of US 101, Caltrain crosses US 101 through a tunnel underneath Bayshore Boulevard.

The PCJPB's Caltrain Electrification project will replace Caltrain's existing diesel service with a fully electrified service from the 4th and King Station in San Francisco to the Tamien Station in San Jose. The improvements will result in faster and more frequent service, reduction of air pollutant emissions, and reduction of noise and vibration. Electrification will include installation of two 25kv overhead electrical lines. This will

require additional vertical clearance at overhead structures beyond the existing standards and result in nonstandard vertical clearance at some highway overcrossing locations (e.g. South San Francisco Overhead).

Vertical clearance over the tracks will be reduced to accommodate outside widening of the South San Francisco Overhead and electrification of the Caltrain facility. To maintain existing vertical clearance at this location special bridge design will be required.

Within Segment 4, Caltrain tracks cross under US 101 via a tunnel. This tunnel will not be affected by any of the alternatives.

9. STAKEHOLDER INVOLVEMENT

SFCTA performed some public outreach engagement on the proposed Managed Lanes during development of the FCMS Phase 2. A total of 13 community group meetings were held in mid- to late-2017 that focused on communities near freeways. Concepts and strategies for Managed Lanes were introduced to the public and their initial feedback was sought. In addition, a total of 9 advocacy group meetings were held during this period. The primary issues raised by the public were equity (who will use the Managed Lane, who will pay, and who will benefit? how will funds raised by toll revenues be controlled and used? and what traffic and neighborhood impacts will occur - including traffic diversion onto local streets to avoid freeway congestion?) Other concerns included potential users, the fare structure, user benefits, use of toll revenues, impacts to local neighborhoods and potential freeway cut-through traffic to local streets.

SFCTA also performed public agency stakeholder engagement during development of the FCMS Phase 2 and the PID phase. Caltrans and key stakeholders are part of the Project Development Team and are supportive of the project. The Peninsula 101 Corridor Group has been briefed on the project during the FCMS Phase 2 and PID phase. There is no known public opposition to the project at this time.

Opportunities for community interaction on the project will be available at scoping meetings held early in the PA&ED phase, and at the public hearings during circulation of the draft environmental document. Community group and advocacy group meetings will also provide opportunities for public input throughout the PA&ED phase.

10. ENVIRONMENTAL DETERMINATION AND DOCUMENTATION

Caltrans will act as the lead agency for NEPA and CEPA in the preparation of the environmental document. Caltrans will serve as the NEPA lead agency under its assumption of responsibility pursuant to 23 U.S. Code 327.

Caltrans, SFCTA, SMCTA and C/CAG have formally agreed to divide the Project by County after completion of the PID phase. SMCTA and C/CAG will be the sponsoring, funding and implementing agencies for the PA&ED phase of the Project within San Mateo County. SFCTA will be the sponsoring, funding and implementing agency for the PA&ED project within San Francisco County. Accordingly, a separate process will be completed for each PA&ED review and approval. The limits of the PA&ED studies will provide independent utility and logical termini for transportation improvements that would facilitate a thorough review of the environmental impacts. Each project would provide freeway system operational benefits even if no additional transportation improvements are made in the area.

It is expected that the environmental technical reports and environmental document for each County would take approximately 28 -36 months to prepare and process for the final certification/approval including time for coordination with the partner agencies and the environmental division staff within Caltrans, but does not include time for permitting by federal or state resource agencies.

It is anticipated that multiple environmental studies and reports will be required. Key issues include the potential adverse impacts to waters of the U.S. and natural habitat areas adjacent to the freeway corridors; property acquisitions (no displacement); impacts to cultural resources; and water quality impacts. Alternative 1 is the most intrusive to the existing environment given the required freeway widening and structural improvements, with Alternative 2 being the least likely to impact resources within the project limits. Nonetheless, the technical studies that will be required are similar for both alternatives. Alternative 1 is likely to trigger the most substantial permitting and approval requirements associated with potential work within and surrounding the waterway crossings.

See the Preliminary Environmental Analysis Report (Attachment E) for the complete list of environmental studies and reports that would be prepared.

11. FUNDING**Funding**

It is anticipated that this project will be funded from federal, state and local sources. Additional funding will be pursued during the project development process.

Programming

It is anticipated that this project will be funded from federal, state and local sources. Funding will be pursued during the project development process.

Preliminary cost estimates are provided in Attachment D. A summary of project costs is provided below.

Capital Outlay Project Estimate

The estimated total project capital outlay cost for the build alternatives is approximately \$284 million to \$817 million, which includes \$257 million to \$448 million for roadway items, \$6 million to \$283 million for structures, \$0 million to \$66 million for right of way. The low end of the estimate accommodates Alternative 2C with lane conversion, and the high end of the estimate accommodates Alternative 1B/1C with outside widening and elevated viaduct structure to accommodate the Managed Lanes and auxiliary lanes.

Range of Capital Outlay Cost by County (x 1,000,000)

	1A	1B	1C	2A	2B	2C
San Mateo						
ML / TSMO/ ITS	\$245	\$245	\$245	\$125	\$125	\$87
Roadway / Structure Rehab	\$55	\$55	\$55	\$55	\$55	\$55
Total (San Mateo)	\$300	\$300	\$300	\$180	\$180	\$142
San Francisco						
ML / TSMO/ ITS Cost	\$237	\$478	\$481	\$105	\$426	\$105
Roadway / Structure Rehab	\$37	\$37	\$37	\$37	\$37	\$37
Total (San Francisco)	\$274	\$515	\$518	\$142	\$463	\$142
Total (Project)	\$574	\$814	\$817	\$322	\$643	\$284

Range of Project Cost (x 1,000,000)

Alternative	Construction	Right of Way	PA&ED	PS&E	ROW Support	Construction Admin.	Project Total
1A	\$508	\$66	\$15	\$43	\$3	\$43	\$678
1B	\$750	\$64	\$15	\$65	\$3	\$65	\$962
1C	\$753	\$64	\$15	\$65	\$3	\$65	\$965
2A	\$321	\$0	\$15	\$40	\$0	\$40	\$416
2B	\$594	\$49	\$15	\$76	\$2	\$76	\$812
2C	\$285	\$0	\$15	\$37	\$0	\$37	\$374

	Range of Estimate	STIP Funds	Other Funds
Alternatives 1 and 2	\$374M to \$965M	TBD	Local Sales Tax, State and Federal sources TBD

All capital outlay costs are in 2025 dollars.

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 capital funds. The Project Report in the PA&ED phase will serve as the appropriate document from which the remaining capital outlay and support costs of the project will be programmed.

Capital Outlay Support Estimate

The capital outlay support cost estimate for the PA&ED phase of the project is estimated at \$15 million and will be funded with local funds from San Francisco and San Mateo Counties.

Separate Cooperative Agreements for the PA&ED phase will be executed for each County. Each Cooperative Agreement will be executed prior to the start of the PA&ED phase. Separate future Cooperative Agreements for the PS&E, Right of Way and Construction phases of each project will be prepared before those phases begin.

12. DELIVERY SCHEDULE

Project Milestones	Scheduled Delivery Date
Begin Environmental	December 2019
Circulate DED	July 2021
Project Approval & Environmental Document **	January 2022
Complete PS&E *	May 2023
R/W Certification *	June 2023
RTL *	August 2023
Begin Construction *	January 2024
End Construction *	January 2027

* *Contingent on funding availability*

** *Assumes minimal issues and comments on DED*

The following assumptions were made to develop the project schedule as outlined above:

- Funding will be in place for each phase of the project (PA&ED, PS&E and Construction).
- Schedule is based on Alternative 1, which includes partial right of way acquisitions, but no relocation assistance.
- Communities along the corridor will support the preferred alternative without litigation or delaying the project.
- The majority of design exceptions listed as medium to high probability of approval will be approved by Caltrans.

As the project moves forward, there may be opportunities to expedite the delivery schedule. If these opportunities arise, i.e. such as expediting review and approval processes, early consensus of a locally preferred alternative, etc., the Project Development Team will explore and implement accelerating the delivery schedule.

13. RISKS

Project risks are provided in Attachment I: Project Risk Register. In summary, the main risks are as follows:

- Shortfall in funding
- Conflict with current State Statute, AB No. 798, use of GP lane as a Managed Lane, must be changed in a timely manner to allow the use of a GP lane as a Managed Lane (Alternative 2). State legislation to change this prohibition must be in place prior to Project Report approval
- Conflict with US Code Title 23 – conversion of GP lane is not allowed unless another GP lane is added to address removal of the existing GP lane. Federal legislation to change this prohibition must be in place prior to Project Report approval
- Decision on the Tolling Authority needs to be made early in the PA&ED phase in order to not delay project delivery
- A System Integrator needs to be selected for the project during the PA&ED phase to provide design inputs, such as finalization of the tolling zones and equipment
- Right of Way risks include potential delay in R/W acquisitions and longitudinal encroachment approval of tolling equipment.
- Design risks include ML transition between US 101 and I-280, and demonstrating viability of design exceptions.
- Project management risks include coordination with stakeholders and agencies.
- Construction risks include discovery of retrofit of existing structures, unidentified utilities, and findings of cultural significance.
- Environmental risks include challenges to the widening concept in San Francisco conflicting with longstanding City policies, project seen as inequitable, and delays in selecting a preferred alternative

14. EXTERNAL AGENCY COORDINATION

For this phase of project development, this project is considered to be a delegated project in accordance with the current Stewardship and Oversight Agreement between Federal Highway Administration (FHWA) and Department of Transportation (Caltrans) dated May 28, 2015.

During the PA&ED phase, Caltrans and FHWA will jointly determine if the project is a Project of Division Interest (PoDI). If the project is not selected as a PoDI, it will be considered as Delegated Project and Caltrans will have approval authority for all aspects of a Federal-aid project, except those which may not be delegated by federal law (requiring FHWA approval). For a Delegated Project, FHWA will verify compliance with federal regulations via annual program and process reviews. During the PA&ED phase, the Caltrans Project Manager will initiate discussion with the FHWA representative regarding the project.

US 101 is a federally designated national route and I-280 is part of the interstate system, therefore FHWA approval is needed for access modifications or exceptions to delegated design standards.

It is anticipated that the following regulatory permits/approvals would be required for project components that propose alterations to water crossings or impacts to adjacent natural habitat:

- CDFW 1602 Streambed Alteration Agreement permit
- San Francisco Bay RWQCB 401 Water Quality Certification permit
- U. S. Army Corps of Engineers (USACE) Section 404 permit
- San Francisco Bay Conservation and Development Commission Administrative Permit
- San Francisco Tree Preservation Ordinance No. 1271-2000, Municipal Code Chapter 13:30, Protected tree pruning or removal permit.
- Section 7 Consultation, U.S. Fish and Wildlife Service (USFWS).

15. PROJECT REVIEWS

Project reviews with the appropriate PDT members, Caltrans District 4, and FHWA staff will occur during the PA&ED phase. The PSR-PDS reviewers and date of reviews are provided below:

HQ Project Delivery Coordinator	<u>Robert Effinger</u>	Date	<u>1/16/2019</u>
Project Director	<u>Nidal Tuqan</u>	Date	<u>12/21/2018</u>

16. PROJECT PERSONNEL

Caltrans Project Director	Nidal Tuqan	(510) 286-5542
Caltrans Regional Project Manager	Al B. Lee	(510) 715-8663
Caltrans Advance Planning Office Chief	Celia McCuaig	(510) 286-5659
Caltrans Oversight Senior Engineer	Mimy Hew	(510) 286-5578
Caltrans Oversight Project Engineer	Dominic Chin	(510) 286-4858
Caltrans Environmental Analysis	Tom Rosevear	(510) 286-5360
Caltrans Design Peninsula	Stephen Haas	(510) 286-4895
Caltrans Design Peninsula	Hardeep Singh	(510) 286-4755
Caltrans Right of Way	Kristin Schober	(510) 286-5327
Caltrans Highway Operations	Paul Ma	(510) 286-5675
Caltrans Highway Operations	Lance Hall	(510) 286-6311
Caltrans HQ Project Delivery Coord.	Robert Effinger	(916) 704-4384
Caltrans DES Structure Liaison	Majid Madani	(916) 227-8366
SFCTA Project Manager	Anna Harvey	(415) 522-4813
SMCTA Project Manager	Joe Hurley	(650) 508-7942
C/CAG Project Manager	Jean Higaki	(650) 599-1462
Consultant Project Manager	Tim Lee, WMH	(415) 806-7500
Consultant Project Engineer	Carl Gibson, WMH	(916) 844-8604

17. ATTACHMENTS

- A. Location Map
- B. Build Alternatives – Line Diagrams, Layouts, and Typical Sections
- C. Other Alternatives Considered
- D. Preliminary Cost Estimates
- E. Preliminary Environmental Analysis Report (PEAR)
- F. Traffic Engineering Performance Assessment (TEPA)
- G. Transportation Planning Scoping Information Sheet
- H. Right-of-Way Conceptual Cost Estimate Component
- I. Risk Register
- J. Not Used
- K. Quality Management Plan
- L. Storm Water Data Report
- M. Survey Needs Questionnaire
- N. DES Scoping Checklist
- O. Design Scoping Index