ROAD REPAIR AND ACCOUNTABILITY ACT OF 2017
PROJECT BASELINE AGREEMENT

SFOBB Bridge Fender Repair 04-0W140

Resolution SHOPP-P-2425-07B
(to be completed by CTC)

1. FUNDING PROGRAM

- ☐ Active Transportation Program
- ☐ Local Partnership Program (Competitive)
- ☐ Solutions for Congested Corridors Program
- ☑ State Highway Operation and Protection Program
- ☐ Trade Corridor Enhancement Program

2. PARTIES AND DATE

2.1 This Project Baseline Agreement (Agreement) effective on June 26, 2025 (will be completed by CTC), is made by and between the California Transportation Commission (Commission), the California Department of Transportation (Caltrans), the Project Applicant, CALTRANS, and the Implementing Agency, CALTRANS, sometimes collectively referred to as the "Parties".

3. RECITAL

3.1 Whereas at its 3/22/2024 meeting the Commission approved the State Highway Operation and Protection Program and included in this program of projects the SFOBB Bridge Fender Repair 04-0W140, the parties are entering into this Project Baseline Agreement to document the project cost, schedule, scope and benefits, as detailed on the Project Programming Request Form attached hereto as ***Exhibit A***, the Project Report attached hereto as ***Exhibit B***, the Performance Metrics Form, if applicable, attached hereto as ***Exhibit C***, as the baseline for project monitoring by the Commission.

3.2 The undersigned Project Applicant certifies that the funding sources cited are committed and expected to be available; the estimated costs represent full project funding; and the scope and description of benefits is the best estimate possible.

4. GENERAL PROVISIONS

The Project Applicant, Implementing Agency, and Caltrans agree to abide by the following provisions:

4.1 To meet the requirements of the Road Repair and Accountability Act of 2017 (Senate Bill [SB] 1, Chapter 5, Statutes of 2017) which provides the first significant, stable, and on-going increase in state transportation funding in more than two decades.

4.2 To adhere, as applicable, to the provisions of the Commission:

- ☐ Resolution _____, "Adoption of Program of Projects for the Active Transportation Program", dated _____
- ☐ Resolution _____, "Adoption of Program of Projects for the Local Partnership Program", dated _____
- ☐ Resolution _____, "Adoption of Program of Projects for the Solutions for Congested Corridors Program", dated _____
- ■ Resolution G-24-34, "Adoption of Program of Projects for the State Highway Operation and Protection Program", dated 3/22/2024
- ☐ Resolution _____, "Adoption of Program of Projects for the Trade Corridor Enhancement Program", dated _____

4.3 All signatories agree to adhere to the Commission's Guidelines. Any conflict between the programs will be resolved at the discretion of the Commission.

4.4 All signatories agree to adhere to the Commission's SB 1 Accountability and Transparency Guidelines and policies, and program and project amendment processes.

4.5 CALTRANS agrees to secure funds for any additional costs of the project.

4.6 CALTRANS agrees to report to Caltrans on a quarterly basis; on the progress made toward the implementation of the project, including scope, cost, schedule, and anticipated benefits/performance metric outcomes.

4.7 Caltrans agrees to prepare program progress reports on a on a semi-annual basis and include information appropriate to assess the current state of the overall program and the current status of each project identified in the program report.

4.8 CALTRANS agrees to submit a timely Completion Report and Final Delivery Report as specified in the Commission's SB 1 Accountability and Transparency Guidelines.

4.9 CALTRANS agrees to submit a timely Project Performance Analysis as specified in the Commission's SB 1 Accountability and Transparency Guidelines.

4.10 All signatories agree to maintain and make available to the Commission and/or its designated representative, all work related documents, including without limitation engineering, financial and other data, and methodologies and assumptions used in the determination of project benefits and performance metric outcomes during the course of the project, and retain those records for six years from the date of the final closeout of the project. Financial records will be maintained in accordance with Generally Accepted Accounting Principles.

4.11 The Inspector General of the Independent Office of Audits and Investigations has the right to audit the project records, including technical and financial data, of the Department of Transportation, the Project Applicant, the Implementing Agency, and any consultant or sub-consultants at any time during the course of the project and for six years from the date of the final closeout of the project, therefore all project records shall be maintained and made available at the time of request. Audits will be conducted in accordance with Generally Accepted Government Auditing Standards.

5. SPECIFIC PROVISIONS AND CONDITIONS

5.1 Project Schedule and Cost
See Project Programming Request Form, attached as Exhibit A.

5.2 Project Scope
See Project Report or equivalent, attached as Exhibit B. At a minimum, the attachment shall include the cover page, evidence of approval, executive summary, and a link to or electronic copy of the full document.

5.3 Performance Metrics
See Performance Metrics Form, if applicable, attached as Exhibit C.

Attachments:

Exhibit A: Project Programming Request Form
Exhibit B: Project Report
Exhibit C: Performance Metrics Form *(if applicable)*

SIGNATURE PAGE
TO
PROJECT BASELINE AGREEMENT

Project Name: SFOBB Bridge Fender Repair 04-0W140

Resolution: SHOPP-P-2425-07B

(to be completed by CTC)

	4/23/2025
Ahmed Moin	Date
PROJECT MANAGER	
Project Applicant	

	4/23/2025
Ahmed Moin	Date
California Department of Transportation	
Implementing Agency	

	04/28/2025
DINA EL-TAWANSY	Date
District Director	
California Department of Transportation	

Michael D. Keever	06/05/2025
Michael D. Keever	Date
Acting Director	
California Department of Transportation	

	10/31/2025
Tanisha Taylor	Date
Executive Director	
California Transportation Commission	

June CTC SB1 SHOPP Baseline Agreements Review

Final Audit Report 2025-06-05

Created:	2025-06-05
By:	Lauren Matthews (s147989@dot.ca.gov)
Status:	Signed
Transaction ID:	CBJCHBCAABAAbeeIn4gvuwGSbNUwM3S_T23LMcoDdDRw

"June CTC SB1 SHOPP Baseline Agreements Review" History

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Agreement completed.
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Baseline agreement information was extracted from Caltrans' project data systems. Project description, funding and performance measures are from CTIPS. Project delivery milestones are from PRSM. All information is current and accurate.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

BASELINE AGREEMENT

Date:	04/11/25 04:42:17 PM

District	EA	Project ID	PPNO	Project Manager
04	0W140	0420000180	2927G	MOIN, AHMED A

County	Route	Begin Postmile	End Postmile	Implementing Agency	
SF	80	5.7R	7.7R	PA&ED	Caltrans
				PS&E	Caltrans
				Right of Way	Caltrans
				Construction	Caltrans

Project Nickname

SFOBB Bridge Fender Repair

Location/Description

In the City and County of San Francisco, at San Francisco-Oakland Bay Bridge, West Span (Bridge No. 34-0003). Replace fender system. (Additional Contribution: $2,000,000 PA&ED, $3,984,000 PS&E, $16,000 R/W Sup, $8,000,000 Const Sup, and $13,000,000 Con Cap from Bay Area Toll Authority (BATA).)

Legislative Districts

Assembly:	17	Senate:	11	Congressional:	11

PERFORMANCE MEASURES

	Primary Asset	Good	Fair	Poor	New	Total	Units
Existing Condition	Bridge					1	Bridge(s)
Programmed Condition	Bridge					1	Bridge(s)

Project Milestone	Actual	Planned
Project Approval and Environmental Document Milestone	06/02/24	
Right of Way Certification Milestone		01/30/26
Ready to List for Advertisement Milestone		02/11/26
Begin Construction Milestone (Approve Contract)		08/15/26

FUNDING (Allocated amounts are shaded)

Component	Fiscal Year	SHOPP					Total
PA&ED							0
PS&E							0
RW Support							0
Const Support							0
RW Capital	25/26	200					200
Const Capital	25/26	117,800					117,800
Total		118,000					118,000

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

To: RICHARD STONE
SHOPP SB-1 Baseline Agreement
HQ Program Management

Date: May 01, 2025

File: EA 04-0W140
EFIS 0420000180
SF-080-5.7R/7.7R

From: AHMED MOIN
PROJECT MANAGER
DISTRICT 04

Subject: **PROJECT STATUS UPDATE**

This memorandum is written to accompany the Baseline Agreement for the referenced project.

The Project was programmed into the 2024 SHOPP Program for FY 25/26 RTL delivery.
Location of the project is in the City and County of San Francisco, at San Francisco-Oakland Bay Bridge, West Span (Bridge No. 34-0003) Postmiles SF-080-5.7R/7.7R.
The referenced project's performance measures are (1 Bridge).

Since the Project Report was approved, the schedule has been updated to the currently Proposed Major Milestones:

Project Milestones

Milestone	Date
Right of Way (R/W) Certificate M410	01/30/2026 Target
Ready To List (RTL) M460	02/11/2026 Target
Approve Contract (AC) M500	08/15/2026 Target

If you have any questions, please contact me at (510) 385-7652.

cc: D. Nguyen,
R. Effinger
M. Suleiman
M. Omran

04-SF-80 – PM 5.7/7.7
EA 04-0W140 – Project Number 0420000180 – PPNO 2927G – SHOPP ID 24929
20.XX.203.857 – San Francisco-Oakland Bay Bridge – Non-Regional Measure 1
20.XX.201.116 – Bridge Formula Program
June 2024

Project Report

To Request Project Programming and Project Approval

On Route 80

In The City and County of San Francisco

At San Francisco-Oakland Bay Bridge, West Span (Bridge No. 34-0003)

I have reviewed the right of way information contained in this report and the Right of Way Data Sheet attached hereto and find the data to be complete, current, and accurate:

Julie McDaniel, Deputy District Director,
Right of Way and Land Surveys

APPROVAL RECOMMENDED:

Kenneth Young, Project Manager
Project Management – West Region

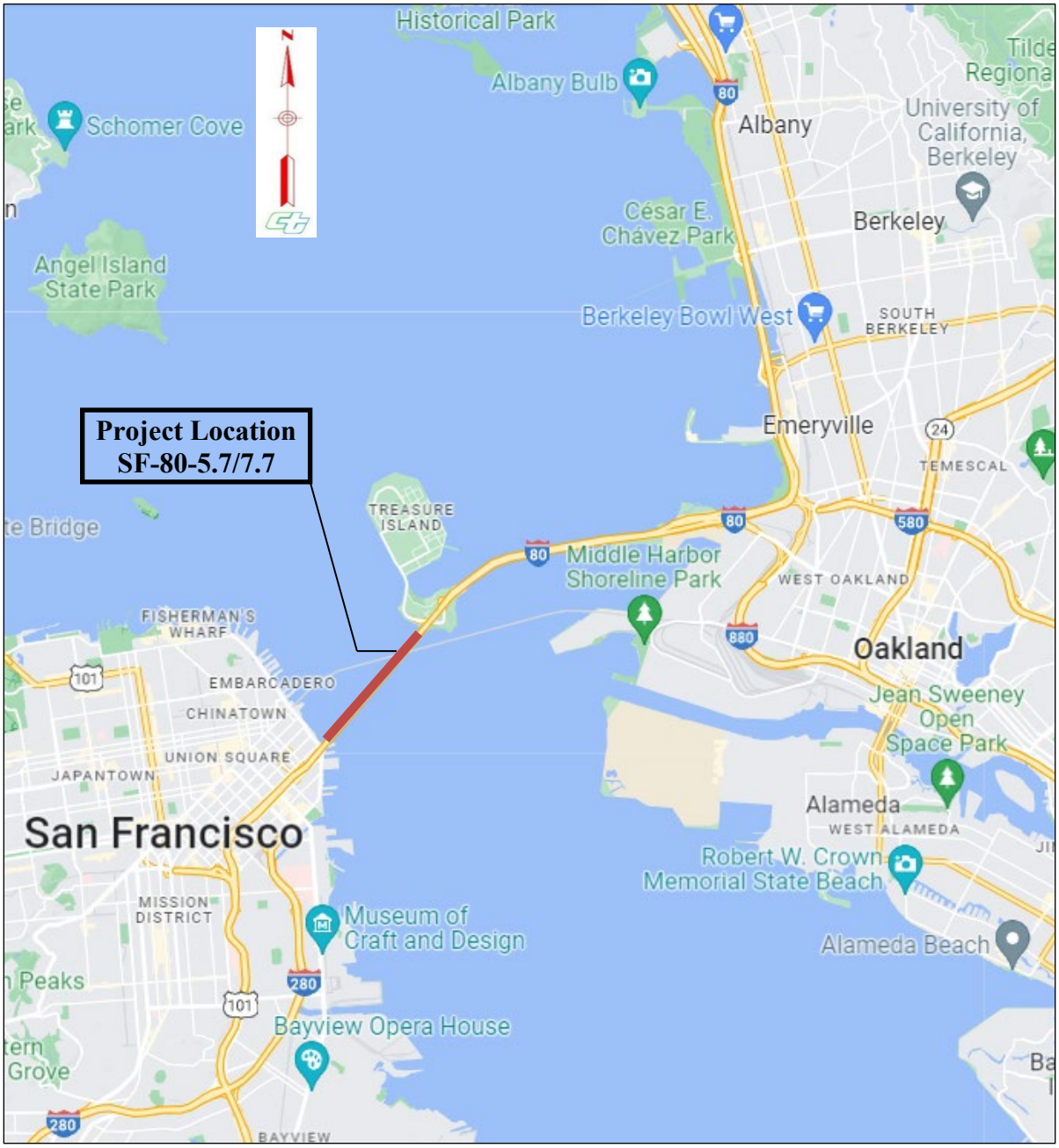
James Hsiao, Office Chief
Design – Special Projects

PROJECT APPROVED:

Wajahat Nyaz
Deputy District Director, Design

6/2/2024
Date

Vicinity Map



In the City and County of San Francisco

on Route 80 at the San Francisco-Oakland Bay Bridge, West Span

This Project Report 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 on which the recommendations, conclusions, and decisions are based.

Hoa-Anh Le

HOA-ANH H. LE
REGISTERED CIVIL ENGINEER

04/05/2024

DATE

Table of Contents

1. INTRODUCTION

Project Description:

This project proposes to replace the fender system for the West Span of the San Francisco–Oakland Bay Bridge (Bridge No. 34-0003, identified as "West Bay" in the 2024 California Log of Bridges on State Highways). The entire corridor is also known as the Bay Bridge or SFOBB. Under Expenditure Authorization (EA) 04-0W140, this fender replacement project (listed in Table 8-3, Section 8, Line No.11), is referred to as "the proposed project" or "the project" throughout this report, includes the complete removal of the existing wooden, plastic, and steel fender elements, partial removal of the existing reinforced concrete skirt, and the construction of a replacement fender system with a modified reinforced concrete skirt at Piers W3 through W6. The project will provide improvements for long-term durability, reducing maintenance, as well as easing repairs from a vessel allision.

The project funds are from the Bay Area Toll Authority (BATA) and the Bridge Formula Program (BFP) in the 2025/2026 fiscal year (FY). This Project Report (PR) also serves as the programming document to secure the Federal funding under BFP, as well as the project approval for the preferred alternative. Attachment A provides the project location map and conceptual plans, and Attachment B provides the project cost estimate. The following table summarizes some of the key details of the project.

Project Limits	04-SF-80–PM 5.7/7.7	
Number of Alternatives	Four (Three Viable Build Alternatives and the No-Build Alternative)	
	Current Cost Estimate:	**Escalated Cost Estimate:**
Capital Outlay Support	$14,000,000*	$14,000,000
Capital Outlay Construction	$117,800,000	$130,800,000
Capital Outlay Right of Way	$200,000	$200,000
Funding Source	20.XX.203.857 (San Francisco-Oakland Bay Bridge – Non-Regional Measure 1) 20.XX.201.116 (Bridge Formula Program, pending approval)	
Funding Year	Fiscal year 2025/26	
Type of Facility	Multi-lane freeway	
Number of Structures	One (Bridge No. 34-0003)	
SHOPP Project Output	Not Applicable	
Environmental Determination or Document	Categorical Exemption (CEQA) / Categorical Exclusion (NEPA)	
Legal Description	In the City and County of San Francisco at the San Francisco-Oakland Bay Bridge, West Span	
Project Development Category	5	

Notes:
BATA = Bay Area Toll Authority
CEQA = California Environmental Quality Act
NEPA = National Environmental Policy Act
SHOPP = State Highway Operation and Protection Program
PM = post mile(s)
SF = San Francisco County
* See Attachment D (BATA Resolution No. 144)

2. RECOMMENDATION

It is recommended that the report be approved for the following purposes:

A) Approval of the Preferred Alternative (Alternative 1) for this project.

B) Securing the Federal funding under the Bridge Formula Program for this project which will be amended to the Transportation Improvement Program (TIP) after California Transportation Commission (CTC) allocation.

3. BACKGROUND

Project History

All State-own toll bridges in Bay Area:

In the past, pier fender timbers were pressure-treated with arsenic-creosote mixture that provided 25-30 years of service life. When these fender timbers deteriorated, they were replaced by timbers that were pressure-treated with creosote only. Arsenic component was eliminated because of its leaching into the environment. Without the presence of arsenic in the fender system, the surrounding water became significantly cleaner for biological habitats, the numbers of marine borers increased, and thereby the life of the fender timber systems decreased significantly. According to the Project Statement included in the 1995 PSSR, the service life of creosote-treated timbers in borer-infested water is about five (5) years.

In 1993, the San Francisco Bay Regional Water Quality Control Board prohibited the use of creosote-treated timbers in the bay and in other waterways in California. Since then, Reinforced Recycled Plastic (RRP) timber has been used for fender replacement. The service life of RRP timber fender is 25-30 years. Table 3-1 lists a partial history of toll bridges fender work and the draft Toll Bridge Rehabilitation 10-Year and 20-Year Plan.

Table 3-1 Partial History of Toll Bridges Fender Work and Draft Toll Bridge Rehabilitation 10-Year and 20-Year Plan
(This table is generated from available data in January 2024.)

Line No.	Bridge Location CO - RTE PM (Bridge No.)	Past Fender Work before year 2000 Material: Creosote-Treated Wood	Past Fender Work after year 2000 Material: Recycled Reinforced Plastic	Environmental Document	Proposed FY Child EA Capital Outlay ($Million)
1	ANTIOCH CC/SAC-160 PM 0.7-1.3/0.0-0.6 (28-009)	(1976) EA 04-157804 Fender **constructed** during new bridge construction.	None		2027/28 EA 0W141* $2
2	BENICIA-MARTINEZ (old bridge-1962) CC/SOL-680 PM 25.0-25.4/0.0-0.8 (28-0153L)	(1980) EA 04-000434 Piers 8 & 9 **Repaired** (1982) EA 04-000714 Pier 10 **Replaced** (1983) EA 04-001014 Pier 9 **Reconstructed**	(2005) EA 04-049084 Pier 4-12 **Replaced**	CE/CE (10/27/1995) for Master EA 04-04900K Revalidation on 09/17/2003	2033/34 EA 0W148* $14
3	BENICIA-MARTINEZ (new bridge-2008) CC/SOL-680 PM 25.0-25.4/0.0-0.8 (28-0153R)	N/A	N/A		2030/31 EA 0W148* $9
4	CARQUINEZ-1958 CC/SOL-80 PM 13.5-14.1/0.0-0.4 (23-0015R)	(1992) EA 04-004694 Pier 3 **Repaired**	(2012) EA 04-049074 Portion of Piers 2, 3 and Entire Pier 4 **Replaced**.	EA 04-049074 (10/30/1995) CE/CE Revalidation on 07/17/2002	2033/34 EA 0W143* $1.5
5	ZAMPA-2005 (CARQUINEZ new bridge) PM 13.5-14.1/0.0-0.4 (28-0352L)	N/A	(2002) EA 04-0490A4 Pier 3 Pile **Rehabilitation**	EA 04-0490A4 (10/30/1995) CE/CE Revalidation on 07/17/2002	2030/31 EA 0W143* $4
6	RICHMOND-SAN RAFAEL CC/MAR-580 PM 6.2-7.7/0.0-2.5 (28-0100)	(1980) EA 04-000244 Pier 35 **Repaired** (1991) EA 04-004094 Pier 33, 36, 46, & 49 Whole Fender **Repaired**	(2008) EA 04-3A7604 Pier 33, 34, 35, 36, 46, 47, 48, & 49 **Replaced**	EA 04-3A7604 (08/28/2007)	2028/29 EA 0W144* $6

		Pier 47 **Repaired**			
Line No.	**Bridge Location CO - RTE PM (Bridge No.)**	**Past Fender Work before year 2000 Material: Creosote-Treated Wood**	**Past Fender Work after year 2000 Material: Recycled Reinforced Plastic**	**Environmental Document**	**Proposed FY Child EA Capital Outlay ($Million)**
7	DUMBARTON SM/ALA-84 PM R29.3-R30.1/R0.0-R0.7 (35-0038)	N/A	(2003) EA 04-049064 Pier 23 & 24 **Repaired**	CE/CE - 04900K (09/01/1995)	2029/30 EA 0W146* $1.2
8	SAN MATEO-HAYWARD-Highrise SM - 92 PM R14.4-R16.3 (35-0054)	(1989) 04-002784 Piers 19 & 20 **Repaired**	(2004) EA 04-049054 Piers 19 & 20 **Replaced**	CE/CE - 04900K (09/01/1995)	2028/29 EA 0W145* $2
9	SAN MATEO-HAYWARD-Trestle SM/ALA - 92 PM R16.3-R18.8/R0.0-R2.4 (35-0054)	N/A	N/A		2027/28 EA 0W145* $5
10	SFOBB-EAST SPAN SF/ALA - 80 PM R7.9-R8.9/R0.0-R0.2 (34-0006) **Not in 10-20 Year Plan**		(2000) Br. No. 33-0025 04-004894 E2, E3, E4, E5 **Replaced** (2012) EA 04-0120F4	04-004894 CE/CE (10/24/1994)	2040/41 EA 0W147* $ (TBD)
11	SFOBB-WEST SPAN SF - 80 PM 5.7-7.7 (34-0003)	(1980) EA 04-000524 Pier W5 **Repaired** (1989) EA 04-002984 Piers W2 & W6 **Reconstructed & Repaired**	(2007) EA 04-049044 Pier W2 – W6 **Replaced** fender sheathing, walers and struts, and repaired portion of concrete skirt	CE/CE - 04900K (09/03/2004)	2023/24 EA 04-0W140 $ (Attachment B)

Notes:
*Proposed EA is currently not reserved, not programmed, and not opened.
Env. = Environmental
Doc. = Document

San Francisco-Oakland Bay Bridge-West Span:

In 2006, the lower fender system composed of existing wooden sheathing, walers, knee braces and tie rods were replaced with reinforced recycled plastic lumber and steel struts under Contract 04-049044. At several locations, the lower half of the inner wooden vertical posts were also replaced with steel square tubes. The upper fender system was kept as is.

On November 11, 2007, the fender system at Pier W5 was struck by the Costco Busan vessel resulting in damage to the southwest corner of the pier. Repairs were performed under the emergency Director's Order (EA 04-4A804). During the allision, the hull of the vessel was punctured, releasing over 50,000 gallons of heavy fuel oil into the bay. The resulting environmental disaster highlighted the need for a fender system that not only protects the structure but is also more forgiving to vessels.

On January 7, 2013, the fender system at Pier W6 was struck by the Overseas Reymar vessel resulting in damage to the southeast corner of the pier. Repairs were performed under emergency Director's Order (EA 04-3G4474).

An emergency Director's Order (EA 04-3G4454) was executed in 2016 due to the decay of the inner wooden fender system. Several segments of the lower fender system dropped into the bay. The Director's Order included repairs of the missing sections. In addition, the securing chains were installed to minimize the risk of future sections separating.

From 2017 to the present, the Caltrans Maintenance crews have installed additional chains at multiple locations to prevent fender sections from breaking free. The process of securing the outer and lower fender system with chains is considered on going until the fender system is completely replaced. An emergency Director's Order (EA 04-0W0104) was completed in 2024 which secured and replaced fender segments that fell into the water.

Community Interaction

The proposed project does not address specific community concerns. The project will not result in adverse impacts on population growth, municipal or community services, utility services, community character, or existing or proposed land uses.

Existing Facilities

The idea of a bridge connecting the west and east parts of San Francisco Bay has been conceptualized since the California Gold Rush era. In the 1870s, a bridge committee was formed for the planning of a railroad bridge to connect San Francisco with Oakland. During the 1920s, as the automobile became increasingly popular, interest increased in the planned connection of Oakland to San Francisco. After years of planning, a law passed in 1929 established the California Toll Bridge Authority, together with the State Department of Public Works, to procure funds to build the

bridge. Yerba Buena Island (YBI), formerly a United States Naval Base, was chosen as the midpoint to reduce the amount of material and labor needed. The San Francisco–Oakland Bay Bridge was opened to traffic on November 12, 1936.

The SFOBB, West Span originally divided automobile traffic on the upper deck from trucks, buses, commuter trains, and some cars on the lower deck. After rail service on the bridge was abandoned in 1958, the lower deck was converted for use by all road traffic in the early 1960s. The SFOBB has two sections or spans of about equal length. The West Span, known as the Willie L. Brown Jr. Bridge, connects San Francisco to YBI, and from there the new East Span connects YBI to Oakland. The West Span is a double suspension bridge with two decks; the upper deck is used for the westbound traffic, and the lower deck carries the eastbound traffic. The West Span, which is 10,304 feet long, has five lanes of traffic on the upper deck and five lanes of traffic on the lower deck. Each deck has a width of 57.5 feet. The clearance of the lower deck is 14.67 feet, and the clearance of the upper deck is 14 feet. The height of the West Span over the shipping channel is 220 feet.

Only motorized freeway traffic is allowed on the West Span of the Bay Bridge. Pedestrians, bicycles, and other non-freeway vehicles are not allowed to travel on the West Span.

4. PURPOSE AND NEED

Purpose:

The project includes the complete removal of the existing wooden, plastic, and steel fender elements, partial removal of the existing reinforced concrete skirt, and construction of a replacement fender system with a modified reinforced concrete skirt at Piers W3 through W6. The replacement fender system is designed to absorb and reduce the impact energy transferred between the piers and the vessel during the "design vessel allision." This will structurally protect the bridge piers while also reducing the probability of costly vessel damage. Additionally, the new fender system will reduce maintenance and increase long-term durability, as well as easing repairs after a vessel allision.

Need:

Fender system is an integral part of a bridge since it provides protection for the piers against vessel allision. A functional fender system is required under federal regulations and is under the jurisdiction of the United States Coast Guard (USCG). Caltrans has been doing what's necessary to maintain the functionality of the existing fender systems at SFOBB-West Span.

As the existing fender system at Piers W3 to W6 continues to deteriorate due to aging and environmental conditions, maintaining its functionality has become more costly and less feasible. In addition, vessel traffic and vessel size have been dramatically increased since the construction of the bridge. Thus, to better protect the piers of the bridge, which is part of the life-line corridor on I-80, and as well as thousands of

vessels traveling in and out of the San Francisco Bay, a new fender system is necessary.

4A. Problem, Deficiencies, Justification

The upper and inner wooden fender system, which is part of the original fender system constructed in 1932, has shown signs of extensive decay. Such decay can be attributed to the age of the wooden fender system and to the fender system being exposed to the harsh marine environment. Due to the decay of the inner wooden fender system, the connection of the outer walers and the lower plastic fender system has had pullout failures causing several segments of the lower fender system to drop into the bay. An emergency Director's Order was executed in 2016 to secure multiple locations with chains to prevent the complete separation.

The concrete skirt supporting the fender system has also shown signs of significant section loss of reinforcement steel and spalling of the concrete. The bridge inspection report has assessed that the existing fender system is reaching the end of its service life and has recommended the complete replacement and reconstruction of the fender system at Pier W3 to W6.

4B. Regional and System Planning

Corridor Overview

The Interstate 80 (I-80) San Francisco Oakland Bay Bridge corridor is approximately eight miles in length and begins at US 101 in San Francisco County and ends in Alameda County near the I-80/I-580 distribution structure in Emeryville. It is classified as an Interstate freeway and functions as a gateway to San Francisco connecting US 101 to I-80, I-580, and I-880 in the East Bay. The nearly five-mile long SFOBB has an eastern and western span that are connected to YBI through the Yerba Buena Tunnel. Treasure Island is connected to the northern end of YBI. The new self-anchored suspension eastern span, which was opened to traffic in 2013 to replace its seismically vulnerable two deck predecessor, has a single deck with ten lanes equally divided between the two directions. There is also a shared bicycle/pedestrian path south of the vehicular lanes on the eastern span. The western span has two decks, with five westbound (WB) lanes on the upper deck and five eastbound (EB) lanes on the lower deck, transitioning to a single deck on the east side of YBI. The bridge toll plaza is located in the westbound direction east of the bridge in Oakland with twenty lanes, including two High-Occupancy Vehicle (HOV) lanes and two HOV/bus only lanes.

Federal and State Planning

Table 4-1 lists the Federal and State characteristics of I-80.

Table 4-1: Federal and State Characteristics of I-80 Within the Project Limits

Route	Functional Classification	Trucking Designation	National Highway System (NHS)*	Scenic Highway	Interregional Road System (IRRS)*
I-80	Interstate Freeway	STAA* Route	Eisenhower Interstate	Eligible	Yes

Notes:
*NHS = (National Highway System) U.S. network of strategic highways, including interstates.
*IRRS = (Interregional Road System) California network of routes that connect all economic centers in the State.
*STAA = (Surface Transportation Assistance Act) National network allows large commercial trucks on Interstates

Future Projects

State Highway Operation and Protection Program (SHOPP)

SHOPP is the State's "fix-it-first" program; it funds the repair and preservation of the State Highway System, safety improvements, and some highway operational improvements. There are no current or planned SHOPP projects in the vicinity of the EA 04-0W140.

California State Transportation Improvement Program

The California State Transportation Improvement Program (STIP) is the biennial 5-year plan that the California Transportation Commission adopts for future allocations of certain State transportation funds for State highway improvements, intercity rail, and regional highway and transit improvements. There are no STIP projects in the vicinity of the EA 04-0W140 project limits.

Plan Bay Area (PBA) 2050

There is no project in PBA 2050 within the vicinity of EA 04-0W140.

District 4 Bike Plan

The District 4 Bike Plan (2018) is an update to the 2017 Bike Plan that identifies infrastructure improvements that can enhance bicycle safety and mobility throughout District 4 and remove obstacles to bicycling in the region. It is intended to be a resource that will help to inform future investments on the State transportation network by Caltrans and other jurisdictions. Within the vicinity of project 04-0W140, there is one project listed in the table below.

Project Number	County/ Route	City	Postmile Range	Location	Improvement Type	Description	Cost	Tier
I-80-C01	SF / 080	San Francisco	7.67	SF Touchdown to Yerba Buena Island	Corridor Improvement – Class I	New separated Class I path along the Western span of the Bay Bridge	TBD	TOP

Notes:
C01 = Corridor Improvement, Order number 1 SF = San Francisco County
TBD = To be determined and over $7,000,000

4C. Traffic

Traffic data is not applicable to the project. Due to the nature of the work, it is anticipated that there is minimal traffic impact on the bridge.

5. ALTERNATIVES

5A. Preferred Alternative:

Alternative 1: Rubber and FRP Waler Fender System

This fender system is composed of fiber reinforced polymer (FRP) walers and posts connected to a modified concrete skirt. This fender system is intended to dissipate energy through deflection and compression. Rubber elements will be incorporated into the system to increase the energy absorption capability for allision from large vessels. This system is very similar to the existing fender system, but with the timber and steel elements substituted by corrosion resistant FRP, and elements redesigned to optimize the energy absorption capability of the system. In addition, this fender system also allows for segmental replacement and repair in the event of localized damage during a vessel collision.

a) Proposed Engineering Features

The project proposes to do the following work:

- Construct platforms, protective covers and enclosures
  - Protective covers and enclosures would be required to prevent any debris from falling into the bay.
  - Provide access to barges that will serve as staging areas and transportation for construction materials.
- Remove existing fender system
  - Remove and dispose all treated timber, plastic lumber, steel strutting, and anchoring system that are attached to concrete skirt and pier shaft.

- Remove a portion of the existing concrete skirt, including removing and disposing coal tar from the surface of the concrete that is affected by the removal.
- Relocate all exiting electrical systems that are within the limits of concrete skirt removal.

➢ Reconstruct concrete skirt
- Drill and bond dowels as necessary to provide adequate connection between newly poured concrete and existing concrete.
- Place structural concrete to reconstruct the outer portion of the concrete skirt.

➢ Construct new rubber and FRP Waler and Post Fender System on the reinforced concrete skirt and the pier shaft.

b) Nonstandard Design Features of SFOBB-West Span

The West Span of both westbound and eastbound I-80 consists of five 12-foot wide lanes and no shoulders. The shoulder widths do not meet the requirements of the Highway Design Manual, Table 302.1. Shoulder widths for four-lane freeways and expressways require 5-foot wide paved shoulders on the left and 10-foot wide paved shoulders on the right. The shoulder widths for six or more lanes require 10-foot wide shoulders for both left and right sides. The bridge within the project limits does not meet both the standard left and right shoulders as well as horizontal clearance per HDM Index 309.1(3)(a). Due to the vicinity and project scope, it is not feasible to widen the bridge to meet these standards. This project does not propose to reconfigure any of the existing geometric design features of the bridge. On May 9, 2024, the District Design Liaison concurred that the project is a limited focus project and is not required to prepare a Design Standard Decision Document or Memo to File for Existing Features.

c) Highway Planting and Erosion Control

Highway planting is not present at project locations; therefore, it is not applicable to the project.

d) Temporary Pedestrian Access Route

Temporary pedestrian access routes are not required for the project because there are no existing pedestrian facilities within the project limits.

e) Americans with Disabilities Act Compliance

The project will not affect Americans with Disabilities Act of 1990 (ADA). No features, such as curb ramps or sidewalks exist within the project limits.

5B. Rejected Alternatives:

Alternatives 2 through 4 were rejected for the reasons listed below.

Alternative 2: FRP Segmental Cell Floating Fender System

This fender system is comprised of large FRP segmental cells that would surround the pier, each cell locked in place with dove tail slots that connect them to the next cell. The system of FRP cells will act together during an allision and dissipate energy through distortion and compression. The large amount of compression and distortion the cells can take results in better energy absorption capability when compared to the FRP post and waler system, thus providing better protection for the piers and vessels. The system is also resistant to corrosion and allows for segmental replacement and repair.

However, this fender system has a larger footprint and is more expensive than the waler and post system. With a significantly larger footprint, the fender system will cause more impacts to the environment and the navigable waters.

Alternative 3: Pile Fender System

This fender system is comprised of piles and large caisson dolphins that would be installed surrounding the existing pier system, and FRP walers will be used to bridge in between the piles and dolphins. This fender system is considered the most superior in terms of energy absorption, since the pile system can act completely independent of the existing pier, bringing any force transfer to the piers in an allision to a minimum.

This system, however, is not considered feasible considering the expensive cost ($800M for the SFOBB-West Span), the budgeting from BATA, the extensive environmental disturbance, and the rigorous muti-agencies review.

Alternative 4: The No-Build

This proposal is not feasible as Caltrans is obligated to maintain the bridge and maintain an appropriate level of safety and service for the traveling public. The current deteriorated fender system may not provide adequate protection for the piers supporting the bridge and may lead to pier damage and bridge collapse in the event of an allision.

6. CONSIDERATIONS REQUIRING DISCUSSION

6A. Hazardous Waste

This project involves the removal of portions of the concrete skirt that contain coal tar. Coal tar located at the top surface near the edge which are within the limits of the concrete skirt removal will need to be removed. In addition, this project will also involve extending the concrete skirt diaphragms approximately 1ft 2in at the bottom. Coal tar located on the pier core surface within the limits of the extension will also need to be removed in order to properly connect the concrete skirt extension to the pier core surface. Special Provisions will be developed during the PS&E phase to

address the methodologies of coal tar removal, equipment used, debris containment, management and disposal.

6B. Value Analysis

A Value Analysis (VA) study was conducted for the project on February 5 through 8, 2024. In this VA study, the concept for the fender replacement that utilizes a concrete skirt, rubber fender units and FRP fender elements, was evaluated with the goal to optimize and improve the design. Four metrics were used in the evaluation; namely: Allision Performance, Maintainability, Constructability, and Environmental Impacts.

The VA study resulted in the following recommendations which will be further investigated in the design process to fully determine their viability:

- The use of titanium as an alternative to stainless steel for the bolts, plates, shapes and other hardware elements for the connections of the rubber fender units and FRP elements. Titanium has better corrosive resistance and higher strength compared to stainless steel. The cost of titanium is seemingly comparable to the cost of stainless steel.
- The use of ChromeX as an alternative to epoxy coated reinforcing bar for the concrete skirt rehabilitation. The use of ChromeX may provide better corrosion resistance compared to epoxy coating since the epoxy coating on rebar has the propensity to be damaged in the field. ChromeX also has higher strength compared to traditional steel rebar. The cost of ChromeX is seemingly comparable to the cost of epoxy coated rebar.
- Additional fender materials including rubber fender units and FRP fender elements may be procured as part of the fender replacement project for future maintenance use. This recommendation would eliminate the lead time for any future procurement and would allow for competitive pricing for the additional materials. Also, this would require warehouse space to properly store the materials.

The VA study also investigated whether improvements can be made to the Preferred Alternative to address the potential for sea level rise and marine growth. During the study, it was determined that the proposed fender replacement can accommodate the projected 5ft sea level rise considering the fender elements extend way above the mean higher high water (MHHW) elevation plus the 5ft projected rise. As for the potential for marine growth, it was determined during the study that the surface of the FRP elements near the water elevation is already very resistant to marine growth, and any additional coating system would provide very little additional value making them impractical. It was also noted that the proposed configuration for the horizontal walers is optimal as far as preventing marine growth. The FRP elements will be designed for additional weight and drag force associated with marine growth.
See Attachment J for the current version of the Value Analysis Study.

6C. Resource Conservation

Resource conservation will be implemented during PS&E when feasible and cost effective.

6D. Right of Way

General

A Right of Way Data Sheet has been prepared for the project based on its scope of work. The project is not anticipated to require any right of way acquisitions. There are no anticipated utility adjustments or relocations. The Right of Way Data Sheet is provided as Attachment E.

Railroads

There is no railroad involvement in the project.

Utilities

Verification of utilities will not be required for the project.

6E. Environmental Compliance

The project is Categorically Exempt under Class 1 of the California Environmental Quality Act (CEQA) Guidelines. Also, the project is Categorically Excluded under the National Environmental Policy Act (NEPA). The Categorical Exemption / Categorical Exclusion Determination Form and the Environmental Commitments Record, approved on March 27, 2024 are provided as Attachment F.

Water Quality

The project will require the implementation of a Water Pollution Control Program (WPCP) to comply with the requirements of the National Pollutant Discharge Elimination System (NPDES) permit in the PS&E phase of the project. Potential water quality impacts will be reduced to the Maximum Extent Practicable through the proper implementation of the WPCP and inclusion of Standard Special Provisions for Temporary Construction Site BMPs. The project will need to prevent debris from entering San Francisco Bay water. The project will not require new right of way.

It is anticipated that the project will generate 0 acres of net new impervious area. As a result, per the Caltrans NPDES General Permit, implementation of permanent stormwater treatment BMPs will not be required. Also, it is not anticipated that the project will require a Section 401 permit; thus, the project will not require stormwater treatment.

The project will not require a risk level determination because the disturbed soil area (DSA) will be less than 1 acre. Please see Attachment B for the estimated cost of BMPs treatment and Attachment G for the Stormwater Data Report.

6F. Air Quality Conformity

If this project continues to be funded only by toll funds, the air quality conformity does not apply since the project is not federally funded.

6G. Title VI Considerations

Under Title VI of the Civil Rights Act of 1964, the Department ensures that

> "No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."

Related federal statutes and State law further these protections to include sex, disability, religion, sexual orientation, and age.

Caltrans recognizes the unique responsibility of State government to eliminate the transportation barriers that have divided communities and amplified racial inequities and the leadership role Caltrans has in this responsibility. Caltrans is committed to provide more equitable transportation for all Californians by creating more transparent, inclusive, and ongoing consultation and collaboration processes and engaging with the communities most impacted by structural racism in transportation decision-making, policies, processes, planning, design, and construction. Caltrans is also committed to increase pathways to opportunity for minority-owned and disadvantaged business enterprises and for individuals who face systemic barriers to employment. The goal is to create a more resilient transportation system that distributes the benefits and burdens of the system more equitably to current and future generations of Californians.

The project will not have disproportional impacts on low-income, minority, or low-mobility groups.

6H. Noise Abatement Decision Report

The project does not qualify as either a Type I or Type II project under 23 CFR 772. Noise abatement need not be considered, and a Noise Study Report is not required.

6I. Life-Cycle Cost Analysis

A Life-Cycle Cost Analysis is not applicable to the project.

6J. Reversible Lanes

Reversible lanes are not applicable to the project.

7. OTHER CONSIDERATIONS AS APPROPRIATE

Public Hearing Process

A public hearing is not required for the project, as the environmental document is a Categorical Exemption under CEQA and a Categorical Exclusion under NEPA.

Route Matters

The project does not involve Freeway Agreements, New Connections, Route Adoptions, or Relinquishments.

Report on Feasibility of Providing Access to Navigable Rivers

The project does not involve any new bridge construction; thus, this report is not applicable.

Public Boat Ramps

The project does not involve any new bridge construction; thus, public boat ramps are not applicable.

Transportation Management Plan

A Transportation Management Plan (TMP) is a program designed to be implemented during construction to assist and minimize impacts to the traveling public. The TMP provides public information such as press releases and notifications to impacted groups (e.g., motorists, bicycle users, pedestrians). In addition, lane closures, portable changeable message signs, flaggers, and the California Highway Patrol's Construction Zone Enhanced Enforcement Program (COZEEP) may be incorporated into the TMP to minimize delays.

It is anticipated that there is minimal impact to the travelling public. All work is anticipated to be performed under the bridge, however the contractor can propose alternative construction methods that will require access to the bridge deck. As such, the estimate in the TMP Data Sheet has no impact on the project's total cost. Please refer to Attachment H.

Accommodation of Oversize Loads

The project will not result in any additional temporary or permanent restrictions on the movement of oversize loads.

Asset Management

Currently, the project is not listed in the 2024 State Highway Operation and Protection Program (SHOPP). Therefore, a SHOPP Project Performance Measure Output is not applicable.

Complete Streets and Context Sensitive Solutions

Director's Policy DP-37 ensures that all transportation projects funded or overseen by Caltrans will provide comfortable, convenient, and connected complete streets facilities for people walking, biking, and taking transit or passenger rail.

The project is at the water level, therefore it will not affect the safety and mobility of the pedestrians and bicyclists now or in the future. There will be no impact to the existing landscape or natural areas near and within the project limits.

Climate Change Considerations

Construction-Related Greenhouse Gas Emissions

Construction-generated greenhouse gas (GHG) includes emissions resulting from material processing by on-site construction equipment, workers commuting to and from the project site, and traffic delays due to construction. The emissions will be produced at different rates throughout the project depending on the activities involved at the various phases of construction. The analysis of construction GHG emissions focused on vehicle-emitted GHGs. Carbon dioxide (CO_2) is the single most important GHG pollutant due to its abundance relative to other vehicle-emitted GHGs, including methane (CH_4), nitrous oxide (N_20), hydrofluorocarbons (HFCs), and black carbon (BC).

Based on project information available for environmental studies, the construction-related GHG emissions were calculated using the Caltrans Construction Emissions Tool (CAL-CET 2021), version 1.0.2, developed by Caltrans. It was estimated that for the total construction duration, the amount of CO2 produced due to construction would be 1305 tons. Table 7-1 summarizes the construction related emissions, including the total CO2e emission.

Table 7-1: Summary of Construction-related GHG Emissions[1]

Project location: San Francisco County I-80 Bridge No. 34-0003 PM 5.7/7.7	PARAMETERS			PROJECT TOTAL
	CO_2 (tons)	CH_4 (tons)	N_2O (tons)	CO_2e[1] (metric tons)
Total emissions:	1305	0.031	0.066	1276

[1] Gases are converted to CO_2e by multiplying by their GWP. Specifically, GWP is a measure of how much energy the emission of 1 ton of a gas will absorb over a given period of time relative to the emission of 1 ton of CO_2.

Notes:

CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
I GHG = greenhouse gas
GWP = global-warming potential
N_2O = nitrous oxide

Because construction activities are short term, the GHG emissions resulting from construction activities will not result in long-term adverse effects. Implementation of the Caltrans Standard Specifications, such as complying with the air pollution control rules, regulations, ordinances, and statutes that apply to work performed under the

Contract, and the use of construction BMPs will reduce GHG emissions from construction activities. The BMPs will include (but not be limited to):

- Perform regular vehicle and equipment maintenance.
- Limit idling of vehicles and equipment on-site.
- If practicable, recycle nonhazardous waste and excess material; if recycling of such waste and material is not practicable, properly dispose of the waste and material.
- Use solar-powered signal boards, if feasible.

With innovations such as longer pavement lives, improvements in traffic management, and changes in materials used, construction-related GHG emissions produced during construction can be offset to some degree by longer intervals between maintenance and rehabilitation activities.

California Climate Investments Priority Populations

(Refer to California Climate Investments Priority Populations 3.0 by Census Tract to identify Senate Bill (SB) 535 and Assembly Bill (AB) 1550 communities near a corridor). According to SB 535, Disadvantaged communities are disproportionately affected by environmental pollution, low income, high unemployment, low levels of home ownership, high rent burden, sensitive populations, or low levels of educational attainment. In AB 1550, low-income communities are defined as census tracts with median household incomes at or below 80 percent of the statewide median income or with median incomes at or below the threshold designated as low income by the U.S. Department of Housing and Urban Development. Both SB 535 and AB 1550 have a formula to direct that a percentage of State GHG-reduction funds be invested in disadvantaged and low-income communities.

Caltrans identified SB 535 and AB 1550 communities near the project limits in Treasure Island and YBI of San Francisco County. The construction activities and proposed improvements for this project will not result in negative impacts to the environment. Mitigation involves minimizing GHG emissions during construction.

Caltrans Equity Statement

State Departments of Transportation are bound by law to consider the needs of residents with low incomes, communities of color, people with limited English proficiency, seniors, the disabled, and other communities and individuals when developing transportation plans. Caltrans acknowledges that communities of color and underserved communities have experienced fewer benefits and a greater share of the negative impacts associated with the California State transportation system. Some of these disparities reflect a history of transportation decision-making, policy, processes, planning, design, and construction that often put up barriers, divided communities, and amplified racial inequities, particularly in disadvantaged neighborhoods. Caltrans recognizes its leadership role and unique responsibility to eliminate barriers and provide more equitable transportation for all Californians. This understanding is the foundation for intentional decision-making that recognizes past, stops current, and prevents future harms from our actions. Furthermore, Caltrans is

developing public outreach methodologies to increase participation by disadvantaged community members and local community-based organizations to ensure that they have a voice in projects that will affect their communities.

There was no Community Impact Assessment prepared for the project because the proposed project will not create significant impacts to the public or communities.

On March 4, 2024, Caltrans launched the Transportation Equity Index (EQI), a data tool that turns Equity into action. The EQI was developed to help identify communities that are most burdened by and receive the least benefits from the State's transportation system. The EQI integrates transportation and socioeconomic indicators into following three screens that reflects the status of low-income and Tribal land:

- Transportation-Based Priority Populations – Communities that are most burdened by the transportation system and receive the fewest benefits.
- Traffic Exposure – Communities that are the most burdened through high exposure to traffic and crashes.
- Access to Destinations – Communities that have the greatest gaps in multimodal access to destinations.

Based on the EQI, this project is adjacent to the Transportation-Base Priority Populations screen. However, there will be no impact to the communities as the project is at the water level.

Environmental Justice

Information used to identify potential Environmental Justice issues is documented in corridor plans so that transportation projects guarantee the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income. This approach applies to the scope of the project, from the early stages of transportation planning and investment decision-making through construction, operations, and maintenance. Title VI of the Civil Rights Act of 1964 states that "No person in the United States shall, on the grounds of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Executive Order 12898, issued in 1994, gave a renewed emphasis to Title VI and added low-income populations to those protected by the principles of Environmental Justice. There are three fundamental principles at the core of Environmental Justice:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.

- To ensure the full and fair participation of all potentially affected communities in the transportation decision-making process.

- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority or low-income populations.

Caltrans identified environmental justice communities near the project area in Treasure Island and YBI of San Francisco County. The construction activities and proposed improvements for this project will not result in negative impacts to the environment. Mitigation involves BMP's and minimizing GHG emissions during construction.

Equity Priority Communities

Metropolitan Transportation Community (MTC)'s Equity Priority Communities (EPC) index is based on eight American Community Survey (ACS) 2014-2018 tract-level variables. The development of MTC's EPC was a part of the Equity Framework within the Regional Transportation Plan. The framework includes equity measures to analyze scenarios and define disadvantaged communities. These variables included minority populations, low-income areas, less-English-proficient populations, seniors (age 75 and older), zero-vehicle households, single-parent households, people with disabilities, and rent-burdened households. EPCs within the Regional Transportation Plan area are rated at high and highest levels of concern, meaning these communities are burdened by multiple socioeconomic factors.

Caltrans identified EPCs adjacent to the project area in Treasure Island and YBI of San Francisco County. There is no general impact to underserved communities for the proposed improvements.

Broadband and Advanced Technologies

As outlined in California Streets and Highways Code, Chapter 2, Section 2030(d), where feasible, Caltrans shall use advanced technologies and communications systems in transportation infrastructure that recognize and accommodate advanced automotive technologies.

Pursuant to AB 1549 (2016) and Caltrans Deputy Directive (DD)-116, collaboration between Caltrans and agencies working on broadband deployment is encouraged and when feasible, plans for additional wired broadband facilities are accommodated.

This project falls within the 10,000-mile Middle-Mile Broadband Initiative (MMBI) network. Standalone MMBI project is being implemented using innovative delivery method – Job Order Contracting (JOC):

- A JOC (EA 04-4Y180) of the MMBI project on I-80, in the counties of San Francisco and Alameda, will install broadband conduits within project limits.

The proposed project will not impact the accommodation of wired broadband facilities, fueling for zero-emission vehicles, or provisions of infrastructure-to-vehicle communications for transitional or fully autonomous vehicles.

8. FUNDING, PROGRAMMING, AND ESTIMATE

Funding

The project has been included in BATA Resolution No. 122 since 2017 under FY 2021-31 Ten-Year Toll Bridge Rehabilitation Program. The dollar amounts have been updated annually by BATA. The 2021 Resolution No. 144 is the last update that shows this project was budgeted for both project support and capital costs.

During the last 10 years, the Department has transferred to BATA over $7.3 billion from collected tolls. According to BATA Resolution No. 169, page 13 of 18, dated on June 28, 2023, a total of $1.9 billion was used to reimburse monthly project expenditures in the Toll Bridge Rehabilitation Program going back to 1998. With a remaining $5.4 billion, it is apparent that BATA could fund this project. See Attachment D.

As requested by BATA, Caltrans District 4, will apply for Federal funding under Bridge Formula Program (20.XX.201.116) in Spring 2024. However, the pursuit of Federal funding is contingent on meeting eligibility requirements. If the Federal funding cannot provide the total construction capital cost for the project, then BATA shall supplement the difference to fully fund this project."

Programming

The following tables show the costs needed to fully fund this project.

Table 8-1A: Costs To Be Programmed from BFP

Fund Source	Fiscal Year Estimate								
20.XX.201.116 (BFP)	Prior	2021/ 22	2022/ 23	2023/ 24	2024/ 25	2025/ 26	2026/ 27	Future	Total
Component	In thousands of dollars ($1,000)								
PA&ED Support	—	—	—	—	—	—	—	—	—
PS&E Support	—	—	—	—	—	—	—	—	—
Right of Way Support	—	—	—	—	—	—	—	—	—
Construction Support	—	—	—	—	—	—	—	—	—
Right of Way	—	—	—	—	—	$200	—	—	$200
Construction	—	—	—	—	—	$117,800	—	—	$117,800
Total:	—	—	—	—	—	$118,000	—	—	$118,000

Notes:
— = not applicable
PS&E = Plans, Specifications, and Estimate
PA&ED = Project Approval and Environmental Document

Table 8-1B: Existing Budgeted Costs from BATA (to complement Table 8-1A)

Fund Source	Fiscal Year Estimate								
20.XX.203.857 (BATA)	Prior	2021/ 22	2022/ 23	2023/ 24	2024/ 25	2025/ 26	2026/ 27	Future	Total
Component	In thousands of dollars ($1,000)								
PA&ED Support	—	—	—	$1,700	$300	—	—	—	$2,000
PS&E Support	—	—	$200	$200	$2,600	$984	—	—	$3,984
Right of Way Support	—	—	—	—	—	$16	—	—	$16
Construction Support	—	—	—	—	—	$8,000	—	—	$8,000
Right of Way	—	—	—	—	—	—	—	—	—
Construction	—	—	—	—	—	$13,000	—	—	$13,000
Total:	—	—	$200	$1,900	$2,900	$22,000	—	—	$27,000

Notes:
— = not applicable PS&E = Plans, Specifications, and Estimate
PA&ED = Project Approval and Environmental Document

Table 8-1C: Combined Costs

Fund Sources	Fiscal Year Estimate								
20.XX.201.116 20.XX.203.857	Prior	2021/ 22	2022/ 23	2023/ 24	2024/ 25	2025/ 26	2026/ 27	Future	Total
Component	In thousands of dollars ($1,000)								
PA&ED Support	—	—	—	$1,700	$300	—	—	—	$2,000
PS&E Support	—	—	$200	$200	$2,600	$984	—	—	$3,984
Right of Way Support	—	—	—	—	—	$16	—	—	$16
Construction Support	—	—	—	—	—	$8,000	—	—	$8,000
Right of Way	—	—	—	—	—	$200	—	—	$200
Construction	—	—	—	—	—	$130,800	—	—	$130,800
Total:	—	—	$200	$1,900	$2,900	$140,000	—	—	$145,000

Notes:
— = not applicable PS&E = Plans, Specifications, and Estimate
PA&ED = Project Approval and Environmental Document

The support cost ratio (the total programmed support cost relative to the combined programmed right of way and construction costs) is 10.7%.

Estimate

The Project Statement identifying the need and cost for the project was provided to District 4 Design on July 1, 2021 from the Office of Structure Maintenance and Investigations (OSM&I). The Project Statement was revised on April 17, 2024 with the updated estimate (Attachment C). Functional units provided estimates that were reflected in the Project Cost Estimate dated on March 27, 2024. The current and escalated construction capital cost estimates for the project are $118,000,000 and

$131,000,000, respectively. See Table 8-2 for the summary and Attachment B for detailed estimates.

Table 8-2 Summary of Project Cost Estimates: Alternative 1 (Preferred Alternative)

Item	Current Cost Estimate (Year 2024)	Escalated Cost Estimate (Year 2026)
District items (includes electrical work)	$15,519,800	$17,158,612
Structure items	$102,280,000	$113,080,245
Subtotal construction	$117,799,800	$130,238,857
Right of way	$200,000	$200,000
Total project capital outlay cost (rounded)	**$118,000,000**	**$131,000,000**

9. DELIVERY SCHEDULE

Project Milestones		Milestone Date	Milestone Designation
PROGRAM PROJECT	M015	07/14/2017	Actual
PA&ED	M200	06/02/2024	Target
PS&E	M380	02/28/2025	Target
RIGHT OF WAY CERTIFICATION	M410	07/2/2025	Target
READY TO LIST	M460	07/24/2025	Target
FUND ALLOCATION	M470	09/16/2025	Target
HEADQUARTERS ADVERTISE	M480	11/01/2025	Target
AWARD	M495	1/03/2026	Target
APPROVE CONTRACT	M500	2/03/2026	Target
CONTRACT ACCEPTANCE	M600	06/30/2027	Target
END PROJECT	M800	12/01/2028	Target

Notes:
This Table does not reflect the dates in PRSM as of March 2024
M = milestone

10. RISKS

A Level 2 Risk Register has been prepared to identify the various project management, design, and construction risks that could affect the Design and Construction phase of the project (see Attachment I, Risk Management Plan). Each risk is given a probability, a cost impact, time impact ratings, and risk response actions. Some of the risks with higher impact scores are listed below.

- Risk ID #5 (Additional Unsound Concrete): Unanticipated unsound concrete may be discovered during the replacement of the fender system leading to additional concrete repairs. As a result, the estimated cost will increase.

- Risk ID # 6 (Hazardous Materials): Unanticipated hazardous materials may be encountered during construction which may require mitigation, removal, and disposal. This results in extra project cost and delays.

11. EXTERNAL AGENCY COORDINATION

Federal Highway Administration

The project is considered to be an Assigned Project in accordance with the current Joint Stewardship and Oversight Agreement between the Federal Highway Administration (FHWA) and Caltrans, dated May 28, 2015.

The Francis Scott Key Bridge in Baltimore, Maryland collapsed on March 26, 2024 when one of its support columns was hit by the cargo ship "Dali." The catastrophe prompted questions about bridges' protective system across the country. In response to this incident, Caltrans District 4 held a meeting with FHWA on April 11, 2024. The design criteria, alternatives, and conceptual plans of the fender replacement were presented by Caltrans OSM&I. A draft Project Report and its attachments were also sent to FHWA on March 28, 2024. At this time, FHWA did not have comments nor information about the incident as the investigation is still at the early stage. Caltrans District 4 will schedule follow-up meetings.

MTC-BATA

The existing Cooperative Agreement 4-2078-A1 was executed on June 13, 2011 for allocation of Capital Outlay/Capital Outlay Support funds.

Other Agencies (for permit review)

Regional Water Quality Control Board
Clean Water Act Section 401
Water Quality Certification to be confirmed during PS&E phase.

San Francisco Bay Conservation and Development Commission
California Government Code Title 7.2
California Public Resources Code Division 19
Maintenance Permit M87-42, Amendment Six or successor document.

US Army Corps of Engineers
Clean Water Act Section 404
Rivers and Harbors Act of 1899 Section 10
Department of Army Permit (Nationwide Permit 3)

United States Coast Guard
Rivers and Harbors Act of 1899 Section 9
Bridge Permit from original construction, USCG Statute Regulations 33CFR115.40-
Bridge repairs: Repairs to a bridge which do not alter the clearances, type of structure, or any integral part of the substructure or superstructure or navigation conditions, but

which consist only in the replacement of worn or obsolete parts, may, if the bridge is a legally approved structure, be made as routine maintenance without a formal permit action from the U.S. Coast Guard. [CGFR 67–46, 32 FR 17771, Dec. 12, 1967, as amended by USCG–2012–0306, 77 FR 37314, June 21, 2012].

12. PROJECT REVIEWS

For each type of project review, Table 12-1 lists the review topic, the assigned reviewer, and the completion date of the review.

Table 12-1: Project Reviews: Topics, Assigned Reviewers, and Dates of Completion

Review Topic	Assigned Reviewer	Completion Date
Program Advisor	Mark Woods	04/09/2024
District Maintenance	Monique Nguyen	03/12/2024
Project Manager	Kenneth Young	03/05/2024
District Safety Review	Haixiong Xu	03/20/2024
Constructability Review	Jeffrey Hupe	03/19/2024
Headquarters Project Delivery Coordinator	Robert Effinger	04/11/2024

13. PROJECT PERSONNEL

Table 13-1 lists the project personnel by title, name, and phone contact number.

Table 13-1: Project Personnel by Title, Name, and Telephone Number

Title	Name	Phone No.
Program Advisor	Mark Woods	(916) 765-3187
Project Manager	Kenneth Young	(510) 385-5767
Design Office Chief	James Hsiao	(510) 715-8263
Design Senior	Gordon Jeong	(510) 407-2637
Project Engineer (Design)	Hoa-Anh Le	(510) 807-1779
Senior Bridge Engineer (OSM&I)	Hongyuan Su	(916) 639-5817
Project Engineer (OSM&I)	Karl Cruz	(916) 639-5600
Project Liaison Engineer (DES)	Li Zhou Barnard	(916) 639-5856
Supervising Bridge Engineer (DES-Structure Construction)	Thomas Grey	(510) 393-1828
Senior Bridge Engineer (DES-Structure Construction)	Mehran Ardakanian	(415) 720-4005
Senior Transportation Engineer (DES-Geotechnical)	Sungro Cho	(805) 217-5766
Senior Biologist	Gregory Pera	(415) 535-1372
Environmental Planner	Nina Hofmarcher	(510) 926-0702
Environmental Senior Planner	Zachary Gifford	(510) 506-1264
Hazardous Waste Branch Chief	Chris Wilson	(510) 719-7440
Right of Way Senior Agent	Shella Orson	(510) 908-9183
Traffic Management Manager	Raoul Maltez	(510) 314-5333
Traffic Management Senior	Rod Oto	(510) 715-8667
Water Quality Branch Chief	Brian Rowley	(510) 496-9313

14. ATTACHMENTS (Number of Pages)

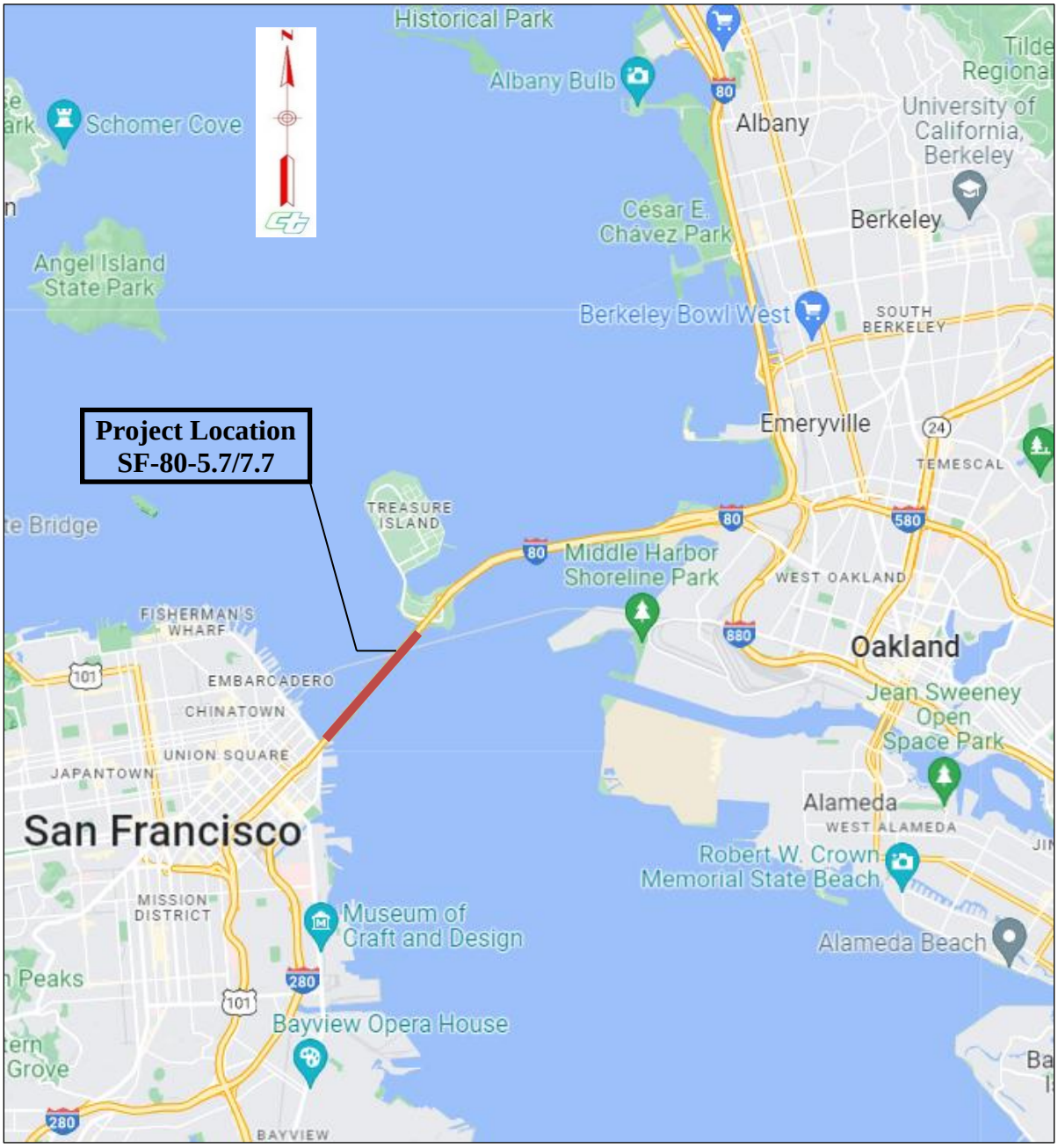
A. Location Map and Conceptual Plans (3)
B. Project Cost Estimate (10)
C. Structure Project Statements and Bridge Maintenance Strategy Fact Sheet (17)
D. BATA Resolutions 122, 144, 169 and MTC-BATA Historic Toll-Paid Vehicle Counts and Toll Revenue (5)
E. Right of Way Data Sheet (7)
F. Environmental Documents: Categorical Exemption/Categorical Exclusion and Re-validation (7)
G. Stormwater Data Report (10)
H. Transportation Management Plan Data Sheet (6)
I. Risk Register (2)
J. Value Analysis Study (90)
K. Programmatic Permit Approvals (1)

ATTACHMENT A

PROJECT LOCATION AND

CONCEPTUAL PLANS

Location Map
SFOBB, West Span



In the City and County of San Francisco

on route 80 at the San Francisco-Oakland Bay Bridge, West Span

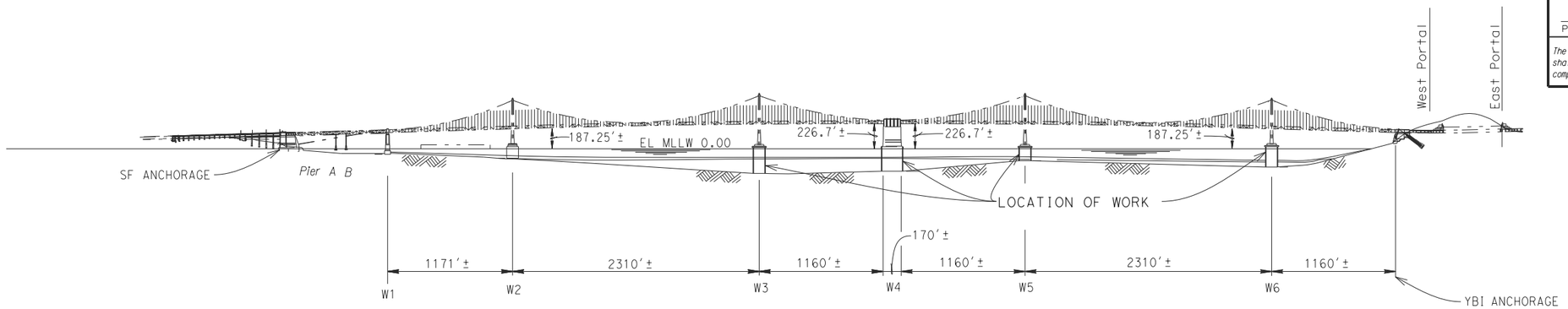
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER _____ DATE _____

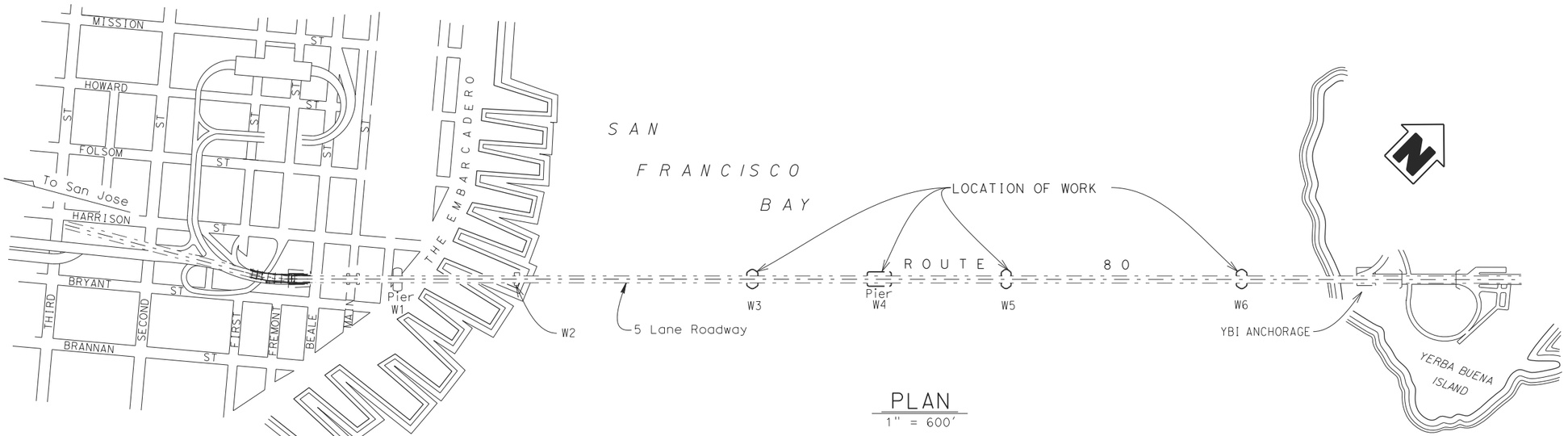
PLANS APPROVAL DATE _____

REGISTERED PROFESSIONAL ENGINEER — No. _____ Exp. _____ CIVIL — STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



ELEVATION
1" = 600'



PLAN
1" = 600'

NOTE:
THE CONTRACTOR MUST VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN	BY K. CRUZ	CHECKED H. SU	LOAD FACTOR DESIGN				
DETAILS	BY B. BALLESTEROS	CHECKED H. SU	LAYOUT	BY B. BALLESTEROS	CHECKED K. CRUZ		
QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED		

DESIGN ENGINEER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF MAINTENANCE
STRUCTURE MAINTENANCE AND INVESTIGATIONS

BRIDGE NO. 34-0003
POST MILE 6.35L

PROJECT STATEMENT CONCEPTUAL DRAFT

SAN FRANCISCO-OAKLAND BRIDGE WEST SPAN

GENERAL PLAN

STRUCTURES MAINTENANCE GENERAL PLAN SHEET (ENGLISH) (REV. 09-01-10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3486
PROJECT NUMBER & PHASE: 04200001801 CONTRACT NO.: 04-0W1404

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES

SHEET 1 OF 2

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER — No. Exp. — STATE OF CALIFORNIA

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

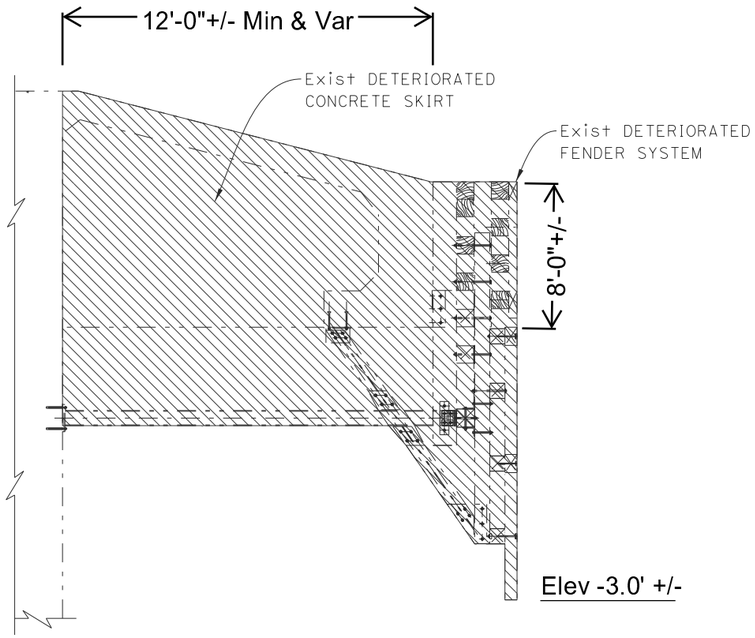
LEGEND:

- - - - Indicates existing structure

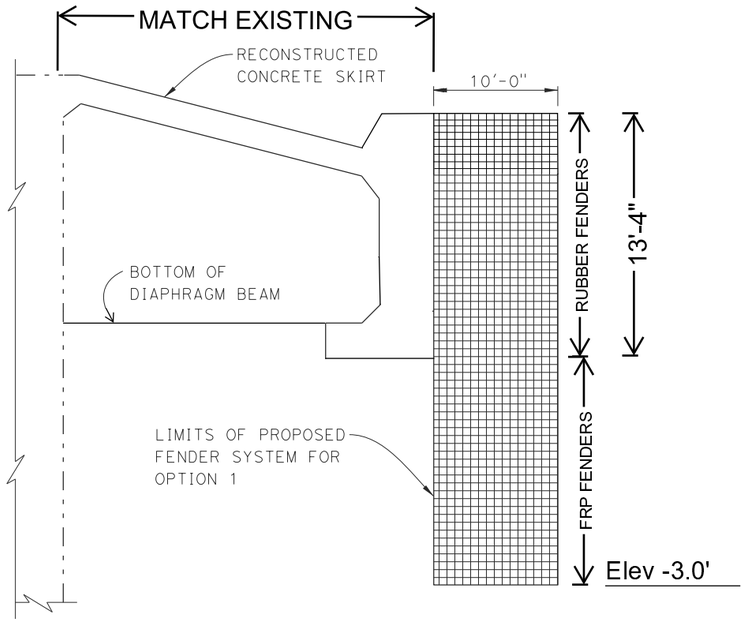
——— Indicates new structure

Indicates limits of existing fender system

Indicates limits of new fender system.



EXISTING



RECONSTRUCTION

NOTE:
THE CONTRACTOR MUST VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN	BY K. CRUZ	CHECKED H. SU	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF MAINTENANCE STRUCTURE MAINTENANCE AND INVESTIGATIONS	BRIDGE NO. 34-0003
DETAILS	BY B. BALLESTEROS	CHECKED H. SU			POST MILE 6.35L
QUANTITIES	BY	CHECKED			

PROJECT STATEMENT CONCEPTUAL DRAFT

SAN FRANCISCO-OAKLAND BRIDGE WEST SPAN

FENDER SECTIONS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3486
PROJECT NUMBER & PHASE: 04200001801 CONTRACT NUMBER: 04-0W1404

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES						SHEET	OF
						2	2

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

FILE => $REQUEST

ATTACHMENT B

PROJECT COST ESTIMATE

PROJECT COST ESTIMATE©

EA: 04-0W140 PID: 0420000180

EA: 04-0W140

PID: 0420000180

District-County-Route: 04-SF-80

PM: 5.7/7.7

Type of Estimate : Project Report

Program Code : 20.XX.203.857

Project Limits : In the City and County of San Francisco at Various Locations from San Francisco Anchorage to Yerba Buena Anchorage.

Project Description: San Francisco-Oakland Bay Bridge - West Bay - Fender Replacement

Scope : The project includes the complete removal of the existing wooden and plastic fenders, partial removal of the existing reinforce concrete skirt, and the construction of a replacement fender system with a modified reinforced concrete skirt at Piers W3 through W6

Alternative : Alternative 1 (Preferred Alternative)

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost	Escalated Cost
TOTAL ROADWAY COST	$ 15,519,800	$ 17,158,612
TOTAL STRUCTURES COST	$ 102,280,000	$ 113,080,245
SUBTOTAL CONSTRUCTION COST	$ 117,799,800	$ 130,238,857
TOTAL RIGHT OF WAY COST	$ 200,000	$ 200,000
TOTAL CAPITAL OUTLAY COSTS	$ 118,000,000	$ 130,439,000
PA/ED SUPPORT	$ 2,000,000	$ 2,000,000
PS&E SUPPORT	$ 3,984,000	$ 3,984,000
RIGHT OF WAY SUPPORT	$ 16,000	$ 16,000
CONSTRUCTION SUPPORT	$ 8,000,000	$ 8,000,000
TOTAL SUPPORT COST	$ 14,000,000	$ 14,000,000
TOTAL PROJECT COST	$ 132,000,000	$ 145,000,000 *

Programmed Amount $135,000,000

BATA Res. No 144

	Month	/	Year
Date of Estimate (Month/Year)	3	/	2024
Estimated Construction Start (Month/Year)	11	/	2025
Number of Working Days =	300		
Estimated Mid-Point of Construction (Month/Year)	6	/	2026
Estimated Construction End (Month/Year)	1	/	2027
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	9/1/1995
PA/ED Approval	3/29/2024
PS&E	1/30/2025
RTL	3/24/2025
Begin Construction	11/3/2025

Reviewed by District O.E. or Cost Estimate Certifier

Thanh Luu / Cost Estimate Certifier — 03/26/2024 (Date) — (510) 421-6993 (Phone)

Approved by Project Manager

Kenneth Young / Project Manager — 3/27/2024 (Date) — (510) 385-5767 (Phone)

I. ROADWAY ITEMS SUMMARY

	Section		Cost
1	**Earthwork**	$	-
2	**Pavement Structural Section**	$	-
3	**Drainage**	$	-
4	**Specialty Items**	$	132,000
5	**Environmental**	$	2,020,500
6	**Traffic Items**	$	2,101,000
7	**Detours**	$	-
8	**Minor Items**	$	340,300
9	**Roadway Mobilization**	$	459,400
10	**Supplemental Work**	$	244,900
11	**State Furnished**	$	583,800
12	**Time-Related Overhead**	$	7,613,500
13	**Total Roadway Contingency**	$	2,024,400
	TOTAL ROADWAY ITEMS	**$**	**15,519,800**

Estimate Prepared By : Hoa-Anh Le — 03/25/2024 — 510-807-1779

Hoa-Anh Le, Project Engineer — Date — Phone

Estimate Reviewed By : Gordon Jeong — 03/25/2024 — 510-407-2637

Gordon Jeong, Branch Chief — Date — Phone

By signing this estimate you are attesting that you have discussed your project with all functional units and have incorporated all their comments or have discussed with them why they will not be incorporated.

SECTION 1: EARTHWORK

Item code		Unit	Quantity		Unit Price ($)		Cost
190101	Roadway Excavation	CY		x	=	$	-
19010X	Roadway Excavation (Insert Type) ADL	CY		x	=	$	-
19801X	Imported Borrow	CY/TON		x	=	$	-
194001	Ditch Excavation	CY		x	=	$	-
192037	Structure Excavation (Retaining Wall)	CY		x	=	$	-
193013	Structure Backfill (Retaining Wall)	CY		x	=	$	-
193031	Pervious Backfill Material (Retaining Wall)	CY		x	=	$	-
17010X	Clearing & Grubbing	LS/ACRE		x	=	$	-
100100	Develop Water Supply	LS		x	=	$	-
19801X	Imported Borrow	CY/TON		x	=	$	-
21012X	Duff	ACRE/SQFT		x	=	$	-
XXXXXX	Some Item	Unit		x	=	$	-

TOTAL EARTHWORK SECTION ITEMS $ -

SECTION 2: PAVEMENT STRUCTURAL SECTION

Item code		Unit	Quantity		Unit Price ($)		Cost
401050	Jointed Plain Concrete Pavement	CY		x	=	$	-
400050	Continuously Reinforced Concrete Pavement	CY		x	=	$	-
390132	Hot Mix Asphalt (Type A)	TON		x	=	$	-
26020X	Class 2 Aggregate Base	TON/CY		x	=	$	-
250401	Class 4 Aggregate Subbase	CY		x	=	$	-
414240	Isolation Joint Seal (Asphalt Rubber)	LF		x	=	$	-
414241	Isolation Joint Seal (Silicone)	LF		x	=	$	-
280010	Rapid Strength Concrete Base	CY		x	=	$	-
410096	Drill and Bond (Dowel Bar)	EA		x	=	$	-
390137	Rubberized Hot Mix Asphalt (Gap Graded)	TON		x	=	$	-
391006	Asphalt Binder (Geosynthetic Pavement Interlayer)	TON		x	=	$	-
290201	Asphalt Treated Permeable Base	CY		x	=	$	-
374002	Asphaltic Emulsion (Fog Seal Coat)	TON		x	=	$	-
397005	Tack Coat	TON		x	=	$	-
377501	Slurry Seal	TON		x	=	$	-
374493	Polymer Asphaltic Emulsion (Seal Coat)	TON		x	=	$	-
370001	Sand Cover (Seal)	TON		x	=	$	-
731530	Minor Concrete (Textured Paving)	CY		x	=	$	-
731502	Minor Concrete (Miscellaneous Construction)	CY		x	=	$	-
39407X	Place Hot Mix Asphalt Dike (Insert Type)	LF		x	=	$	-
398100	Remove Asphalt Concrete Dike	LF		x	=	$	-
420201	Grind Existing Concrete Pavement	SQYD		x	=	$	-
398300	Remove Base and Surfacing	CY		x	=	$	-
390095	Replace Asphalt Concrete Surfacing	CY		x	=	$	-
41800X	Remove Concrete Pavement	SQYD/CY		x	=	$	-
394090	Place Hot Mix Asphalt (Miscellaneous Area)	SQYD		x	=	$	-
398200	Cold Plane Asphalt Concrete Pavement	SQYD		x	=	$	-
846046	6" Rumble Strip (Asphalt Concrete Pavement)	STA		x	=	$	-
846049	6" Rumble Strip (Concrete Pavement)	STA		x	=	$	-
846051	12" Rumble Strip (Asphalt Concrete Pavement)	STA		x	=	$	-
846052	12" Rumble Strip (Concrete Pavement)	STA		x	=	$	-
420102	Groove Existing Concrete Pavement	SQYD		x	=	$	-
394095	Roadside Paving (Miscellaneous Areas)	SQYD		x	=	$	-
390136	Minor Hot Mix Asphalt	TON		x	=	$	-
XXXXXX	Some Item	Unit		x	=	$	-

TOTAL PAVEMENT STRUCTURAL SECTION ITEMS $ -

SECTION 3: DRAINAGE

Item code		Unit	Quantity		Unit Price ($)			Cost
71013X	Remove Culvert	EA/LF		x		=	$	-
710240	Modify Inlet	EA		x		=	$	-
710370	Sand Backfill	CY		x		=	$	-
71010X	Abandon Culvert	EA/LF		x		=	$	-
710196	Adjust Inlet	LF		x		=	$	-
710262	Cap Inlet	EA		x		=	$	-
510501	Minor Concrete	CY		x		=	$	-
510502	Minor Concrete (Minor Structure)	CY		x		=	$	-
731627	Minor Concrete (Curb, Sidewalk, and Curb Ramp)	CY		x		=	$	-
6101XX	XX" Alternative Pipe Culvert (Insert Type)	LF		x		=	$	-
6411XX	XX" Plastic Pipe	LF		x		=	$	-
65XXXX	XX" Reinforced Concrete Pipe (Insert Type)	LF		x		=	$	-
6811XX	XX" Plastic Pipe (Edge Drain)	LF		x		=	$	-
6901XX	XX" Corrugated Steel Pipe Downdrain (0.XXX" Thic	LF		x		=	$	-
7006XX	XX" Corrugated Steel Pipe Inlet (0.XXX" Thick)	LF		x		=	$	-
7032XX	XX" Corrugated Steel Pipe Riser (0.XXX" Thick)	LF		x		=	$	-
7050XX	XX" Steel Flared End Section	EA		x		=	$	-
703233	Grated Line Drain	LF		x		=	$	-
72XXXX	Rock Slope Protection (Type and Method)	CY/TON		x		=	$	-
72901X	Rock Slope Protection Fabric (Insert Class)	SQYD		x		=	$	-
721420	Concrete (Ditch Lining)	CY		x		=	$	-
721430	Concrete (Channel Lining)	CY		x		=	$	-
750001	Miscellaneous Iron and Steel	LB		x		=	$	-
XXXXXX	Additional Drainage	LS		x		=	$	-

TOTAL DRAINAGE ITEMS $ -

SECTION 4: SPECIALTY ITEMS

Item code		Unit	Quantity		Unit Price ($)			Cost	
520103	Bar Reinforced Steel (Retaining Wall)	LB		x		=	$	-	PRSM quantity input for Look Ahead report.
5100XX	Structural Concrete	CY		x		=	$	-	PRSM quantity input for Look Ahead report.
510060	Structural Concrete, Retaining Wall	CY		x		=	$	-	PRSM quantity input for Look Ahead report.
5201XX	Bar Reinforcing Steel	LB		x		=	$	-	PRSM quantity input for Look Ahead report.
080050	Progress Schedule (Critical Path Method)	LS		x		=	$	-	
582001	Sound Wall (Masonry Block)	SQFT		x		=	$	-	
510530	Minor Concrete (Wall)	CY		x		=	$	-	
60005X	Remove Sound Wall	LF/LS/SQFT		x		=	$	-	
070030	Lead Compliance Plan	LS	1	x	6,000.00	=	$	6,000	
080050	Progress Schedule (Critical Path Method)	LS	1	x	50,000.00	=	$	50,000	
090205	Dispute Resolution Board Onsite Mtg.	EA	10	x	6,000.00	=	$	60,000	
090210	Hourly Offsite Dispute Resolution Board-Related Ta	HR	80	x	200.00	=	$	16,000	
710167	Remove Flared End Section	EA		x		=	$	-	
8000XX	Chain Link Fence (Insert Type)	LF		x		=	$	-	
80XXXX	XX" Chain Link Gate (Type CL-X)	EA		x		=	$	-	
8320XX	Midwest Guardrail System (Insert Type)	LF		x		=	$	-	
839301	Single Thrie Beam Barrier	LF		x		=	$	-	
839310	Double Thrie Beam Barrier	LF		x		=	$	-	
839521	Cable Railing	LF		x		=	$	-	
839566	Terminal System (Type CAT)	EA		x		=	$	-	
839584	Alternative In-line Terminal System	EA		x		=	$	-	
839585	Alternative Flared Terminal System	EA		x		=	$	-	
4906XX	XX" Cast-In-Drilled-Hole Concrete Piling	LF		x		=	$	-	
8396XX	Crash Cushion (Insert Type)	EA		x		=	$	-	
8331XX	Concrete Barrier (Insert Type)	LF		x		=	$	-	
475010	Retaining Wall (Masonry Wall)	SQFT		x		=	$	-	
511035	Architectural Treatment	SQFT		x		=	$	-	
780460	Anti-Graffiti Coating	SQFT		x		=	$	-	
780450	Rock Stain	SQFT		x		=	$	-	
4730XX	Reinforced Concrete Crib Wall (Insert Type)	SQFT		x		=	$	-	
83954X	Transition Railing (Insert Type)	EA		x		=	$	-	
780440	Prepare and Stain Concrete	SQFT		x		=	$	-	
839561	Rail Tensioning Assembly	EA		x		=	$	-	
83958X	End Anchor Assembly (Insert Type)	EA							

TOTAL SPECIALTY ITEMS $ 132,000

Effective immediately, districts must input estimated item quantities in blue text above in the PRSM database for the pay items listed in the Design Memo, dated April 9, 2018, when Project Report is approved (Milestone 200). Link to Desgin Memo.

SECTION 5: ENVIRONMENTAL

5A - ENVIRONMENTAL MITIGATION

Item code		Unit	Quantity		Unit Price ($)			Cost
148002A	Biological Mitigation (on-site)	LS	1	x	1,000,000.00	=	$	1,000,000
148001A	Coal Tar Removal	Ls	1	x	234,000.00	=	$	234,000
148005	Noise Monitoring	LS		x		=	$	-

Subtotal Environmental Mitigation $ *1,234,000*

5B - LANDSCAPE AND IRRIGATION

Item code		Unit	Quantity		Unit Price ($)			Cost
20XXXX	Highway Planting	LS		x		=	$	-
20XXXX	Irrigation System	LS		x		=	$	-
204099	Plant Establishment Work	LS		x		=	$	-
20XXXX	Follow-up Landscape Project	LS		x		=	$	-
206405	Remove Irrigation Facility	LS		x		=	$	-
204096	Maintain Existing Planted Areas	LS		x		=	$	-
206400	Check and Test Existing Irrigation Facilities	LS		x		=	$	-
21011X	Imported Topsoil	CY/TON		x		=	$	-
200114	Rock Blanket	SQFT/SQYD		x		=	$	-
200122	Weed Germination	SQYD		x		=	$	-
995100	Water Meter Charges	LS		x		=	$	-
2087XX	XX" Conduit (Use for Irrigation x-overs)	LF		x		=	$	-
20890X	Extend X" Conduit (Use for Extension of Irrigation	LF		x		=	$	-

Subtotal Landscape and Irrigation $ -

5C - EROSION CONTROL

Item code		Unit	Quantity		Unit Price ($)			Cost
211111	Permanent Erosion Control Establishment Work	LS		x		=	$	-
210010	Move-In/Move-Out (Erosion Control)	EA		x		=	$	-
210350	Fiber Rolls	LF		x		=	$	-
210360	Compost Sock	LF		x		=	$	-
2102XX	Rolled Erosion Control Product (Insert Type)	SQFT		x		=	$	-
21025X	Bonded Fiber Matrix	SQFT/ACRE		x		=	$	-
210300	Hydromulch	SQFT		x		=	$	-
210420	Straw	SQFT		x		=	$	-
210430	Hydroseed	SQFT		x		=	$	-
210610	Compost	CY		x		=	$	-
210630	Incorporate Materials	SQFT						

Subtotal Erosion Control $ -

5D - NPDES

Item code		Unit	Quantity		Unit Price ($)			Cost
130300	Prepare SWPPP	LS		x		=	$	-
130200	Prepare WPCP	LS		x		=	$	-
130100	Job Site Management	LS		x		=	$	-
130330	Storm Water Annual Report	EA		x		=	$	-
131104	Water Quality Monitoring	LS	1	x	786,500.00	=	$	786,500
131105	Storm Water Sampling and Analysis Day	EA		x		=	$	-
130520	Temporary Hydraulic Mulch	SQYD		x		=	$	-
130550	Temporary Hydroseed	SQYD		x		=	$	-
130505	Move-In/Move-Out (Temporary Erosion Control)	EA		x		=	$	-
130640	Temporary Fiber Roll	LF		x		=	$	-
130900	Temporary Concrete Washout	LS		x		=	$	-
130710	Temporary Construction Entrance	EA		x		=	$	-
130610	Temporary Check Dam	LF		x		=	$	-
130620	Temporary Drainage Inlet Protection	EA		x		=	$	-
130730	Street Sweeping	LS		x		=	$	-

Subtotal NPDES $ *786,500*

TOTAL ENVIRONMENTAL $ 2,020,500

Supplemental Work for NPDES

066595	Water Pollution Control Maintenance Sharing*	LS		x		=	$	-
066596	Additional Water Pollution Control**	LS		x		=	$	-
066597	Storm Water Sampling and Analysis***	LS		x		=	$	-
XXXXXX	Some Item	LS		x		=	$	-

Subtotal Supplemental Work for NDPS $ -

*Applies to all SWPPPs and those WPCPs with sediment control or soil stabilization BMPs.

**Applies to both SWPPPs and WPCP projects.

*** Applies only to project with SWPPPs.

SECTION 6: TRAFFIC ITEMS

6A - Traffic Electrical

Item code		Unit	Quantity		Unit Price ($)			Cost
870200	Lighting System	LS		x		=	$	-
870300	Sign Illumination System	LS		x		=	$	-
870400	Signal and Lighting System	LS		x		=	$	-
870510	Ramp Metering System	LS		x		=	$	-
87181X	Interconnection Conduit and Cable	LF/LS		x		=	$	-
5602XX	Furnish Sign Structure (Insert Type)	LB		x		=	$	-
5602XX	Install Sign Structure (Insert Type)	LB		x		=	$	-
4980XX	XX" CIDHC Pile (Sign Foundation)	LF		x		=	$	-
87011X	Inductive Loop Detector	EA/LS		x		=	$	-
870600	Traffic Monitoring Station System	LS		x		=	$	-
56804X	Remove Sign Structure	EA/LS		x		=	$	-
568054	Reconstruct Sign Structure	EA		x		=	$	-
568060	Modify Sign Structure	EA		x		=	$	-
870009	Elements During Construction	LS	1	x	2,100,000.00	=	$	2,100,000
872140	Removing Existing Electrical System	LS		x		=	$	-
XXXXX	Some Item	Unit		x		=	$	-

Subtotal Traffic Electrical $ *2,100,000*

6B - Traffic Signing and Striping

Item code		Unit	Quantity		Unit Price ($)			Cost
820840	Roadside Sign - One Post	EA		x		=	$	-
820850	Roadside Sign - Two Post	EA		x		=	$	-
5602XX	Furnish Sign Structure (Insert Type)	SQFT		x		=	$	-
820890	Install Sign Panel on Existing Frame	SQFT		x		=	$	-
846020	Remove Painted Traffic Stripe	LF		x		=	$	-
141102	Remove Yellow Painted Traffic Stripe (Hazardous \	LF		x		=	$	-
846025	Remove Painted Pavement Marking	SQFT		x		=	$	-
820250	Remove Roadside Sign	EA		x		=	$	-
820530	Reset Roadside Sign	EA		x		=	$	-
820610	Relocate Roadside Sign	EA		x		=	$	-
8101XX	Delineator (Insert Class)	EA		x		=	$	-
840502	Thermoplastic Traffic Stripe (Enhanced Wet Night \	LF		x		=	$	-
846012	Thermoplastic Crosswalk and Pavement Marking (Enhanced Wet Night Visibility)	SQFT		x		=	$	-
120090	Construction Area Signs	LS	1	x	1,000.00	=	$	1,000
84XXXX	Permanent Pavement Delineation	LS		x		=	$	-

Subtotal Traffic Signing and Striping $ *1,000*

6C - Traffic Management Plan

Item code		Unit	Quantity		Unit Price ($)			Cost
12865X	Portable Changeable Message Sign	EA/LS		x		=	$	-

Subtotal Traffic Management Plan $ -

6C - Stage Construction and Traffic Handling

Item code		Unit	Quantity		Unit Price ($)			Cost
120198	Plastic Traffic Drums	EA		x		=	$	-
12016X	Channelizer (Insert Type)	EA		x		=	$	-
120116	Type II Barricade	EA		x		=	$	-
120120	Type III Barricade	EA		x		=	$	-
129100	Temporary Crash Cushion Module	EA		x		=	$	-
120100	Traffic Control System	LS		x		=	$	-
129110	Temporary Crash Cushion	EA		x		=	$	-
129000	Temporary Railing (Type K)	LF		x		=	$	-
120149	Temporary Pavement Marking (Paint)	SQFT		x		=	$	-
120152	Temporary Pavement Marking (Tape)	SQFT		x		=	$	-
8101XX	Delineator (Insert Class)	EA		x		=	$	-

Subtotal Stage Construction and Traffic Handling $ -

TOTAL TRAFFIC ITEMS **$ 2,101,000**

SECTION 7: DETOURS

Includes constructing, maintaining, and removal

Item code		Unit	Quantity		Unit Price ($)		Cost
190101	Roadway Excavation	CY		x		= $	-
19801X	Imported Borrow	CY/TON		x		= $	-
390132	Hot Mix Asphalt (Type A)	TON		x		= $	-
26020X	Class 2 Aggregate Base	CY/TON		x		= $	-
250401	Class 4 Aggregate Subbase	CY		x		= $	-
130620	Temporary Drainage Inlet Protection	EA		x		= $	-
129000	Temporary Railing (Type K)	LF		x		= $	-
128601	Temporary Signal System	LS		x		= $	-
120149	Temporary Pavement Marking (Paint)	SQFT		x		= $	-
80010X	Temporary Fence (Insert Type)	LF		x		= $	-
XXXXXX	Some Item	LS		x		= $	-

TOTAL DETOURS **$ -**

SUBTOTAL SECTIONS 1 through 7 $ 4,253,500

SECTION 8: MINOR ITEMS

8A - Americans with Disabilities Act Items

ADA Items 0.0% $ -

8B - Bike Path Items

Bike Path Items 0.0% $ -

8C - Other Minor Items

Other Minor Items 8.0% $ 340,280

Total of Section 1-7 $ 4,253,500 x 8.0% = $ 340,280

TOTAL MINOR ITEMS **$ 340,300**

SECTIONS 9: ROADWAY MOBILIZATION *

Item code							
999990	Total Section 1-8	$	4,593,800	x	10%	= $	459,380

TOTAL ROADWAY MOBILIZATION **$ 459,400**

SECTION 10: SUPPLEMENTAL WORK

Item code		Unit	Quantity		Unit Price ($)		Cost
066596	Additional Water Pollution Control	LS	1	x	1,100.00	= $	1,100
066094	Value Analysis	LS	1	x	10,000.00	= $	10,000
066070	Maintain Traffic	LS		x		= $	-
066919	Dispute Resolution Board	LS		x		= $	-
066921	Dispute Resolution Advisor	LS		x		= $	-
066015	Federal Trainee Program	LS		x		= $	-
066610	Partnering	LS	1	x	50,000.00	= $	50,000
066204	Remove Rock and Debris	LS		x		= $	-
066222	Locate Existing Crossover	LS		x		= $	-
XXXXXX	Some Item	Unit		x		= $	-

*Cost of **NPDES** Supplemental Work specified in Section 5D* = $ -

Total Section 1-8 $ 4,593,800 4% = $ 183,752

TOTAL SUPPLEMENTAL WORK **$ 244,900**

SECTION 11: STATE FURNISHED MATERIALS AND EXPENSES

Item code		Unit	Quantity		Unit Price ($)		Cost
066105	Resident Engineers Office	LS	1	x	400,000.00	=	$400,000
066063	Traffic Management Plan - Public Information	LS		x		=	$0
066901	Water Expenses	LS		x		=	$0
8609XX	Traffic Monitoring Station (X)	LS		x		=	$0
066841	Traffic Controller Assembly	LS		x		=	$0
066840	Traffic Signal Controller Assembly	LS		x		=	$0
066062	COZEEP Contract	LS		x		=	$0
066838	Reflective Numbers and Edge Sealer	LS		x		=	$0
066065	Tow Truck Service Patrol	LS		x		=	$0
066916	Annual Construction General Permit Fee	LS		x		=	$0
XXXXXX	Some Item	Unit		x		=	$0
	Total Section 1-8	$	4,593,800		4%	= $	183,752

TOTAL STATE FURNISHED	$583,800

SECTION 12: TIME-RELATED OVERHEAD

Total of Roadway and Structures Contract Items excluding Mobilization $84,593,800 (used to calculate total TRO)

Estimated Time-Related Overhead (TRO) Percentage (0% to 10%) = **9%**

Item code		Unit	Quantity		Unit Price ($)		Cost
090100	Time-Related Overhead	WD	300	X	$25,378	=	$7,613,500

TOTAL TIME-RELATED OVERHEAD	$7,613,500

SECTION 13: ROADWAY CONTINGENCY*

Risk Amount from Risk Register	(for Known Risks)			0%		
Additional or Residual Contingency	(for Unknown/Undefined Risks)			15%		$2,024,310
Total Section 1-12	$	13,495,400	x	**15%**	=	$2,024,310

TOTAL CONTINGENCY*	$2,024,400

II. STRUCTURE ITEMS

	Bridge 1		Bridge 2		
DATE OF ESTIMATE	03/08/24		00/00/00		00/00/00
Bridge Name	SFOBB-West Bay		xxxxxxxxxxxxxxxxxx		xxxxxxxxxxxxxxxxxx
Bridge Number	34-0003		57-XXX		57-XXX
Structure Type	Bridge		xxxxxxxxxxxxxxxxxx		xxxxxxxxxxxxxxxxxx
Width (Feet) [out to out]	0 LF		0 LF		0 LF
Total Bridge Length (Feet)	0 LF		0 LF		0 LF
Total Area (Square Feet)	0 SQFT		0 SQFT		0 SQFT
Structure Depth (Feet)	0 LF		0 LF		0 LF
Footing Type (pile or spread)	xxxxxxxxxxxxxxxxxx		xxxxxxxxxxxxxxxxxx		xxxxxxxxxxxxxxxxxx
Cost Per Square Foot	$0		$0		$0
COST OF EACH	**$80,000,000**		**$0**		**$0**

	Building 1		Building 2		
DATE OF ESTIMATE	00/00/00		00/00/00		00/00/00
Building Name	xxxxxxxxxxxxxxxxxx		xxxxxxxxxxxxxxxxxx		xxxxxxxxxxxxxxxxxx
Bridge Number	57-XXX		57-XXX		57-XXX
Structure Type	xxxxxxxxxxxxxxxxxx		xxxxxxxxxxxxxxxxxx		xxxxxxxxxxxxxxxxxx
Width (Feet) [out to out]	0 LF		0 LF		0 LF
Total Building Length (Feet)	0 LF		0 LF		0 LF
Total Area (Square Feet)	0 SQFT		0 SQFT		0 SQFT
Structure Depth (Feet)	0 LF		0 LF		0 LF
Footing Type (pile or spread)	xxxxxxxxxxxxxxxxxx		xxxxxxxxxxxxxxxxxx		xxxxxxxxxxxxxxxxxx
Cost Per Square Foot	$300		$0		$0
COST OF EACH	**$0**		**$0**		**$0**

TOTAL COST OF BRIDGES		**$80,000,000**
TOTAL COST OF BUILDINGS		**$0**
Time-Related Overhead	9%	**$7,200,000**
STRUCTURES MOBILIZATION	10%	**$8,000,000**
STRUCTURES CONTINGENCY*	15%	**$14,280,000**
TOTAL COST OF STRUCTURES		**$102,280,000**

Estimate Prepared By: Karl Cruz/Hongyuan Su—SM&I

03/28/2024
Date

EA: 04-0W140 PID: 0420000180

III. RIGHT OF WAY

Fill in all of the available information from the Right of Way Data Sheet.

				Current Value Future Use		*Escalated Value*
A)	A1)	Acquisition, including Excess Land, Fees, Damages, Goodwill	$	0	$	0
	A2)	Acquisition of Offsite Mitigation	$	0	$	0
	A3)	Railroad Acquisition	$	0	$	0
B)	B1)	Utility Relocation (State Share)	$	0	$	0
	B2)	Potholing (Design Phase)	$	0	$	0
C)		Utility - Advance Engineering Estimate (Encumber with State Only Funds)	$	0	$	0
D)		RAP and/or Last Resort Housing	$	0	$	0
E)		Clearance & Demolition	$	0	$	0
F)		Relocation Assistance (RAP and/or Last Resort Housing Costs)	$	0	$	0
G)		Title and Escrow	$	0	$	0
H)		Environmental Review	$	200,000	$	200,000
I)		Condemnation Settlements 0%	$	0	$	0
J)		Design Appreciation Factor 0%	$	0	$	0
K)		Utility Relocation (Construction Cost)	$	0	$	0

L)	**TOTAL RIGHT OF WAY ESTIMATE**	**$200,000**
M)	**TOTAL R/W ESTIMATE: Escalated**	**$200,000**
N)	**RIGHT OF WAY SUPPORT**	**$16,000**

Support Cost Estimate Prepared By	Shella Orson Project Coordinator[1]	510-908-9183 Phone
Utility Estimate Prepared By	Sam Heikel Utility Coordinator[2]	510-908-8505 Phone
R/W Acquisition Estimate Prepared By	Sean Molloy Right of Way Estimator[3]	510-908-2763 Phone

Note: Items G & H applied to items A + B

[1] When estimate has Support Costs only [2] When estimate has Utility Relocation [3] When R/W Acquisition is required

ATTACHMENT C

STRUCTURE PROJECT STATEMENTS AND BRIDGE MAINTENANCE STRATEGY FACT SHEET

Project Statement

Submitted by Office of Structure Maintenance and Investigations-
Toll Bridges

San Francisco – Oakland Bay Bridge (SFOBB) West Span
Bridge No. 34-0003
04-SF-80-6.35-MLP

Pier Fender Replacement
Desired Fiscal Year for Project: 2021-2022
Estimated Cost of Project: **$132,000,000**

Scope:

The project would involve the complete replacement of the wooden and plastic fender system that protects the piers from vessel collision and the complete reconstruction of the concrete skirt to which the fender system is attached at Piers W3 through W6. The replacement fender system must have sufficient energy absorption capabilities to reduce the impact energy transferred to the piers during a vessel allision to a level below the structural capacity, while reducing the impact energy absorbed by the vessels as much as practical to reduce the probability of vessel damage. Also, the replacement fender system must allow for easy repair and replacement, whether portions of it or the entire system, in the event of damage during an allision. Lastly, the replacement fender system must be resistant to corrosion since it will be within the marine splash zone.

Based on these design requirements, a fender system comprised of fiber reinforced plastic (FRP) members is proposed. Two FRP Fender alternatives have been evaluated for this project. The first alternative is comprised of FRP walers and posts that will be attached to the reconstructed concrete skirt. The second alternative is a floating fender system composed large FRP cells. The final fender system will be designed to have sufficient energy absorption through deflection, compression, and distortion. Both alternative fender systems allow for segmental replacement and repair in the event of localized damage during a vessel collision.. Lastly, the FRP members in both alternatives are resistant to corrosion.

History:

Background Information:

Bridge Inspection Reports identified the need to replace the deteriorated wooden and plastic fender system and repair the concrete skirt to which the fender system is attached at Piers W3 through W6. The upper and inner wooden fender system, which is part of the original fender system constructed in 1932, has shown signs of extensive decay. Such decay can be attributed to the age of the wooden fender system and to the fender system being exposed to the harsh marine environment. Due to the decay of the inner wooden fender system, the connection of the outer walers and the lower plastic fender system has had pullout failures causing several segments of the lower fender system to drop into the

bay. An emergency Director's Order was executed (EA 04- 3G4454) in 2016 to secure multiple locations with chains to prevent complete separation.

The concrete skirt supporting the fender system has also shown signs of significant section loss of the reinforcement rebar and spalling of the concrete. The bridge inspection report has assessed that the existing fender system is reaching the end of its service life and has recommended the complete replacement and reconstruction of the fender systems at Piers W3 through W6.

Why the Project Is Necessary:

A functional fender system is required under federal regulations and under the jurisdiction of the United States Coast Guard (USCG). The fender system is an integral part of the bridge since it provides protection for the piers against vessel allision. In a structure design perspective, the fender system is intended to dissipate sufficient energy during an allision so that the structural capacity of the pier is not exceeded. Considering the lifeline status of the SFOBB corridors and the massive vessel traffic that navigates across the San Francisco Bay, it is of critical importance that the fender system protecting the piers be reconstructed to an acceptable standard. This will ensure that the bridge piers are adequately protected against catastrophic damage, and the risk of vessel damage during an allision is reduced.

Related Work Already Done:

(1) In 2005, the lower fender system composed of existing wooden sheathing, walers, knee braces and tie rods was replaced with reinforced recycled plastic lumber and steel struts under Contract 04-049044. At several locations, the lower half of the inner wooden vertical posts were also replaced with steel square tubes. The upper fender system was kept as is.

(2) On November 11, 2007 the fender system at Pier W5 was struck by the vessel Costco Busan resulting in damage to the SW corner of the pier. Repairs were performed under emergency Director's Order (EA 04-4A804). During the allision, the hull of the vessel was punctured releasing over 50,000 gallons of heavy fuel oil into the bay. The resulting environmental disaster highlighted the need for a fender system not only there to protect the structure, but one that was "more forgiving" to the vessel.

(3) On January 7, 2013 the fender system at Pier W6 was struck by the vessel Overseas Reymar resulting in damage to the SE corner of the pier. Repairs were performed under emergency Director's Order (EA 04-3G4474).

(4) An emergency Director's Order was executed (EA 04-3G4454) in 2016 due to the decay of the inner wooden fender system that caused several segments of the lower fender system to drop into the bay. The Director's Order included repairs to

the missing sections and the installation of securing chains to minimize the risk of future sections separating.

(5) From 2017 to the present, Maintenance Crews have installed additional chains at multiple locations to prevent additional fender sections from breaking free. The process of securing the outer and lower fender system with chains is considered on going until the fender system is completely replaced.

Alternative Solutions:

(1) Option 1- FRP Waler and Post Fender System: This fender system is composed of reinforced plastic lumber walers and posts connected to a modified concrete skirt. This fender system is intended to dissipate energy through deflection and compression. Rubber elements will be incorporated into the system to increase the energy absorption capability. This system is very similar to the existing fender system, but with the timber and steel elements substituted by corrosion resistant FRP, and elements redesigned to optimize the energy absorption capability of the system.

(2) Option 2- FRP Segmental Cell Floating Fender System: This fender system is comprised of large FRP segmental cells that would surround the pier, each cell locked in place with dove tail slots that connect them to the next cell. The system of FRP cells will act together during an allision and dissipate energy through distortion and compression. The large amount of compression and distortion the cells can take results in better energy absorption capability when compared to the FRP post and waler system, thus providing better protection for the piers and vessels. Despite the potential of having a larger footprint compared to the waler and post system, this alternate fender system is still considered viable, and a cost estimate for this alternative was provided as part of this report.

(3) Another alternate fender system would be a Pile Fender System. This fender system is comprised of piles and large caisson dolphins that would be installed surrounding the existing pier system, and FRP walers will be used to bridge in between the piles and dolphins. This fender system is considered the most superior in terms of energy absorption, since the pile system can act completely independent of the existing pier, bringing any force transfer to the piers in an allision to a minimum. However, considering the significant cost associated with switching to this system, as well the extensive environmental disturbance it entails, this system is not considered feasible.

(4) Do nothing. This proposal is not feasible as Caltrans is obligated to maintain the bridge and maintain an appropriate level of safety and service for the traveling public. The current deteriorated fender system may not provide adequate protection for the piers supporting the bridge and may lead to pier damage and bridge collapse in the event of an allision. Completion of this project fulfills Caltrans' obligation.

Office of Structure Maintenance and Investigations - Toll Bridges
San Francisco – Oakland Bay Bridge (SFOBB) West Span
Bridge No. 34-0003 04-SF-80-6.35-MLP
Fender Replacement Project Statement

Details of the Proposed Work:

Option 1: FRP Waler and Post Fender System

I. Construct Platforms, protective covers and enclosures
   1.1 Protective covers and enclosures would be required to prevent any debris from falling into the bay.
   1.2 Provide access to barges that will serve as staging areas and transportation for construction materials.
II. Remove existing fender system
III. Reconstruct concrete skirt
   3.1 Drill and bond dowels as necessary to provide adequate connection between newly poured concrete and existing concrete
IV. Construct FRP Waler and Post Fender System

Option 2: FRP Segmental Cell Floating Fender System

I. Construct Platforms, protective covers and enclosures
   1.1 Protective covers and enclosures would be required to prevent any debris from falling into the bay.
   1.2 Provide access to barges that will serve as staging areas and transportation for construction materials.
II. Remove existing fender system
III. Remove and modify concrete skirt
   3.1 Drill and bond dowels as necessary to provide adequate connection between newly poured concrete and existing concrete
IV. Construct FRP Segmental Cell Floating Fender System

How the proposed work will solve the problem:

Completion of the proposed work will provide the necessary protection for the piers supporting the SFOBB West Span bridge from vessel allisions, preventing damage to the piers and reducing the probability of vessel damage.

Environmental Aspects:

The proposed work will utilize protective covers and enclosures to prevent any debris from entering the bay. Any work in the water will be performed within acceptable construction windows set forth by environmental permits. Specified work within proximity of protected wildlife species will be monitored per the requirements of environmental documents. Construction activities will be carried out following approved water pollution control plans.

Vessel Traffic Impacts:

The USCG requires mooring plans and notification to mariners whenever a restriction on the navigable water ways is imposed.

Preliminary Project Cost Estimate:

Option 1: FRP Waler and Post Fender System

Structure Cost Subtotal	$61,400,000
Supplemental Work (Environmental/Maritime Coordination) @ 10%	$ 6,100,000
Mobilization @ 10%	$ 6,800,000
Contingencies @ 25%	$18,600,000
Total Option 1:	**$92,900,000**
For Budget Purpose Say	**$93,000,000**
Preliminary Project Time Estimate (working days):	**300**

Option 2: FRP Segmental Cell Floating Fender System

Structure Cost Subtotal	$92,000,000
Supplemental Work (Environmental/Maritime Coordination)	$ 4,000,000
Mobilization @ 10%	$ 9,600,000
Contingencies @ 25%	$26,400,000
Total Option 2:	**$132,000,000**
For Budget Purpose Say	**$132,000,000**
Preliminary Project Time Estimate (working days):	**255**

Submitted by: Karl Cruz

Project Statement Update

Submitted by Office of Structure Maintenance and Investigations-
Toll Bridges

San Francisco – Oakland Bay Bridge (SFOBB) West Span
Bridge No. 34-0003
04-SF-80-6.35-MLP

Pier Fender Replacement
Desired Fiscal Year for Project: 2024-2025
Estimated Cost of Structure Item Works: **$80,000,000**

Scope:

The project entails complete removal of the existing wooden, plastic, and steel fender elements and partial removal of the existing RC skirt and reconstruction of the fender system by modifying the RC skirt and installing new fenders over the modified RC skirt, at Piers W3 through W6. The replacement fender system intends to achieve improved energy absorption capabilities to reduce the impact energy transferred to the piers, while also reducing the impact energy absorbed by the vessels to reduce the probability of vessel damage. Other scopes include improving the long-term durability and reducing maintenance, as well as easing repairs after damage from a vessel allision.

The evaluations on the three different options identified in the original project statement were completed and the bridge-mounted rubber/FRP fender systems have been selected for design. This alternative fender system allows for segmental replacement and repair in the event of localized damage during a vessel allision. The corrosion resistant quality of this system can provide better long-term durability and, therefore, less maintenance demand.

History:

Background Information:

Bridge Inspection Reports identified the need to replace the deteriorated wooden and plastic fender system and repair the concrete skirt to which the fender system is attached to at Piers W3 through W6. The upper and inner wooden fender system has shown signs of extensive decay. Such decay can be attributed to the age of the wooden fender system and to the fender system being exposed to the harsh marine environment. Due to the decay of the inner wooden fender system, the connection of the outer walers and the lower plastic fender system have had pullout failures causing several segments of the lower fender system to drop into the bay. An emergency Director's Order was executed (EA 04- 3G4454) in 2016 to secure multiple locations with chains to prevent complete separation.

The concrete skirt supporting the fender system has also shown signs of significant section loss of the bar reinforcing steel and spalling of the concrete. The bridge inspection report has assessed that the existing fender system is reaching the end of its

service life and has recommended the complete replacement and reconstruction of the fender systems at Piers W3 through W6.

Why the Project Is Necessary:

Fender system is an integral part of a bridge since it provides protection for the piers against vessel allision. A functional fender system is required under federal regulations and is under the jurisdiction of the United States Coast Guard (USCG). Caltrans has been doing what's necessary to maintain the functionality of the existing fender systems at SFOBB West Bay.

As the existing fender system at Piers W3 to W6 continue to deteriorate due to aging and other environmental conditions, maintaining its functionality has become more costly and less feasible. On the other hand, vessel traffic and vessel size have been dramatically increased since the construction of the bridge. Thus, a new fender system with greatly improved functionality is necessary to provide better structural protection to the bridge, which is part of the life-line corridor on I-80, as well as the thousands of vessels traveling in and out of the San Francisco Bay.

Related Work Already Done:

(1) In 2006, the lower fender system composed of existing wooden sheathing, walers, knee braces and tie rods was replaced with reinforced recycled plastic lumber and steel struts under Contract 04-049044. At several locations, the lower half of the inner wooden vertical posts were also replaced with steel square tubes. The upper fender system was kept as is.

(2) On November 11, 2007, the fender system at Pier W5 was struck by the vessel Cosco Busan resulting in damage to the SW corner of the pier. Repairs were performed under emergency Director's Order (EA 04-4A804). During the allision, the hull of the vessel was punctured releasing over 50,000 gallons of heavy fuel oil into the bay. The resulting environmental disaster highlighted the need for a fender system not only there to protect the structure, but one that was "more forgiving" to the vessel.

(3) On January 7, 2013, the fender system at Pier W6 was struck by the vessel Overseas Reymar resulting in damage to the SE corner of the pier. Repairs were performed under emergency Director's Order (EA 04-3G4474).

(4) An emergency Director's Order was executed (EA 04-3G4454) in 2016 due to the decay of the inner wooden fender system that caused several segments of the lower fender system to drop into the bay. The Director's Order included repairs to the missing sections and the installation of securing chains to minimize the risk of future sections separating.

(5) From 2017 to the present, Maintenance Crews have installed additional chains at multiple locations to prevent additional fender sections from breaking free. The process of securing the outer and lower fender system with chains is considered on going until the fender system is completely replaced. An emergency director's order (EA 04-4W0104) was completed in 2024 which secured fender segments and replaced fender segments that have fallen into the water.

Alternative Solutions:

(1) Option 1- Rubber and FRP Waler Fender System: This fender system is composed of fiber reinforced polymer (FRP) walers and posts connected to a modified concrete skirt. This fender system is intended to dissipate energy through deflection and compression of the elements. Rubber elements will be incorporated into the system to increase the energy absorption capability for allision from large vessels. This system is very similar to the existing fender system, but with the timber and steel elements substituted by corrosion resistant FRP, and elements redesigned to optimize the energy absorption capability of the system.

(2) Option 2- FRP Segmental Cell Floating Fender System: This fender system is comprised of large FRP segmental cells that would surround the pier, each cell locked in place with dove tail slots that connect them to the next cell. The system of FRP cells will act together during an allision and dissipate energy through distortion and compression. The large amount of compression and distortion the cells can take results in better energy absorption capability when compared to the FRP post and waler system, thus potentially providing desired protection for the piers and vessels. Despite the potential, the potential much larger footprint compared to the waler and post system and the uncertainty regarding long-term maintenance due to the complex nature of this type, this alternate fender system is no longer considered as a design option.

(3) Another alternate fender system would be a Pile Fender System. This fender system is comprised of piles and large caisson dolphins that would be installed surrounding the existing pier system, and FRP walers will be used to bridge in between the piles and dolphins. This fender system is considered the most superior in terms of energy absorption, since the pile system can act completely independent of the existing pier, bringing any force transfer to the piers in an allision to a minimum. However, considering the significant cost associated with switching to this system, as well the extensive environmental disturbance it entails, this system is not considered feasible.

(4) Do nothing. This proposal is not feasible as Caltrans is obligated to maintain the bridge and maintain an appropriate level of safety and service for the traveling public. The current deteriorated fender system may not provide adequate protection for the piers supporting the bridge and may lead to pier damage and bridge collapse in the event of an allision. Completion of this project fulfills Caltrans' obligation.

Details of the Proposed Work:

Option 1: Rubber and FRP Waler and Post Fender Systems

I. Construct Platforms, protective covers and enclosures
   - 1.1 Protective covers and enclosures would be required to prevent any debris from falling into the bay.
   - 1.2 Provide access to barges that will serve as staging areas and transportation for construction materials.

II. Remove existing fender system
   - 2.1 Remove and dispose all treated timber, plastic lumber and steel strutting and anchoring system that attached to the concrete skirt and pier shaft.
   - 2.2 Remove portion of the existing concrete skirt, including removing and disposing coal tar from surface of the concrete that is affected by removal.
   - 2.3 Relocate all existing electrical systems that are within the limits of concrete skirt removal.

III. Reconstruct concrete skirt
   - 3.1 Drill and bond dowels as necessary to provide adequate connection between newly poured concrete and existing concrete
   - 3.2 Place structural concrete to form new RC skirt.

IV. Construct new rubber and FRP Waler and Post Fender Systems on the RC skirt and the pier shaft.

How the proposed work will solve the problem:

Completion of the proposed work will provide improved protection for the piers supporting the SFOBB West Span bridge from vessel allisions and reduce the probability of vessel damage.

Environmental Aspects:

The proposed work will utilize protective covers and enclosures to prevent any debris from entering the bay. Any work in the water will be performed within acceptable construction windows set forth by environmental permits. Specified work within proximity of protected wildlife species will be monitored per the requirements of environmental documents. Construction activities will be carried out following approved water pollution control plans.

Vessel Traffic Impacts:

The USCG requires mooring plans and notification to mariners whenever a restriction on the navigable water ways is imposed.

Office of Structure Maintenance and Investigations - Toll Bridges
San Francisco – Oakland Bay Bridge (SFOBB) West Span
Bridge No. 34-0003 04-SF-80-6.35-MLP
Fender Replacement Project Statement Update

Preliminary Project Cost Estimate:

Option 1: Rubber and FRP Waler and Post Fender Systems

Structure Work Cost Subtotal (cost estimate, dated 3/8/24, file)	$79,508,000
**Supplemental Work (Environmental/Maritime Coordination)	$ n/a
**Mobilization	$ n/a
**Contingencies	$ n/a
Total Option 1 Structure Cost:	**$79,508,000**
For Budget Purpose Say	**$80,000,000**
Preliminary Project Time Estimate (working days):	**300**

** To be estimated by the district

Submitted by: Karl Cruz
Updated by: Hongyuan Su/Karl Cruz
Updated: 4/17/2024

Structure Maintenance & Investigations
BRIDGE MAINTENANCE STRATEGY FACT SHEET
Br. No. 34 0003 on Route 80 in San Francisco County
December 22, 2022

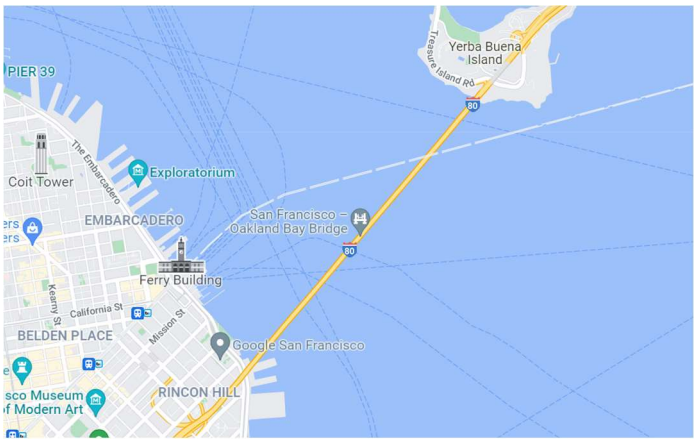
Project Location

04-SF-80-6.35L

The San Francisco-Oakland Bay Bridge (SFOBB) West Bay is located in San Francisco Bay, spanning between the Yerba Buena Island and the Embarcadero in San Francisco. The structure is composed of twin double deck suspension bridges placed end to end with a concrete center anchorage linking the two bridges, and supported on steel towers with concrete piers founded on caissons. The structure was built in 1936 and has had multiple retrofits and modifications throughout the years. The SFOBB West Bay carries Interstate 80 and is within the lifeline corridor in the Bay Area.

San Francisco Bay, directly under the SFOBB West Bay, is part of a very busy network of navigable waters. Approximately 140,000 vessels of different sizes and weights pass under the 6 navigable spans of the bridge every year, with span lengths ranging from 1100' to over 2200'. A fender system is constructed on each pier for bridge and vessel protection. The water under the SFOBB West Bay is deep, with water depths of approximately 100 feet to mudline. There are 8 recorded vessel allisions with the bridge piers that resulted in bridge fender damage since the bridge was opened. The most recent two occurred in 2007 when the Cosco Busan struck the southwest corner of Pier W5, and in 2013 when the Overseas Reymar struck the southeast corner of Pier W6. The fender system protected the bridge in both allisions with no damage to the piers and towers, and damaged portions of the fender system were replaced. However, the Cosco Busan allision punctured the hull of the vessel and released over 50,000 gallons of heavy fuel into the bay.

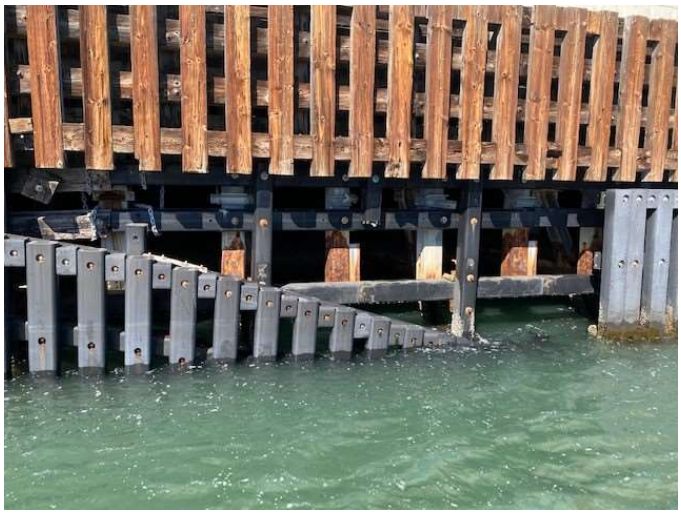
The area of focus for this Fact Sheet is the bridge fender system protecting the piers. The original construction of the fender system was composed of wooden walers and posts attached to the concrete skirt surrounding the main pier support. It has been performing per design and has remained mainly unchanged except for maintenance renovations though out the years. The latest major fender rehabilitation was in 2005 when the lower portion of the fender system was replaced with reinforced recycled plastic lumber walers and posts, and steel main vertical posts and struts. Since the 2005 rehabilitation, the fender system has been affected by the accelerated deterioration of the older timber elements and the original concrete skirt. As a result, two emergency fender repair projects were initiated between 2016 and 2021. Bridge inspection reports identified the need to replace the fender system. Project 04-0W140 was programed to develop a modern and more efficient fender system complying with the current AASHTO Vessel Collision Design of Highway Bridges Specification.



Location Map

Elevation View

Existing Fender System



Deteriorated Fender System

Event Description

A Structures Maintenance & Investigations (SM&I) Strategy Meeting convened on December 22, 2022 to discuss the design criteria for the fender replacement design at SFOBB West Bay. The AASHTO Vessel Collision Design of Highway Bridges Specification (2009) is proposed to be the main design criteria supplemented by the PIANC Guidelines for the Design of Fender Systems (2002). The AASHTO specifications will be used to determine the acceptable level of protection for the bridge against damage or collapse due to vessel allision. Since the provisions of AASHTO only minimally addresses the protection of vessels, the PIANC Guidelines will be consulted in determining the minimum protection of vessels.

The AASHTO specifications provide three methods of analysis in determining the appropriate level of protection for the bridge. AASHTO provides a general description of when each of the methods may appropriately be used. The purpose of this strategy meeting would be to evaluate each method, and to come up with a resolution of which method should ultimately be used.

Attendees were: Deputy Division Chief/State Bridge Maintenance Engineer – Erol C Kaslan, Office Chief Bridge Asset Management – Diana Campbell, Office Chief Structure Investigations North – Ryan Odell, Office Chief Structure Investigations South – Ching Chao, Office Chief Structure Design and Analysis – Michael J. Lee, Office Chief Structure Investigations - Bay Toll Bridges – Bill Shedd, Office Chief Specialty Investigations/NTIS Inspection Program Manager – Vassil Simeonov, Sr Bridge Engineer (Technical Specialist) – Timothy J. Powell, Sr Toll Bridge Design Branch Chief – Hongyuan Su, Sr Bridge Engineer Toll Bridge Branch Chief – Mark P. Woods, Sr Bridge Engineer Toll Bridge Branch Chief – Edward Thometz, Toll Bridge ABME – Robert Hugel, and Toll Bridge Design Engineer – Karl David Cruz

Background

The AASHTO specifications provide three methods of analysis for determining the appropriate level of protection for the bridge. Method II and its corresponding acceptance criteria shall be used for all bridge design unless the approval of the Owner and the special situations stated for the other methods exist.

Method I

Method I is a simple semi-deterministic procedure that requires the bridge pier or fender to be able to withstand a direct impact from the assumed largest vessel transiting under the bridge. The design vessel is selected such that the annual number of vessels larger than the design vessel is a maximum 50 or of 5% of the total number of vessels that pass the bridge, whichever is smaller. AASHTO states that Method I is less accurate than Method II and should only be used in simple and uncomplicated situations. Method I may be used in situations that include:

- Shallow draft waterways where the marine traffic consists almost exclusively of inland barges
- Waterways where there is not much variation in vessel size (DWT) (vessels using the waterway are almost all the same size)
- Waterways in which accurate vessel traffic data is unavailable or difficult to obtain.

AASHTO also enumerates situations in which Method I should not generally be used as follows:

- Critical/Essential Bridges
- Deep draft waterways where large merchant ships comprise a significant portion of the total vessel traffic
- Waterways where the distribution of vessel sizes (*DWT*) vary over a wide range of vessel types and sizes

Based on the criteria set by AASHTO, Method I is not an appropriate procedure to use for the SFOBB West Bay.

Method II

Method II is a probability-based risk analysis procedure for selecting the design vessel for collision impact. This method calculates annual frequency of bridge element collapse by calculating the probabilities of aberrant vessels colliding with the bridge piers and then compares the collision force demand with the capacity of the bridge pier to determine the probability of collapse for each bridge pier. The annual frequency of collapse is computed as follows:

$$AF = (N)(PA)(PG)(PC)(PF) \qquad (4.8.3\text{-}1)$$

where:

AF = annual frequency of bridge element collapse due to vessel collision;

N = annual number of vessels classified by type, size, and loading condition which can strike the bridge element;

PA = probability of vessel aberrancy;

PG = geometric probability of a collision between an aberrant vessel and a bridge pier or span;

PC = probability of bridge collapse due to a collision with an aberrant vessel; and

PF = adjustment factor to account for potential protection of the piers from vessel collision due to upstream or down stream land masses, or other structures, that block the vessel.

The annual frequency of collapse of the total bridge is obtained by summing the annual frequency of collapse of each pier within the waterway navigation zone, which for the SFOBB West Bay would be Piers W2, W3, W4, W5, and W6. The design vessel is selected so that the annual frequency of collapse for any vessel larger than the design vessel is less than the acceptance criteria of 0.0001 for essential bridges and 0.001 for typical bridges. The SFOBB West Bay is part of the lifeline corridor making it an essential bridge.

In order to calculate the annual frequency of collapse for each pier, a yearly comprehensive log of ships including each individual ship's DWT, length and width is required. A log of ships was obtained from the United States Coast Guard (USCG) for the month of November 2020. Due to the large number of ships that pass through the SF Bay, USCG's log of ships only cover 30 days until they are overwritten. USCG's log of ships also do not correlate the different ships tallied with pertinent information like DWT, length, and width. To obtain a more comprehensive log of ships, the website boatingsf.com was used to get a snapshot of vessel presence within the bay. The website shows all ships that are in close proximity to the SFOBB West Bay at a given time and provides information on each ship's DWT, length, and width. The website was used for several days across 3 months to get a better picture of the log of ships that pass under the SFOBB West Bay. Using the tally obtained from the website and assuming that the monthly log of ships obtained from the USCG is a good representative month to calculate the yearly tally, a comprehensive yearly log of ships was developed for use in determining the design vessel.

The probability of vessel aberrancy (PA in the equation above) is defined as the probability that a vessel will stray off course and threaten the bridge. The PA was calculated using the aberrancy base rate provided in AASHTO and tidal current velocity obtained from National Oceanic and Atmospheric Administration (NOAA).

The geometric probability (PG in the equation above) is defined as the conditional probability that a vessel will hit the bridge given that it has lost control. Normal distribution is utilized to model the aberrant vessel transit path near the bridge, with the mean representing the centerline of the vessel transit path which is the midspan of structure, the standard deviation being equal to the length of the vessel, and the x values representing the relative location of the ship/bridge impact zone boundaries. The PG is calculated as the area under the curve within the impact zone boundaries.

The probability of collapse (PC in the above equation) is calculated using the capacity to demand ratio of each pier under an allision loading. The capacity of the piers was calculated using the caisson cross section at each pier. The demand was calculated using the Extreme Event II load combination which simplifies to Dead Load+ 0.5*vehicular live load + vessel collision impact force. In calculating the vessel collision impact force, AASHTO stipulates that piers are to be designed for head-on collisions with the assumption that the original velocity will go to a complete stop after the allision. This provision is very conservative considering the geometry of the waterway under the SFOBB West Bay and considering the past allisions that were documented for the SFOBB West Bay. For instance, the Cosco Busan allision was a corner swipe at Pier W5 that reduced vessel speed from 11 knots to 7 knots. Based on these, the PC was calculated using the following design parameters for the vessel collision impact force:

- Head-on collision at an impact speed equal to 12 knots (vessel transit speed per USCG).
- Ships were assumed to collide with the side of the piers at an angle of 22 degrees, with a 4 knot reduction in velocity (Similar to the Cosco Busan allision)

The calculated annual frequency of collapse for the case similar to the Cosco Busan allision is 0. The calculated annual frequency of collapse assuming a head-on collision of the largest ship noted in the log of ships is 0.002. This annual frequency is way above the acceptable criteria set by AASHTO (0.0001 for essential bridges) and results in the largest ship of 160,000 DWT becoming the design vessel.

With such a large design vessel and considering the very deep waters under the SFOBB West Bay, designing to Method II would require multiple large diameter piles that will serve as dolphins with reinforced plastic lumber walers spanning in between the dolphins. Such a fender system was considered during the project development phase but was deemed not feasible due to the significant construction cost and environmental disruption. The total construction cost for such a system is estimated at $800 Million.

Method III

Method III is a cost effectiveness analysis procedure for selecting the design vessel for collision impact and determining the appropriate level of protection for the bridge. Method III may be used in cases where it is not economical or technically feasible to design the bridge structure under Method II. AASHTO cited situations in which Method III may be considered to include:

- Existing bridges which are evaluated for vulnerability to vessel collision and potential bridge protection retrofit measures
- Bridges crossing very wide waterways resulting in many piers exposed to vessel collision.

The SFOBB West Bay meets AASHTO's criteria for Method III summarized above.

Method III analysis methodology is a conventional benefit to cost ratio where the tangible costs associated with bridge collapse is compared with cost of adding an appropriate level of protection to the bridge under Method II. The comparison is intended to inform the designer and owner whether the costs of bridge protection outweighs the benefits. If the bridge protection scheme is not cost-effective, AASHTO does not mandate that the protection project be undertaken.

Tangible costs associated with bridge collapse, known as disruption cost, includes the cost to replace the bridge as well as the cost associated with motorist inconvenience and port interruption. The disruption cost is then multiplied by the annual frequency of collapse calculated under Method II to factor in the probability of collapse and factors intended to account for potential growth of disruption cost over time and to adjust the future cost of the benefits of the bridge to the present time. This will determine the present worth of bridge collapse that will be compared with the cost of the bridge protection scheme.

For the case of the SFOBB West Bay, the disruption cost is roughly estimated at $18 billion. The annual frequency of collapse calculated in Method II is 0.002. Assuming a remaining operational life of 25 years for the bridge, the present worth of bridge collapse is calculated to be $823 million. This is very close to the cost of designing to Method II which was estimated at 800 Million. Based on this result, the bridge protection cost using Method II is cost effective with an assumed operational life > 25 years and is not cost effective with an assumed operational life < 25 years. This demonstrates that the cost effectiveness of the bridge protection cost under Method II is highly dependent on assumed variables and is therefore somewhat subjective. It is important to note that such a high upfront cost for the bridge protection scheme under Method II (800 Million) is not feasible based on the current budgeting information from the Bay Area Transit Authority (BATA).

Alternatives Considered

1. Do nothing
2. Design per Method II: Replace fender system with multiple large diameter piles acting as dolphins with recycled plastic lumber walers spanning in between piles. This fender system will eliminate risk of collapse in a "design allision" but will be significantly more expensive ($800 M Construction Cost), will involve more impact to the environment and navigable waters, and will require a rigorous multi-agency review.
3. Design per Method III: Replace fender system in kind with modifications to improve vessel protection. This option will restore and improve the existing fender system and will be more economically feasible (100M Construction Cost), but the probability of collapse is not 0. Per AASHTO, Owner will need to approve use of Method III. A bridge mounted rubber fender system will have improved energy absorption capability compared to the current timber/FRP Fender System resulting in better protection for the bridge and better protection for the vessels in an allision. Rubber Fender System design can be optimized to minimize the amount of force that the allision transfers to the structure and maximize the energy absorption of the system.

Recommended Action

It was a unanimous decision to design per AASHTO Method III - Replace fender system in kind with modifications to improve vessel protection under contract 04-0W140.

ATTACHMENT D

BATA RESOLUTIONS 122, 144, AND 169

(Portions only)

MTC-BATA HISTORIC TOLL-PAID

VEHICLE COUNTS AND TOLL REVENUE

Line No.	Project No.	EA Program	Bridge CCA	Description Status		Thru 2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total
72	CTR 0213	01412	SFO	CT Oversight of Bridge Yard ***	Support	$276,198	$0										$276,198
		REHAB		(IERBYS Building Slab)	Capital	$0											$0
		6825			Total	$276,198	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$276,198
73	CTR 0214	01413	SFO	CT Oversight of Bridge Yard	Support	$423,802	$52,376										$476,178
		REHAB		(IERBYS Building Retrofit)***	Capital	$0											$0
		6825			Total	$423,802	$52,376	$0	$0	$0	$0	$0	$0	$0	$0	$0	$476,178
74	CTR 0215	2J190	SFO	Replace transverse expansion joints ***	Support	$1,309,010											$1,309,010
		REHAB		West Span	Capital	$1,944,698											$1,944,698
		6825			Total	$3,253,708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,253,708
75	CTR 0216	2J410	CARQ	Al Zampa (CARQ) Joint Repair ***	Support	$146,672											$146,672
		REHAB			Capital	$183,592											$183,592
		6813			Total	$330,265	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$330,265
76	CTR 0217	2J400	SFO	I-880 Overhead Signage and Delineation Upgrade	Support	$40,000	$6,649										$46,649
		REHAB		Oversight***	Capital	$0											$0
		6825			Total	$40,000	$6,649	$0	$0	$0	$0	$0	$0	$0	$0	$0	$46,649
77	CTR 0219	0K220	SFO	Metering Lights Upgrade Oversight	Support	$366,000		$134,000									$500,000
		REHAB			Capital	$0											$0
		6825			Total	$366,000	$0	$134,000	$0	$0	$0	$0	$0	$0	$0	$0	$500,000
78	CTR 0222	TBD	SFO	SFOBB Maintenance Administration	Support	$0											$0
		REHAB			Capital	$1,000,000											$1,000,000
		6825			Total	$1,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,000,000
79	CTR 0225	4J710	RSR	RSR Access - Bike Ped Oversight	Support	$637,000	$300,000										$937,000
		REHAB			Capital	$0											$0
		6814			Total	$637,000	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$937,000
80	CTR 0226	1K450	SFO	Roof Repairs at Sterling Substation	Support	$72,000											$72,000
		REHAB		Minor Rehab***	Capital	$120,000											$120,000
		8033			Total	$192,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$192,000
81	CTR 0227	1K470	SMH	Roof Repairs at toll admin building (Toll Plaza)	Support	$60,000	$0										$60,000
		REHAB		Minor Rehab***	Capital	$100,000											$100,000
		8033			Total	$160,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$160,000
82	CTR 0228	1K460	BM	Bird abatement at Benicia Toll Plaza	Support	$150,000											$150,000
		REHAB		Minor Rehab	Capital	$250,000											$250,000
		8033			Total	$400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$400,000
83	CTR 0229	0K691	SFO	Install Grease Caps and Repair Pre-stress Tendons	Support	$1,000,000											$1,000,000
		REHAB		East Span- Director's Order	Capital	$3,000,000											$3,000,000
		6825			Total	$4,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,000,000
84	CTR 0230	3G482	BM	Repair Seismic Joint - Pier 3	Support	$120,000											$120,000
		REHAB		Director's Order	Capital	$291,000											$291,000
		6812			Total	$411,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$411,000
85	CTR 0231	TBD	RSR	Replace Aircraft Beacon, Fog Horns, Radar Beacons and	Support	$0				$1,000,000	$500,000						$1,500,000
		REHAB		Related Electrical Systems and connect with SCADA	Capital	$0				$2,500,000	$1,500,000						$4,000,000
		6814			Total	$0	$0	$0	$0	$3,500,000	$2,000,000	$0	$0	$0	$0	$0	$5,500,000
86	CTR 0232	2K960	SFO	YBI Tunnel Concrete Repair	Support	$600,000											$600,000
		REHAB			Capital	$1,400,000											$1,400,000
		6825			Total	$2,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,000,000
87	CTR 0233	3G445	SFO	W4 Fender Repair	Support	$1,000,000											$1,000,000
		REHAB		Director's Order	Capital	$3,250,000											$3,250,000
		6825			Total	$4,250,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,250,000
88	CTR 0234	2K560	SFO	Repair SFOBB Seismic Dampers	Support	$100,000											$100,000
		REHAB		Director's Order	Capital	$291,000											$291,000
		6825			Total	$391,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$391,000
89	CTR 0236	TBD	CARQ	Replacement Study Old Bridge	Support	$0						$1,000,000					$1,000,000
		REHAB			Capital	$0											$0
		6813			Total	$0	$0	$0	$0	$0	$0	$1,000,000	$0	$0	$0	$0	$1,000,000
90	CTR 0237	TBD	RSR	Replacement Study Old Bridge	Support	$0			$1,000,000								$1,000,000
		REHAB			Capital	$0											$0
		6814			Total	$0	$0	$0	$1,000,000	$0	$0	$0	$0	$0	$0	$0	$1,000,000
91	CTR 0238	TBD	BM	Replace Fog Horns, Radar Beacons and	Support	$0								$300,000	$1,500,000		$1,800,000
		REHAB		Related Electrical Systems and connect with SCADA	Capital	$0									$3,500,000		$3,500,000
		6812			Total	$0	$0	$0	$0	$0	$0	$0	$0	$300,000	$5,000,000	$0	$5,300,000
92	CTR 0239	TBD	SFO	Replace Aircraft Beacon, Fog Horns, Radar Beacons	Support	$0					$300,000	$700,000				$300,000	$1,300,000
		REHAB		and Related Electrical Systems and connect with SCADA	Capital	$0						$3,600,000					$3,600,000
		6825			Total	$0	$0	$0	$0	$0	$300,000	$4,300,000	$0	$0	$0	$300,000	$4,900,000
93	CTR 0240	TBD	CARQ	Replace Radar Beacons and Related Electrical Systems	Support	$0		$800,000									$800,000
		REHAB		and connect with SCADA	Capital	$0		$2,500,000									$2,500,000
		6813			Total	$0	$0	$3,300,000	$0	$0	$0	$0	$0	$0	$0	$0	$3,300,000
94	CTR 0241	TBD	RSR	Concrete Column Repair	Support	$0				$300,000	$300,000	$400,000					$1,000,000
		REHAB			Capital	$0					$2,000,000						$2,000,000
		6814			Total	$0	$0	$0	$0	$300,000	$2,300,000	$400,000	$0	$0	$0	$0	$3,000,000
95	CTR 0242	TBD	SMH	Replace and Upgrade Navigational Lights to LED	Support	$0								$100,000	$500,000		$600,000
		REHAB		and connect it with SCADA	Capital	$0									$1,500,000		$1,500,000
		6826			Total	$0	$0	$0	$0	$0	$0	$0	$0	$100,000	$2,000,000	$0	$2,100,000
96	CTR 0243	TBD	SFO	Replace Fender System and Skirt Modifications	Support	$0					$1,500,000	$1,500,000	$2,000,000	$1,500,000			$6,500,000
		REHAB			Capital	$0							$23,000,000				$23,000,000
		6825			Total	$0	$0	$0	$0	$0	$1,500,000	$1,500,000	$25,000,000	$1,500,000	$0	$0	$29,500,000
97	CTR 0244	TBD	RSR	Structural Steel Painting (Lower Deck, Towers)	Support	$0		$1,000,000	$4,000,000	$4,000,000	$3,000,000	$3,000,000		$2,500,000	$3,500,000	$3,500,000	$24,500,000

Attachment C-2
Bay Area Toll Authority
FY 2022-31 Ten-Year Toll Bridge Rehabilitation Program

BATA Resolution No. 144
Date: June 23, 2021
W.I.: 1251
Referred by: BATA Oversight Committee

		Thru 2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
Toll Bridge Rehabilitation Program Summary	Support	$320,997,488	$39,702,375	$26,130,000	$20,830,000	$21,680,000	$25,980,000	$28,780,000	$35,030,000	$31,530,000	$29,530,000	$23,530,000	$603,719,863
	Capital	$1,237,116,323	$98,056,746	$80,453,000	$63,943,000	$69,843,000	$104,013,000	$165,038,000	$140,450,000	$81,700,000	$92,950,000	$55,700,000	$2,189,263,069
	Total	$1,558,113,811	$137,759,122	$106,583,000	$84,773,000	$91,523,000	$129,993,000	$193,818,000	$175,480,000	$113,230,000	$122,480,000	$79,230,000	$2,792,982,932

Line No.	Project No.	EA Program	Bridge CCA	Description Status		Thru 2021	2022	2023	2024	2025	2026	2030	2028	2029	2030	2031	Total
74	CTR 0227	1K470	SMH	Roof Repairs at toll admin building (Toll Plaza)	Support	$60,000											$60,000
		REHAB		Minor Rehab***	Capital	$99,550											$99,550
		8033			Total	$159,550	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$159,550
75	CTR 0228	1K460	BM	Bird abatement at Benicia Toll Plaza	Support	$150,000											$150,000
		REHAB		Minor Rehab***	Capital	$249,950											$249,950
		8033			Total	$399,950	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$399,950
76	CTR 0229	0K691	SFO	Install Grease Caps and Repair Pre stress Tendons	Support	$1,188,816											$1,188,816
		REHAB		East Span Director's Order***	Capital	$3,318,043											$3,318,043
		6825			Total	$4,506,859	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,506,859
77	CTR 0230	3G482	BM	Repair Seismic Joint Pier 3	Support	$148,912											$148,912
		REHAB		Director's Order***	Capital	$250,846											$250,846
		6812			Total	$399,758	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$399,758
78	CTR 0232	2K960	SFO	YBI Tunnel Concrete Repair	Support	$811,591											$811,591
		REHAB			Capital	$1,463,409											$1,463,409
		6825			Total	$2,275,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,275,000
79	CTR 0233	3G445	SFO	Fender Repair	Support	$735,111											$735,111
		REHAB		Director's Order***	Capital	$4,302,040											$4,302,040
		6825			Total	$5,037,151	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,037,151
80	CTR 0234	2K560	SFO	Repair SFOBB Seismic Dampers	Support	$185,712											$185,712
		REHAB		Director's Order***	Capital	$279,263											$279,263
		6825			Total	$464,976	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$464,976
81	CTR 0243	0W140	SFO	Replace Fender System and Skirt Modifications	Support	$2,000,000	$5,000,000					$3,500,000	$3,500,000				$14,000,000
		REHAB			Capital	$0					$45,000,000	$45,000,000	$45,000,000				$135,000,000
		6825			Total	$2,000,000	$5,000,000	$0	$0	$0	$45,000,000	$48,500,000	$48,500,000	$0	$0	$0	$149,000,000
82	CTR 0244	TBD	RSR	TBD Work on RSR lower deck, towers, columns, trave	Support	$0											$0
		REHAB			Capital	$11,200,000	$11,200,000										$0
		6814			Total	$11,200,000	$11,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
83	CTR 0245	0P560	Var.	Install BASE radio links	Support	$300,583											$300,583
		REHAB		Director's Order ***	Capital	$483,201											$483,201
		6828			Total	$783,784	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$783,784
84	CTR 0246	0Q470	SFO	East Span Skyway Polyester Concrete Overlay Repai	Support	$22,760											$22,760
		REHAB		Director's Order ***	Capital	$183,163											$183,163
		6825			Total	$205,922	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$205,922
85	CTR 0247	1Q490	SFO	East Span Replace Expansion Joint Panels	Support	$86,000											$86,000
		REHAB		Director's Order	Capital	$314,000											$314,000
		6825			Total	$400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$400,000
86	CTR 0248	1Q500	BM	Repair Water Line	Support	$118,911											$118,911
		REHAB		Director's Order ***	Capital	$230,583											$230,583
		6812			Total	$349,494	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$349,494
87	CTR 0249	1Q360	SFO	SFOBB Replace Seismic Joint Headers and Strip Seals	Support	$195,905											$195,905
		REHAB		(West Approach & Anchorage)	Capital	$163,601											$163,601
		6825		Director's Order ***	Total	$359,506	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$359,506
88	CTR 0250	1Q950	SFO	SFOBB YBI tunnel Repair Fire Suppression System	Support	$251,000											$251,000
		REHAB		Director's Order	Capital	$314,000											$314,000
		6825			Total	$565,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$565,000

BAY AREA TOLL AUTHORITY

Attachment C-1
Bay Area Toll Authority
Rehabilitation Program Budget Summary

BATA Resolution No. 169
Date: June 28, 2023
W.I.: 1255

NEW PROJECT

		Thru 2023	2024	Thru 2024
Toll Bridge Rehabilitation Program Summary	Support	$429,855,451	$60,357,759	$490,213,211
	Capital	$1,438,203,678	$124,838,629	$1,563,042,307
	Total	$1,868,059,129	$185,196,388	$2,053,255,518

Line No.	Project No.	EA / Program	Bridge / CCA	Description / Status		Thru 2023	2024	Thru 2024
208	BR 0050	8940	BATA	HOV Lane Enforcement	Support	$2,600,000		$2,600,000
		REHAB		Vehicle Occupancy	Capital	$4,000,000		$4,000,000
					Total	$6,600,000	$0	$6,600,000
209	BR 0051	8942	BATA	Bridge Yard Capital Improvements	Support	$0		$0
		REHAB			Capital	$500,000		$500,000
					Total	$500,000	$0	$500,000
210	BR 0052	8943	BATA	Link: Bike/Ped Access to East Span of SFOBB	Support	$0		$0
		REHAB			Capital	$1,400,000	$450,000	$1,850,000
					Total	$1,400,000	$450,000	$1,850,000
211	BR 0053	8944	BATA	Dumbarton Bridge Operational Improvement	Support	$0		$0
		REHAB			Capital	$17,000,000		$17,000,000
					Total	$17,000,000	$0	$17,000,000
212	BR 0054	8945	BATA	Next Gen Clipper (C2) System	Support	$0		$0
		REHAB			Capital	$9,600,000		$9,600,000
					Total	$9,600,000	$0	$9,600,000
213	BR 0055	8946	BATA	I-680/I-80/SR-12 Interchange Package 2A	Support	$0		$0
		REHAB			Capital	$14,300,000		$14,300,000
					Total	$14,300,000	$0	$14,300,000
214	BR 0056	8947	BATA	New BATA Bridge Evaluation and Due Diligence	Support	$0		$0
		REHAB		SR-37	Capital	$8,000,000	$1,000,000	$9,000,000
					Total	$8,000,000	$1,000,000	$9,000,000
215	BR 0057	8948	BATA	I-580 Richmond-San Rafael Bridge Forward	Support	$3,930,000		$3,930,000
		REHAB		Open Road Tolling and HOV Lane	Capital	$3,841,920	$16,000,000	$19,841,920
					Total	$7,771,920	$16,000,000	$23,771,920
216	BR 0058	8949	BATA	Regional Transportation Commute Challenge	Support	$0		$0
		REHAB		Carryover from FY19-20	Capital	$2,000,500		$2,000,500
					Total	$2,000,500	$0	$2,000,500
217	BR 0059	8950	BATA	Link: Bike/Ped Access to East Span of SFOBB Design	Support	$3,000,000	$1,913,000	$4,913,000
		REHAB			Capital	$3,000,000		$3,000,000
					Total	$6,000,000	$1,913,000	$7,913,000
218	BR 0060	8951	BATA	SFOBB ORT Civil Design	Support	$3,177,000		$3,177,000
		REHAB			Capital	$3,477,000		$3,477,000
					Total	$6,654,000	$0	$6,654,000
219	BR 0061	8954	BATA	Bay Bridge Forwards	Support	$0		$0
		REHAB			Capital	$5,000,000		$5,000,000
					Total	$5,000,000	$0	$5,000,000
220	BR 0062	8952	BATA	Bay Skyway - CCO to YBI	Support	$0		$0
		REHAB			Capital	$2,700,000		$2,700,000
					Total	$2,700,000	$0	$2,700,000
221	BR 0063	8953	BATA	Richmond-San Rafael Bridge Shared Use Path Gap Closure	Support	$1,150,000	$100,000	$1,250,000
		REHAB			Capital	$4,302,000	$800,000	$5,102,000
					Total	$5,452,000	$900,000	$6,352,000
222	BR 0064	TBD	BATA	Misc Toll Plaza Improvements	Support	$0		$0
		REHAB			Capital	$0	$1,000,000	$1,000,000
					Total	$0	$1,000,000	$1,000,000
223	BR 0065	TBD	BATA	Seismic and Code Changes	Support			$0
		REHAB			Capital		$1,000,000	$1,000,000
					Total		$1,000,000	$1,000,000
224	BR Res	8928	BATA	BATA Program Contingency	Support	$0		$0
		REHAB		RM1 and Seismic Closeout	Capital	$25,868,759	$4,000,000	$29,868,759
					Total	$25,868,759	$4,000,000	$29,868,759

*Caltrans Capital includes capital outlay construction and right-of-way.
**Previous expenses covered in RM1 Program.
*** Project closed to expenditure reimbursement June 30, 2023 or earlier.

		Thru 2023	2024	Thru 2024
Toll Bridge Rehabilitation Program Summary	Support	$429,855,451	$60,357,759	$490,213,211
	Capital	$1,438,203,678	$124,838,629	$1,563,042,307
	Total	$1,868,059,129	$185,196,388	$2,053,255,518
Caltrans Rehabilitation Program Summary	Support	$386,132,451	$58,344,759	$444,477,210
	Capital	$654,204,463	$53,591,629	$707,796,092
	Total	$1,040,336,914	$111,936,388	$1,152,273,302
BATA Rehabilitation Program Summary	Support	$43,723,000	$2,013,000	$45,736,000
	Capital	$783,999,215	$71,247,000	$855,246,215
	Total	$827,722,216	$73,260,000	$900,982,216

Funding Agreements

Funding	Program	Thru 2023	2024	Thru 2024
Alameda County Transportation Commission - Measure B	8950	$0	$3,000,000	$3,000,000
Active Transportation Program - Cycle 5 (Transfer from MTC)	8953	$0	$4,302,000	$4,302,000
Total		$0	$7,302,000	$7,302,000

Historic Toll-Paid Vehicle Counts & Toll Revenue

See the total number of toll-paid vehicles and the amount of toll revenue generated on all of the toll bridges for fiscal years 1994 through 2023. Vehicles not paying a toll, such as emergency vehicles or carpoolers prior to FY 10-11, are not included in these counts.

* FY 2010-11 is the first occurrence where carpool vehicles are required to pay a toll. This is the reason the number of total toll paid vehicles increased significantly over the previous fiscal year

30 Years of Toll-Paid Vehicle Crossings and Total Toll Revenues

Fiscal Year	Total # of Toll-Paid Vehicles	% Change from Previous Year	Total Toll Revenue
2013-14	126,280,732	+0.5%	$693,588,810
2014-15	131,133,828	+3.8%	$694,954,848
2015-16	135,256,191	+3.1%	$714,132,352
2016-17	136,813,538	+1.2%	$720,784,303
2017-18	138,301,718	+1.1%	$727,350,430
2018-19	138,284,256	0.0%	$724,914,020
2019-20	119,782,843	-13.4%	$633,932,206
2020-21	112,897,806	-5.75%	$830,404,750
2021-22	122,662,236	+8.61%	$756,197,027
2022-23	124,747,603	+1.7%	$833,282,112

ATTACHMENT E

RIGHT OF WAY DATA SHEET

To: Office of Design South – Special Projects

Date April 22, 2024
Dist 4 Co SF Rte 80
PM 5.7/7.7

Attention: GORDON W. JEUNG
Senior Transportation Engineer

EA 0W140 (04-2000-0180)

From: Mona Poon
Right of Way Resource Manager

SFOBB Fender Replacement
D.S. # 7802

Subject: Current Estimated Right of Way Costs

We have completed an estimate of the right of way costs for the above referenced project based on maps we received from you on April 4, 2024 and the following assumptions and limiting conditions.

[ ] 1. The mapping did not provide sufficient detail to determine the limits of the right of way required.
[ ] 2. The transportation facilities have not been sufficiently designed so our estimator could determine the damages to any of the remainder parcels affected by the project.
[ ] 3. Additional right of way requirements are anticipated, but are not defined due to the preliminary nature of the early design requirements.
[ ] 4. This estimate does not include $_____right of way costs previously incurred on the project, which may affect the total project right of way costs for programming purposes.
[ ] 5. We have determined there are no right of way functional involvements in the proposed project at this time, as designed.
[ ] 6. This Data Sheet is being completed without an estimate for Environmental Permit Fees or Mitigation Costs.

Right of Way Lead Time will require a minimum of 6 months after we begin receiving final right of way requirements, necessary environmental clearance has been obtained, and freeway agreements have been approved. From the date of receipt of final right of way requirements, we will require a minimum of 4 months prior to the date of certification of the project. Shorter lead times will require either more right of way resources or an increased number of condemnation suits to be filed. Either of these actions may reflect adversely on the District's other programs or our public image generally.

Right of Way Resource Manager

Attachments:

[ ] Right of Way Data Sheet – Page One (always required)
[X] Right of Way Data Sheet – All Pages (required when interest in real property is being acquired)
[X] Utility Information Sheet
[ ] Railroad Information Sheet

RIGHT OF WAY DATA SHEET

TO: Design South-Special Projects
Date 4/18/2024 D.S. # 7802
Dist. 04 Co. SF Rte 80 PM 5.7/7.7
EA 0W140 (0420000180)
ATTN: Gordon W. Jeong
Senior Transportation Engineer
Project Description: Bay Bridge, West Bay Fender Replacement

SUBJECT: Right of Way Data - Alternate No.

1. Right of Way Cost Estimate:

		Current Value (Future Use)	Escalation Rate	Escalated Value
A.	Acquisition, including Excess Lands, Damages, and Goodwill	$0.00	%	$0.00
	Permits			$0.00
	Environmental Mitigation			$200,000.00
	Grantor's Appraisal Cost			$0.00
B.	Utility Relocation (State Share)	$0.00	%	$0.00
C.	Railroad (from page 6)			$0.00
D.	Relocation Assistance	$0.00	%	$0.00
E.	Clearance Demolition	$0.00	%	$0.00
F.	Title and Escrow Fees	$0.00	%	$0.00
G.	TOTAL ESCALATED VALUE			$200,000.00
H.	Construction Contract Work	$0.00		
I.	Railroad Phase 4 Costs	$0.00		
J.	Utility Phase 4 Costs	$0.00		

2. Anticipated Date of Right of Way Certification 2-Dec-25

3. Parcel Data:

	Type	Dual/Appr
X		
A		
B		
C		
D		
E	XXXX	
F	XXXX	
Total	0	

Utilities Involvements	
Utility Verification	9
Positive Identification	0
Utility Relocation	0
Other (Specify)	0

RR Involvements	
None	X
C&M Agrmt	
R/W Agrmt	
Design	
Const.	
Lic/RE/Clauses	
Misc R/W Work	
RAP Displ	0
Clear Demo	0
Const. Permits	0
Condemnation	0

Areas: Right of Way ____ No. Excess Parcels ___ Excess ____

4. Are there any major items of construction contract work?
Yes ☐ No ☑ (If yes, explain)

5. Provide a general description of the right of way and excess lands required(zoning, use, major improvements critical or sensitive parcels, etc.).
No right of way required. ☑
Per request memo dated 04/04/2024.

6. Is there an effect on assessed valuation? (If yes explain)
Yes ☐ Not Significant ☐ No ☑

7. Are utility facilities or rights of way affected? Yes ☑ No ☐
(If yes, attach Utility Information Sheet Exhibit 01-01-05)

8. Are railroad facilities or rights of way affected? Yes ☐ No ☑
(If yes, attach Railroad Information Sheet Exhibit 01-01-06)

9. Were any previously unidentified sites with hazardous waste and/or material found?
Yes ☐ None evident ☑
(If yes, attach memorandum per Procedural Handbook Volume 1, Section 101.011)

10. Are RAP displacements required? Yes ☐ No ☑
(If yes, provide the following information)

No. of personal property relocations _____

No. of single family _____ No. of business/non profit _____

No. of multi-family _____ No. of farms _____

Based on Draft / Final Relocation Impact Statement / Study dated_____ , it is anticipated that sufficient replacement housing will / will not be available without Last Resort Housing.

11. Are material borrow and / or disposal sites required? Yes ☐ No ☑
(If yes, explain)

12. Are there potential relinquishments / abandonments? Yes ☐ No ☑
(If yes, explain)

13. Are there any existing and/or potential Airspace sites? Yes ☐ No ☑
(If yes, explain)

14. Are there Permit Fees? Yes ☐ No ☑
(If yes, explain)
Per prior Right of Way Data Sheet #7749, completed on 02/16/2024, work being done under existing BCDC Permit No. 87-042 Amendment 6. This Right of Way Data Sheet assumes no changes from previously completed Right of Way Data Sheet.

15. Are there Environmental Mitigation Costs? Yes ☑ No ☐
(If yes, explain)
Per prior Right of Way Data Sheet #7749, completed on 02/16/2024, $200,000 dollars in permit fees provided by Hoa-Anh Le via email 2/14/2024. Upon consultation with Right of Way Planning and Management, it was decided that this need was more accurately categorized as an Environmental Mitigation Cost. This Right of Way Data Sheet assumes no changes from previously completed Right of Way Data Sheet.

16. Indicate the anticipated Right of Way schedule and lead time requirements.
Based on the R/W Requirements on Page 1 of this Data Sheet, R/W will require a lead time of 6 months from the date regular appraisals can begin to project certification.

17. Is it anticipated that all Right of Way work be performed by CALTRANS staff?
Yes ☑ No ☐ (If no, discuss)

Assumptions and Limiting Conditions

- This data sheet was completed without a hazardous waste/materials report.
- This data sheet assumes no changes to Permit Fees and Environmental Mitigation from prior Right of Way Data Sheet #7749 completed on 02/16/2024.
- Information on this data sheet was based on maps provided by Gordon W. Jeong on 4/4/2024

Evaluation Prepared By: Sean Molloy

Right of Way: Name _____ Date 04/18/2024

Railroad: Name _____ Date 04/18/2024

Utilities: Name _____ Date 04/18/2024

Recommended for Approval:

_____
Right of Way Capital Cost Coordinator

I have personally reviewed this Right of Way Data Sheet and all supporting information. It is my opinion that the probable Highest and Best Use, estimated values, escalation rates, and assumptions are reasonable and proper subject to the limiting conditions set fourth, and find this Data Sheet complete and current.

_____
Chief, R/W Appraisal Services

04/22/2024
Date

cc: Program Manager
Project Manger

UTILITY INFORMATION SHEET

1. Utility owners located within project limits:
SFPUC City Distribution Division, PG&E (gas & electric), AT&T, Comcast, Sonic, Frontier

2. Facilities potentially impacted by project (if known, include Owners(s) & facility type(s)):
None anticipated.

3. Anticipated Workload:

9	Utility Verification Required
	Positive Identification
	Utility Relocation
	Other (Specify)

4. Additional information concerning anticipated utility involvements (include limiting conditions and a narative addressing likelihood that conflicts will occur);

_____ Involves possible relocation of electric transmission facilities
(If X'd, Data sheet should be forwarded to environmental)

_____ Utility agreements will be required for this project due to CCW on public utility facilities for all public utility relocations and adjustments, including but not limited to, manhole cover adjustments to grade (unless determined & specified in writing by the Utility Engineering Workgroup (UEW) that none are required for this project). A minimum lead-time of 12 months from PA&ED to RWC is needed to secure the utility agreement(s) and specifications as required for the RWC and PS&E milestones. Leadtime requires that UEW provide RW Utilities with a conflict memo and maps no later than the PA&ED milestone.

5. Estimated Costs:

Positive Identification $ 0.00

(Describe Positive Identification Needs)

Utility Relocation $ 0.00

(Describe Utility Relocation Needs)

Phase 4* $ 0.00

(Describe Phase 4 Needs)

*not apart of page 1 total

ESTIMATED STATE SHARE OF COSTS $ 0.00

Prepared by: Latorya Young

Latorya Young
Right of Way Utility Coordinator

04/18/2024
Date

Right of Way Workplan

Date: 2/28/24

Project ID No:	04-2000-0180
Project Manager:	Kenneth Young
Programmed RW Support:	$0
PA&ED Date or Transmittal:	3/1/24
RWC Date:	12/2/25
Prepared by:	Jim Murphy

EA: 0W140

Please note that this estimate only contains the hours needed by RW Agents. You must also obtain an estimate from Land Surveys for a complete support cost total for the Office of Right of Way.

150 — Phase K — Start Date: — End Date:

(Data Sheet & PID)		Hours Needed
0849	DDD R/W	
0850	Acq/P&M O.C.	
0852	Utilities O.C.	
0851	Appraisals O.C.	
0856	Proj. Coord.	
0859	Capital Mgmt.	
0860	Appraisals	
0867	Railroad	
0869	Utilities	

160 — Phase 0 — Start Date: — End Date:

(Util. Verifications, RR study, PR, &/or Updated Datasheet)		Hours Needed
0849	DDD R/W	
0850	Acq./P&M O.C.	
0851	Appraisals O.C.	
0852	Utilities O.C.	
0856	Proj. Coord.	
0859	Capital Mgmt.	
0860	Appraisals	
0865	Acquisitions	
0867	Railroad	
0869	Utilities	
0876	Rap	
0882	Clerical	

185 — Phase 1 — Start Date: — End Date:

(Updated datasheet, if needed)		Hours Needed
0850	Acq/P&M O.C.	
0851	Appraisals O.C.	
0856	Proj. Coord.	
0859	Capital Mgmt.	
0860	Appraisals	
0867	Railroad	
0869	Utilities	

255 — Phase 1 — Start Date: — End Date:

(Certification - PSE)		Hours Needed
0850	Acq./P&M O.C.	10
0851	Appraisals O.C.	
0852	Utilities O.C.	
0856	Proj. Coord.	20
0860	Appraisals	
0865	Acquisitions	
0867	Railroad	
0869	Utilities	10

100.25 — Phase 2 — Start Date: 3/1/2024 — End Date: 12/3/2026

(Project Mgmt)		Hours Needed
0849	DDD R/W	**8**
0850	Acq /P&M O.C.	10
0856	Proj. Coord.	40
0859	Capital Mgmt	20
0854	Data Mgmt O.C.	0
0763	Data Mgmt Staff	0

195 — Phase 2 — Start Date: — End Date:

(Prop Mgmt & Excess Land)		Hours Needed
0851	Appraisals O.C.	
0856	Proj. Coord.	
0860	Appraisals	
0872	Prop Mgmt	
0875	Excess Lands	
0874	Airspace	
0882	Clerical	

200 — Phase 2 — Start Date: 3/1/2024 — End Date: 12/3/2026

(Utilities)		Hours Needed
0849	DDD R/W	**0**
0852	Utilites O.C.	0
0856	Proj. Coord.	
0859	Capital Mgmt	
0869	Utilities	0
0882	Clerical	

225 — Phase 2 — Start Date: 3/1/2024 — End Date: 12/2/2025

(Pre-Cert Work)		Hours Needed
0849	DDD R/W	**0**
0850	Acq /P&M O.C.	0
0851	Appraisals O.C.	0
0856	Proj. Coord.	
0859	Capital Mgmt	0
0860	Appraisals	0
0865	Acquisitions	0
0867	Railroad	
0868	Acq. Spec. (R.A.)	
0873	Demolition	
0876	RAP	
0882	Clerical	0

245 — Phase 2 — Start Date: 12/3/2025 — End Date: 12/3/2026

(Post-Cert Work)		Hours Needed
0849	DDD R/W	**0**
0850	Acq /P&M O.C.	0
0851	Apprasisals O.C.	0
0859	Capital Mgmt	0
0860	Appraisals	
0865	Acquisitions	0
0867	Railroad	
0868	Acq. Spec. (R.A.)	
0873	Demolition	
0876	RAP	
0882	Clerical	

Total hours required (RW Agents Only): **118**

Total RW COS (RW Agents Only): **$15,930**

Phase 2 only COS (RW Agents Only): **$10,530**

Approved By:

Shella Orson (Feb 28, 2024 13:40 PST)

Shella Orson
District Branch Chief
R/W Project Coordination

Please contact 4-Land.Surveys@dot.ca.gov for Land Surveys Support Cost Estimates

ATTACHMENT F

ENVIRONMENTAL DOCUMENTS:

CE/CE (03/26/2024)

RE-VALIDATION (05/30/2024)

CEQA EXEMPTION / NEPA CATEGORICAL EXCLUSION DETERMINATION FORM (rev. 06/2022)

Project Information

Project Name (if applicable): San Francisco Bay Bridge Pier Fender Replacement

DIST-CO-RTE: 04-SF-80 **PM/PM:** 6.2/7.7

EA: 0W140 **Federal-Aid Project Number:** N/A

Project Description

The project proposes to replace the wooden and plastic fender systems at Piers W3 to W6. In addition, the concrete skirts to which the fender systems are attached will also be reconstructed. A functional fender system is required under federal regulations and under the jurisdiction of the United States Coast Guard (USCG). The bridge inspection report has assessed that the existing fender system is reaching the end of its service life and has recommended the complete replacement and reconstruction of the fender systems at Piers W3 through W6.

Caltrans CEQA Determination (Check one)

☐ **Not Applicable** – Caltrans is not the CEQA Lead Agency

☐ **Not Applicable** – Caltrans has prepared an IS or EIR under CEQA

Based on an examination of this proposal and supporting information, the project is:

☐ **Exempt by Statute.** (PRC 21080[b]; 14 CCR 15260 et seq.)

☒ **Categorically Exempt. Class** C . (PRC 21084; 14 CCR 15300 et seq.)

☐ No exceptions apply that would bar the use of a categorical exemption (PRC 21084 and 14 CCR 15300.2). See the SER Chapter 34 for exceptions.

☐ **Covered by the Common Sense Exemption**. This project does not fall within an exempt class, but it can be seen with certainty that there is no possibility that the activity may have a significant effect on the environment (14 CCR 15061[b][3].)

Senior Environmental Planner or Environmental Branch Chief

Zachary Gifford		3/26/2024
Print Name	Signature	Date

Project Manager

Kenneth Young		3/26/2024
Print Name	Signature	Date

Caltrans NEPA Determination (Check one)

☐ **Not Applicable**

Caltrans has determined that this project has no significant impacts on the environment as defined by NEPA, and that there are no unusual circumstances as described in 23 CFR 771.117(b). See SER Chapter 30 for unusual circumstances. As such, the project is categorically excluded from the requirements to prepare an EA or EIS under NEPA and is included under the following:

☒ **23 USC 326:** Caltrans has been assigned, and hereby certifies that it has carried out the responsibility to make this determination pursuant to 23 USC 326 and the Memorandum of Understanding dated April 18, 2022, executed between FHWA and Caltrans. Caltrans has determined that the project is a Categorical Exclusion under:

- ☒ **23 CFR 771.117(c): activity (c)(28)**
- ☐ **23 CFR 771.117(d): activity (d)**
- ☐ **Activity listed in Appendix A of the MOU between FHWA and Caltrans**

☐ **23 USC 327:** Based on an examination of this proposal and supporting information, Caltrans has determined that the project is a Categorical Exclusion under 23 USC 327. The environmental review, consultation, and any other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by Caltrans pursuant to 23 USC 327 and the Memorandum of Understanding dated May 27, 2022, and executed by FHWA and Caltrans.

Senior Environmental Planner or Environmental Branch Chief

Zachary Gifford	Zachary Gifford	3/26/2024
Print Name	Signature	Date

Project Manager/ DLA Engineer

Kenneth Young	Kenneth S. Young	3/27/2024
Print Name	Signature	Date

Date of Categorical Exclusion Checklist completion (if applicable): N/A
Date of Environmental Commitment Record or equivalent: 3/26/24

Briefly list environmental commitments on continuation sheet if needed (i.e., not necessary if included on an attached ECR). Reference additional information, as appropriate (e.g., additional studies and design conditions).

Continuation sheet:

Air/Noise Quality
Because construction activities are short-term, the GHG emissions resulting from construction activities would not result in long-term adverse effects.

Biological Resources
As the project activities would only transpire at the physical bridge piers it would not create any barrier to movement to any nektonic organisms including marine mammals. Without these impediments impacts to marine mammals are typically evaluated through the scope of noise or pollutive runoff from project activities. Since the project does not involve any pile driving or similar equipment that would expose marine mammals to sound with sufficient duration or pressure to cause a shift in hearing sensitivity (either temporary or permanent). Furthermore, no in water work is proposed so sound pressure from jackhammering would be near negligible below surface waters. The Project will not rise to the level of take as defined by the ESA or cause any direct effects from hydroacoustic noise; therefore, an Incidental Harassment Authorization or Letter or Authorization will not be required from NMFS.

Caltrans will implement reasonable and prudent measures to minimize and avoid direct impact and harassment of marine mammals. Please see ECR for full list of AMMs.

Cultural Resources

The Office of Cultural Resource Studies completed a Historic Property Survey Report which determined a Finding of No Historic Properties Affected is appropriate for this undertaking pursuant to PA Stipulation IX.A.

Visual Resources

Project work will result in visually negligible permanent change. Newly constructed bridge pier fenders will be slightly larger but visually similar to removed fenders. Construction will take place from barges, causing temporary visual impact to boating traffic. This review indicates that the project would not adversely affect any “Designated Scenic Resource” as defined by CEQA statutes or guidelines, or by Caltrans policy.

Caltrans will need to apply for a Waste Discharge Requirements (WDR) for the current project; the project may qualify as being covered under the General Order for Overwater Structures if it meets the size threshold requirements for the project impacts. If the project impacts exceed the size threshold, then we would apply for an individual WDR for the project.

Water Quality
To address the temporary water quality impacts resulting from the construction activities, the project will comply with section 13-3 of the Standard Specifications to

develop and implement a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP will identify the potential sources of stormwater pollution and outline the Best Management Practices (BMPs) to prevent discharge of pollutants from construction site into receiving water bodies. These BMPs will include measures for sediment control, wind erosion control, tracking control, spill prevention and control, waste management/materials pollution control, non-storm water management, and dewatering activities.

It is anticipated that the project will construct protective covers, platforms, and enclosures to collect debris and prevent debris from falling into the bay. All debris-catching devices will be emptied daily, and the debris will be off hauled to a State approved site for disposal.

After construction is completed, all disturbed soil areas will be stabilized to prevent erosion.

NEPA/CEQA RE-VALIDATION FORM (rev. 03/2024)

DIST-CO-RTE: 04-SF-80
PM/PM: 5.7/7/7
EA or Fed-Aid Project No.: 0W140
Other Project No. (specify):
Project Title: San Francisco Bay Bridge Pier Fender Replacement
Environmental Approval Type: CE/CE
Date Approved: 3/26/24
Reason for Consultation (23 CFR 771.129): ☐ Project proceeding to next major federal approval ☒ Change in scope, setting, effects, mitigation measures, requirements ☐ 3-year timeline (EIS only) ☐ **N/A** (Re-Validation for CEQA only)
Description of Changed Conditions: The postmiles for this project have been revised from the original CE from postmile 6.2/7.7 to 5.7/7.7 to include lane closures on the bridge. The lane closure is covered under the 3G487 PR, with the same project limits, which was completed and signed on 12/29/2023. Please see continuation sheet for full description of changed conditions.

NEPA CONCLUSION - VALIDITY

Based on an examination of the changed conditions and supporting information: (*Check ONE of the three statements below, regarding the validity of the original document/determination (23 CFR 771.129). If document is no longer valid, indicate whether additional public review is warranted and whether the type of environmental document will be elevated.* ***NOTE:*** *If applicable, remember to check conformity status. See the SER Vol. 1, Chapter 11 and contact the District Air Quality Specialist for additional information.)*

☒ **The original environmental document or CE remains valid. No further documentation will be prepared.**

☐ **The original environmental document or CE is in need of updating; further documentation has been prepared and ☐ is included on the continuation sheet(s) or ☐ is attached. With this additional documentation, the original ED or CE remains valid.**
Additional public review is warranted (23 CFR 771.111(h)(3)) ☐ Yes ☐ No

☐ **The original environmental document or CE is no longer valid.**
Additional public review is warranted (23 CFR 771.111(h)(3)) ☐ Yes ☐ No
Supplemental environmental document is needed. ☐ Yes ☐ No
New environmental document is needed. ☐ Yes ☐ No (If "Yes," specify type:)

CONCURRENCE WITH NEPA CONCLUSION

I concur with the NEPA conclusion above.

Zachary Gifford p.p. Tanvi Gupta — 5/30/24
Signature: Environmental Branch Chief — Date

Kenneth S. Young Kenneth Young — 5/24/2024
Signature: Project Manager/DLAE — Date

NEPA/CEQA RE-VALIDATION FORM

CEQA CONCLUSION (Only mandated for projects on the State Highway System.)

Based on an examination of the changed conditions and supporting information, the following conclusion has been reached regarding appropriate CEQA documentation: (*Check ONE of the five statements below, indicating whether any additional documentation will be prepared, and if so, what kind. If additional documentation is prepared, attach a copy of this signed form and any continuation sheets.*)

☒ **Original document remains valid. No further documentation is necessary.**

☐ **Only minor technical changes or additions to the previous document are necessary.**
☐ **An addendum has been or will be prepared and is ☐ included on the continuation sheets or ☐ will be attached. It need not be circulated for public review (CEQA Guidelines, §15164). The addendum must include a brief explanation of why the decision was made to not prepare a subsequent or supplemental environmental document as well as a summary statement explaining the changes to the project.**

☐ **Changes are substantial, but only minor additions or changes are necessary to make the previous document adequate. A Supplemental environmental document will be prepared, and it will be circulated for public review (CEQA Guidelines, §15163).**

☐ **Changes are substantial, and major revisions to the current document are necessary. A Subsequent environmental document will be prepared, and it will be circulated for public review (CEQA Guidelines, §15162).**
(Specify type of subsequent document, e.g., Subsequent FEIR):

☐ **The CE is no longer valid. New CE is needed. ☐ Yes ☐ No**

CONCURRENCE WITH CEQA CONCLUSION

I concur with the CEQA conclusion above.

Zachary Gifford p.p. Tanvi Gupta — 5/30/24
Signature: Environmental Branch Chief — Date

Kenneth S. Young Kenneth S. Young — 5/30/2024
Signature: Project Manager/DLAE — Date

NEPA/CEQA RE-VALIDATION FORM

CONTINUATION SHEET(S)

Address only changes or new information since approval of the original document and only those areas that are applicable. Use the list below as section headings as they apply to the project change(s). Use as much or as little space as needed to adequately address the project change(s) and the associated impacts, minimization, avoidance and/or mitigation measures, if any.

Changes in project design, e.g., scope change; a new alternative; change in project alignment.

The fender replacement includes the reconstruction of the concrete skirt to which the fender is attached. Due to the large volume of concrete needed a large amount of concrete loading trucks will need access to the bridge by lane closures. In addition, the work includes navigation lighting systems, electrical equipment, Bay Area Security Equipment (BASE), conduits, etc on top of the existing concrete skirt that will be relocated to higher locations during construction. Traffic control will be required for access and construction activities

Changes in environmental setting, e.g., new development affecting traffic or air quality.

N/A

Changes in environmental circumstances, e.g., a new law or regulation; change in the status of a listed species.

N/A

Changes to environmental impacts of the project, e.g., a new type of impact, or a change in the magnitude of an existing impact.

N/A

Changes to avoidance, minimization, and/or mitigation measures since the environmental document was approved.

N/A

Changes to environmental commitments since the environmental document was approved, e.g., the addition of new conditions in permits or approvals. When this applies, append a revised Environmental Commitments Record (ECR) as one of the Continuation Sheets.

N/A

ATTACHMENT G

STORMWATER DATA REPORT

Dist-County-Route: 04-SF-80
Post Mile Limits: 5.7-7.7
Project Type: San Francisco-Oakland Bay Bridge Fender Repair
Project ID (EA): 04 2000 0180 (04-0W140)

Phase: ☐ PID ☒ PA/ED ☐ PS&E

Regional Water Quality Control Board(s): San Francisco Bay RWQCB (Region 2)

1.	Does the project disturb 5 or more acres of soil?	Yes ☐	No ☒
2.	Does the project disturb 1 or more acres of soil and not qualify for the Rainfall Erosivity Waiver?	Yes ☐	No ☒
3.	Is the project required to implement Treatment BMPs?	Yes ☐	No ☒
4.	Does the project impact existing Treatment BMPs?	Yes ☐	No ☒

If the answer to any of the preceding questions is "Yes", prepare a Long Form – Stormwater Data Report. Unless otherwise agreed upon by the District/Regional Design Stormwater Coordinator.

Applicable Caltrans Permit Post Construction Treatment Requirement: 2012 ☐ 2022 ☒
Total Disturbed Soil Area: 0 acre New Impervious Surface: 0 acre
Estimated Const. Start Date: 07/01/2026 Estimated Completion Date: 11/26/2027

Risk Level: RL 1 ☐ RL 2 ☐ RL 3 ☐ Not Applicable ☒
Is (M)WELO applicable? Yes ☐ No ☒

This Short Form – Stormwater Data Report has been prepared under the direction of the following Licensed Person. The Licensed Person attests to the technical information contained herein and the data upon which recommendations, conclusions, and decisions are based. Professional Engineer or Landscape Architect stamp required at PS&E only.

Mojgan Osooli 4/11/2024
Mojgan Osooli, Registered Project Engineer/Landscape Architect *Date*

I have reviewed the stormwater quality design issues and find this report to be complete, current, and accurate:

C S M. Mora 04/18/2024
Carlos Mora, District/Regional Design SW Coordinator or Designee *Date*

1. Project Description

The project proposes to replace the fender system at Piers 3, 4, 5, and 6 of the San Francisco-Oakland Bay Bridge, West Bay (Bridge No. 34-0003). The project also includes the reconstruction of the concrete skirt to which the fender system attached.

The project would involve the complete replacement of the wooden and plastic fender system that protects the piers from vessel collision and the complete reconstruction of the concrete skirt to which the fender system is attached at Piers W3 through W6. The replacement fender system must have sufficient energy absorption capabilities to reduce the impact energy transferred to the piers during a vessel allision to a level below the structural capacity, while reducing the impact energy absorbed by the vessels as much as practical to reduce the probability of vessel damage. Also, the replacement fender system must allow for easy repair and replacement, whether portions of it or the entire system, in the event of damage during an allision. Lastly, the replacement fender system must be resistant to corrosion since it will be within the marine splash zone.

Based on these design requirements, a fender system comprised of fiber reinforced plastic (FRP) members is proposed. Two FRP Fender alternatives have been evaluated for this project. The first alternative is comprised of FRP walers and posts that will be attached to the reconstructed concrete skirt. The second alternative is a floating fender system composed large FRP cells. The final fender system will be designed to have sufficient energy absorption through deflection, compression, and distortion. Both alternative fender systems allow for segmental replacement and repair in the event of localized damage during a vessel collision. Lastly, the FRP members in both alternatives are resistant to corrosion.
The activity of demolition is anticipated in the Water. The construction roadway capital cost of this project is $5,000,000.

The total disturbed soil area (DSA) for this project is 0 acre. There will be no net new impervious area, nor any replaced impervious surface. This results in a new impervious surface (NIS) area of 0 acres.

2. Site Data and Stormwater Quality Design Issues

The project is located within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board, which is responsible for the implementation and enforcement of State and Federal laws and regulations concerning water quality.

The proposed project locates in the San Francisco Bay Watershed and Oakland Inner Harbor-San Francisco Bay Sub-Watershed (Hydrologic Unit Code 180500041002). The project locations are also within the SOUTH BAY Hydrologic Unit, Bay Channel Hydrologic Area, HSA #204.1.

Oakland Inner Harbor-San Francisco Bay and San Francisco Bay are the receiving waterbody and it is on the 303(d) list, with the pollutant of concern as shown in the table below.

Name	Pollutant	Status
Oakland Inner Harbor-San Francisco Bay	Mercury	TMDL required
	PCBs	TMDL required
San Francisco Bay	Selenium	TMDL required

The Region 2 Basin Plan establishes beneficial uses for waterways and water bodies within the

region. Beneficial uses include Agricultural Supply (AGR), Areas of Special Biological Significance (ASBS), Municipal and Domestic Supply (MUN), Freshwater Replenishment (FRSH), Groundwater Recharge (GWR), Industrial Service Supply (IND), Industrial Process Supply (PROC), Commercial and Sport Fishing (COMM), Shellfish Harvesting (SHELL), Cold Freshwater Habitat (COLD), Estuarine Habitat (EST), Marine Habitat (MAR), Fish Migration (MIGR), Preservation of Rare and Endangered Species (RARE), Fish Spawning (SPWN), Warm Freshwater Habitat (WARM), Wildlife Habitat (WILD), Contact/Non-Contact Water Recreation (REC1/REC2), and Navigation (NAV).

San Francisco Bay has beneficial uses as COMM, EST, IND, MIGR, NAV, PROC, RARE, REC1, REC2, SHELL, SPWN, WILD. It is a Sediment-Sensitive Waterbody.

There is no Area of Special Biological Significance (ASBS), no Drinking Water Reservoirs and/or Recharge Facilities within the project vicinity.

The project will perform in water work, a 401 certificate and 404 permit will be determined.

3. Construction Site BMPs

Potential Construction Water Quality Impacts

Given the scope of the project, the demolition will pose water quality concerns of turbidity and spiling.

Water Pollution Control Program (WPCP)

The disturbed soil area for the project is less than one acre. To comply with the conditions of the Caltrans NPDES Permit and address the temporary water quality impacts resulting from the construction activities in this project, the construction activities need to comply with the Standard Specifications 13-2 “Water Pollution Control Program (WPCP). Potential water quality impacts will be reduced to the Maximum Extent Practicable through proper implementation of the WPCP & inclusion of the Standard Special Provisions (SSP’s) for Temporary Construction Site Best Management Practices (BMP’s) into the project.

Temporary construction site BMPs will be deployed for non-stormwater management, waste management and material pollution control, stormwater monitoring, and water quality monitoring. No WPC plan for construction BMP will be required.

1) Non-Stormwater Management BMPs

- Reconstruction of Concrete Skirt to which the fender system is attached at Piers
  Proper control and use of equipment, materials, and waste products from concrete operations will reduce the discharge of potential pollutants to the storm drain system or watercourses.

- Material and Equipment Use Over Water
  Since the project will be performed in the water, it should ensure there is no fuel pollution or dropping tools in the water. This BMP consists of procedures for the proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations that minimize or eliminate the discharge of potential pollutants to a watercourse. The project procedures should follow the Site Best Management Practice (BMP)

Field Manual and Troubleshooting Guide, Section NS-13 Material and Equipment Use on Water.
Key Point #1 – Be Prepared
Use drip pans and absorbent materials under equipment and vehicles expected to be idle more than one hour. Ensure that an adequate supply of spill clean- up materials is available. Identify types of spill control measures to be employed, including the storage of necessary clean-up materials and equipment.
Key Point #2 – Be Aware
Ensure NS-10 is implemented. If repairs cannot be made, remove the equipment from over the water. Ensure compliance with all other permits associated with the project.
Key Point #3 – Secure the Area
Provide watertight curbs or toe boards to contain spills and prevent materials, tools, and debris from leaving the barge, platform, dock, etc. Secure all materials to prevent discharge to the watercourse via wind.
Key Point #4 – Inspection and Maintenance
Ensure timely and proper removal of accumulated waste. Inspect equipment for leaks and spills on a daily basis and ensure necessary repairs are done. Ensure proper procedures of storage and use of materials and equipment are being followed. Inspect and maintain all associated BMPs and perimeter controls to ensure continuous protection of the watercourse.

- Structure Demolition/Removal Over or Adjacent to Water
  Since the project activities include demolition in the water. This BMP consists of procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses.
  The project procedures should follow the Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide, Section NS-15 Structure Demolition/Removal over or Adjacent to Water.
  Key Point #1 – Containment
  Use attachments on construction equipment to catch debris or use covers or platforms to collect debris and prevent it from falling into the watercourse. Debris catching devices must be emptied regularly and the debris stored away from the watercourse and protected until removal.
  Key Point #2 – Disposal
  Dispose of accumulated debris in a timely manner and at an approved disposal site. For hazardous waste disposal, refer to WM-6.
  Key Point #3 – Inspection and Maintenance
  Inspect equipment and any debris catching devices on a daily basis. Ensure any stockpiles are protected and disposed of properly. Any discharge must be reported to the RE immediately.

2) Waste Management and Materials Pollution Control (WM).

- Material Delivery and Storage
  This BMP consists of procedures and practices for the proper handling and storage of materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses. These procedures include secondary containment, spill prevention and control, product labeling, quantity reduction, proper storage, material covering, training, and inventory control.
- Material Use

This BMP consists of procedures and practices for use of construction material in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or watercourses. These procedures include proper waste disposal, product labeling, proper cleaning techniques, recycling materials, reducing quantities, and application rates, spill prevention and control, training, and reduction of exposure to stormwater.

- Stockpile Management
  This BMP consists of procedures and practices to eliminate pollution of stormwater from stockpiles of soil and paving materials (such as concrete rubble, aggregate, and asphalt concrete). These procedures include locating stockpiles away from drainages, providing perimeter sediment barriers, soil stabilization, and wind erosion control measures.
- Spill Prevention and Control
  This BMP consists of procedures and practices implemented to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to storm drain systems or watercourses. Spill prevention and prompt appropriate spill response reduce the potential for polluting receiving waters with spilled contaminants. Spills of concern include chemicals and hazardous wastes such as soil stabilizers/binders, dust palliatives, herbicides, growth inhibitors, fertilizers, de-icing products, fuels, lubricants, paints, and solvents. Spill prevention practices include education as well as cleanup and storage procedures that address small spills, semi-significant spills, and significant/hazardous spills.
- Solid Waste Management
  This BMP consists of procedures and practices to minimize or eliminate the discharge of pollutants to storm drain systems or watercourses as a result of the creation, stockpiling or removal of construction site wastes. Solid wastes include such items as used brick, mortar, timber, steel, vegetation/landscaping waste, empty material containers, and litter. Measures include education as well as collection, storage, and disposal practices.
- Hazardous Waste Management
  This BMP consists of procedures and practices to minimize or eliminate the discharge of pollutants from construction site hazardous waste to the storm drain system or watercourses. Hazardous wastes should be collected, stored, and disposed of using practices that prevent contact with stormwater. The following types of wastes are considered hazardous, petroleum products, concrete curing compounds, palliatives, septic wastes, paints, stains, wood preservatives, asphalt products, pesticides, acids, solvents, and roofing tar. There may be additional wastes on the project that are considered hazardous. It is also possible that non-hazardous waste could come into contact with these hazardous wastes, such that they become contaminated and are therefore considered hazardous waste. Measures include education, storage procedures, and disposal procedures.
- Sanitary/Septic Waste Management
  This BMP consists of procedures and practices to minimize or eliminate the discharge of construction site toilet facilities to the storm drain system or watercourse. Measures include education, and storage and disposal procedures.
- Liquid Waste Management
  This BMP includes procedures to prevent pollutants related to non-hazardous liquid wastes from entering storm drains or receiving waters. Liquid wastes include drilling slurries, drilling fluids, wastewater that is free from grease and oil, dredging, and other non-stormwater liquid discharges not covered by separate permits.

3) Water Quality Monitoring (WQM)

Sampling and analysis of water quality under this item is used to address a PLAC requirement for in-water work. This is for work that is not related to CGP monitoring. Per standard specifications 2023, Section 13, samples will be collected at multiple locations and multiple times a day for the work occurs in water.

Proposed Construction Site BMPs are summarized in the Table below.

Proposed Construction Site BMPs

STD. PLAN NO	ITEM CODE	ITEM DESCRIPTION	UNIT OF MEASURE	ESTIMATED QUANTITY
	130100	JOB SITE MANAGEMENT	LS	1
	130201	PREPARE WATER POLLUTION CONTROL PROGRAM	LS	1
	Water Quality Monitoring			
	131103	WATER QUALITY SAMPLING AND ANALYSIS DAY	EA	220
	131104	WATER QUALITY MONITORING REPORT	LS	1
	131105	WATER QUALITY ANNUAL REPORT	LS	1
	Supplemental Items			
	066595	WATER POLLUTION CONTROL MAINTENANCE SHARING	LS	1
	066596	ADDITIONAL WATER POLLUTION CONTROL	LS	1

RWQCB Special Requirements/Concerns& Trash Captures

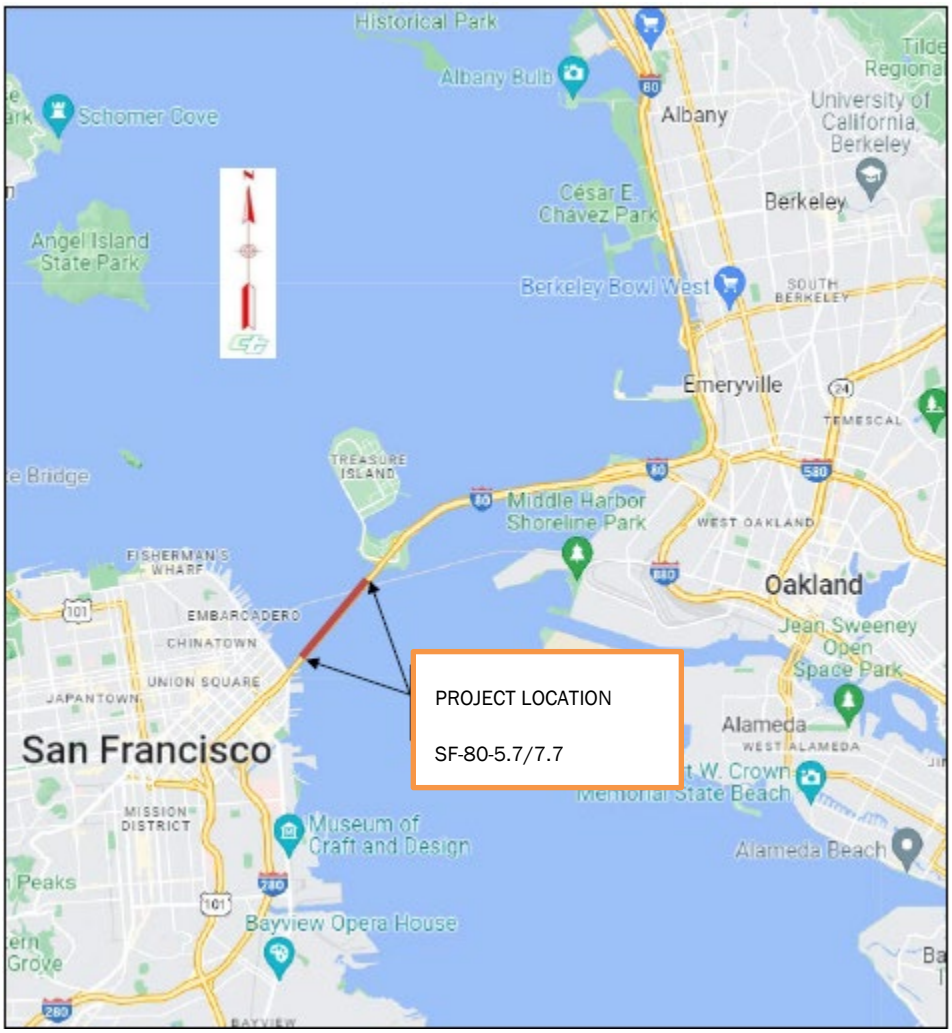
The San Francisco Bay RWQCB states that Caltrans District 4 projects must implement trash control measures for all hotspot locations with water bodies that discharge to the San Francisco Bay. The project is in a Low Significant Trash Generating Area (STGA), so trash capture BMPs will not need to be considered.

Required Attachments[1]

- Vicinity Map
- Evaluation Documentation Form
- Water Quality Form
- Construction BMP Estimate

[1] Additional attachments may be required as applicable or directed by the District/Regional Design Stormwater Coordinator (e.g., BMP line item estimate, SW, DPP, and CS Checklists).

- Vicinity Map



Evaluation Documentation Form

No.	Criteria	Yes ✓	No ✓	Supplemental Information for Evaluation
1.	Begin Project evaluation regarding requirement for implementation of Treatment BMPs	✓		Continue to 2.
2.	Is the scope of the Project to install Treatment BMPs (e.g., Alternative Compliance or TMDL requirement)?		✓	If **Yes**, go to 8. If **No**, continue to 3.
3.	Is there a direct or indirect discharge to surface waters?	✓		If **Yes**, continue to 4. If **No**, go to 9.
4.	As defined in the WQAR or ED, does the project: a. discharge to Areas of Special Biological Significance (ASBS), or b. discharge to a TMDL watershed where Caltrans is named stakeholder, or c. have other pollution control requirements for surface waters within the project limits (e.g. STGA)?		✓	If **Yes to any**, contact the District/Regional Design Stormwater Coordinator or District/Regional NPDES Coordinator to discuss the Department's obligations, go to 8 or 5. _____*(Dist./Reg. Coordinator initials)* If **No** to all, continue to 5.
			✓	
			✓	
5.	Are any existing Treatment BMPs partially or completely removed? (ATA Condition 1, Section 4.3.1)		✓	If **Yes**, go to 8 **AND** continue to 6. If **No**, continue to 6.
6.	Is this a Routine Maintenance Project?		✓	If **Yes**, go to 9. If **No**, continue to 7.
7.	Does the project result in an increase of 10,000 ft² or more of new impervious surface (NIS)?		✓	If **Yes**, go to 8. If **No**, go to 9.
8.	Project is required to implement Treatment BMPs.	Complete Checklist T-1, Part 1.		
9.	Project is not required to implement Treatment BMPs. CMM *(Dist./Reg. Design SW Coord. Initials)* MO *(Project Engineer Initials)* 4/11/2024 *(Date)*	Document for Project Files by completing this form and attaching it to the SWDR.		

Water Quality Form

Caltrans Dist-4 Water Quality Information Form	
EA-County-Route	04-0W140-SF-80
PM (Begin/End)	5.7/7.7
Project Description	The project proposes to replace the wooden and plastic fender systems at Piers W3 to W6. In addition, the concrete skirts to which the fender systems are attached will also be reconstructed.
RU *(CT Requesting Unit Number)*	0700
Program ID	04 2000 0180
Phase *(PID, PA/ED, PS&E)*	PA&ED and PS&E
Project Engineer or Oversight Engineer *(Name / Phone #)*	Hoa-Anh Le 510-807-1799
Project Manager *(Name / Phone #)*	Keneth Young 510-385-5767
Biologist *(Name / Phone #)*	Nina Hofmarcher (Env Planner) 510-962-070
Hydraulics Contact *(Name / Phone #)*	N/A
Geotechnical Contact *(Name / Phone #)*	N/A
Hazardous Waste Contact *(Name / Phone #)*	Chris Wilson 510-719-7440
PID Due Date *(MM/DD/YYYY)*	09/01/1995 (approved)
PA/ED Due Date *(MM/DD/YYYY)*	4/5/2024
PS&E Due Date *(MM/DD/YYYY)*	1/30/2025
RTL Due Date *(MM/DD/YYYY)*	3/24/2025
Construction Start Date *(MM/DD/YYYY)*	11/3/2025
Construction Completion Date *(MM/DD/YYYY)*	7/1/2027
Number Working Days	300 WDs
Project Brokered? *(Y/N)* **If Yes, which District?**	No
Caltrans responsible for only Oversight? *(Y/N)* **If Yes, which Agency is the sponso**	No
Construction Managed & Administered by Caltrans? *(Y/N)*	Yes
Total Roadway Item Cost ($)	$5 M
Total Structure Item Cost ($)	$80M
Net New **Impervious Area (ac)**- area of added impervious excluding eliminated impervious areas	0
Any Deep Excavation & Dewatering required? *Y/N*	No
Replaced Impervious Surface **-RIS (ac)** ***Area of entire structural Section totally removed*** & replaced	No
Existing Impervious Area (ac)	N/A
404 Permit Required? *(Y/N)* **Reporting or Non-Reporting?***(Check w/ Biologist)*	TBD
1602 Permit Required? *(Y/N) (Check w/ Biologist)*	TBD
Notice of ***ADL*** **Reuse** *(Date)*	N/A
Shoulder Backing Proposed? *(Y/N)*	No
Concrete Work Involved?*(Y/N) If yes, provide the volume*	Yes 5000 CY
PCC Grinding Involved? *If yes, how much?*	No
Total Disturbed Soil Area (DSA) (ac)	N/A
Total Construction Site Area (ac)	N/A. Bridge Maintenance Project
Is there any Landscape Work Involved? *(Y/N)*	No
Contractor's Staging Areas *(Y/N), Area(sqft)*	Barges may be used for staging areas
Contractor's Stockpiling Areas *(Y/N), Area(sqft)*	Barges may be used for stockpiling areas
Number Drainage Inlets within Project Limits	0
Any bridge widening/replacement over a waterbody required? Y/N	No

Construction BMP Estimate

	COST ESTIMATE (WPCP ONLY)						
	Project Description	San Francisco-Oakland Bay Bridge Fender Repair					
	04-COUNTY-ROUTE-PM	04-SF-80, PM 5.7-7.7					
ITEM NO	**STD. PLAN NO**		**ITEM DESCRIPTION**	**UNIT OF MEASURE**	**ESTIMATED QUANTITY**	**ITEM PRICE**	**TOTAL**
1		130100	JOB SITE MANAGEMENT	LS	1	$ 70,000.00	$ 70,000.00
2		130201	PREPARE WATER POLLUTION CONTROL PROGRAM	LS	1	$ 1,700.00	$ 1,700.00
SUPPLEMENTAL ITEMS							
3		066595	WATER POLLUTION CONTROL MAINTENANCE SHARING	LS	1	$ 1,700.00	$ 1,700.00
4		066596	ADDITIONAL WATER POLLUTION CONTROL	LS	1	$ 1,700.00	$ 1,700.00
WATER QUALITY MONITORING ITEMS							
5		131103	WATER QUALITY SAMPLING AND ANALYSIS DAY	EA	220	$ 1,750.00	$ 385,000.00
6		131104	WATER QUALITY MONITORING REPORT	LS	1	$ 8,000.00	$ 8,000.00
7		131105	WATER QUALITY ANNUAL REPORT	LS	1	$ 4,000.00	$ 4,000.00

ATTACHMENT H

TRANSPORTATION MANAGEMENT PLAN DATA SHEET

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

M e m o r a n d u m

Making Conservation a California Way of Life.

To: GORDON W. JEONG
Senior Transportation Engineer
Design South-Special Projects

Date: Mar 29, 2024
File: 04-SF-80
PM 5.7/7.7

EA/Project ID #: 0W140/0420000180

Attn: HOA-ANH LE
Project Engineer

From: RODNEY N. OTO
Senior Transportation Engineer
Highway Operations Branch III (Toll Bridges & Special Studies)
Office of Highway Operations

Subject: **Transportation Management Plan (TMP) Data Sheet**

As you requested, we have revised the TMP Data Sheet for the project to replace the fender system at various locations from the San Francisco anchorage to the Yerba Buena Island anchorage of the San Francisco-Oakland Bay Bridge on Route 80 in San Francisco County.

If you have any questions, please contact Quynh Dong of my staff at (510) 407-6132 or me at (510) 715-8867.

Attachment – TMP Data Sheet

c: File

TRANSPORTATION MANAGEMENT PLAN DATA SHEET

Preliminary TMP Elements and Costs

Project Manager:	Kenneth Young (510) 385-5767
Project Engineer:	Hoa-Anh Le (510) 807-1779
DIST-EA: 04-0W140 PROJECT ID: 04 2000 0180 PROGRAM CATEGORY: Toll Bridges Rehabilitation	
Co-Rte-PM: SF-80-5.7/7.7	
Project Limits: In the City and County of San Francisco at various locations from San Francisco Anchorage to Yerba Buena Island Anchorage.	
Project Description: The project proposes to replace the fender system at Piers 3, 4, 5, and 6 of the San Francisco-Oakland Bay Bridge, West Bay (Bridge No. 34-0003)	
Construction Cost Estimate: $20 M	
Project Phase:	PID ☐ PR ☒ PS&E ☒ _____65___%

Traffic Impact Descriptions

A) Will the proposed project include any closures for which the traffic volume using the facility exceeds the capacity of the lane closures or detours?
Yes ☐ No ☒
[If "No," skip to Item F (Preliminary TMP Elements and Costs).

B) For what types of closures is the capacity expected to be exceeded?
- ☐ Freeway or highway lane closures
- ☐ Freeway or highway shoulder closures
- ☐ Freeway connector closures
- ☐ Freeway off-ramp closures
- ☐ Freeway on-ramp closures
- ☐ Complete freeway or highway closures
- ☐ Local street lane closures

C) Would any of these closures result in significant traffic impacts?[1]
Yes ☐ No ☐
Does the proposed project include any long-term closures?[2]
Yes ☐ No ☐

[1] A significant traffic impact is defined as an individual traffic delay of 15 minutes or more above normal recurrent travel time on the existing facility. Any closure expected to have a significant traffic impact must be approved by the District Lane Closure Review Committee.
[2] A long-term closure is defined as a closure lasting 3 or more days.

D) Are there any construction strategies that can mitigate the delay expected from the closures or restore the existing number of lanes?
(Check applicable strategies)

- ☐ Temporary roadway widening
  Structure involvement? Yes____ No____
  (If yes, notify Project Manager)
- ☐ Lane restriping (temporary non-standard lane widths)
- ☐ Roadway realignment (detour around work area)
- ☐ Median and/or right shoulder utilization
- ☐ Use of an HOV lane as a temporary mixed-flow lane
- ☐ Staging alternatives (explain below)

Notes:

_____
_____
_____

E) Calculated Delays (To be performed if the answer to Item A is "yes.")

1. Estimated maximum individual vehicle delay[3] _____ minutes
2. Estimated daily vehicle-minutes delay[3] _____ veh-min
3. Estimated daily vehicle delay cost[4] $_____
4. Estimated # days of construction-related delays _____
5. Cost of construction-related delays [3 x 4] $_____

F) Preliminary TMP Elements and Cost

1. Public Information
   - ☐ a. Brochures and mailers $_____
   - ☐ b. Press release $_____
   - ☐ c. Paid advertising $_____
   - ☐ d. Public Information Center/Kiosk $_____
   - ☐ e. Public meeting/speakers bureau $_____
   - ☐ f. Telephone hotline $_____
   - ☐ g. Internet $_____
   - ☐ h. Notification to impacted groups $_____
     (Bicycles, Pedestrians with disability, others.)
   - ☐ i. Others: To be determined by PIO $_____

   SUB TOTAL **$**_____

[3] Delay above normal recurrent travel time resulting from temporary construction closures.
[4] Use value of time: $0.31/veh-min (auto); $0.60/veh-min (truck).

2. Traveler Information strategies
   - ☐ a. Changeable Message Signs (Fixed) $_____
   - ☐ b. Changeable Message Signs (Portable) $_____
   - ☐ c. Ground-mounted signs $_____
   - ☐ d. Highway Advisory Radio $_____
   - ☐ e. Caltrans Highway Information Network (CHIN) $_____
   - ☐ f. Detour maps (i.e. bicycle, vehicle, pedestrian) $_____
   - ☐ g. Revised transit schedules/maps $_____
   - ☐ h. Bicycle community information $_____
   - ☐ i. Other: _____ $_____

   SUB TOTAL **$**_____

3. Incident Management
   - ☐ a. COZEEP $_____
   - ☐ b. Freeway Service Patrol $_____
   - ☐ c. Traffic Management Team $_____
   - ☐ d. Helicopter surveillance $_____
   - ☐ e. New monitoring stations (CCTVs and Detectors) $_____
   - ☐ f. Other: _____ $_____

   SUB TOTAL **$**_____

4. Construction Strategies (In addition to elements identified in Item D)
   - ☐ a. Off peak/night/weekend work (Lane requirements charts) $_____
   - ☐ b. Reversible lanes/Contra-flow $_____
   - ☐ c. Complete facility closure $_____
   - ☐ d. Extended weekend closure $_____
   - ☐ e. Truck traffic restrictions $_____
   - ☐ f. Reduced speed zone $_____
   - ☐ g. Connector and ramp closures $_____
   - ☐ h. Maintain traffic _____
   - ☐ i. Incentive and disincentive $_____
   - ☐ j. Moveable barrier $_____
   - ☐ k. Other: _____ $_____

   SUB TOTAL _____

TRANSPORTATION MANAGEMENT PLAN DATA SHEET

Preliminary TMP Elements and Costs

5. Demand Management
   - ☐ a. HOV lanes/ramps (new or convert) $_____
   - ☐ b. Park and Ride Lots $_____
   - ☐ c. Rideshare Incentives $_____
   - ☐ d. Variable work hours $_____
   - ☐ e. Telecommute $_____
   - ☐ f. Ramp metering (new Installation) $_____
   - ☐ g. Ramp metering (maintain existing) $_____
   - ☐ h. Others _____ $_____

   SUB TOTAL **$**_____

6. Alternate Route Strategies
   - ☐ a. Add capacity to freeway connector $_____
   - ☐ b. Street improvement (Widening, traffic signal, etc) $_____
   - ☐ c. Traffic control officers $_____
   - ☐ d. Parking restrictions
   - ☐ e. Others $_____

   SUB TOTAL **$**_____

7. Other Strategies
   - ☐ a. Application of new technology $_____
   - ☐ b. Others $_____

   SUB TOTAL **$**_____

8. The Project includes the following closures: (Check applicable type of facility)
   - ☐ a. Freeway or highway lane closures
   - ☐ b. Freeway or highway shoulder closures
   - ☐ c. Freeway or highway complete closures
   - ☐ d. Freeway on/off-ramp lane/shoulder closures
   - ☐ d. Freeway on/off-ramp complete closures
   - ☐ e. Freeway connector Lane closures
   - ☐ e. Freeway connector complete closures
   - ☐ f. Local street lane closures
   - ☐ f. Local street complete closures
   - ☐ g. Prolonged Ramp closures

TRANSPORTATION MANAGEMENT PLAN DATA SHEET

Preliminary TMP Elements and Costs

9. Major operations requiring traffic control and working days for each

Operation	# of Working Days	# of Traffic Control Days
☐ a. Clearing and grubbing		
☐ b. Existing feature removal		
☐ c. Embankment excavation		
☐ d. Structural section construction		
☐ e. Drainage feature construction		
☐ f. Structures construction		
☐ g. MGS/barrier construction		
☐ h. Striping/pavement marking		
☐ i. Electrical component construction		
☒ j. Other		
Total days		0

TOTAL ESTIMATED COST OF TMP ELEMENTS 0

Note: Major TMP may be required for significant traffic impacts.

Prepared By:

Quynh Dong
(Print Name)

Quynh A Dong Date 03/29/2024
(Signature)

Approval Recommended By:

Rodney N Oto
(Highway Operations/TMP Branch Chief Name)

Rodney N Oto Date 3/29/2024
(Signature)

ATTACHMENT I

RISK REGISTER

RISK REGISTER LEVEL	2	PROJECT NAME	Bay Bridge Fender Replament Project		DIST-EA	04-0W140 (0420000180)	Project Manager	Kenneth Young	RISK MANAGER	Gurmukh Thiara		TOTAL COST (Capital +Support)		$0.00
PROJECT PHASE	PA&ED	PDT MEMBERS			RISK ASSESSMENT INFORMATION							TOTAL DAYS (Construction + Initial review (30 days)+ Closeout (60 days))		290
Risk Identification					Probability	Cost Impact		Time Impact		Phase	Capital / Support	Individual Risk	Risk Response			
Status	ID #	Category	Title	Risk Statement	Current Status/ Assumptions	Rating	Rating	Score	Rating	Score	ENG / CON	C/S	Rationale	Strategy	Response Actions	Risk Owner	Updated
Active	1	Construction	Material Procurement	Procurement of fender material may have longer lead time than expected, leading to additional non working time during construction resulting In additional project cost & delays.	Procurement for material may take longer time during constructon delaying the constructlon completion schedule.	2-Low	02-Low	4	04-Moderate	8	CON	S	Based on input of PDT and Department's experience with past projects of similar nature.	Mitigate	Construction to work with contractor for the timely procurement of materials.	Construction	3/15/2024
Active	2	PM	IIJA Funding	Unavailabilty and delay in securing project funding can cause project construction be delayed which may result in additonal cost.	Project construction capital is expected to be funded through IIJA program.	2-Low	02-Low	4	02-Low	4	CON	C	Based on input of PDT and Department's experience with past projects of similar nature.	Accept	PM to work closely with program advisor for the timely approval of funds. If IIJA funding is not approved, PM to elevate the matter to management and explore other possible options.	PM	3/15/2024
Active	3	Construction	Possible Maritime Traffic Impact	Project activities may impact movement of vessels travelling under the bridge leading to need for additional measures to facilitate traffic during construction, resulting in additional costs to the project.	Construction activities may restrict movement of big barges through the area.	2-Low	01-Very Low	2	01-Very Low	2	CON	C	Based on input of PDT and Department's experience with past projects of similar nature.	Accept	Field conditions will be assessed during PS&E and appropriate measures will be incorporated in project plans. If any need for additional measures arises during constriction, RE to work with contractor to resolve by using project contingency funds.	Construction	3/15/2024
Active	4	Construction	Weather Delays	Unsual rain event or inclement weather conditions may cause delay during construction resulting in additional cost.	Extreme weather conditions may limit contractor to perform certain construction activities.	3-Moderate	02-Low	6	04-Moderate	12	CON	S	Based on input of PDT and Department's experience with past projects of similar nature.	Mitigate	If weather related delays push construction for another season, PM to work on plans to secure extra funding to cover any additional costs.	Construction	3/15/2024
Active	5	Construction	Additional Unsound Concrete	Unanticipated unsound concrete may be discovered during fender replacemnet activities leading to additional required repair work resulting to an increase of project cost not accounted for in the project estimates.	PDT mentioned the possibility of unsound concrete. Additional concrete spalling may be found during construction.	3-Moderate	04-Moderate	12	04-Moderate	12	ENG	C	Based on the input from PDT.	Mitigate	Design to perform field inspections to determine the condition of the existing structure and include any needed repairs in contract plans. If any unanticipated unsound concrete is encountered during construction, contingency funds will be utilized to cover the additional cost.	Design	3/15/2024
Active	6	Environmental	Hazardous Material	Unanticipated hazardous materials encountered during construction may require mitigation, removal and disposal resulting in additional cost and schedule delays.	Coal tar coating may increase the risk of human cancer in very high concentrations.	2-Low	04-Moderate	8	04-Moderate	8	CON	C	Based on input of PDT and Department's experience with past projects of similar nature.	Accept	Hazardous material assessment will be made during PS&E phase. If any unanticipated hazardous materials are encountered during construction, RE to work with Environmental and use contingency funds to cover any additional cost.	Environmental	3/15/2024
Active	7	Construction	Nesting Birds	Nesting birds, protected form harassment under the Migratory Bird Treaty Act, may delay construction during the nesting season.	The probability of nesting birds is low due to constant bridge maintenance before construction.	3-Moderate	02-Low	6	04-Moderate	12	CON	S	Based on previous CT projects.	Mitigate	This risk is to cover the cost associated with nesting birds during construction. Preventive measures will be applied to work locations prior to nesting season.	Construction	3/27/2024

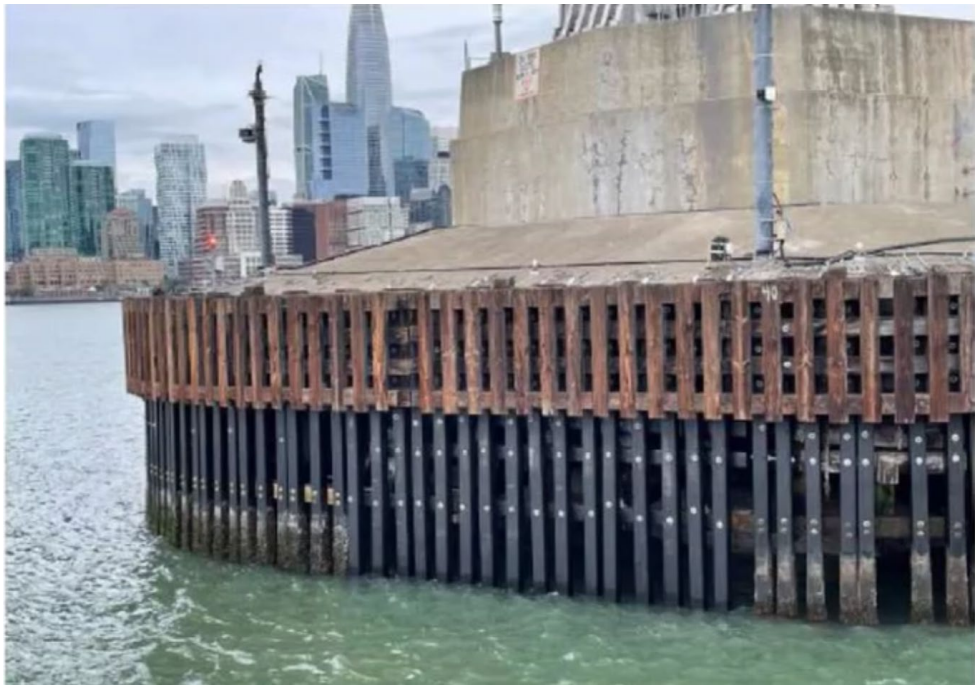
Printed Date: 4/4/2024

RISK REGISTER LEVEL	2	PROJECT NAME	Bay Bridge Fender Replament Project		DIST-EA	04-0W140 (0420000180)	Project Manager	Kenneth Young	RISK MANAGER	Gurmukh Thiara		TOTAL COST (Capital +Support)		$0.00
PROJECT PHASE	PA&ED	PDT MEMBERS			RISK ASSESSMENT INFORMATION							TOTAL DAYS (Construction + Initial review (30 days)+ Closeout (60 days))		290
Risk Identification					Probability	Cost Impact		Time Impact		Phase	Capital / Support	Individual Risk	Risk Response			
Status	ID #	Category	Title	Risk Statement	Current Status/ Assumptions	Rating	Rating	Score	Rating	Score	ENG / CON	C/S	Rationale	Strategy	Response Actions	Risk Owner	Updated
Active	8	Construction	Seismic Event During Construction	Major seismic occurrence during construction may occur leading to project delays and/or increase in scope resulting in additional project cost and time.	In the event of seismic activities, Structure Construction will coordinate with the contractor, SM&I, DES and PIO.	1-Very Low	01-Very Low	1	01-Very Low	1	ENG	C	Based on previous CT projects.	Accept	Delay to the construction and installation schedule.	Design	3/27/2024
Active	9	Construction	Time-Related Overhead (TRO)	This project is schedule dependent. Any unexpected delay would delay construction activities on critical path resulting in TRO overhead increases.	TRO contingency to be increased for the sum of all contract items, supplemental work and contingencies.	2-Low	02-Low	4	02-Low	4	CON	C	Based on input of PDT and Department's experience with past projects of similar nature.	Accept	This risk is to cover any additional cost associated with contractor TRO.	Design	3/27/2024
Active	10	Construction	Work site accident	Vessel collision during construction when existing fenders are removed	In the event of allision, Structure Construction will coordinate with the contractor, DES and PIO.	1-Very Low	01-Very Low	1	01-Very Low	1	CON	C	Based on previous CT projects.	Mitigate	Contractor shall develop a site safety plan that details the procedures necessary to ensure the work site is protected from shipping traffic and all workers have the proper safety training.	Construction	3/27/2024
Active	11	Design	Change in governing regulations/guidelines	Unexpected changes in regulatory requirements may delay awarding the contract and increase the project cost and time.	Construction will have to alleviate issue from FHWA\, USCG, BCDC and other regulatory agencies. D4's maintenance permit from BCDC is due for renewal	2-Low	02-Low	4	02-Low	4	CON	C	Based on input of PDT and Department's experience with past projects of similar nature.	Accept	Delay to the project from new compliance to the updated regulatory requirements.	Design	3/27/2024
Active	12	Construction	Disruption by Protest and Media Coverage (PIO)	Unexpected public protests and media's curiosity may lead to the delay in construction activities resulting in project cost and time.	Concern from the public may impact the project schedule with delay. Public protests on the SFOBB or on water may also impact project schedules with delays.	2-Low	02-Low	4	02-Low	4	CON	C	Based on input of PDT and Department's experience with past projects of similar nature.	Mitigate	Delay to the construction and installation schedule. Design, Construction, and PIO will work together with news media about pending road closures and impacts.	Construction	3/27/2024
Active	13	Design	Discrepancy in Project Plans	Discrepancy between actual as-built details/conditions and plans may delay awarding the contract and increase the project cost and time.	Information on the plans may not correspond with as-built conditions.	2-Low	02-Low	4	02-Low	4	CON	C	Based on input of PDT and Department's experience with past projects of similar nature.	Avoid	Verify that the plans are full, complete, and accurate according to the project scope. Field modification may be necessary during construction.	Construction	3/27/2024
Active	14	PM	COS costs due to delay	Additional support costs will be needed if the project is delayed during the construction phase.	These are unanticipated COS costs expended by the construction inspection team due to changes and workday delays to the project.	2-Low	02-Low	4	02-Low	4	CON	C	Based on input of PDT and Department's experience with past projects of similar nature.	Avoid	PM to work closely with the Construction team for the timely approval of funds.	PM	3/27/2024

ATTACHMENT J

VALUE ANALYSIS STUDY

Final Value Analysis Study Report



D-4 I-80 Bridge Fender System Replacement

EA 0W140 PN 0420000180

SF-0620-080

Contract No. 53A0248

Task Order No. 1419

May 2024

Prepared by
Value Management Strategies, Inc.

Value Management Strategies, Inc.

Date: May 15, 2024

To: Binh Dang, District 4 DVAC

Subject: Final VA Study Report

D-4 I-80 Bridge Fender System Replacement (T.O 1419)

Dear Mr. Dang

Value Management Strategies, Inc. is pleased to submit this Final VA Study Report for the referenced project. This report summarizes the results and events of the virtual study conducted February 5–8, 2024, using the Microsoft Teams virtual meeting platform for District 4, California.

It was a pleasure working with District 4 on this project, and I look forward to the next one. If you have any questions or comments concerning this preliminary report, please do not hesitate to contact me at 760-741-5518 ext. 110 or email rob@vms-inc.com.

Sincerely,

Value Management Strategies, Inc.

Rob Stewart, CVS-Life, PMP, PMI-RMP, FSAVE
VA Study Team Leader

Copy: (PDF) Addressee
(PDF) Jarek Kusz, Office of Innovative Design and Delivery
(PDF) Erika Barrick, HQ VA Program Administrator

TABLE OF CONTENTS

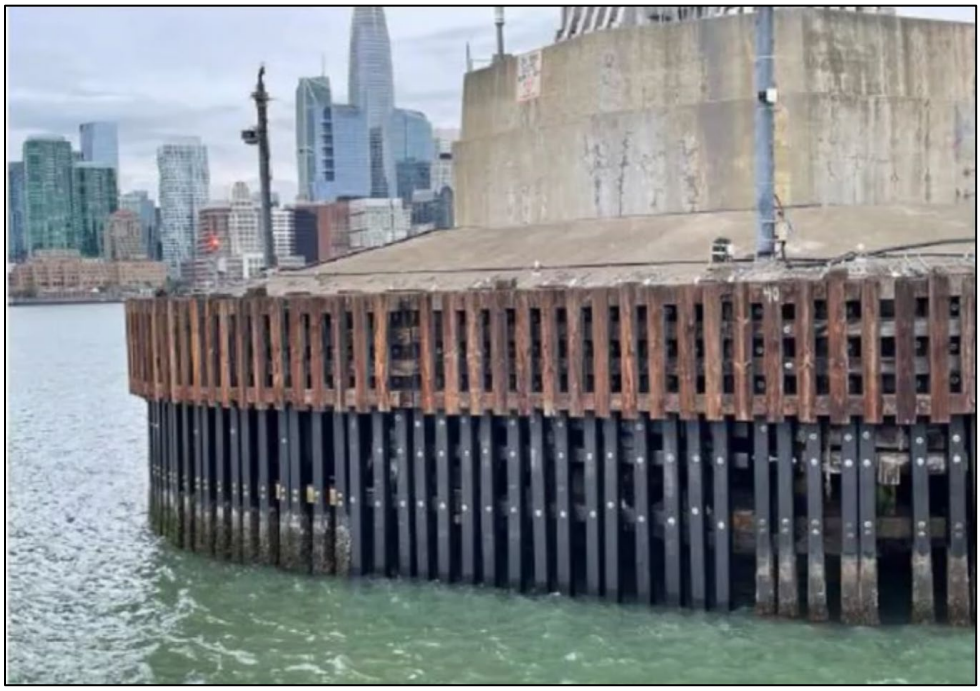
FINAL

VA STUDY SUMMARY REPORT

FINAL RESULTS

VA Study Summary Report – Final Results
D-4 I-80 Bridge Fender System Replacement

PN 0420000180
EA OW140
04-SF-080
Route 080



A virtual Value Analysis (VA) study, sponsored by the California Department of Transportation (Caltrans) District 4 and facilitated by Value Management Strategies, Inc. (VMS), was conducted for the West Span SFOBB Fender System Replacement located in San Francisco, California. The workshop was facilitated February 5–8, using the MS Teams virtual meeting platform. This *VA Study Summary Report – Final Report* provides an overview of the project, key findings, and the alternative developed by the VA team.

PROJECT SUMMARY

The project involves the replacement of the wooden and plastic fender system that protects the piers from vessel collision and the reconstruction of the concrete skirt to which the fender system is attached at Piers W3 through W6. The replacement fender system must have sufficient energy absorption capabilities to reduce the impact energy transferred to the piers during a vessel allision to a level below the structural capacity, while reducing the impact energy absorbed by the vessels as much as practical to reduce the probability of vessel damage. Also, the replacement fender system must allow for easy repair and replacement, whether portions of it or the entire system, in the event of damage during an allision. Lastly, the replacement fender system must be resistant to corrosion since it will be within the marine splash zone.

The baseline concept uses fiberglass-reinforced plastic (FRP) walers and posts that will be attached to the reconstructed concrete skirt. The fender system allows for replacement and repair in the event of localized damage during a vessel allision. The current escalated total project cost is estimated to be **$93,000,000.**

VA STUDY TIMING

The VA study was conducted during the PA&ED phase of the project, which is to be completed in March 2024. The project is scheduled for Ready to List (RTL) in March 2026 and Construction Completion is scheduled for 2027.

PROJECT PURPOSE AND NEED

The purpose of this project is to protect the San Francisco-Oakland Bay Bridge (SFOBB) from damage caused by an allision by replacing the deteriorating fender system with a new one that will improve energy dissipation and also potentially reduce damage to affected marine vessels.

The project is needed because a functional fender system is required under federal regulations and under the jurisdiction of the United States Coast Guard (USCG). The fender system is an integral part of the bridge since it provides protection for the piers against vessel allision. In a structure design perspective, the fender system is intended to dissipate sufficient energy during an allision so that the structural capacity of the pier is not exceeded. Considering the lifeline status of the SFOBB corridors and the massive vessel traffic that navigates across the San Francisco Bay, it is of critical importance that the fender system protecting the piers be reconstructed to an acceptable standard. This will ensure that the bridge piers are adequately protected against catastrophic damage, and the risk of vessel damage during an allision is reduced.

VA STUDY OBJECTIVES

The objectives of the VA study were to:

1. Analyze the current project design, estimate, and schedule
2. Provide possible cost and/or schedule saving recommendations
3. Provide performance improvement recommendations

KEY PROJECT ISSUES

The items listed below are the key drivers, constraints, or issues being addressed by the project and considered during this VA study to identify possible improvements.

- The footprint of the fender system cannot change due to environmental impacts without voiding the permit.
- There is an existing permit that allows "in-kind" replacement of the fender system. This permit expires in June 2024. Caltrans is currently seeking an extension.
- There is currently a Director’s Order to ensure that the existing system be secured to prevent fender segments from falling off into San Franscisco Bay.
- There are potential issues with barnacles building up on fenders and increasing stress on structural supports.
- The new fender system must be designed to reduce damage to vessels impacting the fender system.
- There is a need to maintain adequate navigational clearance while construction is ongoing.

EVALUATION OF BASELINE CONCEPT

During the VA study, a number of analytical tools and techniques were applied to develop a better understanding of the baseline concept. A major component of this analysis was Value Metrics, which seeks to assess the elements of cost, performance, time, and risk as they related to project value. These elements require a deeper level of analysis, the results of which are detailed in the *Project Analysis* section of this report. The key performance attributes identified for the project are listed in the table, "Performance Attributes." A summary of the major observations and conclusions identified during the evaluation of the baseline concept, which led the VA team to develop the alternatives and recommendations presented in this report follows.

Performance Attributes
Environmental Impacts
Construction Impacts
Allision Performance
Maintainability

The stakeholders rated the four performance attributes identified as each having a major contribution to the success of the project. Through a paired comparison process, study participants determined that Allision Performance was weighted the highest at 31% as the project is primarily about protecting the bridge and vessels involved in an allision. Construction Impacts and Environmental Impacts were rated on the next tier of importance at 26% and 25%, respectively. Maintainability was weighted the lowest at 18%.

The initial evaluation of the current basis, or baseline concept, for the project by the stakeholders determined that it represents an effective and responsible approach to replacing the aging fender system while fulfilling the purpose and need of the project in a very conventional and proven way. Although there are still some details that need to be further developed, the four performance attributes scored higher than typical projects of this nature and prove that a great deal of work and effort have been applied to the current design. The baseline concept should provide adequate protection to the bridge in the event of an allision while improving the durability and maintainability of the fender system using an economical design.

Overall, the stakeholders concluded that this baseline concept for the project was good and addressed many of the key concerns admirably; however, there is still room for potential project value improvement, especially regarding improving the maintainability of the fender system.

FINAL VA STUDY RESULTS

An Implementation Meeting was held on April 29, 2024 with members of the PDT in attendance. The stakeholders accepted all three of the VA team's proposed VA alternatives for improvement of the project. Below are the accepted VA alternatives along with their associated potential initial cost savings, potential change in schedule, performance change, and a brief discussion of each.

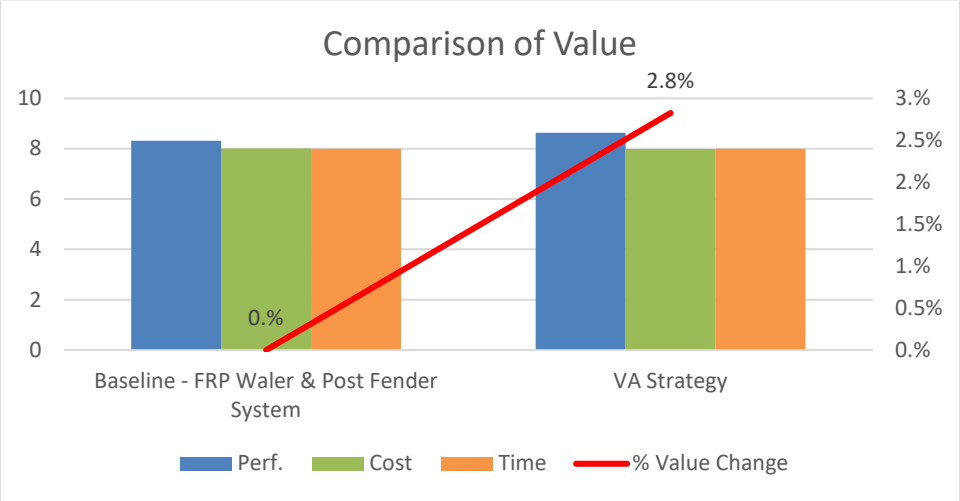
Alternative No. and Description	Initial Cost Savings	Change in Schedule	Change in Performance
1.0 Consider alternative fastener materials to improve corrosion resistance	**$120,000**	**No change**	**+ 1.1 %**
The baseline concept specifies the use of se ASTM A193 B8 Class 2 stainless steel fasteners. The alternative concept proposes to consider using fasteners made of more corrosive resistant, higher tensile materials such as monel, titanium, or a higher-grade stainless steel. Based on the VA team's initial analysis, it appears that titanium Grade 5 hardware would provide the best value in terms of price, tensile strength, and corrosion resistance. The PDT will work with METS and SOE to further evaluate this alternative.			
2.0 Consider ChromX-4100 for concrete skirt reinforcement	**No change**	**No change**	**+ 0.4 %**
The alternative concept proposes to use ChromX-4100 steel reinforcement in lieu of epoxy coated reinforcement in the concrete skirt. ChromX-4100 reinforcement is expected to achieve a 100-year service life. The PDT will investigate ways to articulate the specifications to allow for ChromX.			
3.0 Procure additional specialty fender components for future maintenance	**($1,500,000)**	**No change**	**+ 2.1 %**
The baseline concept proposes to procure fender materials (Rubber Fender Units, FRP Fender elements, and corrosion resistant hardware) based on the total quantities required for the project. The alternative concept proposes to procure additional rubber fender materials in this project for use in future repairs. The VA team noted that many of the FRP, rubber, and specialty fasteners are long-lead items. Having a small amount on-hand will improve the response time for repairs for Caltrans Maintenance. The PDT will continue to evaluate this option.			

Summary of Accepted VA Alternatives

Strategy Description	Initial Cost Savings	Change in Schedule	Change in Performance	Value Change
Accepted VA Alternatives *VA Alternatives 1.0, 2.0, and 3.0*	**($1,380,000)**	**No change**	**+ 3.8 %**	**+ 2.8 %**

Note: Because the cost data depicted above represents savings, a number in parentheses represents a cost increase.

Comparison of Value –
Baseline Concept & Accepted VA Strategy



VA TEAM

VA Study Team

Name	Organization	Title
Robert Stewart	VMS, Inc.	VA Study Facilitator
Karl Cruz	Caltrans – District 4	SM&I Bay Toll – Design
Edward Bin Mu	Caltrans – District 4	Structures Design
Kenenth Young	Caltrans – District 4	Project Manager
Gordon Miyachi	Caltrans – District 4	Structures Construction
Keith Merkel	Merkel & Assoc.	Marine Biologist

Key Project Contacts

Name	Organization	Title
Kenneth Young	Caltrans – District 4	Project Manager
Karl Cruz	Caltrans – District 4	SM&I Bay Toll – Design
Binh Dang	Caltrans – District 4	DVAC

VA ALTERNATIVES

The results of this study are presented as individual alternatives to the baseline concept. Each alternative consists of a summary of the baseline concept, a description of the suggested change, a listing of its advantages and disadvantages, a cost comparison, change in performance and value, discussion of schedule and risk impacts (if applicable), and a brief narrative comparing the baseline concept with the alternative. (Please refer to the *Project Analysis* section of this report for an explanation of how the performance attributes and value are calculated.) Sketches, calculations, and performance attribute ratings are also presented where applicable. The cost comparisons reflect a similar level of detail as in the baseline estimate.

PROPOSED VA ALTERNATIVES

Alternative No. & Description	Initial Cost Savings	Change in Schedule	Performance Change	Value Change
1.0 Consider alternative fastener materials to improve corrosion resistance	$120,000	No change	+ 1.1 %	+ 1.1 %
2.0 Consider ChromX-4100 for concrete skirt reinforcement	No change	No change	+ 0.4 %	+ 0.4 %
3.0 Procure additional specialty fender components for future maintenance	($1,500,000)	No change	+ 2.1 %	+ 1.2 %

Note: Because the cost data depicted above represent savings, a number in parentheses represents a cost increase.

OTHER CONSIDERATIONS

The VA team identified three design suggestions, relatively general in nature, for consideration by the PDT. More detailed descriptions can be found in the following pages of this report.

Alignment with Safe System Objectives

The VA process considers the degree to which the baseline concept and VA alternatives align with and support the five USDOT Safe System objectives for all road users. These objectives include:

Safe Road Users focuses on people and behaviors with the goal to support safe, responsible behavior by people who use the roads; this prioritizes their ability to reach the destination unharmed. This often takes the form of improvement through clear signage, roadway facilities that are consistent with expectations, and items that affect driver behavior and predictability.

Safe Vehicles expands the availability of vehicle systems and roadway features that facilitate the operation of safer vehicles; this additionally aims to help prevent crashes and minimize the impact of crashes for both occupants and non-occupants. This currently focuses primarily with transportation management systems (TMS) and its communication with drivers in addition to shoulder width accommodations for law enforcement, EMS, and distressed vehicles.

Safe Speeds promotes safer speeds in all roadway environments through a combination of thoughtful, context-appropriate roadway design, targeted education and outreach campaigns, and enforcement. This category often includes aspects such as signage, traffic management, and road characteristics including speedbumps, roundabouts, crosswalks, etc.

Safe Roads aims to mitigate human mistakes and account for injury tolerances, encourage safer behaviors, and facilitate safe travel for the most vulnerable users. This encompasses the geometry and logistics of a roadway with items such as roadway sight distance, stopping sight distance, shoulder and buffer widths, and roadway delineation.

Post-Crash Care provides roadway features that support post-crash care and enhances the survivability of crashes through expedient access to emergency medical care while simultaneously creating a safe working environment for vital first responders. This also helps prevent secondary crashes through robust traffic incident management practices. This category often encompasses features such as shoulder width suitable for supporting first responders and emergency vehicle turn-arounds, pullouts, or other access points.

The baseline concept for the project was assessed by the project team and is included in the *Project Analysis* section of this report. Each VA alternative was assessed by the VA team with respect to its influence on alignment with Safe System objectives and is included in each VA alternative form.

SUMMARY OF PERFORMANCE IMPROVEMENTS

The Caltrans HQ VA Program requires the following information to enable reporting of performance to the FHWA. Only the six standard Caltrans performance attributes, shown in the table below, are to be documented. Caltrans does not require reporting of the performance of any other attributes utilized in this study.

Summary of Proposed VA Alternative Performance Improvements

Alt. No.	*Multi-Modal Connectivity*	*Long-Term Environmental Impacts*	*Construction Impacts*	*Traffic Operations*	*Maintainability*	*Project Schedule*
1.0					Improved	
2.0					Improved	
3.0					Improved	

Summary of Accepted VA Alternative Performance Improvements

Alt. No.	*Multi-Modal Connectivity*	*Long-Term Environmental Impacts*	*Construction Impacts*	*Traffic Operations*	*Maintainability*	*Project Schedule*
1.0					Improved	
2.0					Improved	
3.0					Improved	

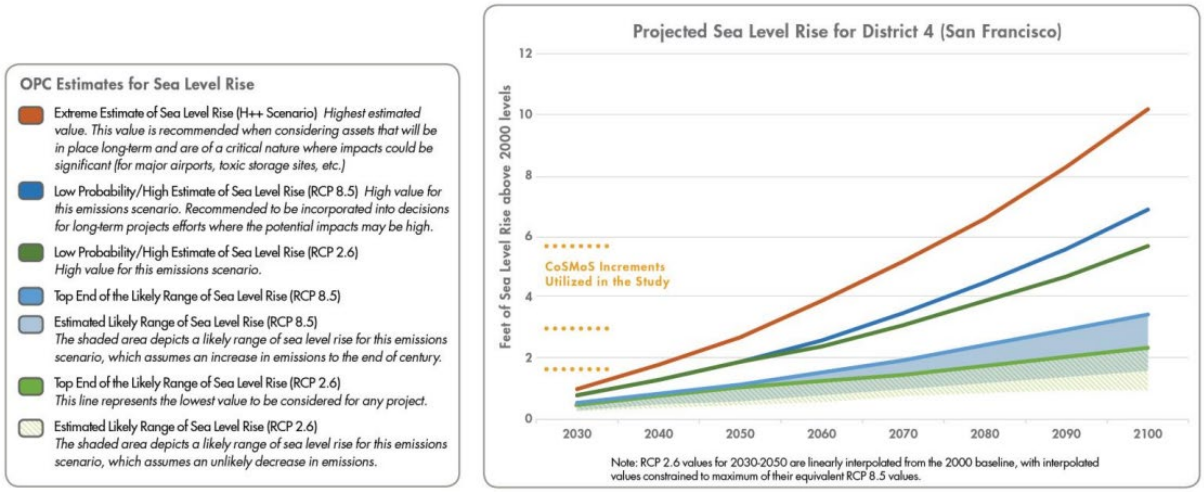
OTHER CONSIDERATIONS

AV-1 Review the impact of sea-level rise on the project

The VA team evaluated the potential impact of sea level rise to the fender system replacement. The current design concept is currently increasing the height of the concrete skirt edge by about 4 feet to accommodate the rubber fender elements.

The figure below, taken from the Caltrans Climate Change Vulnerability Assessments, January 2018, suggests that an approximately 5-foot rise in sea level could be expected by 2070.

FIGURE 6: OPC 2018 DRAFT GUIDANCE SEA LEVEL RISE PROJECTIONS



Note: The OPC guidance outlines an approach for incorporating sea level rise into planning, permitting, and investment decisions which recognizes the uncertainties for future SLR. The sea level rise estimates shown above are the values the guidance identifies that practitioners should consider. When making decisions, practitioners are advised to address the impacts of various water levels on project alternatives, identify possible adaptive designs that can be altered to adjust to changing future conditions, and consider the risk tolerance for assets. This approach is recommended for Caltrans assets, and a design approach that includes these considerations is outlined on page 32 of this document.

The current mean high high-water elevation is at EL 5.9 feet. The existing top of the concrete skirt is at EL 19.38 feet. The proposed repairs to the concrete skirt would increase the top of the outer edge to El. 23.33 feet. Therefore, the VA team assumes that there would be no additional benefit in terms of protecting the bridge piers by further increasing the height of the new top of skirt.

AV-3 Consider using CMGC for the project

The VA team reviewed the possibility of using the construction manager/general contractor (CMGC) project delivery method for this project. The alternative concept will require coordination with District 4 (D4) PPM, D4 Design, SM&I, D4 Construction, HQ OIDD, and D4 CSU to determine the feasibility of this approach.

The VA team noted some additional advantages and disadvantages of using CMGC for this project:

Advantages:

- Potential for contractor innovation
- Could mitigate cost and schedule risks
- Allows for early input from the Contractor

Disadvantages:

- Very intensive contract administration effort by the Department
- Additional available funding from BATA is needed for pursuing CGMC and ICE
- Increase support to construction cost ratio
- Length duration to achieve RTL before February 2026 and, therefore, could potentially lose the IIJA funding

This concept was further explored with HQ Alternative Delivery personnel (Belinda Hon and Jarek Kusz). The following talking points emerged from the discussion:

- The timing of bringing on a CMGC for this project should not cause a schedule problem.
- A potential concern with CMGC workload capacity is that it would require District 4 to manage the contract.
- CMGC could have some benefits in securing construction permits for in-water work. Design-Bid-Build would require a broader environmental footprint whereas a CMGC can help more narrowly focus the permit.
- CMGC could have an early work package for material procurement for longer lead items (specialty connectors, FRP elements, etc.).
- There would also be some advantages in timing in-water work windows.

The CMGC approach could represent a significant impact to the project schedule's critical path. OIDD and D4 CSU lack the resources to quickly advertise and award the CMGC and ICE contracts. This project must be RTL by February 2026, per funding allocation requirement of the Infrastructure Investment and Jobs Act (IIJA). The schedule impact is, therefore, assumed to be significant.

AM-13 Marine fouling considerations for west span SFOBB fendering systems

Marine growth on the SFOBB has added surface area, volume displacement, and roughness to the existing fendering system on the bridge. This growth does not pose a significant physical concern for the structure materials but does increase the overall horizontal shear force due to tidal exchange and vessel wake passing at the bridge, as well as increasing the vertical load on the fendering members. There is some concern that this additional drag may be causing damage to the fender system on the present fender system. With plans to replace this fendering system, questions have arisen about whether the effects to the structure resulting from marine growth, often referred to as barnacles in discussions but actually comprised of many different organisms, can be mitigated within the new design.

Characteristics of Marine Growth on Structures

Marine growth on structures can generally be characterized by organism composition. Factors influencing the makeup of the communities comprising marine growth include water chemistry, water motion, light levels, and inundation frequency. More quiescent waters with low light levels and relatively stable marine salinities tend to support an encrusting cryptic community dominated by sponges, bryozoans, hydroids, and mollusks among other sessile organisms. This community is often termed a fouling community and is found below the fendering system deep down on the bridge abutments. They do not have a bearing on the fendering system, so they are not discussed further here. Within the fendering system environment, communities occur in shallow subtidal and intertidal environments. These include both areas of high and low light exposure depending upon the orientation of the structure on which the growth occurs and the exposure face of the surface. Because the marine growth occurs in areas that are near the water surface, the area experiences variation in submergence, high wave/wake influence, periods of depressed salinity and desiccation stress, and variable levels of light exposure depending on position on the fendering system. These communities tend to be very diverse and structurally complex. They are dominated by barnacles (sessile crustaceans), mussels (bivalve mollusks), encrusting bivalves (oysters and rock scallops), tube worms, and various cryptic hydroids and bryozoans as well as mobile organisms. Algae can be a major element within this zone, growing on the exposed portions of a structure.

The exposure and orientation of the base structure on which growth occurs influences the characteristics of the community developing on the surface and the extent of growth. To a large degree, the thickness of marine growth is self-regulating and is influenced by multiple factors. These include a limitation on the degree of adhesion possible by anchoring organisms. The shear stresses the mass of growth, density and non-density dependent mortality factors, and the composition of the growth. Marine growth develops from organisms that settle on primary substrate (e.g., bridge fendering system); as these organisms grow, they become substrate for other organisms. This process continues as organisms grow on organisms. The result of this growth is an increase in thickness and increase in roughness and shear stress under different loading. Concurrently organisms in the core of the growth are smothered or starved by organisms growing on the outer margins. This results in their death and a weakening of the

adherence of dead or dying organisms to the structure. In the case of barnacles, the cement is comprised of lipids and hydroxylated proteins while mussels extrude byssal threads comprised of extracellular collagenous proteins. Growth in barnacles continues to expand the footprint of adhesion, while post-mortem degradation of the carbonate skeleton weakens the adhesion. Live mussels continuously extrude new byssal threads to replace broken and degrading threads or to resecure the mussel when partially torn loose from a structure. As these primary anchoring organisms die, the adhesion weakens and large blocks of the growth dependent on the anchoring to the primary substrate or to other organisms rips off and falls to the bay floor. The propensity for mass loss in marine growth increases with thickness and changes seasonally with changing environmental stress, such as storms or macroalgal growth, or stresses that lead to large mortality events (e.g., freshwater pulses, desiccation stress).

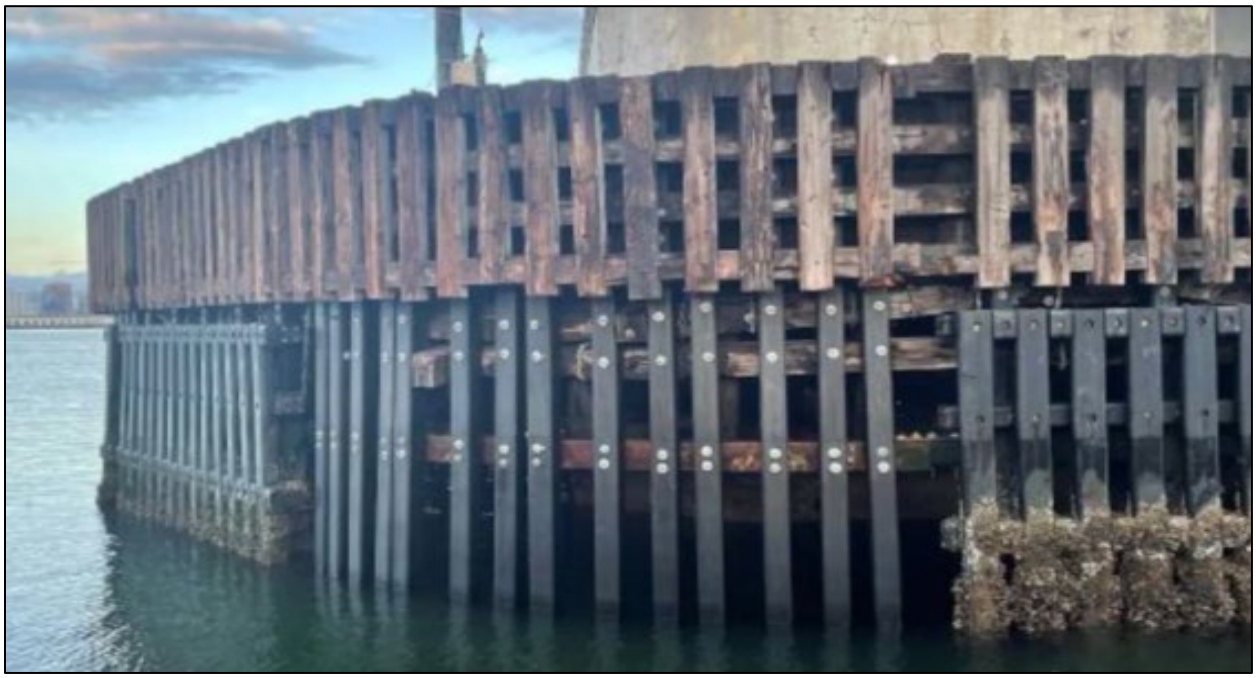
Because of an inverse correlation between growth mass and tear off, the scale of marine growth is self-limiting. Typical growth within an energetic exposed environment within an enclosed bay (e.g., exterior vertical surface on a bridge) extends to a thickness of about 2 inches before regular loss through mechanical stresses (shear) will begin to be a common occurrence. Other damage, such as impact scraping, is generally unrelated to thickness of growth. Growth from the base structure can extend greater than 2 inches out. It is not uncommon to find built up growth, particularly supporting young bay mussels, which extends 4–6 inches out from the structure; although, rigid marine growth extending as much as 6 inches from the primary substrate is rare within environments of high flow velocity or wave/wake energies. Algal growth may extend this width even further, but the low shear and elasticity of the algae generally results in much lower stress on the base of the growth than does more rigid invertebrate growth form.

The prior discussion typically identifies the range of marine growth common on structures exposed to high to moderate hydrodynamic energies to range from 2–6 inches, with a typical maximum thickness closer to 4 inches than 6 inches in extension from the base substrate. However, it is worth noting that this growth is principally limited by shear stress and that in areas where shear is reduced, growth may be greater. However, where shear is reduced, so is the relevance of marine growth on drag against the structure.

Recommendations to Minimize Structure Damage from Marine Growth

As noted, marine growth results in effectively increasing the diameter of structural members from a drag perspective but does not result in an increase in structure strength. Extra-loading can result in greater stress of the members when loaded by waves/wakes and currents. This can exacerbate failure of the structure members exposed to loading. In the case of the existing fendering design on the west span of the SFOBB, fender member posts extend into the water as individual vertical units at the most exposed faces of the fender system. This means that each post is independently exposed to drag forces. The greatest forces would be experienced by the leading edges, particularly corners of the fenders, with the least drag being experienced on the side members of the fenders. As this force is experienced, it not only creates potential breakage of the fendering system, but also would be expected to spread gaps between member

elements allowing for additional marine growth to start to expand connection joints between members.



Existing SFOBB west span fendering system, following recent temporary repairs; this shows the back brace supported vertical fender posts with marine growth, and the single layer temporary repair members

To combat the stress of loading of elements, it would be beneficial to change the orientation of the exposed face from vertical to horizontal members and extend the facia to below the low tide levels. This would serve to both tie the vertical post members together such that the transfer hydrodynamic loads across multiple members. In addition, it vastly reduces the roughness of the structure relative to prevailing hydrodynamic forces from waves/wakes and currents acting on the fendering. This can be achieved by moving the buttressing backing walers to the front of the structure. The configuration would improve deflection of water along the face of the fendering, limiting potential to act on any flow normal members.

An additional factor that may affect the effects of marine growth on the structure is how heavy the marine growth develops before it is removed by limiting events, most specifically hydraulic loads against the marine growth. The intent is to ensure that the marine growth is torn free of the structure before the structure members fail. The best solution to achieve this objective is to limit either settlement or adherence capacity of organisms on the structure.

Limiting Organism Settlement

Historically, both objectives were achieved by chemically infused wooden members, most notably, those treated with creosote; however, other treated lumber members had similar but less effective results. Due to environmental concerns, most continually leaching chemically

active settlement deterrents are no longer available for use. However, short-term and less effective chemical deterrents operating on biochemical settlement cues of marine organisms do exist, but they are not well suited for bridge fendering as they require regular recoating to remain effective.

Limiting Marine Growth Adherence

Limiting marine growth adherence can be achieved by material selection and limiting the structural rugosity on micro- and macro-scales. Slick surfaces that are not subject to pitting and have a permanent waxy texture weaken the marine organism adherence to the structure. This can include Teflon, HDPE, nylon, or fiber-reinforced polymers (FRP). At the other extreme of the scale is rough concrete and uncoated steel. The effectiveness of slick substrates to shed marine organisms is often limited by the propensity of substrates to oxidize thereby developing a rough surface at a microscopic scale. For purposes of limiting adherence, it is worth considering how the material will weather over the design life of the fendering improvements. Rapidly oxidizing surfaces, or those subject to developing expansion cracking or other weathering that roughens the substrate surface, should be avoided where practical.

The second element to minimizing adhesion by marine growth relates to minimizing the inherent macro-scale rugosity that can allow building marine growth to attach to many different angles and exposures, deep cracks, and even wrapping around structure members. As marine growth develops, it creates an interconnected lattice of connected organisms that function as a structural unit. To the extent that this can fully encircle a structural member, the growth gains resistance to tear off from the structure itself. To reduce adherence, the objective should be to simplify the complexity of the structure and maintain as much of the simplified face as an exposure to high energy environments. This promotes hydrodynamic tear off removal and will result in minimizing the developed thickness of the growth.

The best way to address this objective is to create a continuous face to the fendering. This appears to be somewhat counter-intuitive in that the continuing facia would also increase loading on the fendering system. However, for closely spaced fendering members it should be assumed that the gaps between members will be bridged by marine growth thereby creating an effective solid surface. If exposed members are more than approximately 8 inches in separation, this assumption may not hold; however, the passage of water between members will still be severely limited by the expanding radius of growth from adjacent members.
The current design for the fendering system proposes a horizontal configuration of the outer element comprised of FRP. These would have spaces between the members. The material and surface configuration would be well suited to shed growth. Eliminating gaps between members would further increase tear-off of marine growth, because it would limit potential for adherence to the backside of fender members. The horizontal fender members should extend below the waterline to maximize tear-off of marine growth and to further tie the vertical post members together at the location where they will experience the greatest shear.

Example of horizontal fender members on an exposed surface; for the bridge fendering, this should extend below the low tide line

Recommendations for Marine Growth Damage Management

1) Utilize slick surface materials, such as FRP, for exposed fendering members below approximately mean sea level (including sea level rise predictions during design life).
2) Utilize a horizontal arrangement of the outer fender members to most effectively direct flow with the least amount of hydraulic drag.
3) Tie all posts into horizontal members to reduce the effective capacity for drag to act on any one member of the fendering system.
4) Consider narrowing the gaps through the horizontal fendering members to improve growth shedding.
5) Conduct loading analysis for the fendering system assuming marine growth of 4 inches off of the structural members. Also conduct a sensitivity analysis based on assumptions of a solid fendering system or 6-inch growth if horizontal fendering members would be further separated than 12 inches such that an assumption of cross gap fill is unreasonable.
6) Ensure that fasteners for fender members are tight and do not become loose with time or are continuously tightened should compression loosen members. This will reduce growth in cracks between members.

VA ALTERNATIVE IMPLEMENTATION FORM VA ALTERNATIVE 1.0

Consider alternative fastener materials to improve corrosion resistance

Responses prepared by: Robert Stewart, CVS **Date:** 4/29/2024

Disposition:	Accept
Validated Initial Cost Savings:	$120,000
Validated Schedule Savings:	No change
Validated Change in Performance:	1.1%

If Alternative is Rejected: *Was rejection due to the VA study taking place too late in the project development process to implement the change?* N/A.

Alternative Description:

The baseline concept specifies the use of se ASTM A193 B8 Class 2 stainless steel fasteners. The alternative concept proposes to consider using fasteners made of more corrosive resistant, higher tensile materials such as monel, titanium, or a higher-grade stainless steel. Based on the VA team's initial analysis, it appears that titanium Grade V hardware would provide the best value in terms of price, tensile strength, and corrosion resistance.

Decision Rationale:

The project decision makers determined that this alternative should be accepted.

METS has the capability to test the titanium fasteners. The intent is to continue to test and evaluate the use of titanium fasteners while contacting other vendors to verify the cost impact. METS and SOE will work together with a target of July/August to reach a final determination.

Implementation Comments:

None noted.

Acceptance of alternatives denotes intent to implement, based on current information, in the given project development phase (PID, PA&ED or PS&E). It is recognized that future conditions may change this disposition. The validation of disposition and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION FORM VA ALTERNATIVE 2.0

Consider ChromX-4100 for concrete skirt reinforcement

Responses prepared by: Robert Stewart, CVS **Date:** 4/29/2024

Disposition:	Accept
Validated Initial Cost Savings:	$0
Validated Schedule Savings:	No change
Validated Change in Performance:	+ 0.4%

If Alternative is Rejected: *Was rejection due to the VA study taking place too late in the project development process to implement the change?* N/A.

Alternative Description:

The alternative concept proposes to use ChromX-4100 steel reinforcement in lieu of epoxy coated reinforcement in the concrete skirt. ChromX-4100 reinforcement is expected to achieve a 100-year service life.

Decision Rationale:

The project decision makers determined that this alternative should be accepted and further evaluated.

ChromX-4100 is proprietary in nature which runs into a sole source procurement issue. This will require special approval. At this point, although the ChromX-4100 material offers superior performance, it may be more challenging to work this into a traditional low-bid. The Project Team can look into it further if this can be made – check with SOE to see if the specification can be written to allow ChromX-4100 while avoiding into conflicts in contracting language. Assume a decision can be made by July/August of 2024.

Implementation Comments:

None noted.

Acceptance of alternatives denotes intent to implement, based on current information, in the given project development phase (PID, PA&ED or PS&E). It is recognized that future conditions may change this disposition. The validation of disposition and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE IMPLEMENTATION FORM VA ALTERNATIVE 3.0

Procure additional specialty fender components for future maintenance

Responses prepared by: Robert Stewart, CVS **Date:** 4/29/2024

Disposition:	Accept
Validated Initial Cost Savings:	($1,500,000)
Validated Schedule Savings:	2.1%
Validated Change in Performance:	1.2%

If Alternative is Rejected: *Was rejection due to the VA study taking place too late in the project development process to implement the change?* N/A.

Alternative Description:

The baseline concept proposes to procure fender materials (Rubber Fender Units, FRP Fender elements, and corrosion resistant hardware) based on the total quantities required for the project. The alternative concept proposes to procure additional rubber fender materials in this project for use in future repairs. The VA team noted that many of the FRP, rubber, and specialty fasteners are long-lead items. Having a small amount on-hand will improve the response time for repairs for Caltrans Maintenance.

Decision Rationale:

The project decision makers determined that this alternative should be accepted and further evaluation is warranted. There is a new 50,000 SF warehouse at the East Span SFOBB toll plaza to store maintenance materials. It is currently not as well used it could be. There should be sufficient space to store FRP members and rubber bumpers – do not want to store fasteners as they are too easy to lose track of. Need to find out how much space could be made available and how much is D-4 Structures Maintenance willing to accept. Make a decision by July/August.

Implementation Comments:
None noted.

Acceptance of alternatives denotes intent to implement, based on current information, in the given project development phase (PID, PA&ED or PS&E). It is recognized that future conditions may change this disposition. The validation of disposition and the cost and performance changes for the alternative are required by Caltrans to ensure that the project decision makers agree with the study results. These validated results become the basis for the VA Program reportables.

VA ALTERNATIVE 1.0 (RD-1)

Consider alternative fastener materials to improve corrosion resistance

Initial Cost Savings:	$120,000
Change in Schedule:	No change
Performance Change	+ 1.1 %
Value Change	+ 1.1 %

Description of Baseline Concept:

The baseline concept proposes to use ASTM A193 B8 Class 2 stainless steel fasteners to attach the FRP fender components together. Stainless steel is being selected due to the corrosive marine environment.

Description of Alternative Concept:

The alternative concept proposes to consider using fasteners made of more corrosive resistant, higher tensile materials such as monel, titanium, or a higher-grade stainless steel. Based on the VA team's initial analysis, titanium Grade 5 hardware would provide the best value in terms of price, tensile strength, and corrosion resistance.

Advantages:

- Reduces risk of fastener corrosion
- Increases tensile strength of fasteners
- Makes replacement of fender elements easier due easier removal of fasteners

Disadvantages:

- Potential for a small initial cost savings
- Alternative materials may require testing by Caltrans METS

Discussion:

The main benefit of this proposed alternative concept is to improve the strength and durability of the fasteners used to assemble the FRP fender system. Currently, it is assumed that ASTM A193 B8 Class 2 stainless steel fasteners (i.e., nuts and bolts) would be used. The VA team investigated several different types of alternative materials for these fasteners to consider. These include:

- **Super Duplex 2507 Stainless Steel** - Super Duplex 2507 bolts (EN 1.4410) are made of a stainless steel alloy containing 25% chromium, 4% molybdenum, and 7% nickel. Duplex 2507 is known for its high strength and excellent localized corrosion resistance to chloride. This alloy is widely used for its yield strength which is twice that of annealed austenitic stainless steels, like 304 and 316 stainless.
- **Titanium Grade 5** - Titanium fasteners are best known for being strong, lightweight, and corrosion resistant. They are critical to many industries including chlor alkali; marine; offshore oil and gas; desalination; medical; and pulp and paper. Grade 5 (UNS R56400/3.7165) titanium has superior strength-to-weight ratio for a unique combination of corrosion and high strength. Perhaps the most notable attribute of titanium fasteners is their superior corrosion resistance

to saltwater/seawater. Titanium screws have the unique ability to rapidly regrow their protective passive layer in the presence of oxygen, giving them unparalleled resistance to saltwater environments.

- **Monel K500** – Also known as alloy k500, monel K500 fasteners are comprised of a nickel alloy that combines the outstanding corrosion resistance of monel 400 with increased strength and hardness. These additional attributes of monel K500 fasteners are a result of an age hardening process where aluminum and titanium are added to the nickel-copper base and then precipitated throughout the matrix. They offer the highest level of corrosion resistance of the fasteners discussed in this alternative.

These have been organized into the table below:

Metal Alloy	Temperature Limit	Ultimate Tensile
ASTM A193 B8 Class 2 Stainless Steel	320°F	100 ksi
Super Duplex 2507 Stainless Steel	570°F	125 ksi
Titanium Grade 5	850°F	148 ksi
Monel K500	1100˚F	160 ksi

The VA team contacted a fastener supplier, Extreme Bolt & Fastener, and requested a quote for 6,000 hex bolts (1-inch diameter and 20 inches long) and 6,000 1-inch diameter nuts. The pricing received indicates the following pricing information:

Metal Alloy	Pricing
ASTM A193 B8 Class 2 Stainless Steel	$619,860
Super Duplex 2507 Stainless Steel	$474,120
Titanium Grade 5	$499,680
Monel K500	$2,238,840

Refer to the supplier quotes following this writeup for details. Pricing does not include shipping.

Project Management Considerations:

The alternative concept will require coordination with Caltrans METS to confirm the suitability for any of the alternative materials identified in this alternative.

Discussion of Schedule Impacts:

This alternative concept represents no impact to the project schedule's critical path.

Discussion of Risk Impacts:

The alternative concept reduces the risk of the fasteners corroding and improves the tensile strength of the fender system.

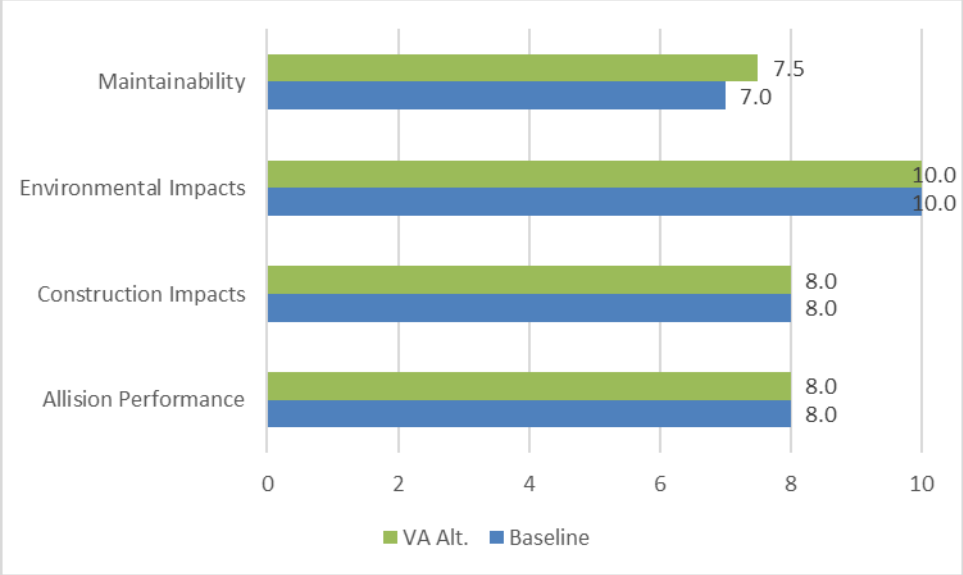
VA ALTERNATIVE 1.0 (RD-1)

Consider alternative fastener materials to improve corrosion resistance

Alignment with Safe System Objectives

Increased Alignment: △ *No change in alignment: ○* *Decreased Alignment: ▽*		
Objective	**Effect**	**Rationale**
Safe Road Users	○	The VA alternative would not affect roadway user behavior.
Safe Vehicles	○	The VA alternative would not affect vehicles.
Safe Speeds	○	The VA alternative would not affect vehicle speeds.
Safe Roads	○	The VA alternative would not affect vehicle speeds.
Post-Crash Care	○	The VA alternative would not affect post-crash care.

Comparison of Performance



Performance Attribute	Rationale for Change in Performance
Construction Impacts	No significant change.
Maintainability	Reduces the risk of corrosion of the fasteners and should improve the ease of replacing fender elements by Caltrans Maintenance.
Allision Performance	No significant change.
Environmental Impacts	No significant change.

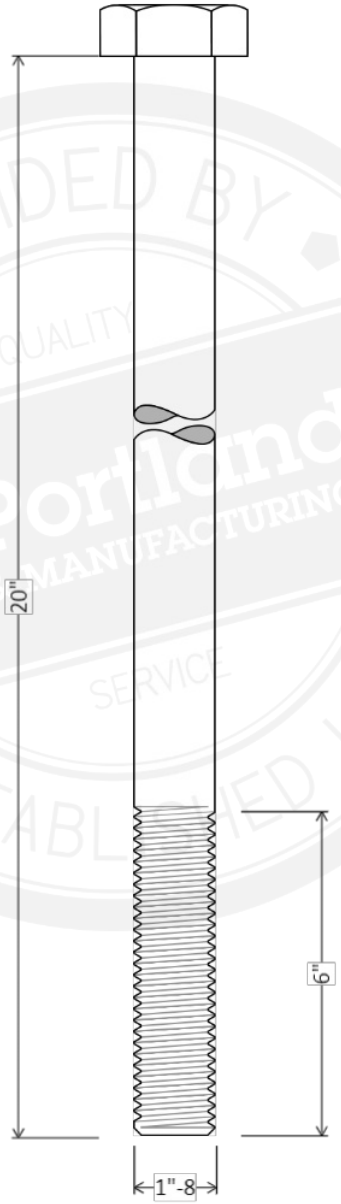
VA ALTERNATIVE 1.0 (RD-1)

Consider alternative fastener materials to improve corrosion resistance

Assumptions and Calculations:

The initial cost assumption of the alternative concept:

Metal Alloy	Pricing
ASTM A193 B8 Class 2 Stainless Steel	$619,860
Titanium Grade 5	$499,680
Cost Savings	$120,180



Bill of Material (Line 1)

QTY.	SIZE	LEN.	GRADE / DESCRIPTION
6000	1	20	ASTM A193 Grade B8 heavy hex bolt

Notes

Heavy hex bolt dimensions meet ASME B18.2.1

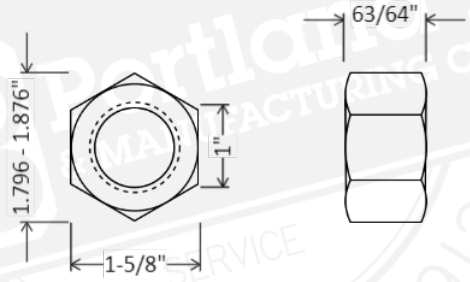
Drawings are not to scale

X

APPROVED BY **DATE**

PROJECT	Fender Replacement San Francisco Open Bay Bridge
CUSTOMER	CALIFORNIA DEPT OF TRANSPRTATN

© PORTLAND BOLT 2024	PAGE 1 of 2	ORDER	QUOTE 232818	BY DA	DATE 2/7/2024	**Portland Bolt & Manufacturing Co.**  3441 NW Guam St. Portland, OR 97210 [p] 800.547.6758 [f] 503.227.4634 [e] sales@portlandbolt .com [w] www.portlandbolt.com



Bill of Material (Line 2)			
QTY.	SIZE	LEN.	GRADE / DESCRIPTION
6000	1		ASTM A194 Grade 8 heavy hex nut

Notes

Heavy hex nut dimensions meet ASME B18.2.2

Drawings are not to scale

X _____ _____

APPROVED BY **DATE**

PROJECT	Fender Replacement San Francisco Open Bay Bridge
CUSTOMER	CALIFORNIA DEPT OF TRANSPRTATN

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sales@portlandbolt.com Phone: 800.547.6758 | Fax: 503.227.4634
www.portlandbolt.com 3441 NW Guam St. Portland OR, 97210

QUOTE # 232818

DATE 2/7/2024
PAGE 1 of 1

SALESPERSON **Dan Karpan**
DIRECT PHONE 800.599.0538
EMAIL dan@portlandbolt.com

CUSTOMER

CALIFORNIA DEPT OF TRANSPRTATN
DIVSN OF PROCUREMNT & CONTRCTS
1727 30TH STREET, MS 65
SACRAMENTO, CA, 95816
Phone: 916.227.0222 | Fax: 916.227.6034
Karl.Cruz@dot.ca.gov

SHIP TO
CALIFORNIA DEPT OF TRANSPRTATN
DIVSN OF PROCUREMNT & CONTRCTS
1727 30TH STREET, MS 65
SACRAMENTO, CA, 95816

JOB Fender Replacement San Francisco Open Bay Bridge
DELIVERY Prepay & Add

ATTN **Karl Cruz**
LEAD TIME **Lead time is negotiable**
CERTS Emailed Mill Test Reports
REF #

LINE	QTY	DESCRIPTION	UNIT PRICE	TOTAL
1	6000	1"-8 x 20" domestic ASTM A193 Grade B8 [CLASS 2] heavy hex bolt with 6" thread	$83.35	$500,100.00
2	6000	1" domestic ASTM A194 Grade 8 heavy hex nut	$19.96	$119,760.00
			NET	$619,860.00
			SACRAMENTO, CA, 95816 Tax	$54,237.75
	TOTAL WEIGHT	30,503 lbs.	TOTAL (USD)	$674,097.75

Lead time is negotiable

All quotations for immediate acceptance, unless otherwise noted. Prices and lead times subject to change without notice. All material subject to prior sale.

Thank you for your inquiry.

Accepted by _____ Date _____ P.O. _____

All account sales are Net 30 days from date of invoice. All quotes, sales & invoices are in US Dollars. All payments are required in US Dollars.

Quotation # 85282-1

Date: 08-Feb-24

280 E. Main St. Suite 107
Newark DE 19711
sales@extreme-bolt.com
888-393-4517

Customer Information

Value Management Strategies

Robert Stewart

Terms and Information

Shipping Method: TBD

Payment Terms: TBD

Sales Person: Dean G

Customer Ref#

Lead Time and Comments

Standard Lead Time: 14-18 Weeks
Expediting: Inquire for Options

Line#	Qty	Part Number	Description	Unit Price	Price
1	6000	DA2507-HH-1-8-20	Super Duplex Alloy 2507 Hex Head Bolt, 1"-8 x 20" Long	$74.00	$444,000.00
2	6000	M500-HH-1-8-20	Alloy 500 Age Hardened Hex Head Bolt, 1"-8 x 20" Long	$275.00	$1,650,000.00
3	6000	TI5-HH-1-8-20	Titanium Gr5 Hex Head Bolt, 1"-8 x 20" Long	$73.28	$439,680.00
4	6000	DA2507-N-1-8	Super Duplex Alloy 2507 Hex Nut, 1"-8	$5.02	$30,120.00
5	6000	M500-N-1-8	Alloy K500 Age Hardened Hex Nut, 1"-8	$98.14	$588,840.00
6	6000	TI5-N-1-8	Titanium Gr5 Hex Nut, 1"-8	$10.00	$60,000.00

Total USD 3,212,640.00

NOTE:
- All material availability based at the time of quote is subject to prior sale
- All pricing is based on quantities quoted. Any deviations are subject to re-quote
- COC's No Charge / MTR's $25 per line item

When Materials Matter...

for extremely corrosive, high temperature, lightweight, non-conductive, high strength and high purity applications

Quotation valid for 30 days

VA ALTERNATIVE 2.0 (RD-2)

Consider ChromX-4100) for concrete skirt reinforcement

Initial Cost Savings:	No change
Change in Schedule:	No change
Performance Change	+ 0.4%
Value Change	+ 0.4%

Description of Baseline Concept:

The baseline concept would repair the existing concrete skirt with new high-performance concrete and epoxy coated rebar.

Description of Alternative Concept:

The alternative concept proposes to use ChromX-4100 steel reinforcement in lieu of epoxy coated reinforcement in the concrete skirt. ChromX-4100 reinforcement is expected to achieve a 100-year service life.

Advantages:

- High yield strength, 100 ksi (GR100)
- High corrosion resistance
- Expected to achieve 100-year service life
- Low life cycle cost

Disadvantages:

- Caltrans may not have much experience with ChromX rebar
- Potential issue with dissimilar metals between Chromx rebar and existing rebar in concrete skirt

Discussion:

The main benefit of this proposed alternative concept is to provide high corrosion resistance and reinforcement in the bridge decks and to provide a lower cost option than stainless steel but comparable to epoxy steel rebar.

ChromX-4100 has similar galvanic properties to mild steel rebar (see alternative concept image). Refer to the FAQ from the manufacturer under alternative concept images.

Project Management Considerations:

The alternative concept will require coordination with Materials and Construction to confirm availability.

Discussion of Schedule Impacts:

This alternative concept is not expected to impact the project schedule critical path.

VA ALTERNATIVE 2.0 (RD-2)

Consider ChromX-4100) for concrete skirt reinforcement

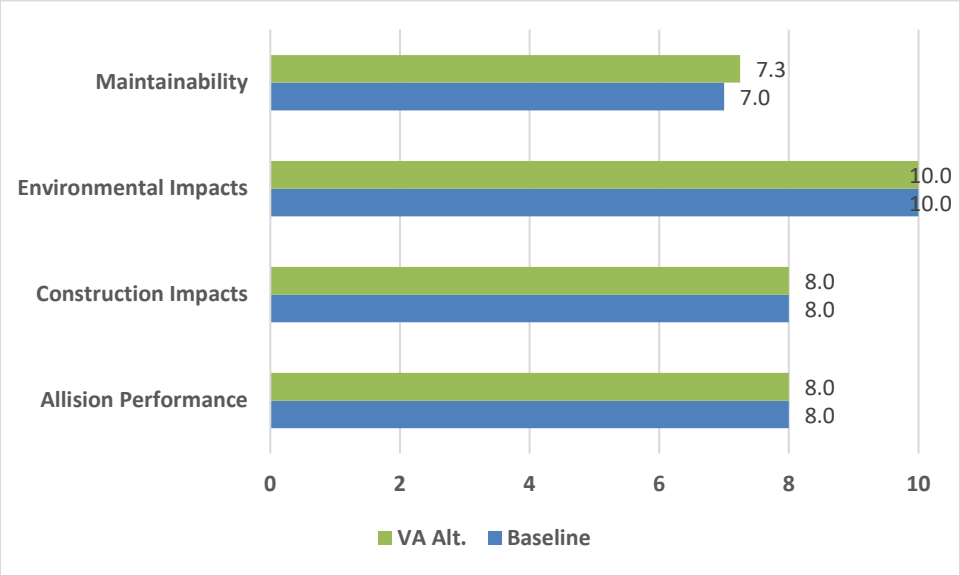
Discussion of Risk Impacts:

The alternative concept is not expected to increase project risk based on the availability of material.

Alignment with Safe System Objectives

Increased Alignment: △ *No change in alignment: ○* *Decreased Alignment: ▽*		
Objective	**Effect**	**Rationale**
Safe Road Users	○	The VA alternative would not affect roadway user behavior.
Safe Vehicles	○	The VA alternative would not affect vehicles.
Safe Speeds	○	The VA alternative would not affect vehicle speeds.
Safe Roads	○	The VA alternative would not affect roads.
Post-Crash Care	○	The VA alternative would not affect post-crash care.

Comparison of Performance

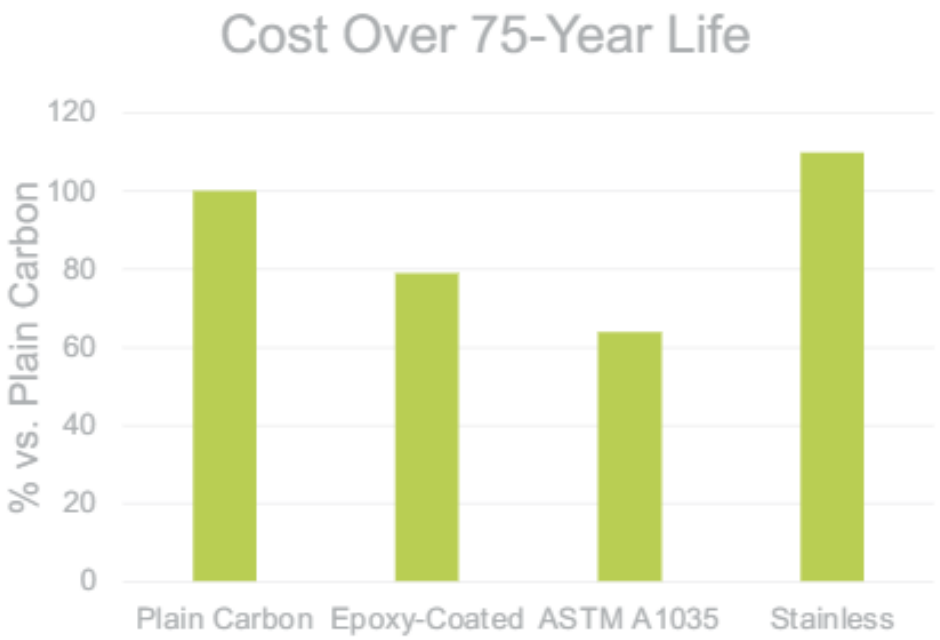


Performance Attribute	Rationale for Change in Performance
Construction impacts	No significant change.
Maintainability	Increases the resistance to corrosion for the steel reinforcement.
Allision Performance	No significant change.
Environmental Impacts	No significant change.

VA ALTERNATIVE 2.0 (RD-2)

Consider ChromX-4100) for concrete skirt reinforcement

Alternative Concept Image



Life cycle costs for various concrete reinforcement (A1035 = ChromX) - Virginia DOT (Department of Transportation)

Alternative Concept Image

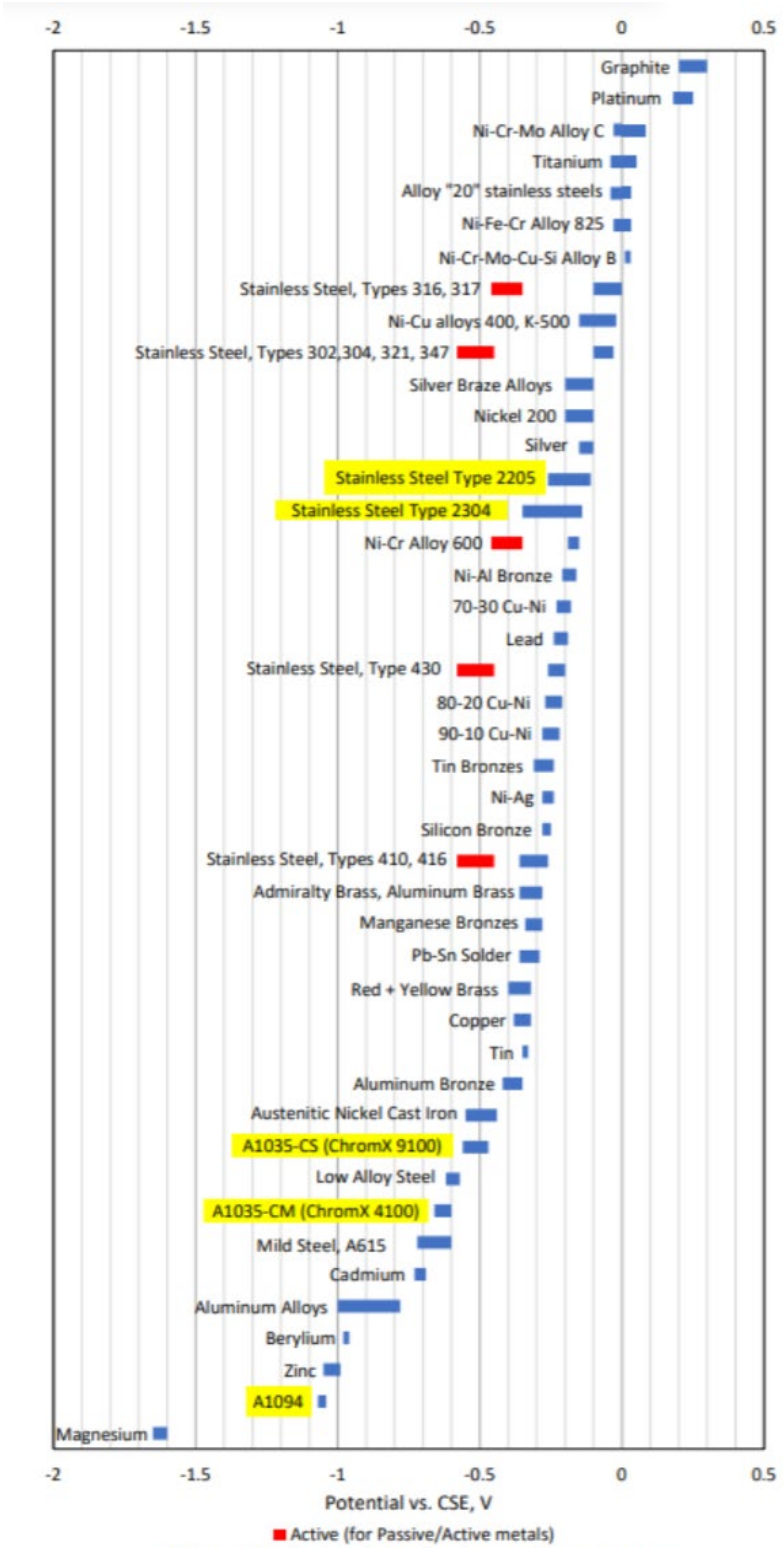


Figure 10: Galvanic Series in moving seawater

Galvanic Series in moving seawater chart

VA ALTERNATIVE 2.0 (RD-2)

Consider ChromX-4100) for concrete skirt reinforcement

Assumptions and Calculations:

The initial cost assumption of the alternative concept:

- The cost per lb. of rebar would be $2.75/lb. Based on a recent estimate for the Vincent Thomas Bridge by the Skanska/CEC CMGC team.
- Standard epoxy coated rebar for large volumes (5M lbs.) are coming in at a comparable price ($2.60 to $2.85/lb.) See the bid tabs below.
- Assumes costs are therefore comparable

Comparing Prices

12	Bar Reinforcing Steel (Epoxy Coated)	GRADE 80	LB	2592598	$2.65	$2.85	$3.10	$7,388,904
13	Bar Reinforcing Steel (Epoxy Coated)	GRADE 60	LB	5206695	$2.40	$2.60	$2.80	$13,537,407

Bar reinforcing steel (epoxy coated) price at $2.85 compared to $2.60

VA ALTERNATIVE 2.0 (RD-2)

Consider ChromX-4100) for concrete skirt reinforcement

Alternative Concept Image

CHROMX®

ChromX® (ASTM A1035) Frequently Asked Questions

Below you will find answers to the questions we get most often about ChromX®. More product information is available in the Resource Library on cmc.com, or you can contact your regional sales representative who will be happy to help answer your questions.

General Questions

What does ChromX® stand for?
The product brand name, ChromX®, combines the alloying element, ferrochrome or chrome, with the "X" adopted as a symbol for steel. While only one element of the process - ferrochrome - plays an important role in the production of ChromX® steels, our products are produced through a combination of steel alloys and controlled manufacturing processes.

How long have ChromX® products been on the market?
The initial production of ChromX® steel reinforcing bar was in 2001. It has been a leading corrosion-resistant, high-strength steel in the market since 2002.

Is ChromX® steel proprietary?
ChromX® steels are proprietary but are sold under a general non-proprietary specification. To support the use of innovation by state and federal departments, the FHWA published a new federal rule on September 27, 2019 that gives states more flexibility in the selection of products used in federal-aid highway projects.

There is no other uncoated product like ChromX® on the market today offering the corrosion resistant properties, high strength and ductility along with the benefits derived from these properties. Therefore, state transportation departments can certify that there is no equally suitable alternative.

How is ChromX® produced?
ChromX® is produced with recycled materials through a combination of alloy additions and a controlled manufacturing process. The combination of the steel's chemical composition and production process develops the unique microstructure of the steel that drives the advantageous product properties. ChromX® steel bars are manufactured by Commercial Metals Company at CMC Steel in Cayce, South Carolina, and by Cascade Steel Rolling Mills, Inc. in McMinnville, Oregon.

Does ChromX® weigh the same as standard rebar?
Yes. ChromX® weighs the same for similar lengths and diameters.

Specification And Engineering Questions

ChromX® 2000, 9000 and 4000 Series are produced in full accordance to ASTM International – ASTM A1035 (2020), Standard Specification for Deformed and Plain, Low-Carbon, Chromium, Steel Bars for Concrete Reinforcement, Grades 100 and 120 types CS, CM, respectively. ChromX® series meet and exceed ASTM A615-20 Grade 100

What is the alloy content of ChromX®?
ChromX® is a low-carbon, chromium alloy steel bar. ChromX® 9100 and 9120, 4100 and 4120, rebar shall meet the requirements of Table 1 as per ASTM A1035-20.

Alloy Type	Carbon	Chromium	Manganese	Nitrogen	Phosphorus	Sulfur
A1035 CS ChromX® 9100 and 9120	0.15%	8.0 - 10.9%(A)	1.5%	0.05%	0.035%	0.0455%
A1035 CM ChromX® 4100 and 4120	0.20%	4.0 - 7.9%	1.5%	0.05%	0.035%	0.0455%

(A)AASHTO M 334 M/M 334 - 17 has a minimum 9.2% Cr content.

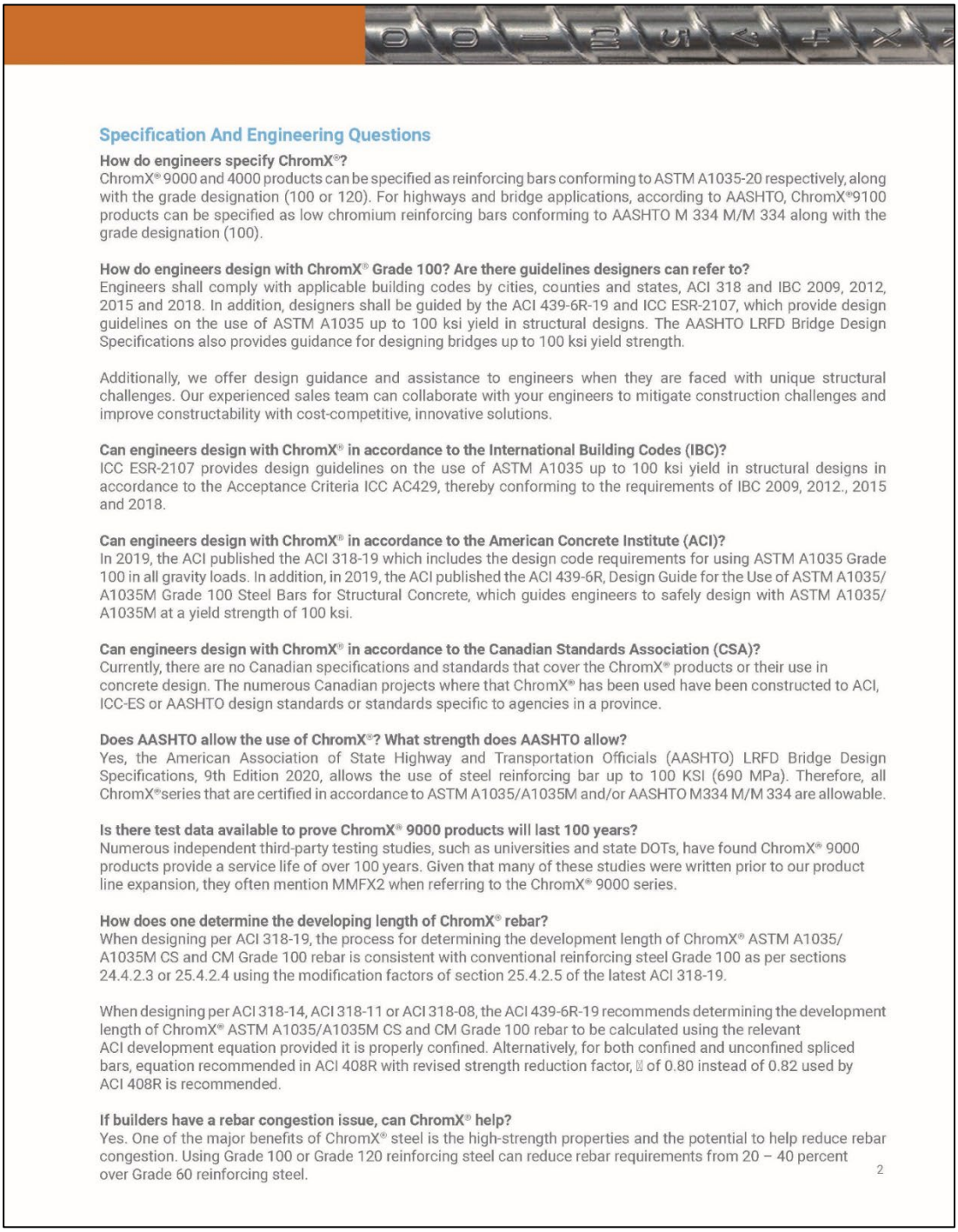
20210615

Company FAQ page

VA ALTERNATIVE 2.0 (RD-2)

Consider ChromX-4100) for concrete skirt reinforcement

Alternative Concept Image



Specification And Engineering Questions

How do engineers specify ChromX®?
ChromX® 9000 and 4000 products can be specified as reinforcing bars conforming to ASTM A1035-20 respectively, along with the grade designation (100 or 120). For highways and bridge applications, according to AASHTO, ChromX®9100 products can be specified as low chromium reinforcing bars conforming to AASHTO M 334 M/M 334 along with the grade designation (100).

How do engineers design with ChromX® Grade 100? Are there guidelines designers can refer to?
Engineers shall comply with applicable building codes by cities, counties and states, ACI 318 and IBC 2009, 2012, 2015 and 2018. In addition, designers shall be guided by the ACI 439-6R-19 and ICC ESR-2107, which provide design guidelines on the use of ASTM A1035 up to 100 ksi yield in structural designs. The AASHTO LRFD Bridge Design Specifications also provides guidance for designing bridges up to 100 ksi yield strength.

Additionally, we offer design guidance and assistance to engineers when they are faced with unique structural challenges. Our experienced sales team can collaborate with your engineers to mitigate construction challenges and improve constructability with cost-competitive, innovative solutions.

Can engineers design with ChromX® in accordance to the International Building Codes (IBC)?
ICC ESR-2107 provides design guidelines on the use of ASTM A1035 up to 100 ksi yield in structural designs in accordance to the Acceptance Criteria ICC AC429, thereby conforming to the requirements of IBC 2009, 2012., 2015 and 2018.

Can engineers design with ChromX® in accordance to the American Concrete Institute (ACI)?
In 2019, the ACI published the ACI 318-19 which includes the design code requirements for using ASTM A1035 Grade 100 in all gravity loads. In addition, in 2019, the ACI published the ACI 439-6R, Design Guide for the Use of ASTM A1035/ A1035M Grade 100 Steel Bars for Structural Concrete, which guides engineers to safely design with ASTM A1035/ A1035M at a yield strength of 100 ksi.

Can engineers design with ChromX® in accordance to the Canadian Standards Association (CSA)?
Currently, there are no Canadian specifications and standards that cover the ChromX® products or their use in concrete design. The numerous Canadian projects where that ChromX® has been used have been constructed to ACI, ICC-ES or AASHTO design standards or standards specific to agencies in a province.

Does AASHTO allow the use of ChromX®? What strength does AASHTO allow?
Yes, the American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications, 9th Edition 2020, allows the use of steel reinforcing bar up to 100 KSI (690 MPa). Therefore, all ChromX®series that are certified in accordance to ASTM A1035/A1035M and/or AASHTO M334 M/M 334 are allowable.

Is there test data available to prove ChromX® 9000 products will last 100 years?
Numerous independent third-party testing studies, such as universities and state DOTs, have found ChromX® 9000 products provide a service life of over 100 years. Given that many of these studies were written prior to our product line expansion, they often mention MMFX2 when referring to the ChromX® 9000 series.

How does one determine the developing length of ChromX® rebar?
When designing per ACI 318-19, the process for determining the development length of ChromX® ASTM A1035/ A1035M CS and CM Grade 100 rebar is consistent with conventional reinforcing steel Grade 100 as per sections 24.4.2.3 or 25.4.2.4 using the modification factors of section 25.4.2.5 of the latest ACI 318-19.

When designing per ACI 318-14, ACI 318-11 or ACI 318-08, the ACI 439-6R-19 recommends determining the development length of ChromX® ASTM A1035/A1035M CS and CM Grade 100 rebar to be calculated using the relevant ACI development equation provided it is properly confined. Alternatively, for both confined and unconfined spliced bars, equation recommended in ACI 408R with revised strength reduction factor, ⍰ of 0.80 instead of 0.82 used by ACI 408R is recommended.

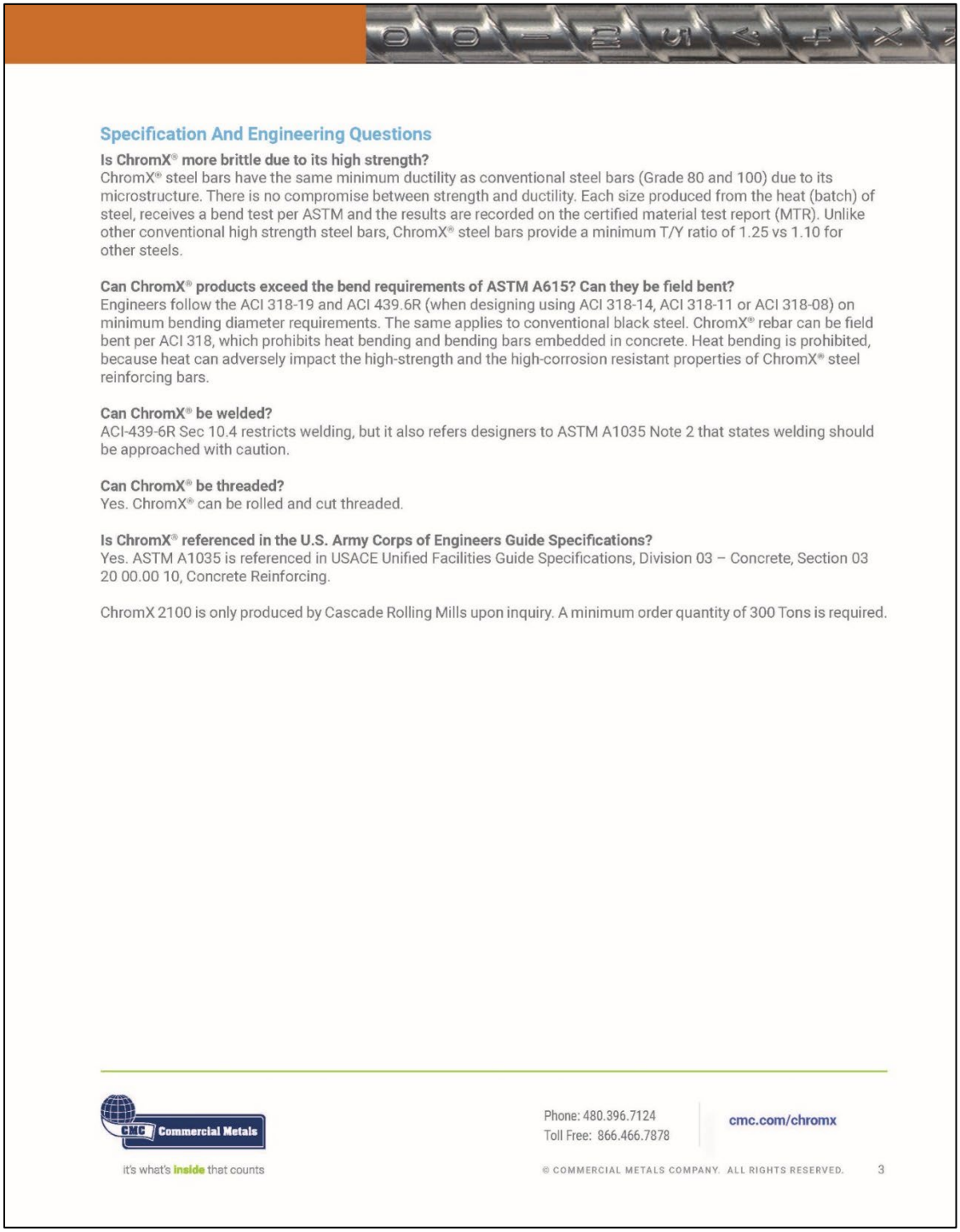
If builders have a rebar congestion issue, can ChromX® help?
Yes. One of the major benefits of ChromX® steel is the high-strength properties and the potential to help reduce rebar congestion. Using Grade 100 or Grade 120 reinforcing steel can reduce rebar requirements from 20 – 40 percent over Grade 60 reinforcing steel.

2

Company FAQ page continued

VA ALTERNATIVE 2.0 (RD-2)
Consider ChromX-4100) for concrete skirt reinforcement

Alternative Concept Image



Specification And Engineering Questions

Is ChromX® more brittle due to its high strength?
ChromX® steel bars have the same minimum ductility as conventional steel bars (Grade 80 and 100) due to its microstructure. There is no compromise between strength and ductility. Each size produced from the heat (batch) of steel, receives a bend test per ASTM and the results are recorded on the certified material test report (MTR). Unlike other conventional high strength steel bars, ChromX® steel bars provide a minimum T/Y ratio of 1.25 vs 1.10 for other steels.

Can ChromX® products exceed the bend requirements of ASTM A615? Can they be field bent?
Engineers follow the ACI 318-19 and ACI 439.6R (when designing using ACI 318-14, ACI 318-11 or ACI 318-08) on minimum bending diameter requirements. The same applies to conventional black steel. ChromX® rebar can be field bent per ACI 318, which prohibits heat bending and bending bars embedded in concrete. Heat bending is prohibited, because heat can adversely impact the high-strength and the high-corrosion resistant properties of ChromX® steel reinforcing bars.

Can ChromX® be welded?
ACI-439-6R Sec 10.4 restricts welding, but it also refers designers to ASTM A1035 Note 2 that states welding should be approached with caution.

Can ChromX® be threaded?
Yes. ChromX® can be rolled and cut threaded.

Is ChromX® referenced in the U.S. Army Corps of Engineers Guide Specifications?
Yes. ASTM A1035 is referenced in USACE Unified Facilities Guide Specifications, Division 03 – Concrete, Section 03 20 00.00 10, Concrete Reinforcing.

ChromX 2100 is only produced by Cascade Rolling Mills upon inquiry. A minimum order quantity of 300 Tons is required.

CMC Commercial Metals
it's what's inside that counts

Phone: 480.396.7124
Toll Free: 866.466.7878
cmc.com/chromx

 3

Company FAQ page continued

VA ALTERNATIVE 3.0 (RD-3)

Procure additional specialty fender components for future maintenance

Initial Cost Savings:	($1,500,000)
Change in Schedule:	No change
Performance Change	+ 2.1 %
Value Change	+ 1.2 %

Description of Baseline Concept:

The baseline concept proposes to procure fender materials (Rubber Fender Units, FRP Fender elements, and corrosion resistant hardware) based on the total quantities required for the project.

Description of Alternative Concept:

The alternative concept proposes to procure additional rubber fender materials in this project for use in future repairs.

Advantages:

- Improved response times for future fender repairs and maintenance
- Eliminates future price escalation for procured materials.
- Acquiring materials in bulk within the current project would allow for competitive prices of materials
- Eliminates need for special contracting to obtain materials

Disadvantages:

- Requires warehouse space to properly store materials to prevent deterioration
- Stockpiled materials may attract theft and vandalism
- Additional initial construction costs to procure additional materials
- Opportunity cost of missing out on upgraded or improved future fender materials

Discussion:

The main benefit of this proposed alternative concept is to eliminate the lead times in procuring additional fender materials for future repairs. The lead times for these fender materials are currently quoted at 8 weeks (about 2 months) but may be more depending on the demand for the materials at the time of acquisition. The procurement of the fender materials in bulk within the current project would also allow for optimal pricing.

Project Management Considerations:

The alternative concept will require project management to obtain additional funds to procure the additional fender materials. Also, the alternative concept will require Caltrans Maintenance Management to set up the warehouse for the storage of the additional fender materials.

VA ALTERNATIVE 3.0 (RD-3)

Procure additional specialty fender components for future maintenance

Discussion of Schedule Impacts:

This alternative concept represents a negligible impact to the project schedule's critical path.

Discussion of Risk Impacts:

The alternative concept will not have any impact on the overall project risk.

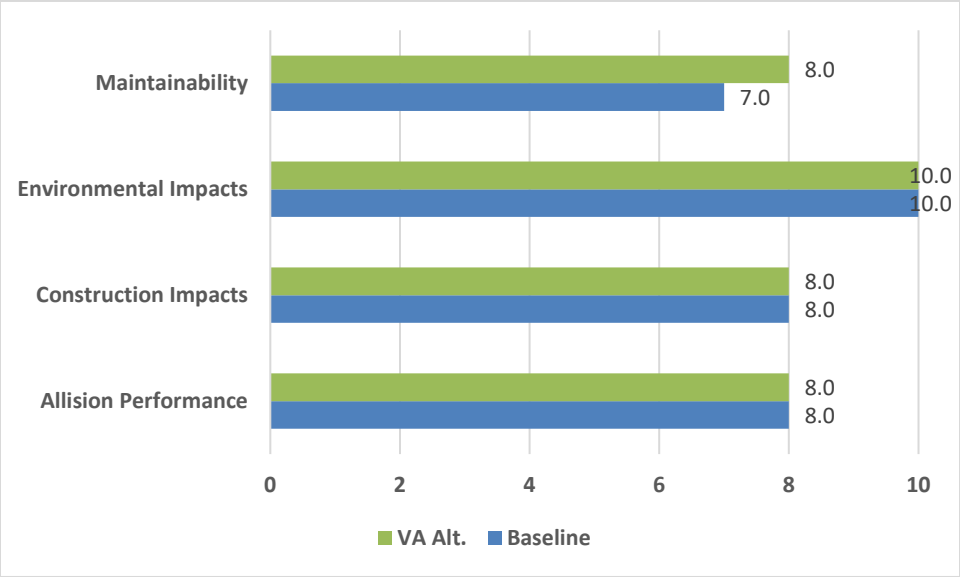
Alignment with Safe System Objectives

Increased Alignment: △ *No change in alignment:* ○ *Decreased Alignment:* ▽		
Objective	**Effect**	**Rationale**
Safe Road Users	○	The VA alternative would not affect roadway user behavior.
Safe Vehicles	○	The VA alternative would not affect vehicles.
Safe Speeds	○	The VA alternative would not affect vehicle speeds.
Safe Roads	○	The VA alternative would not affect vehicle speeds.
Post-Crash Care	○	The VA alternative would not affect post-crash care.

VA ALTERNATIVE 3.0 (RD-3)

Procure additional specialty fender components for future maintenance

Comparison of Performance

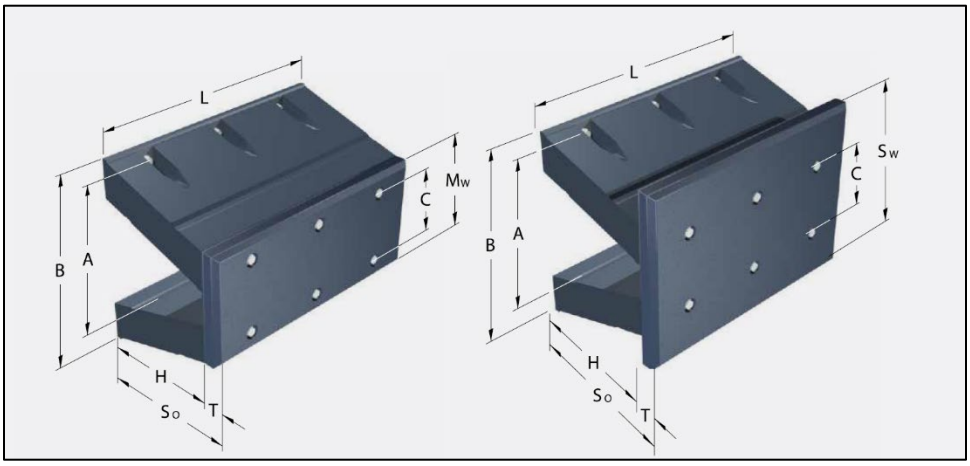


Performance Attribute	Rationale for Change in Performance
Construction Impacts	No significant change.
Maintainability	Maintaining a stock of FRP members and/or connectors on hand would reduce the response time for routine maintenance repairs required and assist Caltrans Maintenance.
Allision Performance	No significant change.
Environmental Impacts	No significant change.

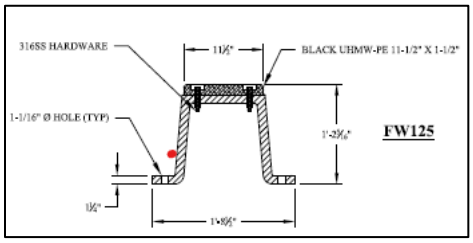
VA ALTERNATIVE 3.0 (RD-3)

Procure additional specialty fender components for future maintenance

Baseline Concept Images



Rubber fender units



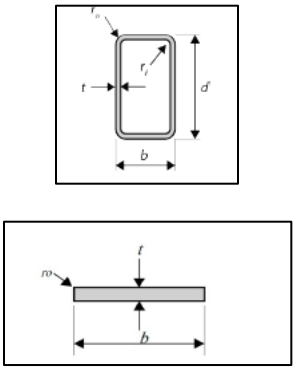
FRP waler

FRP posts

VA ALTERNATIVE 3.0 (RD-3)

Procure additional specialty fender components for future maintenance

Baseline Concept Image



FRP tube and plate struts

Assumptions and Calculations:

The initial cost assumption of the alternative concept:

- With the assumption that an additional 5% of the fender materials will be procured, this alternative will constitute an approximate increase of $1.5M. (Cost of Fender Materials assumed to be $30M).
- For reference, the VA team estimates that this amount would be sufficient to repair a section fender roughly equivalent to the area damaged during the Cosco Busan allision.

PROJECT INFORMATION

PROJECT INFORMATION

BACKGROUND

This project proposes complete replacement of the wooden and plastic fender system, including reconstruction of the concrete skirt to which the fender system is attached, that protects the piers from vessel collision. Bridge Inspection Reports identified the need to replace the deteriorated wooden and plastic fender system and repair the concrete skirt to which the fender system is attached at Piers W3 through W6. The upper and inner wooden fender system, which is part of the original fender system constructed in 1932, has shown signs of extensive decay. Such decay can be attributed to the age of the wooden fender system and to the fender system being exposed to the harsh marine environment. Due to the decay of the inner wooden fender system, the connection of the outer walers and the lower plastic fender system has had pullout failures causing several segments of the lower fender system to drop into the bay. An emergency Director's Order was executed in 2016 to secure multiple locations with chains to prevent complete separation.

The concrete skirt supporting the fender system has also shown signs of significant section loss of the reinforcement rebar and spalling of the concrete. The bridge inspection report has assessed that the existing fender system is reaching the end of its service life and has recommended the complete replacement and reconstruction of the fender systems at Piers W3 through W6.

PROJECT DESCRIPTION

A functional fender system is required under federal regulations and under the jurisdiction of the USCG. The fender system is an integral part of the bridge since it provides protection for the piers against vessel allision. The replacement fender system must have sufficient energy absorption capabilities to reduce the impact energy transferred to the piers during a vessel allision to a level below the structural capacity while reducing the impact energy absorbed by the vessels as much as practical to reduce the probability of vessel damage. The replacement fender system must also allow for easy repair and replacement, whether in portions or throughout the entirety of the system, in the event of damage during an allision. Additionally, the replacement fender system must be resistant to corrosion since it will be within the marine splash zone.

Based on these design requirements, a fender system comprised of FRP members is proposed. Two FRP fender alternatives have been evaluated for this project. The first alternative is comprised of FRP walers and posts that will be attached to the reconstructed concrete skirt. The second alternative is a floating fender system composed large FRP cells. The final fender system will be designed to have sufficient energy absorption through deflection, compression, and distortion. Both alternative fender systems allow for segmental replacement and repair in the event of localized damage during a vessel collision. Lastly, the FRP members in both alternatives are resistant to corrosion.

INFORMATION PROVIDED TO THE VA TEAM

The following project documents were provided to the VA team for their use during the study:

- **SFOBB Fender Replacement Project Statement –** Caltrans, District 4 – January 7, 2021
- **SFOBB Fender Replacement Project – Preliminary Details –** Caltrans, District 4 – March 10, 2021
- **Sling Fender Quote –** Urethane Products Corporation – September 27, 2023
- **Sling Fender Specs Sheet –** Urethane Products Corporation – September 27, 2023

PROJECT DRAWINGS

The project team provided preliminary project layouts and cross-sections for the VA team during the VA study. The project location and the typical cross-section drawings are included in the project report when applicable and are available from the PDT upon request.

PROJECT COST ESTIMATE

The VA study was not provided a cost estimate for this project.

PROJECT ANALYSIS

PROJECT ANALYSIS

SUMMARY OF ANALYSIS

The following analysis tools were used to study the project:

- Key Project Factors
- Cost Model
- Function Analysis
- Value Metrics

KEY PROJECT FACTORS

The first day of the VA study included meetings with the project stakeholders. The following summarizes key project issues and site visit observations identified during these sessions.

Project Issues

The following are some of the issues and concerns associated with the project:

- The footprint of the fender system cannot change due to environmental impacts without voiding the permit.
- There is an existing permit that allows "in-kind" replacement of the fender system. The permit expires in June 2024. Caltrans is currently seeking an extension.
- There is currently a Director's Order to ensure that the existing system be secured to prevent fender segments from falling off into San Franscisco Bay.
- There are potential issues with barnacles building up on fenders and increasing stress on structural supports.
- The new fender system must be designed to reduce damage to vessels impacting the fender system.
- There is a need to maintain adequate navigational clearance while construction is ongoing.

Site Visit Observations

A virtual site visit was conducted by the VA study team using Google Maps and photographs in order to visually assess the project's site conditions and to provide context to all project design components. Through this effort and through the use of several project plan sheets, the VA team was able to more fully understand the constraints, challenges, and issues relating to the project.

Provided below are a series of photos detailing current site conditions as well as photos of the Cosco Busan allision.

Photos of damage to the Cosco Busan following the allision with a SFOBB Pier W5, 2007

Photos of the damage to SFOBB Pier W5 after the Cosco Busan allision, 2007

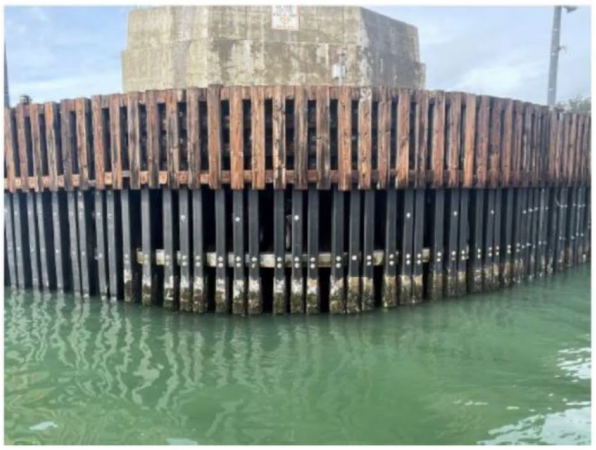


Photo 5: View of Pier W5 (12/2024) repairs due to storm damage.

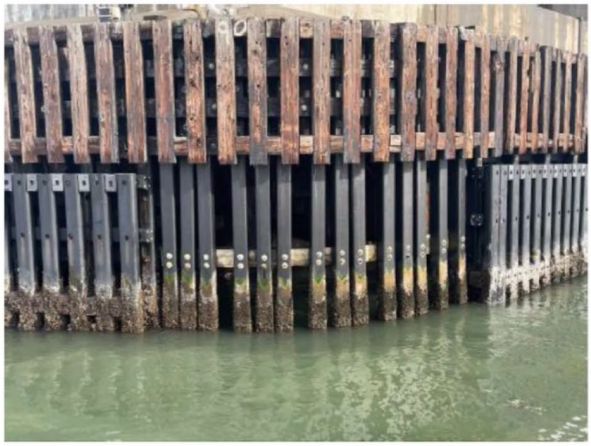


Photo 6: View of Pier W5 (12/2024) repairs due to storm damage.

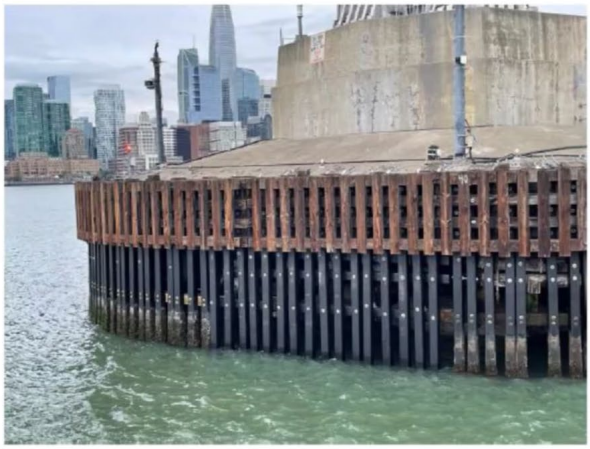


Photo 9: View of Pier W3 (12/2024) repairs due to storm damage.

Photo 10: View of Pier W3 (12/2024) repairs due to storm damage.

COST MODEL

A cost model was not prepared for the VA study due to the highly conceptual nature of the current project cost data. The cost information available at the time of the VA study is provided below.

Office of Structure Maintenance and Investigations - Toll Bridges
San Francisco – Oakland Bay Bridge (SFOBB) West Span
Bridge No. 34-0003 04-SF-80-6.35-MLP
Fender Replacement Project Statement

Vessel Traffic Impacts:

The USCG requires mooring plans and notification to mariners whenever a restriction on the navigable water ways is imposed.

Preliminary Project Cost Estimate:

Option 1: FRP Waler and Post Fender System

Structure Cost Subtotal	$61,400,000
Supplemental Work (Environmental/Maritime Coordination) @ 10%	$ 6,100,000
Mobilization @ 10%	$ 6,800,000
Contingencies @ 25%	$18,600,000
Total Option 1:	**$92,900,000**
For Budget Purpose Say	**$93,000,000**
Preliminary Project Time Estimate (working days):	**300**

FUNCTION ANALYSIS

Function analysis was performed via a Graphic Function Identification, and a Function Analysis System Technique (FAST) diagram was produced which revealed the key functional relationships for the project. This analysis provided a greater understanding of the total project and how the project's performance, cost, time, and risk characteristics are related to the various functions identified. The FAST diagram arranges the functions in logical order so that when read from left to right, the functions answer the question "How?" If the diagram is read from right to left, the functions answer the questions "Why?" Functions connected with a vertical line are those that happen at the same time as, or are caused by, the function at the top of the column (a "When?" relationship).

Random Function Identification

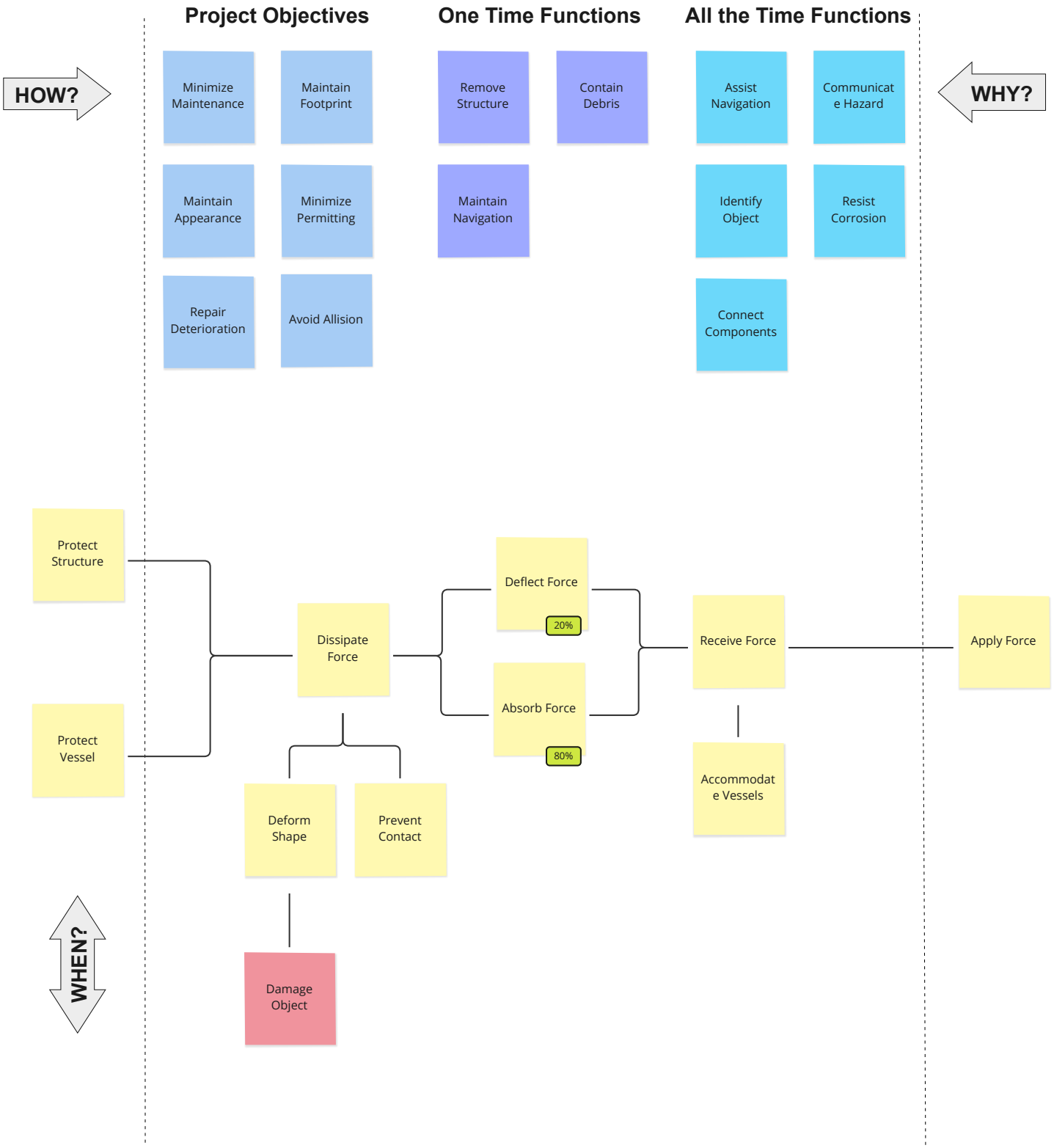
Project Element	Function
Concrete Skirt	Locate Components
Concrete Skirt	Create Buffer
Concrete Skirt	Resist Force
Concrete Skirt	Absorb Energy
Concrete Skirt	Shed Water
Concrete Skirt Repairs	Repair Deterioration
Concrete Skirt Repairs	Maintain Capacity
Concrete Skirt Repairs	Support Load
FRP Fenders	Resist Corrosion
FRP Fenders	Deflect Energy
FRP Fenders	Absorb Energy

Project Element	Function
FRP Fenders	Deform Shape
FRP Fenders	Dissipate Energy
FRP Fenders	Accommodate Vessels
Post & Strut Replacements	Support Load
Post & Strut Replacements	Locate Components
Post & Strut Replacements	Resist Corrosion
Structural Connectors	Resist Corrosion
Structural Connectors	Locate Components
Structural Connectors	Connect Elements

The study team concluded that the higher-order function of the project is to *Protect Structure* and *Protect Vessels* through the basic functions of *Dissipate Force.* Key secondary functions include *Deflect Force, Absorb Force, Prevent Contact,* and *Resist Corrosion.* Project objectives included *Minimize Maintenance, Maintain Footprint, Maintain Appearance,* and *Avoid Allision*. The project's FAST diagram is shown below.

Approximately 80% of the project cost is assumed to support the function *Absorb Force* while 20% is to *Deflect Force.*

FAST Diagram - West Span SFOBB Fender System Replacement



Graphic Function Identification

Post & Strut Replacements

Support Load
Locate Components
Resist Corrosion

LEGEND:

Indicates existing structure

Indicates limits of bridge removal (portion).

Indicates limits of coal tar removal.

Dist	COUNTY	ROUTE

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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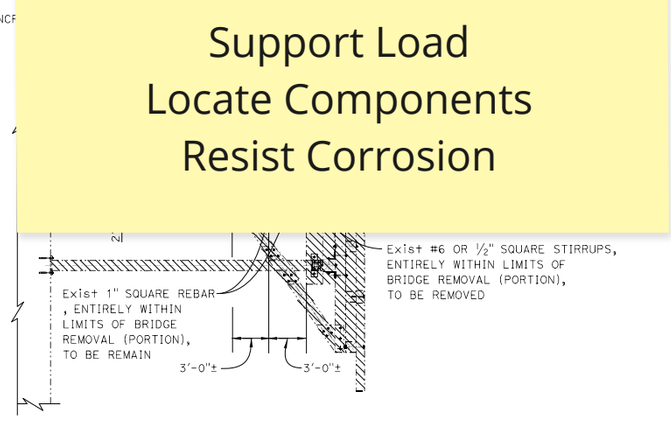
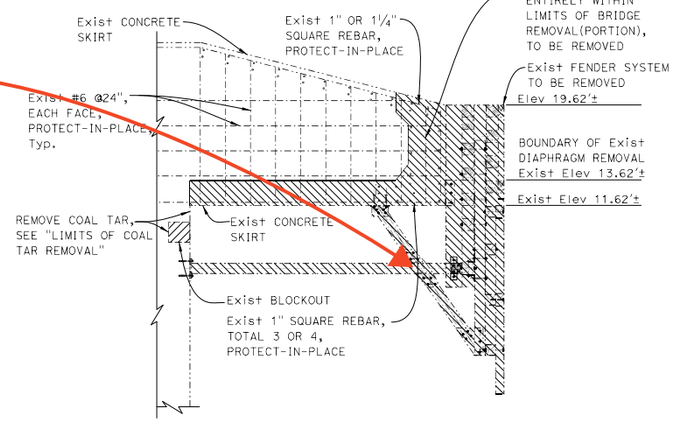


SECTION A-A
NO SCALE



FOR DETAILS NOT NOTED, SEE "SECTION A-A"

SECTION B-B
NO SCALE

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

P&Q

DESIGN	BY K. Cruz	CHECKED D. Chung	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF MAINTENANCE STRUCTURE MAINTENANCE DESIGN-TOLL BRIDGE	BRIDGE No. 34-0003	SFOBB WEST BAY
DETAILS	BY M. Yu	CHECKED D. Chung			POST MILE 6.35L	DEMOLITION DETAILS
QUANTITIES	BY K. Cruz	CHECKED D. Chung				

STRUCTURES MAINTENANCE DETAIL SHEET (ENGLISH) (REVISION 3/10/2021)
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UNIT: 3486 PROJECT NUMBER & PHASE: 04200001801
COUNTY/ROUTE/ZONE: SF/80/3 CONTRACT No.: 04-0W1404
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES
SHEET 3 OF 6

LEGEND:

Indicates existing structure

Indicates limits of bridge removal (portion).

Indicates limits of coal tar removal.

Dist	COUNTY	ROUTE	

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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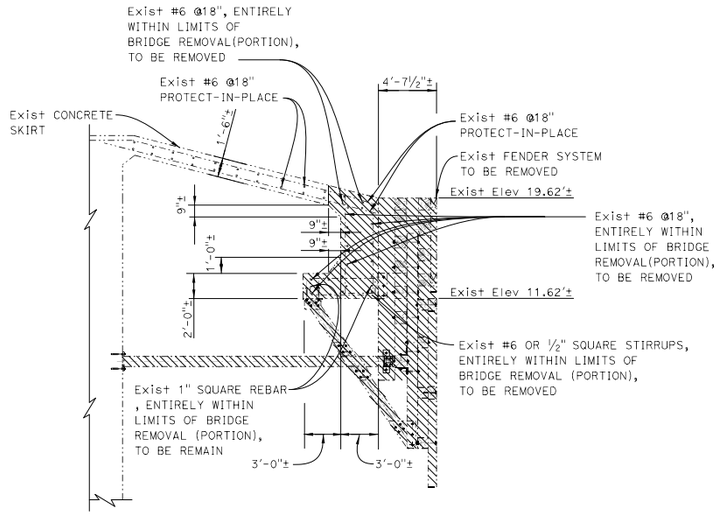

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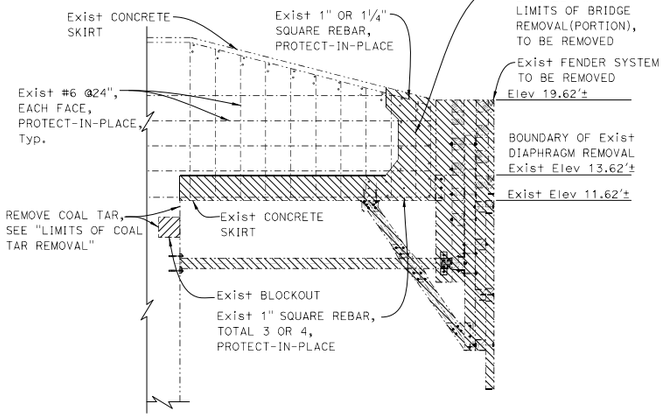

FOR DETAILS NOT NOTED, SEE "SECTION A-A"

SECTION B-B
NO SCALE

Structural Connectors

Resist Corrosion
Locate Components
Connect Elements

NOTE:
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	BRIDGE No.	SFOBB WEST BAY
NTENANCE	34-0003	
ITENANCE BRIDGE	POST MILE 6.35L	DEMOLITION DETAILS

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COUNTY/ROUTE/ZONE: SF/80/3
CONTRACT No.: 04-0W1404

DISREGARD PRINTS BEARING EARLIER REVISION DATES

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				3	6

LEGEND:

Indicates existing structure

Indicates limits of bridge removal (portion).

Indicates limits of coal tar removal.

Dist	COUNTY	ROUTE	

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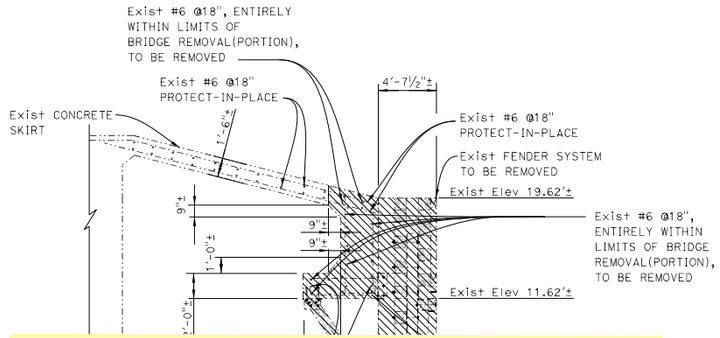

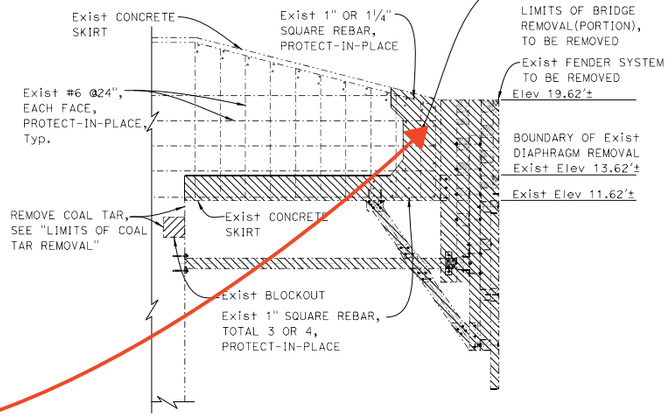

SECTION B-B
NO SCALE

Concrete Skirt Repairs

Repair Deterioration
Maintain Capacity
Support Load

NOTE:
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DETAILS	BY M. Yu	CHECKED D. Chung			POST MILE 6.35L
QUANTITIES	BY K. Cruz	CHECKED D. Chung			SFOBB WEST BAY DEMOLITION DETAILS

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COUNTY/ROUTE/ZONE: SF/80/3 CONTRACT No.: 04-0W1404
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES
SHEET 3 OF 6

LEGEND:

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Indicates limits of bridge removal (portion).

Indicates limits of coal tar removal.

Dist	COUNTY	ROUTE	

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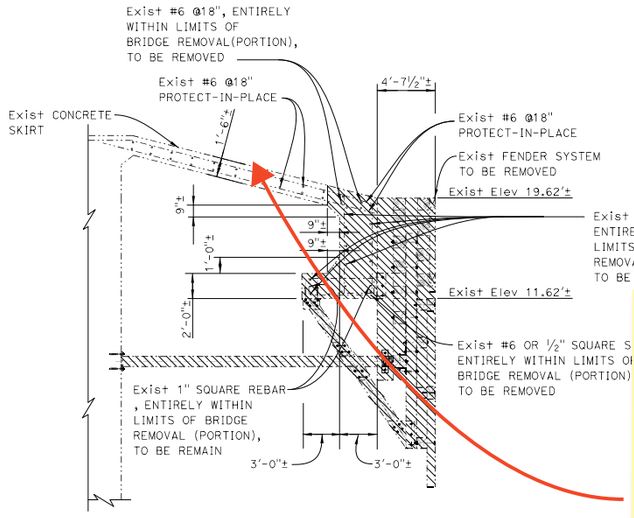

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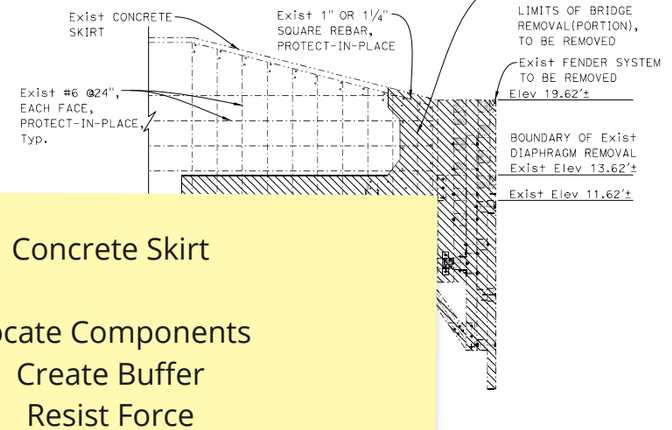
NO SCALE



Concrete Skirt

Locate Components
Create Buffer
Resist Force
Absorb Energy
Shed Water

NOTE:
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COUNTY/ROUTE/ZONE: SF/80/3 CONTRACT No.: 04-0W1404
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES
SHEET 3 OF 6

LEGEND:

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Indicates limits of bridge removal (portion).

Indicates limits of coal tar removal.

Dist	COUNTY	ROUTE

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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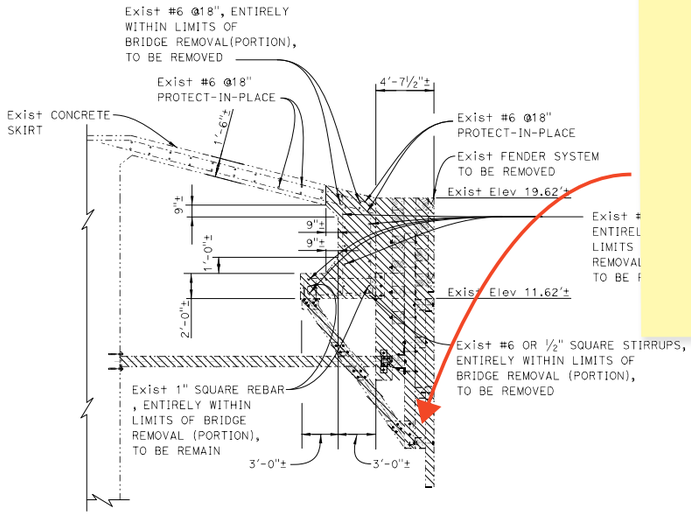
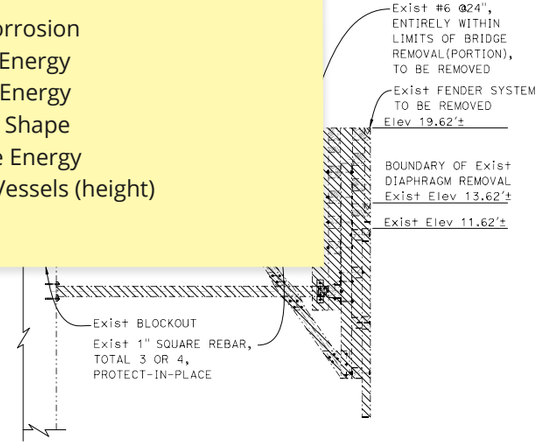
FRP Fenders

Resist Corrosion
Deflect Energy
Absorb Energy
Deform Shape
Dissipate Energy
Accommodate Vessels (height)



SECTION A-A
NO SCALE

TAR REMOVAL"



FOR DETAILS NOT NOTED, SEE "SECTION A-A"

SECTION B-B
NO SCALE

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DETAILS	BY M. Yu	CHECKED D. Chung			POST MILE 6.35L
QUANTITIES	BY K. Cruz	CHECKED D. Chung			SFOBB WEST BAY DEMOLITION DETAILS

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COUNTY/ROUTE/ZONE: SF/80/3 CONTRACT No.: 04-0W1404
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES
SHEET 3 OF 6

VALUE METRICS

Value Metrics provides a systematic and structured means of considering the relationship of a project's performance, cost, time (schedule), and risk as they relate to value. Project performance must be properly defined and agreed upon by the stakeholders at the beginning of the VA study. The basic equation for value is:

$$Value = \frac{Performance}{Cost + Time}$$

The performance attributes and requirements developed are then used throughout the study to identify, evaluate, and document changes to performance and value. OptionLab® was used to facilitate the Value Metrics portions of the VA Study.

The following pages describe the steps in the Value Metrics process.

Define Performance Requirements

Performance requirements represent essential, non-discretionary aspects of project performance. Any concept that fails to meet the project's performance requirements, regardless of whether it was developed during the project's design process or during the VA study, cannot be considered as a viable solution. Concepts that do not meet a performance requirement cannot be considered further unless such shortcomings are addressed through the VA study process in the form of VA alternatives. It should be noted that in some cases, a performance requirement may also represent the minimum acceptable level of a performance attribute. The following performance requirements were selected for this project.

Performance Requirement	Definition
Highway Design Standards	Any deviation from the Caltrans' Highway Design Manual must be approvable by the District's Design Reviewer.
Structural Design Standards	Any structure on the project must comply with current seismic design standards and meet the Load Resistance Design Factor.
Environmental Review Process	Any concept or design modification considered must comply with state and federal environmental law and be compatible with the environmental review process.
Project Milestones	Several critical schedule milestones must be met to meet legislative and/or funding requirements, these include Begin PS&E – March 2024; RTL – March 2026.

Define Performance Attributes and Scales

The PDT identified several performance attributes that represent those aspects of a project's scope that possess a range of potential acceptable values. A standard numeric scale is used for each attribute ranging from 1 to 10 where (Minimum Acceptable = 1) to an ideal level of performance (Ideal = 10). The following performance attributes were selected for this project.

Long-Term Environmental Impacts

These are impacts to the environment that extends beyond the completion of construction. This category includes multiple different types of environmental considerations such as ecological (both air and water quality); biological (both animals and plants); cultural (such as parks, historical buildings, and other resources related to the built environment); archaeological (sites and resources that could be disturbed); visual; noise; equity; and economic impacts.

Rating	Label	Description
8-10	Ideal	The highest reasonable level of performance is achieved.
6-8	High	A high level of performance is achieved.
4-6	Medium	A medium level of performance is achieved.
2-4	Low	A low level of performance is achieved.
0-2	Minimum Acceptable	The minimum acceptable level of performance is achieved.

Construction Impacts *(Short-Term Environmental Impacts)*

These are impacts to the environment that encompasses the construction time up through the completion of construction. This category includes multiple different types of short-term environmental and construction impacts such as ecological (both air and water quality); biological (both animal and plant); cultural (such as parks, historical buildings and other resources related to the built environment), archaeological (sites and resources that could be disturbed); visual, noise (including vibration and dust); equity, economic, and interim traffic operations.

Rating	Label	Description
8-10	Ideal	The highest reasonable level of performance is achieved.
6-8	High	A high level of performance is achieved.
4-6	Medium	A medium level of performance is achieved.
2-4	Low	A low level of performance is achieved.
0-2	Minimum Acceptable	The minimum acceptable level of performance is achieved.

Maintainability

This is the impact to long-term maintenance and operations of the infrastructure. This attribute is focused on life cycle costs and maintenance access considerations. Maintainability may also consider the resiliency of the infrastructure which includes design and service life in the face of uncertainty. This category encompasses items such as long-term maintenance costs; energy costs related to lighting and technology; maintenance access; service and design life; preservation of critical lifelines; and resiliency of the infrastructure to climate change, seismic events, forest fires, drought, sea-level rise, and surface drainage.

Rating	Label	Description
8-10	Ideal	The highest reasonable level of performance is achieved.
6-8	High	A high level of performance is achieved.
4-6	Medium	A medium level of performance is achieved.
2-4	Low	A low level of performance is achieved.
0-2	Minimum Acceptable	The minimum acceptable level of performance is achieved.

Allision Performance

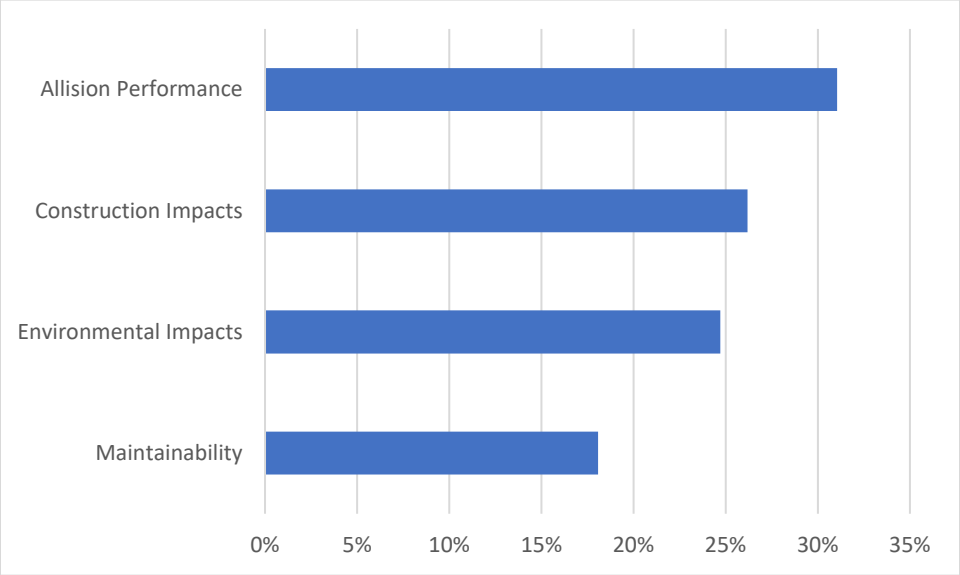
This attribute considers the performance of the fender system in minimizing damage to both the bridge and vessels in the event of an allision.

Rating	Label	Description
8-10	Ideal	The highest reasonable level of performance is achieved.
6-8	High	A high level of performance is achieved.
4-6	Medium	A medium level of performance is achieved.
2-4	Low	A low level of performance is achieved.
0-2	Minimum Acceptable	The minimum acceptable level of performance is achieved.

Prioritize Performance Attributes

Once the performance attributes were defined and their scales developed, the PDT and stakeholders prioritized them based on their relative importance to the project using OptionLab®. The performance attributes were systematically compared to each other using the software. Participants were then asked to indicate their priorities and the relative intensities of their preferences. The chart below provides the results of this analysis and includes the complete breakdown of the priorities, expressed as a percentage of the whole.

Performance Attributes Prioritization



Measure Performance of Baseline Concept

The PDT and stakeholders evaluated the performance of the baseline concept relative to the performance attribute definitions and scales previously identified. The information below reflects the performance ratings and associated rationale for each attribute.

Long-Term Environmental Impacts	**Rating: 10**
Rating Rationale: Ideal – The baseline concept is maintaining a similar shape and form as the current system; there is no significant visual impacts and is maintaining approximately the same in-water footprint.	
Construction Impacts	**Rating: 8**
Rating Rationale: High – The existing fender system and a portion of the skirt will be removed. This requires containment of debris. Navigation would be maintained in the channel. Tidal conditions would impact construction. Potential concerns with long-lead items such as FRP and stainless steel.	
Allision Performance	**Rating: 8**
Rating Rationale: High – The new fender system will be designed to maximize energy dissipation to the extent possible (<100k tonnes). Rubber fenders will be installed which should increase energy absorption.	
Maintainability	**Rating: 7**
Rating Rationale: High – The new support system will incorporate stainless steel connections and FRP members wherever possible. Concrete skirt repairs will include a cathodic protection system. Corrosive environment concrete will be used. Access ladders will be maintained to facilitate maintenance.	

Measure Performance of VA Alternatives

The VA team prepared performance assessments of each of the VA alternatives during the Development Phase of the VA study. For each VA alternative, the VA team rated its performance using the previously defined scale for each performance attribute. The rationale for any change in performance as compared to the baseline concept was recorded. Please refer to the individual performance assessments for each VA alternative as presented in the *VA Alternatives* section of this report.

Define VA Strategies

The VA team identified a single VA strategy for consideration. The Recommended VA Strategy reflects the combination of complimentary VA alternatives recommended by the team and is summarized in the table below.

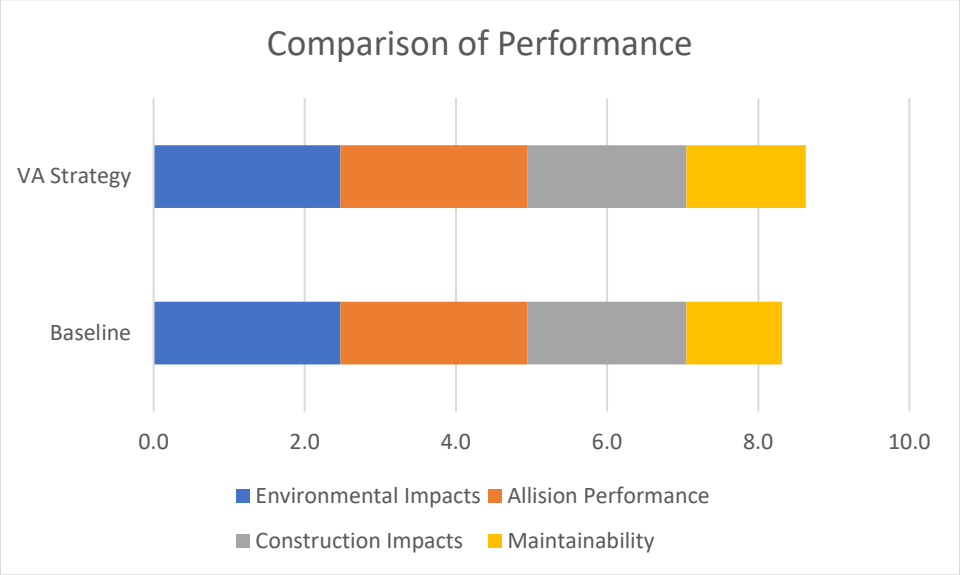
Summary of Recommended VA Strategy

Strategy Description	Initial Cost Savings	Change in Schedule	Performance Change	Value Change
Recommended VA Strategy *Alts. 1.0, 2.0, and 3.0*	($1,380,000)	No change	+ 3.8 %	+ 2.8 %

Compare Performance – Baseline Concept and Recommended VA Strategy

The VA team considered the combined effect of all VA alternatives for the Recommended VA Strategy. The total performance scores reflect the performance rating for each attribute multiplied by its overall priority (weight) expressed using a ration scale. A total performance score of "10" would indicate the highest level of desired performance (i.e., "ideal" performance). The chart below compares the total performance scores for the baseline concept and the VA strategy.

Comparison of Performance



Rating Rationale for Recommended VA Strategy

The rating rationale for the performance of the baseline concept was presented previously in this section. The rating rationale for the VA strategy developed by the VA team is provided below.

Recommended VA Strategy (Alternatives 1.0, 2.0, and 3.0)

Long-Term Environmental Impacts	**Rating: 10**
Rating Rationale: Ideal – No change from the baseline concept.	
Construction Impacts	**Rating: 8**
Rating Rationale: High – No change from the baseline concept.	
Allision Performance	**Rating: 8**
Rating Rationale: High – No change from the baseline concept.	
Maintainability	**Rating: 8.75**
Rating Rationale: High – Maintaining a stock of FRP members and/or connectors on hand would reduce the response time for routine maintenance repairs required and assist Caltrans Maintenance. The use of Chromx increases resistance to corrosion for reinforcing steel. The use of titanium Grade 5 fasteners reduces the risk of corrosion and should improve the ease of replacing fender elements by Caltrans Maintenance.	

Compare Value

The cost and time (i.e., schedule) elements were compared and prioritized by the project decision makers. The relative importance of cost and time is shown on the following table. These factors were applied to the cost and time scores and incorporated into the value calculations.

Relative Importance	
COST	56 %
TIME	44 %

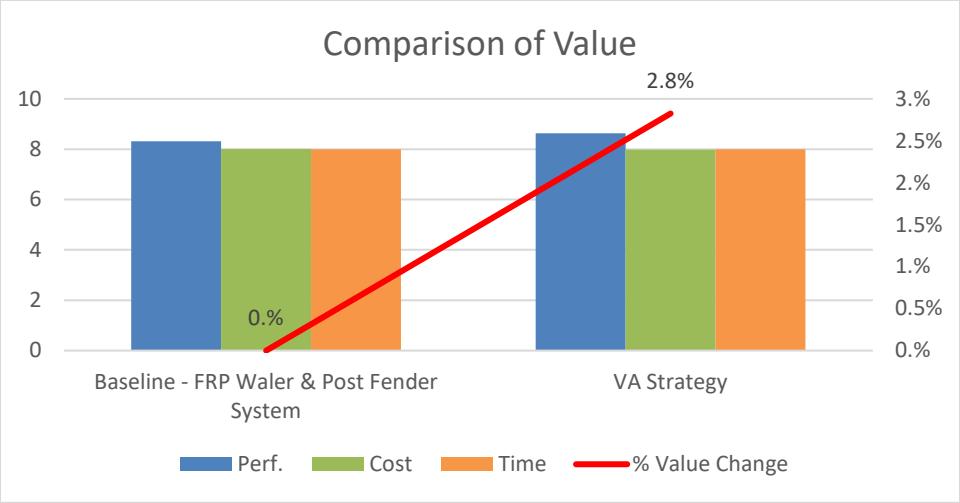
Once relative scores for performance, cost, and time have been derived, the next step is to synthesize a value index for the baseline concept and each VA strategy. This is achieved by applying the following algorithm for value:

- V = Value
- f = Function
- P = Performance
- C = Cost
- t = Time
- α = Risk

$$V_f(P,C,t)_{total} = \frac{\sum_{n=1}^{\infty} P_n \cdot \alpha}{\sum_{n=1}^{\infty}[(C_n \cdot \alpha) + (t_n \cdot \alpha)]}$$

A Value Matrix was prepared which facilitated the comparison of competing strategies by organizing and summarizing this data into a tabular format. The performance scores for each strategy were divided by the total cost/time scores for each strategy to derive a value index. The value indices for the VA strategy are then compared against the value index of the baseline concept and the difference is expressed as a percent (±%) deviation.

Comparison of Value – Baseline Concept and VA Strategy



Rating Rationale for Accepted VA Alternatives

The rating rationale for the performance of the baseline concept was presented previously. The rating rationale for the accepted VA alternatives developed by the VA team is provided below.

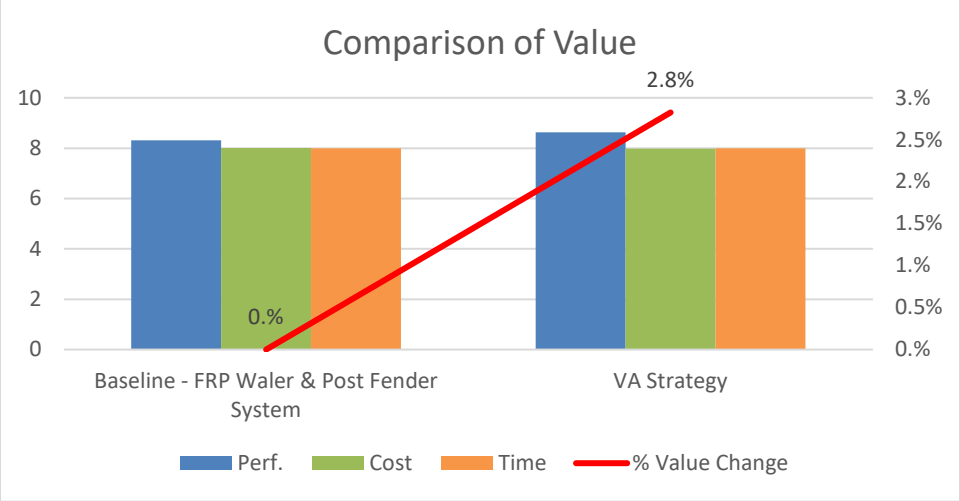
Accepted VA Alternatives (1.0, 2.0, and 3.0)

Long-Term Environmental Impacts	**Rating: 10**
Rating Rationale: Ideal – No change from the baseline concept.	
Construction Impacts	**Rating: 8**
Rating Rationale: High – No change from the baseline concept.	
Allision Performance	**Rating: 8**
Rating Rationale: High – No change from the baseline concept.	
Maintainability	**Rating: 8.75**
Rating Rationale: High – Maintaining a stock of FRP members and/or connectors on hand would reduce the response time for routine maintenance repairs required and assist Caltrans' Maintenance. The use of ChromX increases resistance to corrosion for reinforcing steel. The use of titanium Grade V fasteners reduces the risk of corrosion and should improve the ease of replacing fender elements by Caltrans' Maintenance.	

Value Matrix –
Baseline Concept and Accepted VA Alternatives

Strategies	Performance Score	Net Change	Cost/Time Score	Net Change	Value Index	Change in Value
Baseline Concept	8.3	+ 0.0 %	8.0	+ 0.0 %	4.2	+ 0.0 %
Accepted VA Alternatives	8.6	+ 3.8 %	8.0	+ 0.0 %	4.3	+ 2.8 %

Comparison of Value –
Baseline Concept & Accepted VA Alternatives



IDEA EVALUATION

IDEA EVALUATION

The ideas generated by the VA team were carefully evaluated, and project-specific attributes were applied to each idea to assure an objective evaluation.

PERFORMANCE ATTRIBUTES

The following are key performance attributes identified for this project and used to assist the VA team in evaluating the ideas:

- Allision Performance
- Environmental Impacts
- Construction Impacts
- Maintainability

The VA team enlisted the assistance of the stakeholders and project team (when available) to develop these attributes so that the evaluation would reflect their specific requirements.

EVALUATION PROCESS

The VA team generated and evaluated ideas on how to perform the various project functions using other approaches. The idea list was grouped by function or major project element. Each idea was evaluated with respect to the functional requirements of the project. Performance, cost, time, and risk may also have been considered during this evaluation.

Once each idea was fully evaluated, it was rated to determine which ideas had the greatest potential for value improvement. Ideas identified for development as VA alternatives or as other considerations are documented in the *VA Alternatives* section of this report.

IDEA SUMMARY

All the ideas generated during the Creativity Phase using brainstorming techniques are recorded on the following pages. The team created and evaluated these ideas together using Miro. Each idea received an idea code based on the function statement under which it was brainstormed. The following table indicates the functions related to each idea code.

Idea Code	Related Function
AA	Avoid Allision
AF	Absorb Force
AM	Avoid Marine Growth
AV	Accomm. Vessels
DE	Deflect Force
DF	Dissipate Force

Idea Code	Related Function
DS	Deform Shape
PC	Prevent Contact
RC	Resist Corrosion
RD	Repair Deterioration
RF	Receive Force
RS	Remove Structure

Avoid Allision (AA) | 3

AA-1 Technology to auto correct the ships

Comments: Difficult to discriminate from non-problematic vessels

Dismiss

AA-2 fixed radar and horn system on bridge for early warming

Dismiss

AA-3 Early warning channel marker buoys

Comments: Would require additional analysis and USCG permits. Would need to weigh benefits for large ships vs. impacts to smaller craft.

Dismiss

Avoid Allision (AA) | 3

AA-4 Get Coast guard to limit navigation channel to one or two spans

Dismiss

AA-5 Get SF bar pilots to tow big ships when crossing the bridge.

Dismiss

AA-6 Install small lighted buoys to demarcate navigation channel around piers

Dismiss

Avoid Allision (AA) | 3

AA-7 Better lighting and of bridge supports

Dismiss

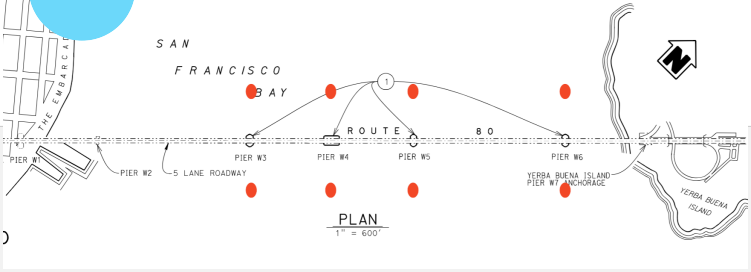
AA-8 Install a warning buoy in advance of each pier to provide time for ships to turn before hitting pier

Dismiss

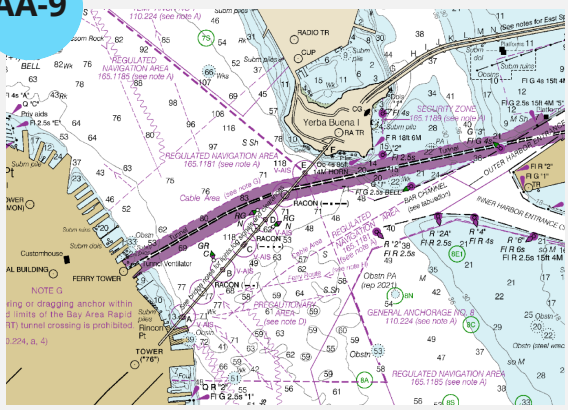
AA-9 Consider discussing potential for additional navigational guidance around SFOBB with USCG to reduce chance of allisions

QR Comment

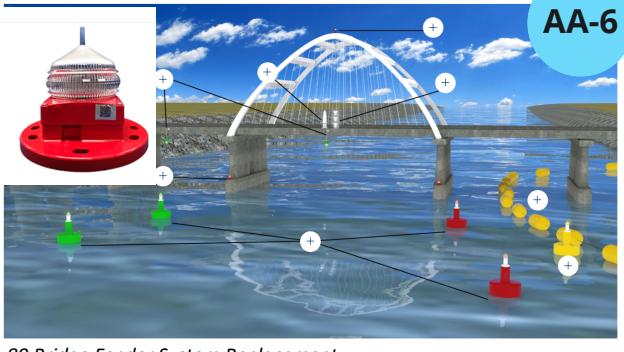
AA-3



AA-9



AA-6



AA-8

Absorb Force (AF) | 3

AF-1 Crushable cellular concrete skirt

Comments: Difficult to predict deformation behavior - could create a "jagged" hazard.

Dismiss

AF-2 Additional floating fendering outboard of abutment nose

Dismiss

AF-3 expellable hydraulic bladder system at nose

Dismiss

Absorb Force (AF) | 3

AF-4 Use a foam fender system (Ocean Guard)

Comments: Could be considered on ends - better for head on, might be scraped off on a side-swipe.

Karl Top Idea

AF-5 Use a steel-PAFRC composite fender

Comments: A novel steel-PAFRC composite fender for bridge pier protection under low velocity vessel impacts - ScienceDirect

AF-6 Use Ocean Cushion Fenders

Karl Top Idea

Absorb Force (AF) | 3

AF-7 Use Komposite Fenders

Dismiss

AF-8 Use roller fenders

Comments: Not the right application

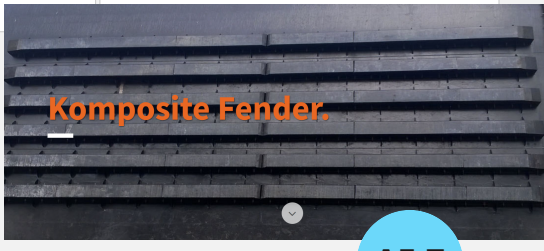
Dismiss

AF-9 Install an airbag system along fenders

Comments: Not practical

Dismiss

AF-4



AF-7

AF-6

AF-8

Avoid Marine Growth (AM) | 5

AM-1 Apply teflon coating to surfaces

Comments: Additional cost. Coating will erode over time

Dismiss

AM-2 Go back to creosote!

Comment: Toxic - not permittable.

Dismiss

AM-3 Would the shape of the members have any impact on the rate of growth? would a round/angular shape be more ideal for preventing marine growth?

Dismiss

AM-4 Nylon coating

Dismiss

AM-5 Ablating Paint

Dismiss

Avoid Marine Growth (AM) | 3

AM-6 Evaluate drag from tidal currents and vertical loading to determine if this is a problem

Comments: Already being done

Dismiss

AM-7 Roller fenders that crush growth

Comments: See AM-8

Dismiss

AM-8 floating camel along faces of pier fenders

Comments: The camel would slowly abrade the surface of the fenders and/or camel. Camel would also better facilitate access to the piers from small vessels

Dismiss

Avoid Marine Growth (AM) | 5

AM-9 Replaceable PVC fascia on outside of fenders

Comments: Already being done

Dismiss

AM-10 HDPE coatings

Dismiss

AM-11 Impressed current antifouling System

Dismiss

AM-12 Silicon elastomeric surfaces

Dismiss

AM-13 Have Keith prepare a summary on his observations on the marine growth issue.

QR Comment

AM-7

AM-8

Deflect Force (DF) | 4

DE-1 mechanical means of deflecting (giant ball bearings on face of fender)

Dismiss

DE-2 horizontal paddle wheel-like structure encompassing the pier to deflect/dissipate ship's energy

Comments: Would require a fairly large mechanical system that would need to be maintained and tested

Dismiss

DE-4 Install a small configuration of piles / fenders in front of piers to act as a deterrent / advance warning

Comments: Piles would be so long that they would likely deflect and be of little value.

Dismiss

DE-3 Can the fender be slanted to deflect (similar to a dolphin fender)

Comments: When the concrete skirt is repaired, form a battered/sloped face extending out to allow fender posts to be installed at an angle. Ship would ride up on the skirt on impact. Concerns about "launching" the vessel up on top of the skirt and possibly into the pier.

Dismiss

Deflect Force (DF) | 3

DE-5 Extend shape of fender to better deflect vessels

Comments: Would require additional foundations to support elongated shape.

Dismiss

DE-6 Construct round dolphin structures at tips of piers

Comments: Requires large caissons to construct

Dismiss

DE-7 Construct floats in front of pier (Francis Scott Key Bridge)

Comments: Would require additional analysis and USCG permits. Would need to weigh benefits for large ships vs. impacts to smaller craft.

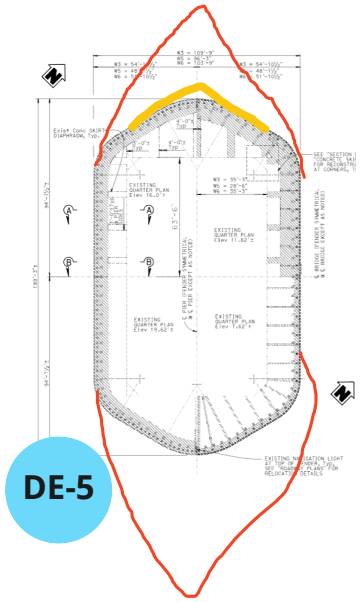
Dismiss

Deflect Force (DF) | 1

DE-8 Construct a fender system using buoys and cables with anchors

Comments: This system would be in addition to the baseline repairs. Need 8 of these (two per pier). Additional cost and dubious value.

Dismiss



DE-5

DE-7

DE-8

Dissipate Force (DF) | 4

DF-1 Use Foam Rubber

Dismiss

DF-2 Shaping the members to better deflect impact

Dismiss

DF-3 Allowing some supporting members to have plastic/ductile deformation

Dismiss

DF-4 Change struts from FRP to a more ductile material or eccentric bracing

Comments: Steel members are currently being replaced with FRP. Struts are designed more for support of the fenders, not for energy absorption

Dismiss

Dissipate Force (DF) | 4

DF-5 Make struts more like a shock absorber

Comments: Costs would be extremely high. Mechanical components subject to marine environment

Dismiss

DF-6 Consider hydropneumatic fenders

Comments: Cost prohibitive. High maintenance

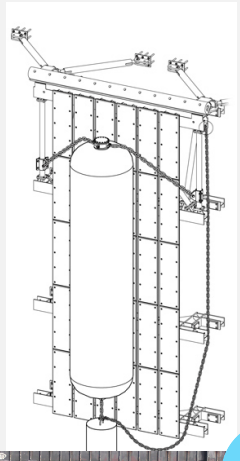
Dismiss

DF-7 Design a cellular steel fender that would deform under heavy loads

Dismiss

DF-8 Consider rigid foam material or other material that is compressible as part of skirt

Dismiss



DF-6

DF-5

DF-8

Prevent Contact (PC) | 4

PC-1 What color (or alternate color stripping) to use for better visibility?

Dismiss

PC-2 Spot lighting the fender?

Dismiss

PC-3 Instead of replacing the concrete for the skirt in it original location, saw cut an reduce the depth of the skirt and locate new fender face 3-feet closer to pier

Comments: Reduces buffer width between face of fender and pier. Reduces cost of casting replacement section. Would require a different fender design.

Dismiss

PC-4 Replace this section of skirt with a pre-cast concrete element

Comments: Connections would be potentially problematic between the pre-cast member and the existing concrete skirt.

Dismiss

Prevent Contact (PC) | 2

PC-5 Replace this section with a hollow steel shape

Comments: Steel boxes would be extremely expensive and corrosion issues

Dismiss

PC-6 Demolish concrete skirt and replace with a steel frame.

Comments: Requires new connections with existing concrete pier - concerns about compromising the integrity of the piers.

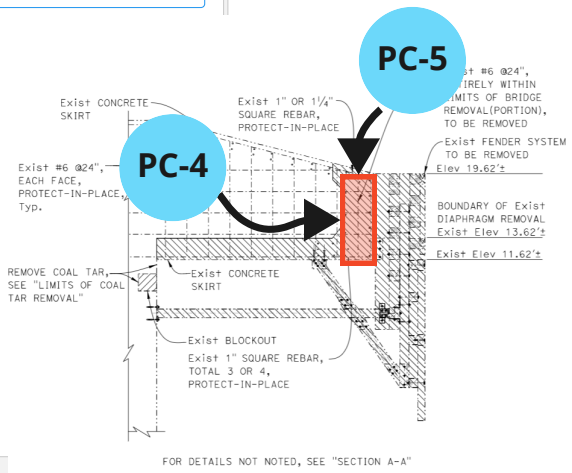
Dismiss

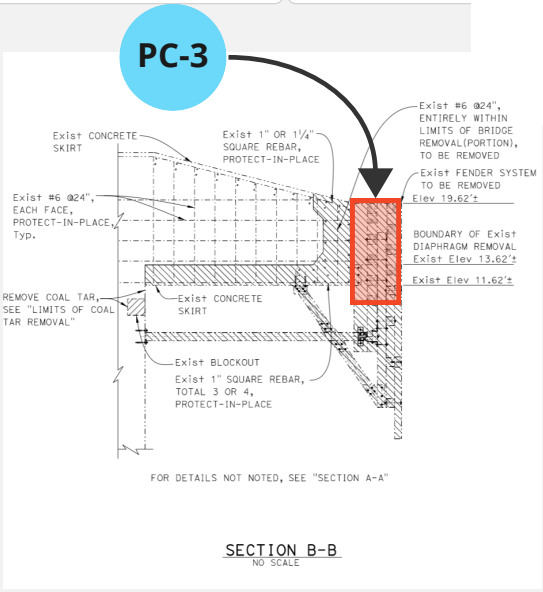
Prevent Contact (PC) | 1

PC-7 Demolish concrete skirt and replace with a FRP beam

Comments: Requires new connections with existing concrete pier - concerns about compromising the integrity of the piers.

Dismiss





Resist Corrosion (RC) | 2

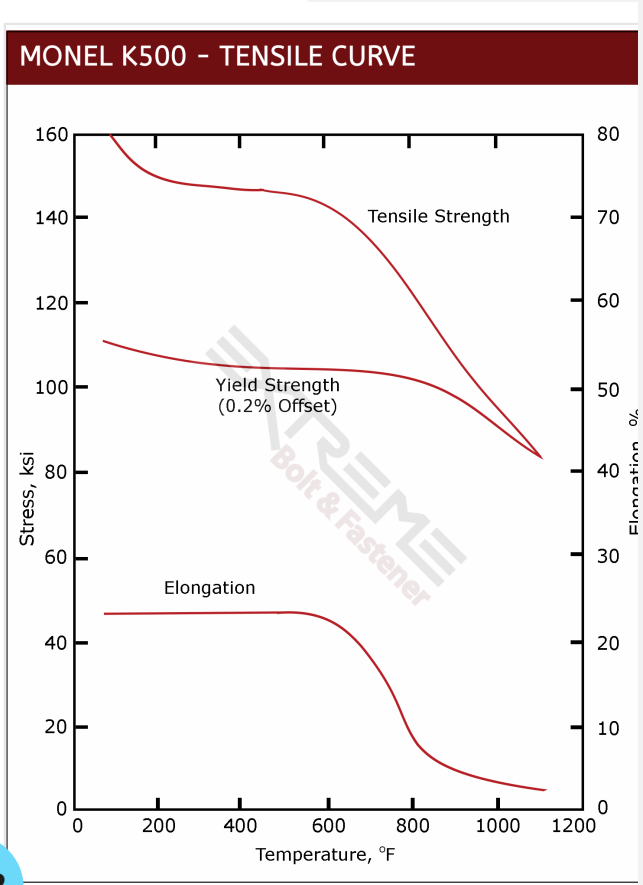
RC-1 Better concrete mixture

Comments: Including a corrosive environment mix as part of current concept

Dismiss

RC-2 Need to be very careful about mixing metals (rebar, stainless bolts, anode cables and anodes

QR Comment



RC-2

www.extreme-bolt.com

Monel K500 Bolts | Monel

Monel K500 Bolts For Corrosive Applications In Seawater & Chemical Processing

Repair Deterioration (RD) | 3

RD-1 Consider using ChromX rebar in lieu of stainless steel or epoxy coated (less expensive)

Rob Top Idea

RD-2 Consider monel hardware

Rob Top Idea

RD-3 Availability of parts for future emergency repair

Comments: Could have a line item in contract to procure 5% additional replacement fender material, etc. Need to figure out where CT would store this material. Need to identify a reasonable quantity and identify what materials would be considered.

Karl Top Idea

Repair Deterioration (RD) | 2

RD-4 Reconfigure under apron to improve concrete pour capacity

QR Comment

RD-5 Consider boring through apron for grout injection to cast below deck

QR Comment

Repair Deterioration (RD) | 2

RD-6 May be able to use floats to lift falsework to base of bridge by blowing ballast tanks of barges positioned under skirt.

QR Comment

RD-7 Consider CMGC to have contractor on early to advise for constructability

Kenneth Top Idea

RD-1

the alloy content of ChromX®?

ChromX® is a low-carbon, chromium alloy steel bar. ChromX® 9100 and 9120, 4100 and 4120, rebar shall meet the requirements of Table 1 as per ASTM A1035-20.

Alloy Type	Carbon	Chromium	Manganese	Nitrogen	Phosphorus	Sulfur
A1035 CS ChromX® 9100 and 9120	0.15%	8.0 - 10.9%(A)	1.5%	0.05%	0.035%	0.0455%
A1035 CM ChromX® 4100 and 4120	0.20%	4.0 - 7.9%	1.5%	0.05%	0.035%	0.0455%

(A)AASHTO M 334 M/M 334 - 17 has a minimum 9.2% Cr content.

Receive Force (RF) | 1

RF-1 Shock absorbing material between the members?

Dismiss

Accomm. Vessels (AV) | 1

AV-1 Consider allowing fender section to be added for future sea-level rise

Comments: Baseline concept is raising the elevation of the skirt - could check (4-feet is currently being considered). Design parapet wall to accommodate an additional 12-24 inches to account for seal-level rise in the future. Need to investigate latest sea-level rise projections to determine potential needs.

Keith Kenneth Top Idea

Remove Structure (RS) | 2

RS-2 Consider packaging any additional work with this project for the West Span of SFOBB (i.e., seismic sensors)

QR Comment

RS-1 Year-round Construction

AV-1

PROJECTION & ASSOCIATED RANGE OF SEA LEVEL RISE ESTIMATES FOR SAN FRANCISCO (FEET)

	2000 - 2050 PROJECTIONS			2000 - 2080 PROJECTIONS			2000 - 2100 PROJECTIONS		
EMISSION SCENARIO	LOW	MEDIUM HIGH	EXTREME	LOW	MEDIUM HIGH	EXTREME	LOW	MEDIUM HIGH	EXTREME
Low	—	—	—	1.8	3.9	—	2.4	5.7	—
High	1.1	1.9	2.7	2.4	4.5	6.6	3.4	6.9	10.2

VA PROCESS

VA PROCESS

The Caltrans Value Analysis (VA) process involves 16 activities needed to accomplish a VA study, and is organized into three parts: Pre-Study, VA Study, and Report. Integral to Caltrans' VA process is the Value Metrics. Value Metrics provides a systematic and structured means of considering the relationship of a project's performance, cost, time (schedule), and risk as they relate to value.

Project performance must be properly defined and agreed upon by the stakeholders at the beginning of the VA study. The performance attributes and requirements developed are then used throughout the study to identify, evaluate, and document changes to performance and value. OptionLab® was used to facilitate the Value Metrics portions of the VA Study.

The following provides an overview of the Caltrans approach to VA. The Caltrans VA Study Activity Chart at the end of this narrative identifies the steps in each activity, which are detailed as follows.

PRE-STUDY

Meaningful and measurable results are directly related to the pre-study work performed. Depending on the type of study, all or part of the following information needs to be determined during the pre-study phase:

- Clear definition of the current situation and study objectives
- Identification of study team members
- Identification of project stakeholders
- Definition of how stakeholders are impacted by the project
- Identification of key issues and concerns
- Identification of project's performance requirements and attributes
- Status of project cost estimate
- Project data gathered to be distributed to VA team

In preparation for the VA study, the team leader confers with owners and stakeholders to outline the VA process; initiate data gathering; refine project scope and objectives; structure the scope, team members, and technical specialists; and finalize study plans. Specific deliverables are provided.

Following the initial planning meeting, the team leader reviews the data collected for the project and develops a cost model. The team leader also consults with the technical specialists to prepare them for the VA study.

VA STUDY

This VA study was conducted in a virtual environment using MS Teams and Miro.MS Teams is a virtual meeting platform that supports audiovisual communications and facilitates the use of breakout sessions to allow for multiple, parallel meetings. Miro is a collaborative whiteboard platform that supports a variety of activities. This platform was used extensively to allow participants to share information visually. It was used explicitly to support the Information, Function Analysis, Creativity, and Evaluation Phases of the VM Process.

The VA Job Plan guides the VA team in their search to enhance value in the project or process. Caltrans follows a seven-phase VA Job Plan:

1. Information Phase
2. Function Analysis Phase
3. Creativity Phase
4. Evaluation Phase
5. Development Phase
6. Presentation Phase
7. Implementation Phase

Information Phase

At the beginning of the VA study, the design team presents a more detailed review of the design and the various systems. This includes an overview of the project and its various requirements, which further enhances the VA team's knowledge and understanding of the project.

The project team also responds to questions posed by the VA team. The project's performance requirements and attributes are discussed, and the performance of the baseline concept is evaluated.

Function Analysis Phase

Key to the VA process are the function analysis techniques used during the Function Analysis Phase. These techniques may include but are not limited to:

- Random Function Identification
- Function-Resource Allocation
- Function Analysis System Technique (FAST Diagrams)
- Graphic Function Identification

Analyzing the functions of a project is essential to assuring an owner that the project has been designed to meet the stated criteria and its need and purpose. The analysis of these functions in terms of cost, performance, time, and risk is a primary focus in a VA study and is used to identify areas within a project for value improvement. This procedure is beneficial to the VA team, as it forces the participants to think in terms of functions and their relative value in meeting the project's need and purpose. This facilitates a deeper understanding of the project.

Creativity Phase

The Creativity Phase involves identifying and listing creative ideas. During this phase, the VA team participates in a brainstorming session to identify as many means as possible to provide the necessary project functions. The judgement of the ideas is not permitted in order to generate a broad range of ideas. The idea list includes all of the ideas suggested during the study. These ideas should be reviewed further by the project team since they may contain ideas worthy of further evaluation and may be used as the design develops. These ideas could also help stimulate additional ideas by others.

Evaluation Phase

The purpose of the Evaluation Phase is to systematically assess the potential impacts of ideas generated during the Creativity Phase relative to their potential for value improvement. Each idea is evaluated in terms of its potential impact to performance, cost, time, and risk. Once each idea is fully evaluated, it is classified as an idea to either "Develop" or "Dismiss." Some ideas can also be "Combined" with other promising ideas or ideas which are "Already Being Done." The rationale for why ideas were rated highly but not developed as alternatives is documented in the *Idea Evaluation* section of the report.

Development Phase

During the Development Phase, the highly rated ideas are expanded and developed into VA alternatives. The development process considers the impact to performance, cost, time, and risk of the alternative concepts relative to the baseline concept. This analysis is prepared as appropriate for each alternative, and the information may include a performance assessment, initial cost and life-cycle cost comparisons, schedule analysis, and an assessment of risk. Each alternative describes the baseline concept and proposed changes and includes a technical discussion. Sketches and calculations are also prepared for each alternative as appropriate.

Presentation Phase

The VA study concludes with a preliminary presentation of the VA team's assessment of the project and VA alternatives. The presentation provides an opportunity for the owner, project team, and stakeholders to preview the alternatives and develop an understanding of the rationale behind them.

Implementation Phase

After the stakeholders have had an opportunity to review the alternatives identified by the VA team, the team leader conducts an implementation meeting to discuss the alternatives and resolve appropriate action for each VA alternative. If necessary, any other VA report edits requested by the representatives are also made by the VA team leader and a final report is issued. This implementation meeting helps to ensure that savings or process improvements are not lost due to a lack of communication, and that those VA alternatives that are accepted are properly integrated into the project design.

VA REPORT

Preliminary Report: Following the completion of the VA study, the team leader compiles the information developed during the VA study into the *Preliminary Value Analysis Study Report.* This report, documenting viable alternatives, is provided to the customer within the timeframe requested (usually within two weeks of study completion). The preliminary report also contains a *VA Study Summary Report – Preliminary Findings*, designed to highlight critical elements of the VA study, including detailed documentation of VA alternatives, in a concise manner for the use of parties without the opportunity to review the report in its entirety. More details can be found in the complete preliminary report, which consists of the following documentation: Executive Summary, VA Alternatives, Project Information, Project Analysis, Idea Evaluation, and VA Process.

Final Report: Once all VA alternatives have been either accepted or rejected, the team leader updates the *Preliminary Value Analysis Study Report* to show the final results of the study in a *Final Value Analysis Study Report.* In addition, a Value Analysis Study Summary Report (VASSR) is sent to Caltrans HQ to permit easy documentation into the Caltrans Annual Report to FHWA.

The following Caltrans VA Study Activity Chart describes each activity.

CALTRANS VA STUDY ACTIVITY CHART

PREPARATION

INITIATE STUDY	ORGANIZE STUDY	PREPARE DATA
➢ Identify study project ➢ Identify study roles and responsibilities ➢ Define study goals ➢ Select team leader ➢ Prepare draft Study Charter **1**	➢ Conduct Pre-Study Meeting ➢ Select team members ➢ Identify stakeholders, decision-makers, and technical reviewers ➢ Identify data collection ➢ Select study dates ➢ Determine study logistics ➢ Update VA Study Charter ➢ Identify and define performance requirements **2**	➢ Collect and distribute data ➢ Develop construction cost models ➢ Develop highway user benefit/life-cycle cost (LCC) model (if required) **3**

VA STUDY

Segment 1

INFORM TEAM	ANALYZE FUNCTIONS	CREATE IDEAS	EVALUATE IDEAS
➢ Review study activities and confirm reviewers ➢ Present design concept ➢ Present stakeholders' interests ➢ Review project issues and objectives ➢ Rate performance of baseline concept ➢ Visit project site **4**	➢ Analyze project data ➢ Expand project functions ➢ Prepare FAST diagram ➢ Determine functional cost drivers and performance **5**	➢ Focus on functions ➢ List all ideas ➢ Apply creativity and innovation techniques (group and individual) **6**	➢ Apply key performance attributes to rate idea ➢ List advantages and disadvantages ➢ Consider cost impacts ➢ Rank all ideas ➢ Assign alternatives for development 7

Segment 2

DEVELOP ALTERANTIVES	CRITIQUE ALTERNATIVES	PRESENT ALTERNATIVES
➢ Develop alternative concepts ➢ Prepare sketches and calculations ➢ Measure performance ➢ Estimate costs, LCC benefits/costs **8**	➢ VA alternatives technical review ➢ VA alternatives team consensus review ➢ Identify mutually exclusive groups of alternatives ➢ Identify VA strategies ➢ Validate performance **9**	➢ Present findings ➢ Document feedback ➢ Confirm pending reviews ➢ Prepare preliminary report **Interim presentation of study findings* **10**

Segment 3

ASSESS ALTERNATIVES**	RESOLVE ALTERNATIVES	PRESENT RESULTS*
➢ Review Preliminary Report ➢ Assess alternatives for project acceptance ➢ Prepare draft implementation dispositions ***Activities performed by PDT, Technical Reviewers, and Stakeholders* **11**	➢ Review implementation dispositions ➢ Resolve implementation actions with decision-makers and stakeholders ➢ Edit alternatives ➢ Revisit rejected alternatives, if needed **12**	➢ Present results ➢ Obtain management approval on implemented alternatives ➢ Summarize performance, cost, and value improvements **Final presentation of study results* **13**

REPORT

DOCUMENT STUDY	VA IMPLEMENTATION ACTION MEMO	PUBLISH RESULTS
➢ Document process and study findings ➢ Distribute Preliminary VA Report ➢ Distribute electronic report to HQ VA Branch ➢ Conduct Implementation Meeting **14**	*(If Conditionally Accepted Alternatives exist)* ➢ Publish memo to document action plan to complete study ➢ Resolve Conditionally Accepted Alternatives **15**	➢ Document process and study results ➢ Incorporate all comments and implementation actions ➢ Distribute Final VA Report ➢ Distribute electronic report to HQ VA Branch ➢ Update VA Study Summary Report (VASSR) ➢ Provide HQ the Final VA Report in PDF format **16**

*Note: The dashed boxes indicate steps that **may** not be required in some VA studies*

Day 1 – Monday, February 5, 2024 – Virtual Workshop

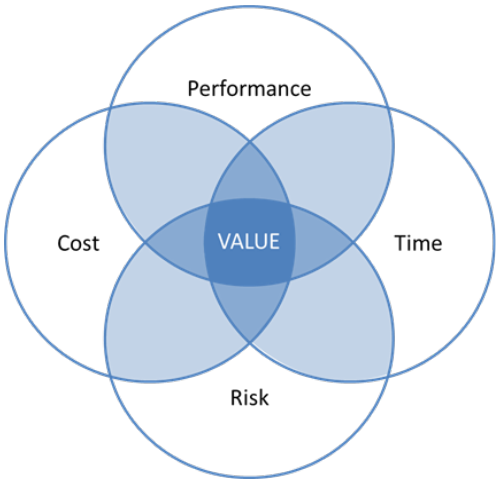
9:00 Introductions
9:15 Sponsor (PM, Design Team & VA Facilitator) In-Brief
- ***Need & Purpose***
- ***Overview of Current Project***

$$Value = \frac{Performance}{Cost + Time}$$

10:15 Discuss and Prioritize Performance Measures
10:45 Complete Performance Measures Evaluation and Discuss Results
12:00 Lunch
1:00 Function Analysis
3:00 Team Brainstorming
4:00 Adjourn

Day 2 – Tuesday, February 6, 2024 – Virtual Workshop

8:00 Team Brainstorming
10:00 Team Evaluation of Ideas
12:00 Lunch
1:00 Team Evaluation of Ideas
3:00 Technical Review of Ideas
4:00 Adjourn



Day 3 – Wednesday, February 7, 2024 – Virtual Workshop

8:00 Team Development of VA Alternatives
12:00 Lunch
1:00 Team Development of VA Alternatives (cont.)
4:00 Adjourn

Day 4 – Thursday, February 8, 2024 – Virtual Workshop

8:00 Finalization of VA Alternatives & Strategies
10:00 Break
10:15 Team Review of VA Study Presentation
12:00 Lunch
1:00 Presentation of Initial VA Study Results (VA Team Recommended Strategy)
2:30 Adjourn

Tentative VA Study Process Dates:

Preliminary Report Distribution:	***by February 22, 2024***
Review/Implementation Comments Due:	***by Date TBD***
Final Report Distribution:	***by May 13, 2024***

VA STUDY MEETING ATTENDEES

2/5	2/6	2/7	2/8	Name	Organization	Position/Role	E-mail
X	X	X	X	Robert Stewart	VMS	VA Study Team Leader	rob@vms-inc.com
X	X	X	X	Meaghan Rowland	VMS	Assistant VA Team Leader	meaghan.rowland@vms-inc.com
X	X	X	X	Karl Cruz	Caltrans	Design	karl.cruz@dot.ca.gov
X	X	X	X	Gordon Miyauchi	Caltrans	VA Team	
X	X	X	X	Edward Bin Mu	Caltrans	VA Team	edward.bin.mu@dot.ca.gov
X	X	X	X	Kenneth Young	Caltrans	VA Team	kenneth.s.young@dot.ca.gov
X	X	X	X	Keith Merkel	Merkel & Associates	Marine Biologist	kmerkel@merkelinc.com
X			X	James Hsiao	Caltrans	Project Development Team	
X			X	Hoa-Anh Le	Caltrans	Project Development Team	hoa-anh.le@dot.ca.gov
X			X	Binh Dang	Caltrans	District 4 DVAC	binh.dang@dot.ca.gov
			X	Jaroslaw Kusz	Caltrans	Project Development Team	jaroslaw.kusz.dot.ca.gov
			X	Belinda Hon	Caltrans	HQ VA Program Manager	belinda.hon@dot.ca.gov
			X	Nina Hofmarcher	Caltrans	Project Development Team	
			X	Muthanna Omran	Caltrans	Project Development Team	
			X	Ed Thometz	Caltrans	Project Development Team	
			X	Gordon Jeong	Caltrans	Project Development Team	

ATTACHMENT K

PROGRAMMATIC PERMIT APPROVALS

San Francisco Bay Conservation and Development Commission
455 Golden Gate Avenue, Suite 10600, San Francisco, California 94102 tel 415 352 3600 fax 415 352 3606

PERMIT NO. M1987.042.06
(Issued on August 12, 1987, As
Amended Through June 26, 2019)
AMENDMENT NO. SIX

California Department of Transportation
P.O. Box 23660
Oakland, California 94623-0660

I. Authorization

A. **Authorized Project.** Subject to the conditions stated below, the permittee, the California Department of Transportation, is hereby authorized to do the following:

Location: Within the Commission's Bay, 100-foot shoreline band and Certain waterway jurisdictions, within state highway right-of-ways, in the nine Bay Area Counties at various tunnels, docks, tidal waterways, and at all existing, state-maintained highway bridges including, but not limited to, the San Francisco-Oakland Bay, Benicia-Martinez, Carquinez, Dumbarton, Richmond-San Rafael, Bay Farm Island, San Mateo-Hayward, Highway 37-Petaluma River, Highway 37-Sonoma Creek and Highway 37-Napa River Bridges.

Description: A five-year amended permit to conduct routine maintenance and rehabilitation until June 30, 2024, as follows:

(1) Repair and replace bridge fenders on a one-for-one basis with no overall increase in Bay fill;

(2) Replace and maintain riprap ~~on an in-kind basis~~ with no overall increase in the amount of Bay coverage, a maximum Bay coverage of 10,000 square feet at any given repair site, and no substantial increase in revetment thickness, at the base of bridge supports to protect the integrity of the supports and for shoreline protection along existing banks. Any project increasing the coverage or thickness of riprap or for placing riprap at new locations shall require written project review pursuant to Special Condition II-A, herein;