A Selected Bibliography of the San Francisco-Oakland Bay Bridge East Span Special Collection

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METROPOLITAN
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I. History

The Original Bay Bridge

“In 1936, the East and West communities of the Bay Area came together like never before. While ferries had long carried people across the Bay's often choppy waters, automobiles were the future of transportation. This meant local residents wanted a quick way to drive between the rapidly growing cities of San Francisco and Oakland. As expected, as soon as the San Francisco-Oakland Bay Bridge was built in 1936, it immediately became the favorite way to travel between San Francisco and the East Bay.

Cynics believed that the bridge would be impossible to build due to the potential impact of turbulent waters and gusty winds. Engineers had assumed that the area's high winds posed a greater threat than earthquakes, despite the bridge's proximity to two major fault lines. The varying soils and water depths, the inaccessibility to bedrock, and the unique design challenges inherent in developing a bridge to span eight miles across the Bay led some to believe that building such a bridge was unthinkable.

The largest and most expensive bridge of its time, the Bay Bridge faced not just natural obstacles, but political hurdles as well. There had been discussion of building a bridge between San Francisco and Oakland since the 1870s, but construction did not move forward until the Reconstruction Finance Corporation, with support from President Herbert Hoover, agreed to purchase bonds to be repaid later with bridge tolls.”

Source:
https://www.baybridgeinfo.org/history

II. Corridor Overview

“The seismic retrofit of the San Francisco-Oakland Bay Bridge is more than an upgrade to one of the country’s busiest bridges; it is an epic transformation into a global icon, featuring some of the most cutting-edge and innovative engineering, construction and seismic technology.

The path forward has not always been an easy one. Public safety is of the utmost importance and prime motivation in building the new Bay Bridge. We have not forgotten the lessons learned from the Loma Prieta earthquake, or that the clock is always ticking.

The collapse of the Bay Bridge's upper deck at Pier E9 was the most arresting evidence that the bridge wouldn't survive the next massive trembler. The 250-ton deck section buckled and collapsed during the 7.1-magnitude quake, issuing a wake-up call for the entire Bay Area. While the East Span quickly reopened after a month of repairs, critical questions lingered: how could the Bay Bridge – an important regional lifeline structure – be strengthened to withstand the next major earthquake? Should the bridge be repaired or rebuilt? These were among the essential decisions to be made to ensure that the Bay Bridge would survive heavy seismic activity and provide access for emergency services and rebuilding efforts following a major earthquake.”

Source:
https://www.baybridgeinfo.org/projects/corridor-overview

III. Replace/Retrofit

After the collapse of a section of the upper deck of the east span of the Bay Bridge caused by the Loma Prieta earthquake on October 17, 1989, the California Department of Transportation (Caltrans) studied the question of retrofitting or replacing the east span.

In January 1996 Caltrans announced that it could be more cost effective to replace the east span of the Bay Bridge as opposed to fixing it. In December 1996 a study by Ventry Engineering of Florida recommended replacing rather than retrofitting the east span. Two expert panels, the Seismic Advisory Board and the Peer Review Panel for the Seismic Safety Review of the Toll Bridge Program Designs, “strongly recommend” that Caltrans build a new east span rather than retrofit the old one.

On January 29, 1997 Caltrans management decided to build a replacement of the east span rather than retrofit the original span. Governor Wilson announced on February 13, 1997 that the east span would be rebuilt rather than repaired.

Competing Against Time

Governor's Board of Inquiry on the 1989 Loma Prieta Earthquake, 1990.
http://libraryarchives.metro.net/DPGTL/harvested/1990-competing-against-time-inquiry-on-loma-prieta-earthquake.pdf

This report aims to make recommendations as to whether the State should modify the existing construction or retrofit programs for freeway structures and bridges in light of new information gained from the Loma Prieta earthquake.

Post Earthquake Report for the San Francisco-Oakland Bay Bridge

California Department of Transportation, 1992.
http://files.mtc.ca.gov/library/pub/non/19212.pdf

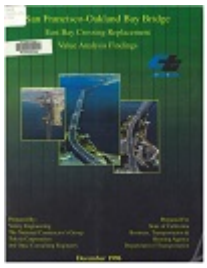
This report will attempt to assess damages caused by the earthquake-induced forces. Also, a summary is given of the observed damages and opinions are given on how the occurrence caused this damage. Recommended changes to improve the earthquake resistance of the bridge are listed.

Seismic Retrofit Strengthening of the San Francisco-Oakland Bay Bridge

California Transportation Commission, 1992.
http://files.mtc.ca.gov/library/pub/non/9191.pdf

The retrofit strategies were a team effort of the UCB Research team, the Caltrans Earthquake Engineering staff and the Caltrans Bridge Maintenance Engineers assigned to the SFOBB and this report briefly describes the results and presents some retrofit strategies that have resulted. The cost estimate to complete the retrofit work described herein will be $150 to 200 million. Cost to replace this bridge today is estimated to be in excess of $1 billion.

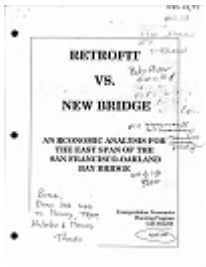
San Francisco-Oakland Bay Bridge: East Bay Crossing Replacement Value Analysis Findings



California Department of Transportation, 1996.
http://files.mtc.ca.gov/library/pub/non/3626.pdf

A team of highly experienced design and construction professionals undertook a study of a variety of measures to address the seismic vulnerability of the Bay Bridge. The team concluded that replacement of the existing structure is not only feasible, but the most prudent approach for the final seismic retrofit strategy.

Retrofit vs. New Bridge: An Economic Analysis for the East Span of the San Francisco-Oakland Bay Bridge



California Department of Transportation, 1997.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000330.PDF

Two alternative projects have been proposed to improve the safety of the motoring public on the east span of the San Francisco-Oakland Bay Bridge. They are retrofitting the existing bridge or building a new bridge parallel to it. To compare these two options from an economic and investment analysis point of view, a life-cycle/benefit-cost study was conducted to assess all benefits and costs of both options over the entire economic life of the bridge. Even though the west span will also be retrofitted, as reflected in this analysis, the main purpose of this analysis is to assist with investment decision making on the east bridge.

San Francisco-Oakland Bay Bridge East Span Seismic Safety Project: Replacement vs. Retrofit

California Department of Transportaion, 2000.
http://files.mtc.ca.gov/library/pub/non/16250.pdf

The purpose of this report is to summarize:

- the studies prepared for the Retrofit Alternative
- Caltrans' decision to consider replacement of the east span of the San-Francisco Bay Bridge (SFOBB) in addition to retrofit
- the identification of replacement as the preferred alternative.

Evaluation & Assessment of Proposed Alternatives to Retrofit/Replace the East Span of the San Francisco-Oakland Bay Bridge Final Report

U.S. Army Corps of Engineers, 2000.
http://files.mtc.ca.gov/library/pub/non/8135.pdf

The City and County of San Francisco (the City) and Caltrans have asked the U.S. Army Corps of Engineers (COE) to evaluate key technical decisions made by Caltrans in reaching the conclusion to build a replacement bridge. Specifically, the purpose of the COE's assessment is to examine two broad areas of concern as raised by the City. First, the City believes that, from the standpoint of cost and public safety, it is preferable to retrofit the East Span than to replace it with the currently proposed design. Second, the City believes that the self-anchored suspension design that Caltrans is currently proposing for the replacement span is not seismically safe.

San Francisco-Oakland Bay Bridge Retrofit/Replacement Facts

California Department of Transportation, no date.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000023.PDF

Retrofit of the Bay Bridge began in 1995 with a project to strengthen the eastern end of the bridge near the toll plaza. Work was well underway under direction to proceed as quickly as possible to make the bridge seismically sound when a replacement option began to take shape. The retrofit of the east spans would alter the appearance of the bridge. Included in all estimates are the anticipated mitigation costs for recordation of the existing east span, peregrine falcon monitoring, and wetlands mitigation at a one to one ratio.

IV. Design Task Force

The Metropolitan Transportation Commission (MTC) appointed the Bay Bridge Design Task Force (Task Force), a seven-person subset of the commission, in March 1997 to forge a regional consensus on the design of the replacement span. The Task Force in turn appointed the Engineering and Design Advisory Panel (EDAP), comprised of experts in bridge engineering, architecture, and geology. The Task Force made its final recommendations based on the advice of the advisory panel.

Draft Design Criteria for the East Span Replacement of the San Francisco Oakland Bay Bridge

Bay Bridge Design Task Force, no date.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000870.PDF

The document lays out the Engineering and Design Advisory Panel draft design criteria for the east span replacement project. It includes both general requirements such as traffic capacity and structure dimensions, as well as more detailed design considerations.

Correspondence: From Lawrence D. Dahms to Bay Bridge Design Task Force (Re: Staff Recommendations on Bay Bridge Design and Amenities)

Metropolitan Transportation Commission, 1998.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000172.PDF

This memorandum presents MTC staff recommendations on the design and amenities of the new eastern span of the San Francisco-Oakland Bay Bridge and the associated extension of the $1 seismic retrofit toll surcharge in effect on the region's state-owned toll bridges. The five recommendations - and the requisite toll surcharge extension to pay for them with incremental cost above the baseline bridge defined in statute - are summarized.

Transcript: Metropolitan Transportation Commission Meeting Bay Bridge Design Task Force

Ken Bukowski, 1998.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000031.PDF

Transcript of the MTC meeting covering design process, design alternatives, naming the bridge, Transbay Terminal, rail options etc. Public comments are included at the end of the transcript.

Staff recommendations on Bay Bridge Design and Amenities

Metropolitan Transportation Commission, 1998.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000172.PDF

This memorandum presents MTC staff recommendations on the design and amenities of the new eastern span of the San Francisco-Oakland Bay Bridge and the associated extension of the $1 seismic retrofit toll surcharge in effect on the region's state-owned toll bridges.

A History of the Bay Bridge Design Task Force and the Engineering and Design Advisory Panel

Metropolitan Transportation Commission, 2021.
http://files.mtc.ca.gov/library/pub/47440.pdf

This document contains a brief history of events that led up to the creation of the Task Force, links to the meeting materials for all the meetings held by the Task Force and EDAP as well as a list of members of both committees.

V. Designs Submitted to Task Force

Astaneh-Black' Steel Single Tower Curved Bridge

Abolhassan Astaneh-Asl; R. Gary Black, 1997.
http://files.mtc.ca.gov/library/pub/22197.pdf

The proposed bridge consists of two parts: (1) a 2,040 feet long steel single tower, curved cable stayed bridge with its single tower on the Yerba Buena Island and (2) a 7,000 feet long causeway connecting the cable stayed bridge to the Toll Plaza on the Oakland shore.

Workshop Submittal: The Steel Curved Cable-Stayed Bridge Designs (Sloped Tower Design and Vertical Tower Design)

Abolhassan Astaneh-Asl, 1997.
http://files.mtc.ca.gov/library/pub/22206.pdf

This MTC Workshop Submittal is prepared to provide information on two conceptual designs for the East Bay Crossing of the San Francisco Oakland Bay Bridge. Both designs are for cable stayed steel bridges with an identical steel multi-cell curved box as the superstructure. However, the two concepts differ in the geometry and location of the single tower as well as the way the single tower affects the seismic and structural behavior. The two designs will be referred to as "the sloped-tower curved" bridge design and "the vertical-tower curved" bridge design throughout this document.

Bridge Proposal for the San Francisco-Oakland Bay Bridge East Bay Replacement Structure and Response to the Caltrans Advisory Panel Report

R. Gary Black & David Galbraith, 1997.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000902.PDF

This proposal uses a single, two-legged tower to support a curved deck by means of cable stays connected from the tower to the center of the divided deck. The cables are aligned so that their force resultant under dead load produces only compressive stresses in the deck and only vertical forces in the tower. This is consistent with accepted engineering practice that seeks "balanced design" under dead load.

San Francisco-Oakland Bay Bridge East Span Replacement Alternatives

California Department of Transportation, 1997.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000021.PDF

The presentation includes assumptions and constraints, design guidelines, details on alignment and design, and analysis of alternative designs.

East Span Replacement of the San Francisco-Oakland Bay Bridge

Coman Feher Associates, 1997.
http://files.mtc.ca.gov/library/pub/22201.pdf

This proposal describes a two-span suspension bridge situated along a straight alignment south of the existing SFOBB, with a central, mid-bay cable tower and anchorages at Oakland and Yerba Buena Island, respectively.

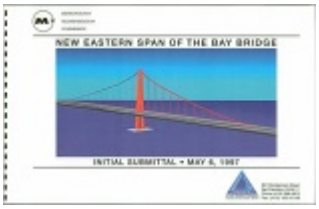
The Arch Way: A Design for the East Side of tThe S.F./Oakland Bay Bridge

The Fogwood Center, 1997.
http://files.mtc.ca.gov/library/pub/22210.pdf

The inexpensive "homely" skyway viaduct is used as the base, a quartet of elegant arches is then set atop the roadway to balance the entire bridge in symmetry (4 towers/4 arches).

New Eastern Span of the Bay Bridge: Suspension Bridge and Twin Viaduct Proposal

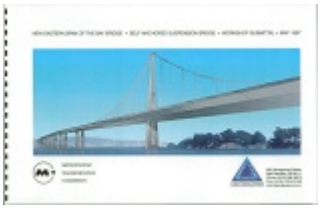
Gerwick/Swerdrup/DMJM, 1997.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_001099.PDF



Traffic entering the East Bay Bridge northern alignment alternative from Oakland will be supported on a gently curving one-level skyway bridge. Drivers will have an excellent view of the bridge landmark, the mono-tower self-anchored suspension bridge at Yerba Buena Island. After passing the suspension bridge drivers will again, via a gentle transition, enter into the existing tunnel and further onto the West Bay Bridge.

New Eastern Span of the Bay Bridge: Self Anchored Suspension Bridge: Workshop Submittal

Gerwick/Swerdrup/DMJM, 1997.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_001098.PDF



While a suspended main span was obvious from an aesthetic point of view, the concept of a self-anchored bridge was a consequence of the difficult foundation conditions. However, the absence of anchor blocks has led to an unmatched lightness and elegance. This lightness is further emphasized by the slender single pylon that pierces the streamlined box girder.

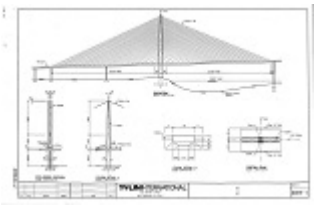
3-Dimension Cable Stay Arch Bridge, Single A-shaped Tower: Design Alternative of East Span SFOBB

Zhong-Lin Hsue, 1997.
http://files.mtc.ca.gov/library/pub/22207.pdf

Single A-shaped tower, steel 3-dimension cable stay bridge and arch bridge composed of a structural system symmetrically spanning the waterway to the Oakland harbor. A 3-D cable stayed structure on the bridge deck would help under high seismic excitations as well as heavy wind.

Concept Designs for the East Span Replacement of the San Francisco Oakland Bay Bridge

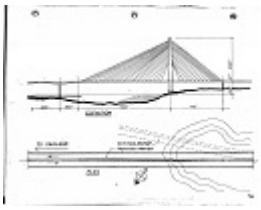
T.Y. Lin International, 1997.
http://files.mtc.ca.gov/library/pub/22199.pdf



Self Anchored Suspension Bridge - The structure will have a single tower similar in proportion to the west span of the Bay Bridge. The bridge shall be self-anchored and hence does not require massive anchor blocks. The back span, towards the island, will be about 500 feet long. The main span 880 feet in length, will bridge the navigation channel. The tower will be located near the existing pier E2.

Proposal for Single-tower Cable-stayed Bridge, East Bay Replacement

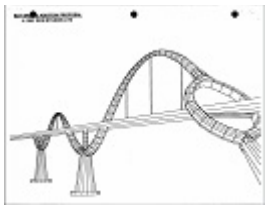
T. Y. Lin, 1997.
http://files.mtc.ca.gov/library/pub/22200.pdf



This memo is to briefly describe the basic ideas underlying the single-tower proposal and to name some of the issues involved for consideration.

Bay Bridge Addition Proposal

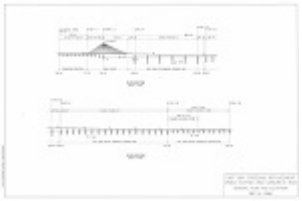
David Morris; DCM Studios LTD, 1997
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000899.PDF



The following drawings present a proposal for the East Span of the San Francisco-Oakland Bay Bridge, with two arched spans of 750' and 1000'. The design relies upon stress-skin loading of a double-hulled cross-section throughout the scheme, with vertical cabling to suspend the roadbed from the arches.

Value Analysis of East Bay Crossing Replacement

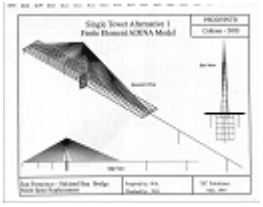
OPAC Consulting Engineers, 1997.
http://files.mtc.ca.gov/library/pub/22203.pdf



A first round of studies, conducted in July and August 1996, resulted in design concepts for a replacement structure. A second round of studies, conducted in September 1996, added Ben C. Gerwick, Lin TungYen China, Geomatrix Consultants, and Imbsen Associates to the Value Analysis team. This resulted in refined structural concepts.

San Francisco-Oakland Bay Bridge East Span Replacement Project: Concepts for the Replacement Structure

Parsons Brinckerhoff, HNTB Corporation, SC Solutions Inc., Digital Structures Inc., 1997.
http://files.mtc.ca.gov/library/pub/24382.pdf



This report presents five alternatives for the bridge replacement including a single pylon asymmetric cable stay bridge, a double diamond tower symmetrical cable stayed bridge and a single cell cast in place segmental concrete box girder.

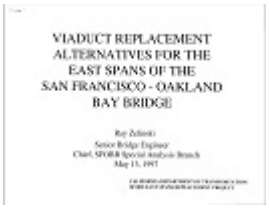
Workshop Submittal: San Francisco-Oakland Bay Bridge East Bay Crossing Replacement

URS Greiner, Imbsen & Associates, LoBuono, Armstrong & Associates, 1997.
http://files.mtc.ca.gov/library/pub/22209.pdf

Our studies indicated that the main span unit for the proposed East Bay Crossing Replacement, which appears most feasible and economical, consists of an asymmetrical cable-stayed structure and a single approach span which is incorporated as a flanking span to the main span unit. The main span is 1375 ft. in length with a 700 ft. side span. An anchor pier is provided at the end of the side span together with three intermediate piers which serve to stiffen and anchor the main span.

VI. Design Alternatives

Viaduct Replacement Alternatives for the East Spans of the San Francisco-Oakland Bay Bridge



California Department of Transortation, 1997.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000022.PDF

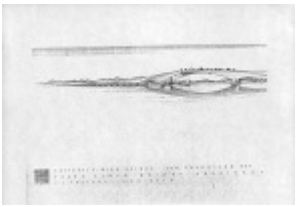
The presentation includes details on alignment, substructure, superstructure alternatives, preliminary sensitivity studies, and an arched viaduct alternative.

Proposed Design Images: Revised Single Tower Suspension Design, Double Portal Suspension Design, Single Tower Cable-Stayed Design, Double Portal Cable-Stayed Design, Integral Bicycle/Pedestrian Path, Separate Bicycle and Pedestrian Path Concept

Metropolitan Transportation Commission, 1998.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000024.PDF

Images show various design proposals, including the revised single tower design, double portal suspension design, and single tower cable-stayed design. Also included are diagrams of the separate bicycle path alternative.

It's a Matter of Wright vs. Wrong



Frank Lloyd Wright Foundation, 1999.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000034.PDF

This document critiques the selected Bay Bridge design and proposes Frank Lloyd Wright's 'Butter-fly Bridge' design as a superior alternative. It includes illustrations, a comparison chart of the Wright design and the MTC design, and other promotional materials.

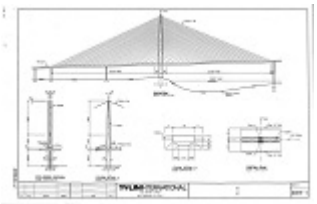
VII. Chosen Design

On May 29, 1998, EDAP recommended a single-tower, self-anchored suspension (SAS) span with the original viaduct design. The Task Force accepted the recommendation on June 24, 1998. The design consisted of four parts: a low-rise "Oakland Approach;" the longest section, a pier-supported "Skyway;" a signature single tower, self-anchored suspension span; and a fourth section connecting the east side of Yerba Buena Island to the bridge. The new east span would have two side-by-side bridges with five lanes each, plus shoulders and a bicycle/pedestrian path.

MTC voted 11-1 on June 24, 1998, to adopt the design recommended by the Task Force. Oakland Mayor Elihu Harris was the only dissenting vote, deriding the aesthetics of the structure.

Concept Designs for the East Span Replacement of the San Francisco Oakland Bay Bridge

T.Y. Lin International, 1997.
http://files.mtc.ca.gov/library/pub/22199.pdf



Self Anchored Suspension Bridge - The structure will have a single tower similar in proportion to the west span of the Bay Bridge. The bridge shall be self-anchored and hence does not require massive anchor blocks. The back span, towards the island, will be about 500 feet long. The main span 880 feet in length, will bridge the navigation channel. The tower will be located near the existing pier E2.

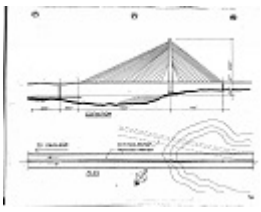
T.Y. Lin Presentation: San-Francisco Oakland Bay Bridge

T.Y. Lin International, 1997.
http://files.mtc.ca.gov/library/pub/22600.pdf

The slides are from a presentation by T.Y. Lin International. Topics covered include cable-stayed bridges of the world, design criteria, illustrations, and design diagrams.

Proposal for Single-tower Cable-stayed Bridge, East Bay Replacement

T. Y. Lin, 1997.
http://files.mtc.ca.gov/library/pub/22200.pdf



This memo is to briefly describe the basic ideas underlying the single-tower proposal and to name some of the issues involved for consideration.

Structural Component Construction Cost Estimates, 30% Design Level, for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

T. Y. Lin International and Moffatt & Nichol, 1998.
http://files.mtc.ca.gov/library/pub/non/5251.pdf

This report contains cost summary sheets and general plan estimates for the various bridge element alternatives.

Design of the New San Francisco-Oakland Bay Bridge: Phase 1

T.Y. Lin International and Moffatt & Nichol, 1999.
http://files.mtc.ca.gov/library/pub/non/5254.pdf

The seismically vulnerable East Span of the San Francisco-Oakland Bay Bridge will be replaced with a dual east bound and west bound 3.6-km-long parallel structure. The cost of the replacement bridge is estimated at $1.5 billion and will be constructed by the year 2004.

VIII. Project Analyses and Reports

Value Analysis Report: San Francisco-Oakland East Bay Bridge Replacement

California Department of Transportation, 1998.
http://files.mtc.ca.gov/library/pub/non/7223.pdf

The purpose of the study is to review the current status of the design and identify alternatives that could improve the current design. While a significant amount of data was provided to the VE team, the design was changing and being refined throughout the study. As a result it was difficult for the VE team to clearly identify the baseline condition (design team's current concept) and quantify the cost impact of the alternative considerations noted in the study.

The San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, 30% Design Report: Executive Summary

California Department of Transportation, 1998.
http://files.mtc.ca.gov/library/pub/non/12108.pdf

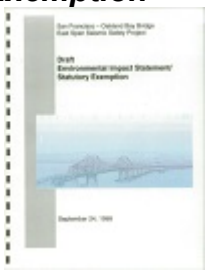
The project team has released a thirty-percent bridge design and cost estimate report. The report includes an array of alternatives and variations, which explore alignment, material, structural and span configuration, architecture, and a bicycle/pedestrian facility. Estimated construction schedules and project costs are also provided.

The San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, Supplement to Final 30% Design Report

California Department of Transportation, 1998.
https://archive.senate.ca.gov/sites/archive.senate.ca.gov/files/committees/2013-14/stran.senate.ca.gov/sites/stran.senate.ca.gov/files/Supplement%20to%20Final%2030%25%20Design%20Report/index.pdf

This supplement to the 30 percent design report summarizes recommendations made by the Engineering Design Advisory Panel (EDAP) and identifies revisions made since the 30 percent design submittal.

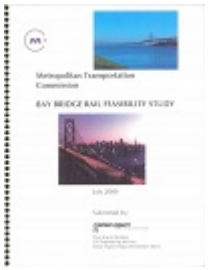
San Francisco-Oakland Bay Bridge East Span Seismic Safety Project on Interstate 80 Between Yerba Buena Island and Oakland in San Francisco and Alameda County: Draft Environmental Impact Statement/Statutory Exemption



California Department of Transportation, 1998.
http://files.mtc.ca.gov/library/pub/non/23289.pdf

Caltrans proposes to ensure a lifeline vehicular connection between Yerba Buena Island in San Francisco and the SFOBB Toll Plaza in Oakland by seismic upgrading of the existing East Span. Alternatives include existing structure retrofit, two replacement alternatives north of the existing bridge, and one replacement alternative to the south. Three bridge main span design variations (cable stayed, self-anchored suspension, and skyway) are being considered.

Bay Bridge Rail Feasibility Study



Metropolitan Transportation Commission, 2000.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000069.PDF

The study concludes that it is feasible to incorporate any of the rail technologies on the Bay Bridge, but at very high cost. The high cost of putting rail on the Bay Bridge is primarily the result of adding live and dead weight to the West spans, which are being retrofitted, but not replaced under the current plan. The cost for structural improvements to the configuration studied in this analysis could be as high as $3 billion, with significant additional investment required for rail infrastructure, rolling stock and operations.

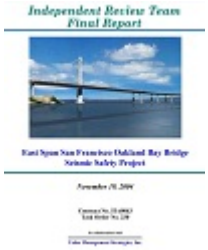
San Francisco-Oakland Bay Bridge East Span Seismic Safety Project: Land Use Issues Associated with the SFOBB East Span Seismic Safety Project and the Naval Station Treasure Island Draft Reuse Plan

California Department of Transportation, 2000.
http://files.mtc.ca.gov/library/pub/non/16255.pdf

With the construction of any East Span Seismic Safety Project alternative, the City and County of San Francisco will retain redevelopment potential on the eastern end of Yerba Buena Island. Any ultimate redevelopment will benefit from access to a lifeline structure serving the nine Bay Area counties including Treasure Island and Yerba Buena Island.

Independent Review Team Final Report: East Span San Francisco Oakland Bay Bridge Seismic Safety Project

California Department of Transportation, 2004.
http://files.mtc.ca.gov/library/pub/non/6819.pdf



The recommendations to redesign the main span using a Cable-Stayed bridge are based on broad experience and a sufficient amount of technical analysis provided by the members of the IRT.

San Francisco-Oakland Bay Bridge Project: Peer Review

U.S. Dept. of Transportation, Federal Highway Administration, 2004.
http://files.mtc.ca.gov/library/pub/non/6811.pdf

Each of the six project alternatives evaluated provides a solution to the SFOBB problem, but can be affected by uncertainty and associated impacts. These impacts typically affect project cost and schedule, either directly or indirectly. They identified, quantified, and prioritized technical, cost, and schedule; environmental; management; and public acceptance and expectation risks.

The Making and Un-making of the San Francisco-Oakland Bay Bridge: A Case in Megaproject Planning and Decisionmaking

Karen Trapenberg Frick, 2005.
https://web.archive.org/web/20131212144210/http:/www.uctc.net/research/diss130.pdf

This dissertation is an analysis of the project and provides a history of the decision-making process at various levels of government.

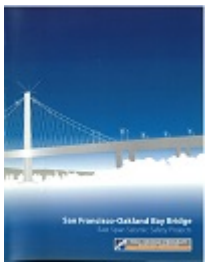
2009 Annual Report

Toll Bridge Program Oversight Committee, 2009.
http://files.mtc.ca.gov/library/pub/26110.pdf

The 2009 Annual Report highlights the significant strides and achievements made in 2008, as well as looks at the year ahead.

San Francisco-Oakland Bay Bridge: East Span Seismic Safety Projects

Toll Bridge Program Oversight Committee, 2011.
http://files.mtc.ca.gov/library/pub/30903.pdf



This report gives an overview of the various aspects of the bridge project including the SAS span, the Yerba Buena Island transition structure, and the Oakland touchdown.

IX. Cost Reviews

There were various cost estimates for the project over the years starting with $250 million in 1995, $1 billion in 1996, $1.3 billion in 1997, $2.6 billion in 2001, $5.5 billion in 2005, and the project finally being completed at a cost of $6.5 billion. During the course of the project a number of reports were created to examine the reasons for the increasing cost estimates.

Toll Bridge Seismic Retrofit Program Cost Review Report

Metropolitan Transportation Commission, 2001.
http://files.mtc.ca.gov/library/pub/24043.pdf

In April 2001, the Metropolitan Transportation Commission requested that Bechtel Infrastructure Corporation perform a cost review of the Toll Bridge Seismic Retrofit Program. The purpose of the cost review is to review the reasonableness of the Caltrans Annual Report cost forecast of $4.6 billion for the Toll Bridge Seismic Retrofit Program.

California Department of Transportation: Seismic Retrofit Costs of State-owned Toll Bridges Have Significantly Exceeded the Department's Original Estimates and May Go Even Higher

California State Auditor, 2002.
http://www.bsa.ca.gov/pdfs/reports/2001-122.pdf

This report concludes that the seismic retrofit costs of state-owned toll bridges have significantly exceeded Caltrans' original estimates for many reasons; however, the largest contributor is the east span replacement of the San Francisco-Oakland Bay Bridge with an estimated cost increase of $1.3 billion. Overall, the program was likely to experience such increases because state statute allows the Bay Area to purchase a more expensive east span replacement than Caltrans originally envisioned and estimated for.

Toll Bridge Seismic Retrofit Program Cost Review Report

Bay Area Toll Authority; Metropolitan Transportation Commission, 2004.
http://files.mtc.ca.gov/library/pub/8545.pdf

In June 2004, the Bay Area Toll Authority requested that Bechtel Infrastructure Corporation perform a cost review of the current Caltrans cost estimate of the Toll Bridge Seismic

Retrofit Program (TBSRP). The purpose of this effort is to review the reasonableness of the current Caltrans cost forecast for the TBSRP.

Department of Transportation: Various Factors Increased Its Cost Estimates for Toll Bridge Retrofits, and Its Program Management Needs Improving

California State Auditor, 2004.
http://www.bsa.ca.gov/pdfs/reports/2004-140.pdf

The largest contributor to the estimated $3.2 billion cost increase has been the East Span component known as the signature span. Of this $3.2 billion, $930 million is attributable to the May 2004 bid to build the superstructure of the signature span. The remaining $2.3 billion is due to factors unrelated to the superstructure bid, such as $556 million in additional Caltrans support costs and the need for a $900 million program contingency reserve above the $7.4 billion Caltrans has allocated to specific projects.

Analysis of SAS Bid Options - Summary of Findings

Metropolitan Transportation Commission, 2004.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000195.PDF

A presentation with an analysis of four different SAS bid options: award current contract, re-bid SAS with revised bid provisions, re-design and bid design/build cable-stayed bridge design, and re-design and bid design/build skyway bridge design.

Hard Decisions Before the Legislature: Toll Bridge Seismic Retrofit

California Legislative Analyst, 2005.
https://lao.ca.gov/2005/toll_bridge/toll_bridges_012405.pdf

The administration recently estimated that the toll bridge seismic retrofit program will require an additional $3.2 billion to complete and has recommended changing the Bay Bridge's design to save money. The Legislature faces two key decisions: (1) whether to approve a redesign of the Bay Bridge east span and (2) how to fund the program's completion.

Toll Bridge Seismic Retrofit Funding History and Options

California Legislative Analyst's Office, 2005.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000205.PDF

This document contains a list of funding sources and analysis of cost projections for the toll bridge seismic retrofit program.

Historical Review of San Francisco-Oakland Bay Bridge East Span Seismic Retrofit Cost Increases: Final Report

State of California Business, Transportation and Housing Agency, 2006.
http://files.mtc.ca.gov/library/pub/non/28401.pdf

The charge to the review team was to consider only increases in cost estimates, not cost overruns, which occurred after a contract had been awarded. This report presents the results of that review, which was conducted over a six-week period beginning in December 2004 and ending in mid-January 2005.

X. Project Timelines

Timeline of the San Francisco-Oakland Bay Bridge Seismic Retrofit: Milestones In Decision-Making, Financing, and Construction

Daniel Pollak, 2004.
https://web.archive.org/web/20051103181024/http:/www.library.ca.gov/CRB/04/13/04-013.pdf

This annotated timeline on the history of the San Francisco-Oakland Bay Bridge was requested by Assemblymember Wilma Chan in her capacity as Chair of the Joint Legislative Audit Committee. The following chronology begins in 1929, but emphasizes the period from 1989 to the present, beginning with the Loma Prieta earthquake of October 1989. That earthquake revealed the seismic vulnerability of the Bay Bridge. This timeline focuses on the efforts to seismically retrofit the Bay Bridge, especially the project to rebuild its eastern span (the portion running from Oakland to Yerba Buena Island).

A Timeline of the San Francisco-Oakland Bay Bridge East Span Replacement Project

Metropolitan Transportation Commission, 2021.
http://files.mtc.ca.gov/library/pub/48083.pdf

This timeline contains information from 1989 to 2018 and includes links to many of the reports related to all phases of the project.

XI. Governance and Oversight of the Project

Governance over building the new east span was assigned to Caltrans and then in 2005 to the newly established Toll Bridge Program Oversight Committee (TBPOC). On July 18, 2005, Governor Schwarzenegger signed Assembly Bill 144 (AB 144) into law and thereby created TBPOC to provide project oversight and project control for the Toll Bridge Seismic Retrofit Program (TBSRP) in California.

The membership of TBPOC was established as the executive directors of three agencies, the Bay Area Toll Authority (BATA), the California Department of Transportation (Caltrans) and the California Transportation Commission (CTC). The original TBPOC members were Steve Heminger, the Executive Director of BATA, Will Kempton, the Director of Caltrans, and Diane Eidam, Executive Director of CTC.

The TBPOC's program oversight and control activities included review and approval of contract bid documents, review and resolution of project issues, evaluation and approval of project change orders and claims, and the issuance of monthly and quarterly program progress reports.

The last meeting of TBPOC was held December 10, 2018, and the project management team's recommendations were approved. These recommendations were:

- that TBPOC declare completion of the Toll Bridge Seismic Retrofit Program in the 2018 Fourth Quarter Project Progress and Financial Update to the Legislature and the California Transportation Commission (CTC);
- delegate the remaining budget to BATA and oversight of remaining minor activities to BATA and Caltrans; and
- to suspend further meetings indefinitely.

Caltrans, and then later TBPOC, created several regularly issued reports on the progress of the TBSRP. A complete list of these reports and other TBPOC materials can be found in the document below.

The Toll Bridge Program Oversight Committee (TBPOC) 2005-2018: a Compilation of Documents

Metropolitan Transportation Commission, 2021.
http://files.mtc.ca.gov/library/pub/47718.pdf

This document contains a description of the Committee and its creation, lists of monthly reports, quarterly reports, annual reports, press releases and meeting materials.

Toll Bridge Seismic Retrofit Program Annual Report for the Legislature and Governor

California Department of Transortation, 1991-2004.
2001. http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000074.PDF
2004. http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000193.PDF

These reports were created to inform the Legislature about budget shortfalls and provide background information for cost increases for the east span replacement project.

San Francisco Bay Area Toll Bridge Seismic Retrofit and Regional Measure 1 Programs: Project Progress and Financial Update

Metropolitan Transportation Commission, 2000-2013.

This report focuses on monitoring project costs and schedule performance, as measured against approved budget and schedule milestones.
See Appendix C – Monthly and Quarterly Reports for a list of the reports.

XII. Pre-opening Construction Issues

Alleged Welding Defects at Piers

FHWA Bay Bridge Pile Connection Plate Welding Investigation Report

Roy Teal, 2005.
http://files.mtc.ca.gov/library/pub/non/12020.pdf

Two independent companies, Mayes Testing Engineers, Inc. and Roy Teal, Inc. were contracted by the Federal Highway Administration to perform independent testing and evaluation of certain predefined weld locations at Pier E4W.

Oakland Bay Bridge Pile Connection Plate Welding Investigation Report

Mayes Testing Engineers, 2005.
http://files.mtc.ca.gov/library/pub/non/11877.pdf

A team of Mayes Testing Engineers inspectors arrived at the San Francisco-Oakland Bay Bridge project site offices on April 19, 2005, to perform an independent evaluation of pile connection plate welds in the Pier Footing Structure E4W.

San Francisco-Oakland Bay Bridge Skyway Project: Quality Assurance-Quality Control Process Review

Roy Teal, 2005.
http://files.mtc.ca.gov/library/pub/non/12488.pdf

Initially, certain welders alleged that they were instructed by the contractor to deliberately hide weld defects from the inspectors by covering them with weld metal in certain partial joint penetration welds joining the pile head connection plates to the pile sleeves. The consensus of the independent investigations was that the welds sampled and tested were in general conformance with the contract documents, and that there was no evidence of major or unacceptable discontinuities.

San Francisco-Oakland Bay Bridge Summary of Welding Studies: April 2005-July 2005

U.S. Dept. of Transportation, Federal Highway Administration, 2005
http://files.mtc.ca.gov/library/pub/non/12629.pdf

The ninety locations that have alleged defects represent less than 2% of the total number of shear plate welds in the structure. The probability is low that there are

other significant locations because of the continuous crosschecks and verifications built into the QA/QC process. FHWA therefore concludes that the welds meet or exceed contract requirements.

Foundation Box E14E QC/QA Document Review and Comparison With E9E and E4W: for the Pile Head Connection Plate (PHCP) Installation and Inspection Process

California Department of Transportation, 2005.
http://files.mtc.ca.gov/library/pub/non/12178.pdf

The purpose of this review was to analyze PHCP inspection records to determine the consistency of inspections at Pier E14E in comparison with the other locations reviewed; confirm weld quality through inspection documentation; and to confirm the QC and QA inspection process is in compliance with contract documents.

Alleged Welding Flaws by ZPMC

San Francisco-Oakland Bay Bridge Self-Anchored Suspension Bridge Project: Project Team Response to QA/QC Expert Panel Recommendations

Metropolitan Transportation Commission, 2011.
http://files.mtc.ca.gov/library/pub/28602.pdf

This document responds to the QA/QC Expert Panel recommendations stated in a November 2010 draft report. A main focus to these recommendations is aimed to reduce and effectively eliminate the number of transverse linear indications related to, in part, an excess hydrogen contaminant problem present in the performance of certain welding processes and their environments.

Anchor Bolt Failure

Metallurgical Analysis of Bay Bridge Broken Anchor Rods S1-G1 & S2-A6

California Department of Transportation, 2013.
http://files.mtc.ca.gov/library/pub/non/28402.pdf

Metallurgical testing and fracture analysis was performed on two broken anchor rods that were removed from shear keys S1 and S2. The results indicate that hydrogen embrittlement was the cause of the recent anchor rod failures.

Report on the A354 Grade BD High-Strength Steel Rods on the New East Span of the San Francisco-Oakland Bay Bridge, With Findings and Decisions

California Department of Transportation, 2013.
http://files.mtc.ca.gov/library/pub/28415_01.pdf

When 32 of the 96 A354 grade BD high-strength anchor rods on shear keys S1 and S2 on Pier E2 failed in March 2013 after being tightened to their specified tension levels, the Toll Bridge Program Oversight Committee launched an investigation into why these rods failed and whether the 2,210 other rods on the SAS Bridge also are at risk.

San Francisco-Oakland Bay Bridge Self-Anchored Suspension Span (SFOBB-SAS): Seismic Evaluation of SAS at E2 Bent Prior to Completion of Shear Keys S1 & S2

T.Y. Lin International, 2013.
http://files.mtc.ca.gov/library/pub/28416_1.pdf
http://files.mtc.ca.gov/library/pub/28416_2.pdf

This paper is to briefly summarize the safety of the Self-Anchored Suspension bridge segment with respect to the expected performance of the San Francisco-Oakland Bay Bridge during a design level earthquake assuming the S1 and S2 shear key work currently underway is not fully completed by the time of seismic safety opening.

San Francisco-Oakland Bay Bridge Self-Anchored Suspension Span (SFOBB-SAS): Seismic Evaluation of SAS at E2 Pier Prior to Completion of Shear Keys S1 & S2

T.Y. Lin International, 2013.
http://files.mtc.ca.gov/library/pub/28601.pdf

This report documents information on demand and capacity of relevant stages of construction and service. Additionally, visual images are included to support the understanding of various structural elements and staging. This report evaluates temporary bearing modifications by adding simple shims to the Pier E2 Bearings to engage the bearing's reserve capacities for an interim condition.

Independent Review of the Seismic Safety Peer Review Panel Proposal to Shim the Bearings at Pier E2 of the New East Span of the San Francisco-Oakland Bay Bridge

Buckland & Taylor, 2013.
http://files.mtc.ca.gov/library/pub/28434.pdf

The Seismic Safety Peer Review Panel has proposed to temporarily shim bearings. Dr. Peter R. Taylor, P.E. of Buckland & Taylor has been invited to conduct this independent review of the engineering analysis and strategy of the "shim concept", which includes opening the new east span to traffic once the bearing shims are installed, before the shear key retrofit is complete.

San Francisco-Oakland Bay Bridge Seismic Retrofit Project: Independent Review of Analysis and Strategy to Shim Bearings at Pier E2 to Achieve Seismic Design Requirements

Bay Area Toll Authority, 2013.
http://files.mtc.ca.gov/library/pub/28433.pdf
http://files.mtc.ca.gov/library/pub/28433_a.pdf

Based on the engineering studies described herein, Modjeski and Masters concludes that the concept of temporarily shimming the bearings at Pier E2 of the San Francisco-Oakland Bay Bridge as described in the July 15th information package will provide more than sufficient capacity between the superstructure and the strut at Pier E2 to resist the design Safety Evaluation Earthquake.

San Francisco-Oakland Bay Bridge Seismic Retrofit Project: FHWA Review of the A 354 Grade BD Bolts Used in the Self-Anchored Suspension Bridge

U.S. Dept. of Transportation, Federal Highway Administration, 2013.
http://files.mtc.ca.gov/library/pub/28435.pdf

The FHWA Review Team conducted an extensive review of the information provided on the bolts and the retrofit of Shear Keys S1 and S2 at Pier E2.

High Strength Steel Anchor Rod Problems on the New Bay Bridge : Revision 1

Berkeley Research Company, 2013.
http://files.mtc.ca.gov/library/pub/non/28553.pdf

This report presents the results of a critical review of TBPOC and other reports on the anchor rod failures. The purpose is to point out numerous errors including the erroneous conclusions as to the cause of the shear key anchor rod failures and serious questions about the long-term performance of anchor rods for the main cable and the tower base.

Main Concerns About Anchor Rods on the New Bay Bridge

Berkeley Research Company, 2013.
http://files.mtc.ca.gov/library/pub/non/28554.pdf

This report has been prepared as a supplement to the Chung-Thomas' previous review of the TBPOC report. This supplement specifically focuses on the problems unique to the anchor rods for the main cable and the tower base.

San Francisco-Oakland Bay Bridge Self-Anchored Suspension Bridge: Evaluation of the ASTM A354 Grade BD Rods

California Department of Transportation, 2014.
http://files.mtc.ca.gov/library/pub/28860.pdf

All results of this study indicate that the 2008 rods on E2 failed by environmentally induced hydrogen embrittlement because they were tensioned above their hydrogen embrittlement threshold while simultaneously immersed in water, which served as the source of hydrogen. The low hydrogen embrittlement threshold of the 2008 rods is likely due to rod fabrication methods.

Validity of Caltrans' Environmental Hydrogen Embrittlement Tests on Grade BD Anchor Rods in the SAS Span

Toll Bridge Program Oversight Committee, 2014.
http://files.mtc.ca.gov/library/pub/non/28945.pdf

The results of this review indicate that the EHE test protocols were scientifically problematic and the findings and conclusions that the HDG BD rods in the SAS are "safe" were based on questionable data interpretation. The possibility of EHE failures of critical HDG BD rods in the SAS remains unresolved. Several reasons why the conclusions by Caltrans and their consultants could be incorrect are discussed.

Supplemental Report on the A354 Grade BD High-Strength Steel Rods on the New East Span of the San Francisco-Oakland Bay Bridge, With Final Findings and Decisions

Toll Bridge Program Oversight Committee, 2014.
http://files.mtc.ca.gov/library/pub/30285.pdf

This supplemental report focuses on the long-term performance of all the A354 grade BD high strength steel installed on the Self-Anchored Suspension (SAS) Bridge of the new East Span of the San Francisco-Oakland Bay Bridge — excluding the failed 2008 rods that were originally used to connect shear keys S1 and S2 of the SAS Bridge superstructure to Pier E2 but are no longer in service.

XIII. Post-opening Construction Issues

After the opening of the east span on September 2, 2013, several construction issues occurred. These included:

- rainwater dripping into the steel structure beneath the road deck (February 2014);
- rust found on cable strands and rods (April 2014);
- steel rods having gaps in protective grout (November 2014);
- rust and cracks found on tower rod (February 2015); and
- rust pits in steel pile casings and corrosive bacteria in soil (October 2018).

XIV. Lessons Learned

San Francisco-Oakland Bay Bridge (SFOBB): New East Span Project - Lessons Learned Rreport

California Department of Transportation, 2014
http://files.mtc.ca.gov/library/pub/non/28795.pdf

The scope of this report is to identify and document the practices that worked and those that should be avoided as well as identify consideration for enhancements of existing practices for future mega-projects.

The San Francisco-Oakland Bay Bridge: Basic Reforms for the Future: Final Report

News to the Next Power, 2014.
http://files.mtc.ca.gov/library/pub/non/28785.pdf

This report results from a request by Senator Mark DeSaulnier searching for an answer to a basic question: Why was the eastern span of the San Francisco-Oakland Bay Bridge $5 billion over budget and delivered ten years late? This report incorporates interviews and the examination of many documents but is not an engineering audit and makes no findings on topics such as the quality of deck welds, anchor rods, corrosion, or foundations. Rather, it is an in-depth look into how key decisions about vital issues were made and what lasting lessons can be learned from the process in order to avoid future cost overruns and delays of this magnitude.

Toll Bridge Seismic Retrofit Program: the State Could Save Millions of Dollars Annually By Implementing Lessons Learned

California State Auditor, 2018.
https://www.bsa.ca.gov/pdfs/reports/2018-104.pdf

The Toll Bridge Seismic Retrofit Program, and particularly the work completed within the program to replace a section of the San Francisco-Oakland Bay Bridge, is one of the most expensive and controversial transportation infrastructure programs in California history. It is also a valuable lesson on how a major project experienced rapid cost escalations before the implementation of robust oversight and risk management brought them under control.

XV. Bridge Overviews and History

The Bay Bridge: History and Design of a New Icon
by Donald MacDonald and Ira Nadel
Chronicle Books, 2013.

A Tale of Two Bridges: the San Francisco-Oakland Bay Bridges of 1936 and 2013
by Stephen D. Mikesell
University of Nevada Press, 2017.

Bay Bridge: the New East Span
by Tom Paiva
Nazraeli Press, 2015.

Appendices

Appendix A – Newsletters

East Span News: the Newsletter of the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project

California Department of Transportation, 1997-2002.
http://files.mtc.ca.gov/library/pub/non/22330_1.pdf
http://files.mtc.ca.gov/library/pub/non/22330_2.pdf
http://files.mtc.ca.gov/library/pub/non/22330_3.pdf
http://files.mtc.ca.gov/library/pub/non/22330_4.pdf
http://files.mtc.ca.gov/library/pub/non/22330_5.pdf

Bay Bridge News: the Newsletter of the San Francisco-Oakland Bay Bridge

Toll Bridge Oversight Program Committee, 2006-2013.
http://files.mtc.ca.gov/library/pub/non/17522_01.pdf
http://files.mtc.ca.gov/library/pub/non/17522_02.pdf
http://files.mtc.ca.gov/library/pub/non/17522_03.pdf
http://files.mtc.ca.gov/library/pub/non/17522_04.pdf
http://files.mtc.ca.gov/library/pub/non/17522_05.pdf
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http://files.mtc.ca.gov/library/pub/non/17522_33.pdf
http://files.mtc.ca.gov/library/pub/non/17522_34.pdf
http://files.mtc.ca.gov/library/pub/non/17522_35.pdf

Toll Bridge Program Oversight Committee (TBPOC) Factsheets

Toll Bridge Program Oversight Committee, 2005-2017.

http://files.mtc.ca.gov/library/pub/non/47654_01.pdf
http://files.mtc.ca.gov/library/pub/non/47654_02.pdf
http://files.mtc.ca.gov/library/pub/non/47654_03.pdf
http://files.mtc.ca.gov/library/pub/non/47654_04.pdf
http://files.mtc.ca.gov/library/pub/non/47654_05.pdf
http://files.mtc.ca.gov/library/pub/non/47654_06.pdf
http://files.mtc.ca.gov/library/pub/non/47654_07.pdf
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http://files.mtc.ca.gov/library/pub/non/47654_32.pdf
http://files.mtc.ca.gov/library/pub/non/47654_33.pdf
http://files.mtc.ca.gov/library/pub/non/47654_34.pdf
http://files.mtc.ca.gov/library/pub/non/47654_35.pdf

Appendix B – News and Press Releases

Online News Articles on the San Francisco-Oakland Bay Bridge East Span Replacement Project 1996-2019

Metropolitan Transportation Commission, 2021
http://files.mtc.ca.gov/library/pub/47950.pdf

A chronological compilation of articles available online related to the replacement of the east span of the San Francisco-Oakland Bay Bridge.

San Francisco-Oakland Bay Bridge East Span Replacement: Newspaper Clipping Highlights

Metropolitan Transportation Commission, 1989-2014.
http://files.mtc.ca.gov/library/pub/23223_v1_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v2_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v3_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v4_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v5_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v6_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v7_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v8_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v9_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v10_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v11_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v12_TOC.pdf
http://files.mtc.ca.gov/library/pub/23223_v13_TOC.pdf

Newspaper articles from the collapse of the bridge in 1989 to the completion of the replacement project in 2014. The table of contents for each volume is available online; the news articles are available in the MTC-ABAG Library.

Toll Bridge Program Oversight Committee (TBPOC) Press Releases

Toll Bridge Program Oversight Committee, 2005-2017.
http://files.mtc.ca.gov/library/pub/non/47652_2005_1.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2006_1.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2006_2.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2006_3.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2006_4.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2007_1.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2007_2.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2007_3.pdf

http://files.mtc.ca.gov/library/pub/non/47652_2008_1.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2008_2.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2009_01.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2009_02.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2009_03.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2009_04.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2009_05.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2009_06.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2009_07.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2009_08.pdf
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http://files.mtc.ca.gov/library/pub/non/47652_2011_1.pdf
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http://files.mtc.ca.gov/library/pub/non/47652_2015_2.pdf

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http://files.mtc.ca.gov/library/pub/non/47652_2017_2.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2017_3.pdf
http://files.mtc.ca.gov/library/pub/non/47652_2017_4.pdf

Appendix C – Monthly and Quarterly Reports

San Francisco Bay Area Toll Bridge Seismic Retrofit and Regional Measure 1 Programs: Project Progress and Financial Update

Metropolitan Transportation Commission, 2000-2013.

http://files.mtc.ca.gov/library/pub/25020_2000_10.pdf
http://files.mtc.ca.gov/library/pub/25020_2000_11.pdf
http://files.mtc.ca.gov/library/pub/25020_2001_01.pdf
http://files.mtc.ca.gov/library/pub/25020_2001_02.pdf
http://files.mtc.ca.gov/library/pub/25020_2001_03.pdf
http://files.mtc.ca.gov/library/pub/25020_2001_03a.pdf
http://files.mtc.ca.gov/library/pub/25020_2001_04.pdf
http://files.mtc.ca.gov/library/pub/25020_2001_05.pdf
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http://files.mtc.ca.gov/library/pub/25020_2011_12.pdf
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http://files.mtc.ca.gov/library/pub/25020_2012_03.pdf
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http://files.mtc.ca.gov/library/pub/25020_2012_06.pdf
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http://files.mtc.ca.gov/library/pub/25020_2013_5.pdf
http://files.mtc.ca.gov/library/pub/25020_2013_6.pdf

San Francisco Bay Area Toll Bridge Seismic Retrofit Program: Quarter Project Progress and Financial Update

California Department of Transportation, 2005;
Metropolitan Transportation Commission, 2005-2018.
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000304.PDF
http://files.mtc.ca.gov/library/BBC/pdf/ACCNO_000306.PDF
http://files.mtc.ca.gov/library/pub/25171_2005_3.pdf
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http://files.mtc.ca.gov/library/pub/25171_2017_4.pdf
http://files.mtc.ca.gov/library/pub/25171_2018_1.pdf
http://files.mtc.ca.gov/library/pub/25171_2018_2.pdf
http://files.mtc.ca.gov/library/pub/25171_2018_3.pdf
http://files.mtc.ca.gov/library/pub/25171_2018_4.pdf

Appendix D – Videos

The collection has a selection of video content which includes interviews with people who worked on the bridge in both the United States and China. There are also many videos recording of various aspects of the construction of the bridge.

Bill Howe Oral History

http://www.youtube.com/watch?v=GlScK8eF5Zw&list=PLDWG2xaX5V8tjDO3GWHQ7_s6qG_O6SKjE

Picking a location from which to lead the project, eventually settling on Pier 7 in Oakland, building a drainage system early in the project for seismic safety, and working on the Yerba Buena Island Transition structure are discussed.

Time Lapse Bay Bridge New East Span, 2009 – 2012

https://www.youtube.com/watch?v=bKLU40TmKSs

This time-lapse video shows the erection of the suspension portion of the new Bay Bridge East Span, compressing the complex, labor-intensive, round-the-clock three-year effort into a fast-paced 2.5 minutes. The sun rises and sets more than 1,000 times as crews and equipment race against the clock and endure all types of weather to assemble the self-anchored suspension span, with its soaring tower and graceful canopy of cables. The video shows the process step by step, including the installation of the steel deck pieces, the construction of a roadway connection to Yerba Buena Island, the erection of the tower piece by piece, the hanging of the catwalks from the top of the tower and the stringing of the main cable soon thereafter, the hanging of the vertical cables, and finally, the transferring of the bridge's load to the cable system — all while a steady stream of cars zip along the old East Span just to the south of the construction zone.

Appendix E – Bay Bridge Troll

For Whom the Troll Dwells: a Legendary Case for Supplemental Safety Measures on the New San Francisco-Oakland Bay Bridge East Span

Metropolitan Transportation Commission, 2013.
http://files.mtc.ca.gov/library/pub/28448.pdf

The Oakland-San Francisco Bay Bridge Troll

by John V. Robinson
America Through Time, 2018.

Appendix F – Further Information About the Collection

For a listing of all the items in the Bay Bridge Special Collection go to the Metropolitan Transportation Commission website (https://mtc.ca.gov) and navigate to the MTC-ABAG Library webpage. The library catalog contains records for all of the items in the "East Span Bay Bridge Special Collection." This bibliography lists only a selection of the documents in the full collection.

Contact information for the library:

MTC-ABAG Library
375 Beale Street, Suite 800
San Francisco, CA 94105
415-778-5236
library@bayareametro.gov