

# FIVE DOCUMENTARIES ABOUT CALIFORNIA BRIDGES AND STRUCTURE MANAGEMENT

Thursday, April 27, 2017, Track #3 , Session 4 @ 9:30 – 10 am Agua Fria

*Greg KADERABEK, Steve LEE &  
Alfred MANGUS,*

*PECG (Professional Engineers in California Government)*



# ***OUTLINE – ASSET MANAGEMENT***

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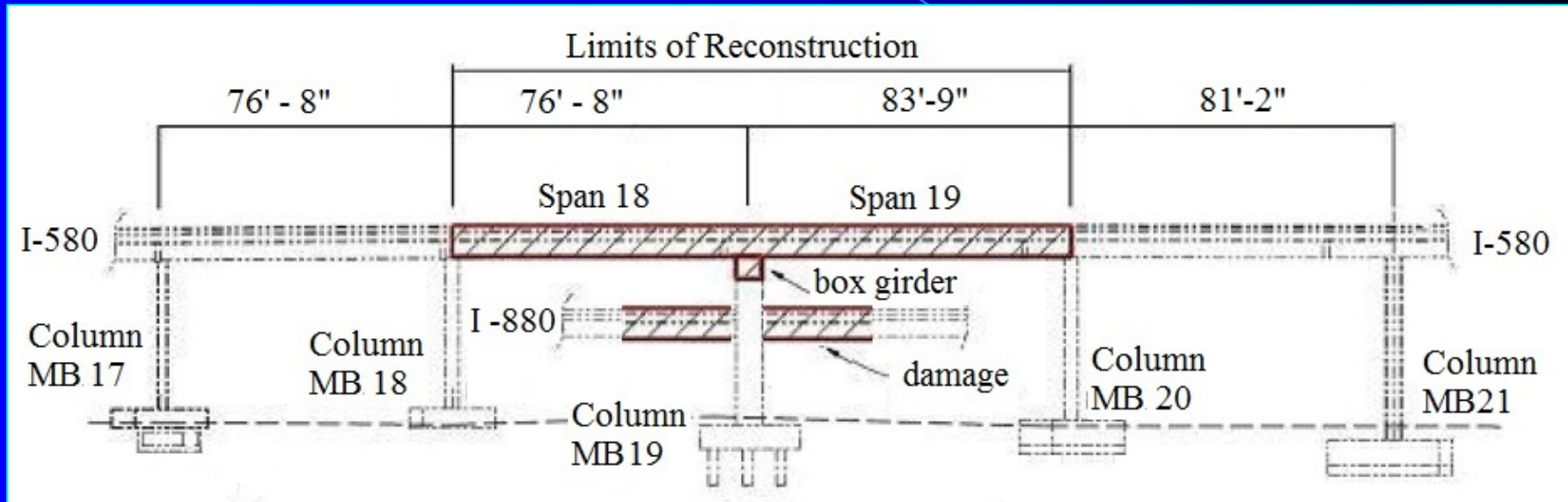
- ***Fire – MacArthur Maze***
- **Flood - “I-5 Boat”**
- **Seismic – YBI Viaduct**
- **Ship Channel – Zampa Suspension**
- **Signature Span – East SFOBB**
- **Movie Clips – 3 PECCG documentaries**

# *Asset Management of the MacArthur Maze Fire*



- *Repair ASAP – vital interchange.*
- *Lower Ramp restored.*
- *Upper Ramp replaced.*

# Asset Management of the MacArthur Maze Fire



*Damage at crossover of 2 ramps*

*I-580 upper*

*I-880 lower*

*Bridge Design*

*Bridge Maintenance*



# *Asset Management of the MacArthur Maze Fire*



- *Engineering Assessment ASAP*
- *Demolition ASAP – force account*

# *Asset Management of the MacArthur Maze Fire*



- *ABC – lower ramp*
- *save undamaged concrete*

# *Asset Management of the MacArthur Maze Fire*



- *ABC – lower ramp*
- *Rapid setting concrete*



## *AMAZING: Rebuilding of the MacArthur Maze*



- *ABC – lower ramp: heat straightening*
- *Encase damaged concrete*



# *Asset Management of the MacArthur Maze Fire*



*Lower I-880 Ramp:  
Traffic Resumes 8 Days after Fire  
Managed By Caltrans Bridge Maintenance*

# *Asset Management of the MacArthur Maze Fire*



## *Lower Ramp managed by Bridge Maintenance:*

- *Demolition \$2 million*
- *Repairs \$8 million*
- *Repainted after open to traffic*

# *Asset Management of the MacArthur Maze Fire*



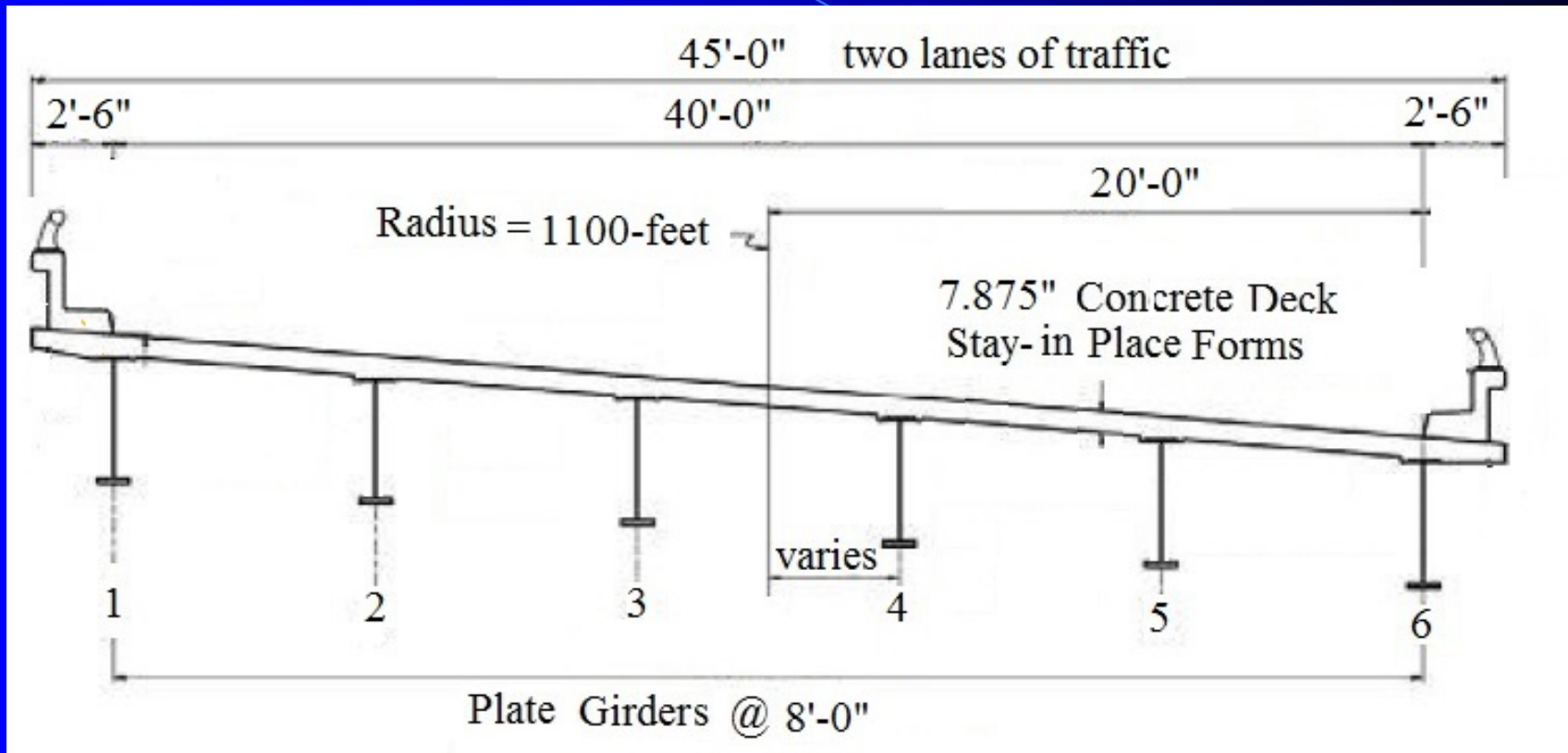
View of damage from above

Aerial Graphic of Collapsed I-580 Span

*I-580 Upper - Two Spans rebuilt  
Caltrans Bridge Design*



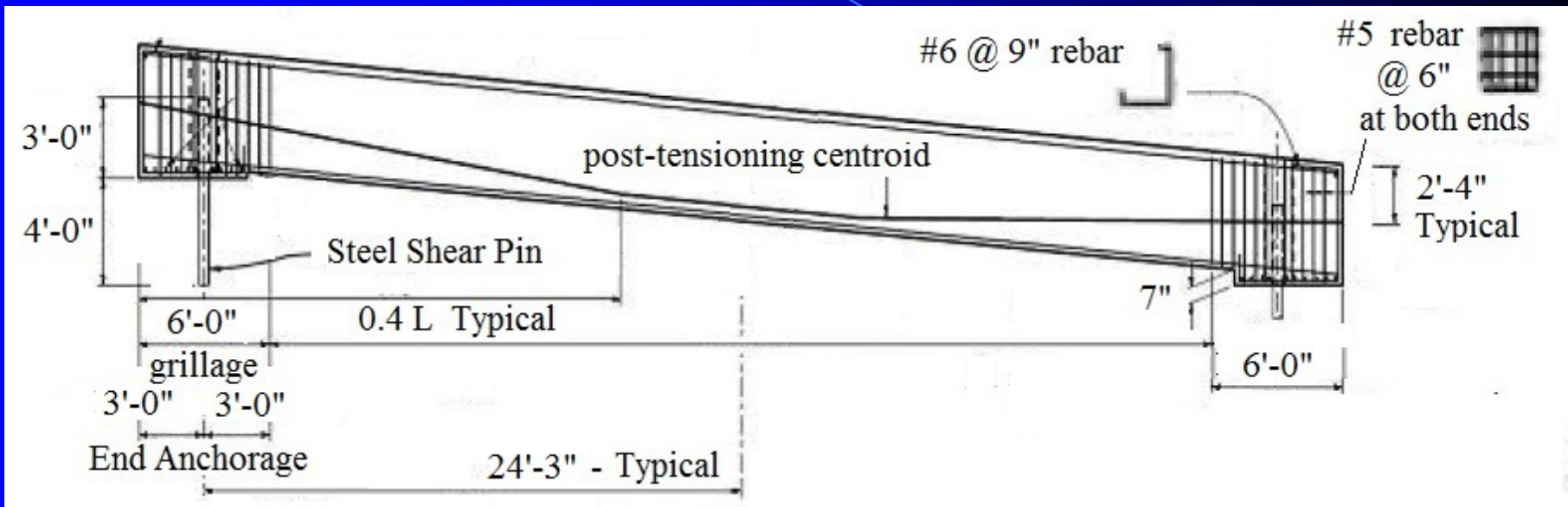
# Asset Management of the MacArthur Maze Fire



*I-580 Cross section of six plate girders  
Matched existing - Two Spans rebuilt  
Caltrans Bridge Design*



# Asset Management of the MacArthur Maze Fire



*Elevation of replacement Bent Cap  
Precast Prestressed Girder  
Selected option by Contractor  
Replaced existing steel box  
Caltrans Bridge Design*

# *Asset Management of the MacArthur Maze Fire*



*Simple Span Precast Concrete Bent Cap  
Contractor finished early at 20 days – upper  
ramp (1 week to design + advertise)*

# *Asset Management of the MacArthur Maze Fire*



Last girder installed at the jobsite

*Bolting Steel Girders to Concrete Beam*



# *Asset Management of the MacArthur Maze Fire Repaired in 26 days*



*Governor Schwarzenegger signs hardhats at reopening ceremony May 25, 2007. (Caltrans photo)*



# *Asset Management of the MacArthur Maze Fire*

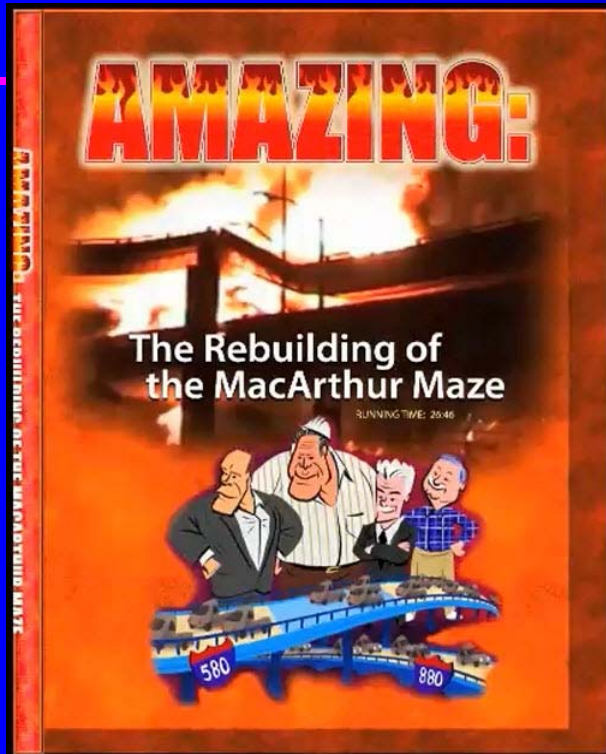


*Martin Pohll PE, SE,  
received NSBA Award*



*Caltrans Design Team Received NSBA Design  
Award (National Steel Bridge Alliance)*

# Asset Management of the MacArthur Maze Fire



*PECG produced award winning  
Documentary shown on PBS  
Humor = A + B contract*

# ***OUTLINE – ASSET MANAGEMENT***

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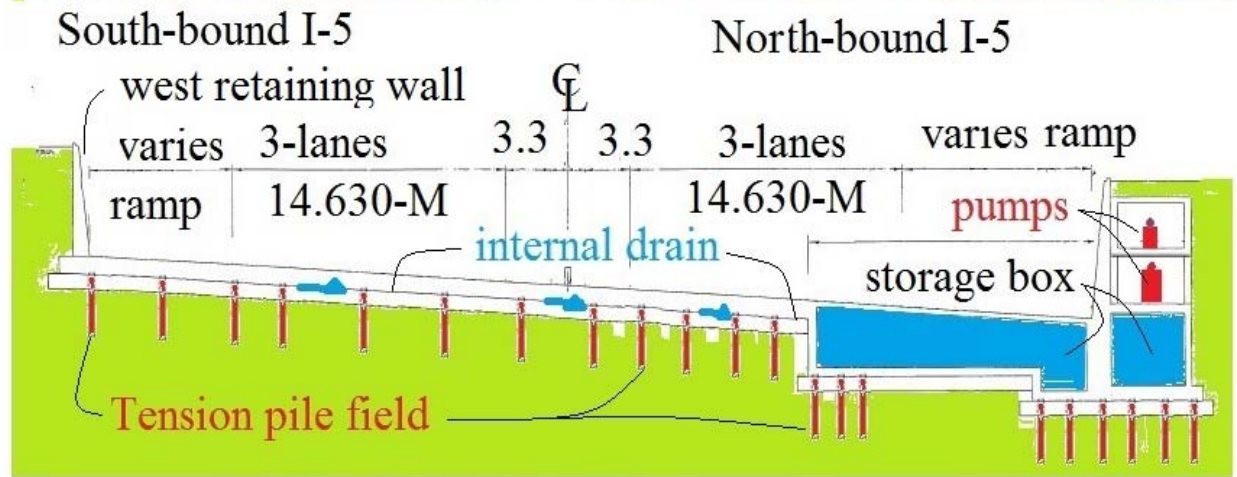
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# Asset Management of I-5 "The Boat Section"



**Depressed Freeway Section: Built in 1960s**



Riverfront Seal Slab Structure No. 24-0274M



# ***Asset Management of I-5 “The Boat Section”***



***1980s floods damaged drain system***

# Asset Management of I-5 “The Boat Section”



## SITE PLAN I-5 Boat section

# ***Asset Management of I-5 “The Boat Section”***



## ***Problems***

- ***Clogged drains***
- ***Pavement failure***

## ***Sacramento Bee Story***



# Asset Management of I-5 “The Boat Section”



## **Solution**

- ***New drains***
- ***New pavement***

***Sacramento Bee Story***

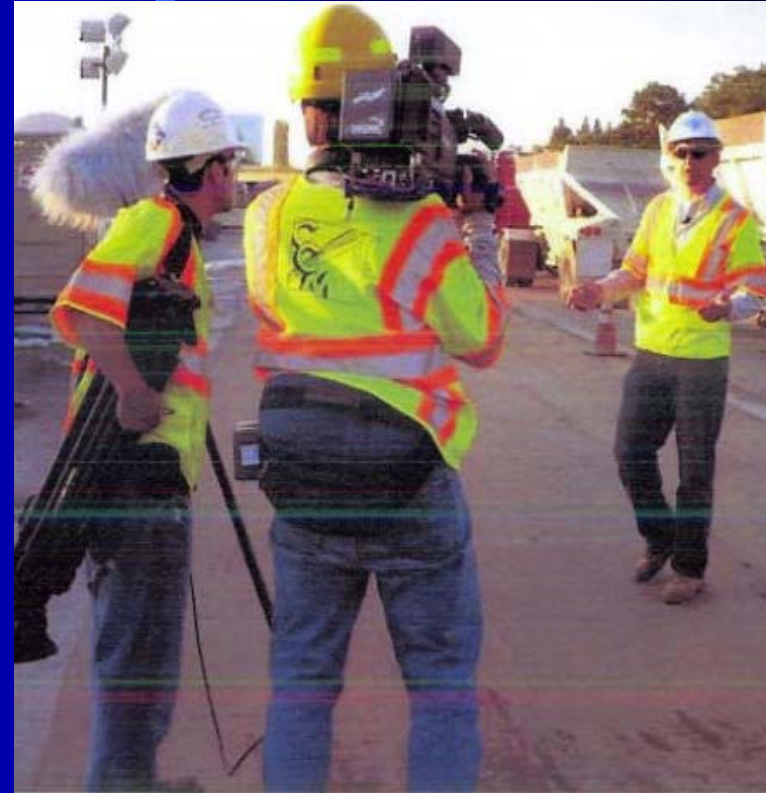
# Asset Management of I-5 “The Boat Section”



*Freeway shutdown in stages*  
*Change order request from contractor*  
*A + B contract*

# ***Asset Management of I-5 “The Boat Section”***

Documentary Project  
KVIE – PBS



***Special Access for Local  
PBS Documentary Project***



# Asset Management of I-5 “The Boat Section”

## Viewfinder PBS TV Show on the I-5 Boat

**viewfinder**

It is Sacramento's most traveled and troubled stretch of highway. Its bumpy 40-year history includes flooding, clogged drainage pipes, and a great deal of deterioration. But how do you fix a vital artery that carries 190,000 cars each day without causing major commuting chaos? *ViewFinder* documents this amazing feat of engineering from start to finish.

**Announcer** Zack Boles  
**Producer/Writer** Dan Bree  
**Executive Producer** Lynn Margherita  
**Associate Producer** Letitia Buchanan  
**Videographers** Martin Christian, Robert Zuill, Ken Day, Rico Corona, Esther Ritter, John Mounier, Stan Chan, Chris Sellers, Dennis Parecaden (Caltrans, District 4), Benjamin Roston (Caltrans, District 4), and Richard Schatzman (Caltrans, District 4)  
**Audio Editors** Robert Neely, Jimmy Bell, Stan Chan, Mark Johnson, Greg O'Toole  
**Production Manager** Alice Yu  
**Post Production Manager** Jim Calahan  
**VP of Content Creation** Mike Sanford  
**Art Director** Jamie Judd  
**Length** 26:46

Production funding by

The *ViewFinder* series is underwritten by Safe Credit Union and AT&T.

**KVIE**

© 2008 KVIE Public Television | Sacramento, California  
kvie.org/viewfinder

**viewfinder**

**Rebuilding The Boat**  
**FIXING I-5 IN SACRAMENTO**

**viewfinder**

**KVIE**

**DVD VIDEO**

**A 29 – MINUTE PBS TV Show**

**[www.youtube.com/watch?v=SP2wNZ5F158](http://www.youtube.com/watch?v=SP2wNZ5F158)**

# Asset Management of I-5 “The Boat Section”



**Subsurface water sensor (and pressure)**

# "I-5 Boat" Section Background

## Freeway Re-Opening

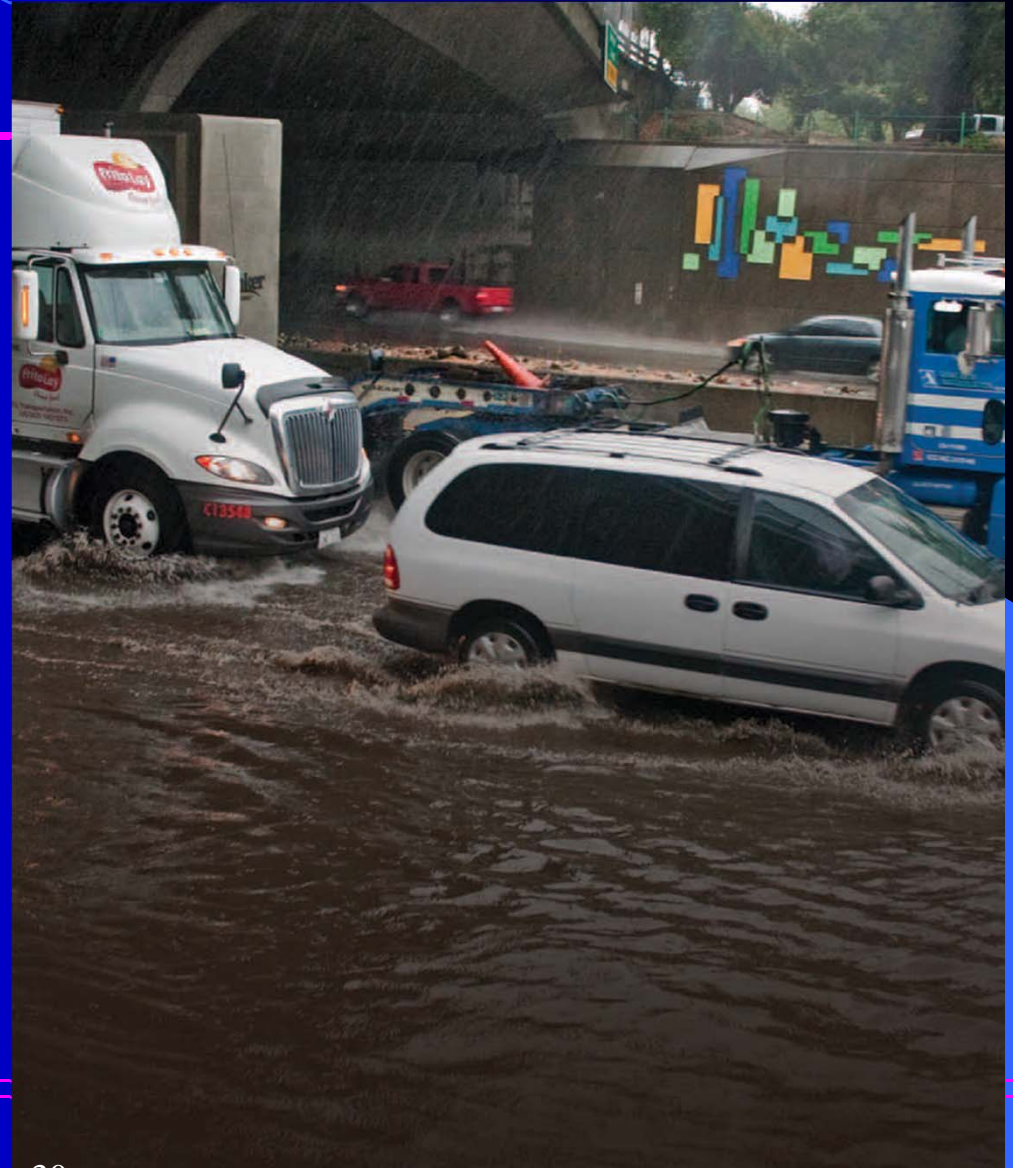


- Press Conference - July 28, 2008
- Contractor C. C. Myers ( left)
- Director Kempton (right)



# ***"Boat" Section – Success ??***

***A few drains –  
Paved over by  
mistake  
North Bound I-5***



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# Asset Management of the YBI VIADUCT

## Seismic Robustness

Caltrans Bridge Design  
Engineers For The YBI Viaduct  
Mike Cullen (Project Engineer)  
and Grant Schuster (Project  
Designer)





# *Asset Management of the YBI VIADUCT*

## *Seismic Robustness*



Construction Activities and Staging

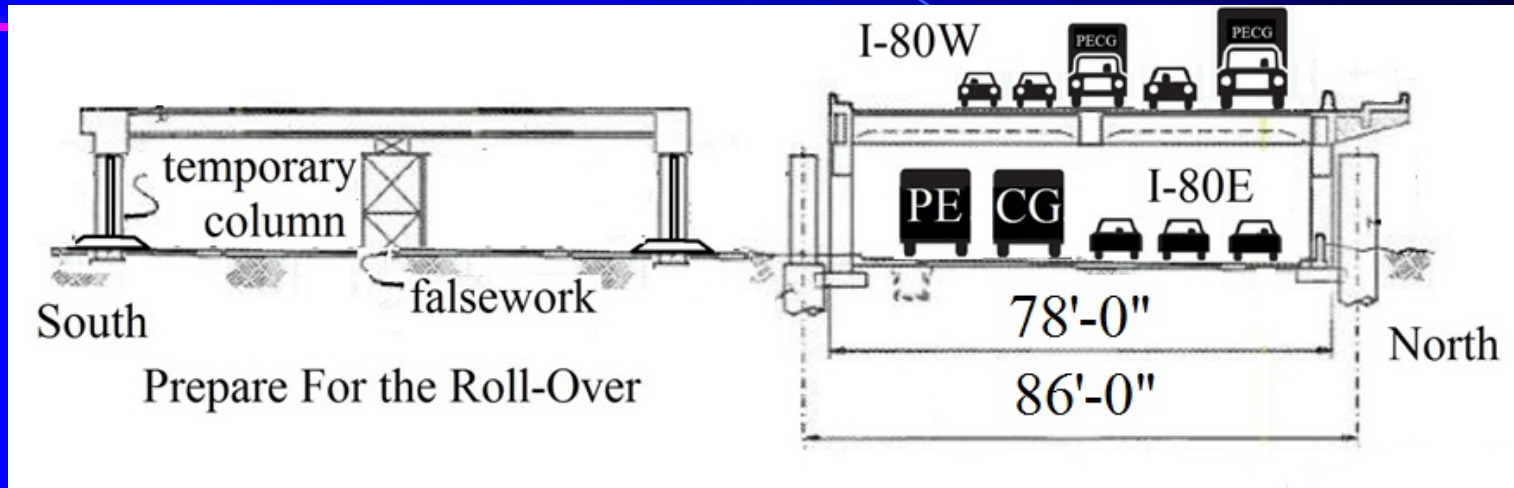
YBI VIADUCT REPLACEMENT SIMULATION AND TIMELAPSE

<http://baybridgeinfo.org/media/video/ybi-viaduct-replacer>



*Sliding or Skidding Phase = ABC*  
*Stage 1: Build replacement*

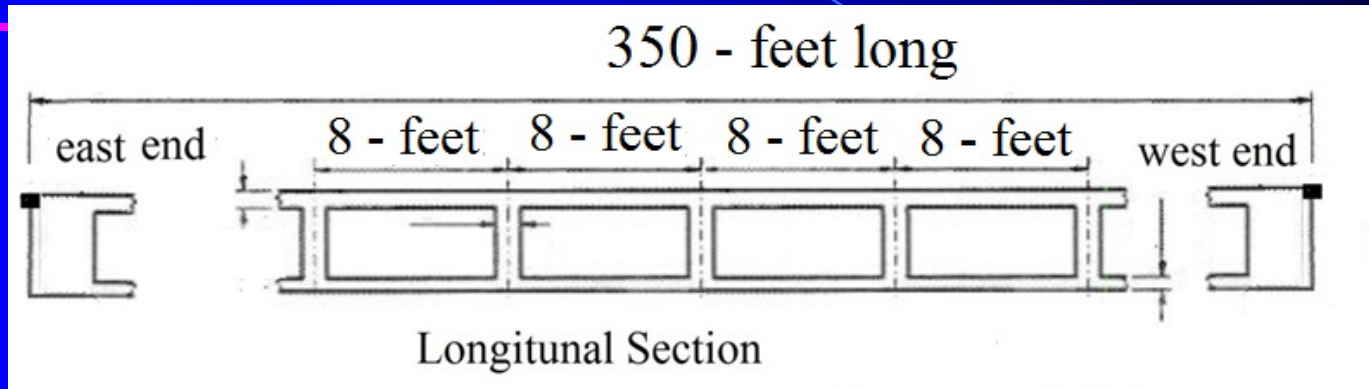
# Asset Management of the YBI VIADUCT Seismic Robustness



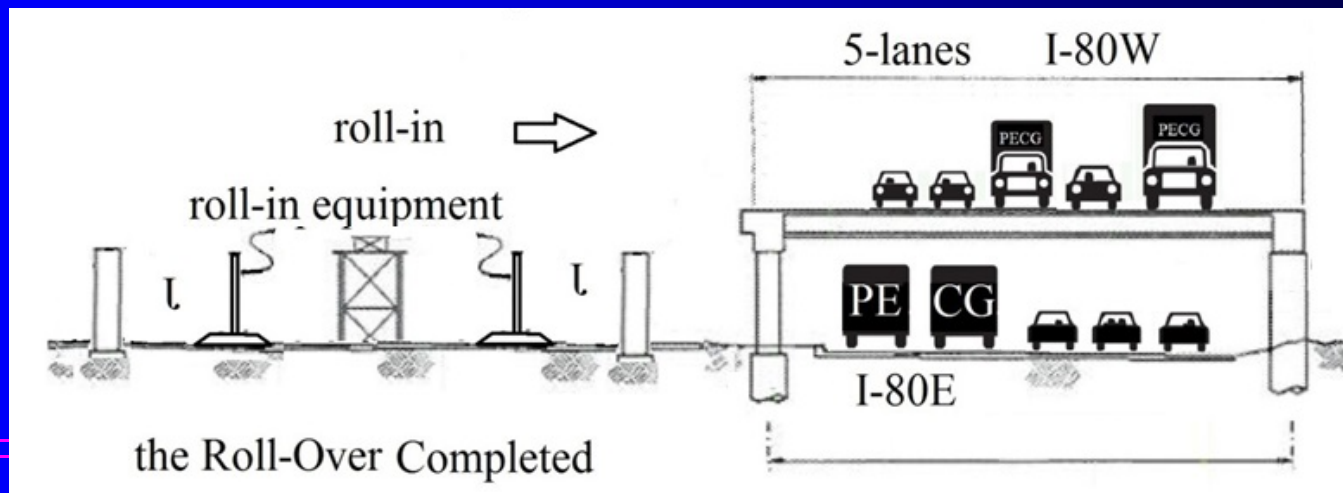
*Caltrans Design Team: ABC solution*

- *Football field sized = 7,165 tons*
- *New seismic standards*
- *I-80 Freeway ADT = 260,000*

# Asset Management of the YBI VIADUCT Seismic Robustness



*Demolition + Slide Phase = 72 hours*





# *Asset Management of the YBI VIADUCT*

## *Seismic Robustness*



Construction Activities and Staging

YBI VIADUCT REPLACEMENT SIMULATION AND TIMELAPSE

<http://baybridgeinfo.org/media/video/ybi-viaduct-replacer>



*Demolition Phase = ABC*

36

# *Asset Management of the YBI VIADUCT Seismic Robustness*

## *Demolition Phase*



# Asset Management of the YBI VIADUCT

## Seismic Robustness



Construction Activities and Staging

YBI VIADUCT REPLACEMENT SIMULATION AND TIMELAPSE

<http://baybridgeinfo.org/media/video/ybi-viaduct-replacer>



# Demolition Phase Completed

38



# Asset Management of the YBI VIADUCT

## Seismic Robustness



*Skidding-in Phase*

*Mammoet Skid System  
Horizontal Jack+  
Vertical Jack*



# Asset Management of the YBI VIADUCT

## Seismic Robustness



4.



Construction Activities and Staging

YBI VIADUCT REPLACEMENT SIMULATION AND TIMELAPSE

<http://baybridgeinfo.org/media/video/ybi-viaduct-replacer>



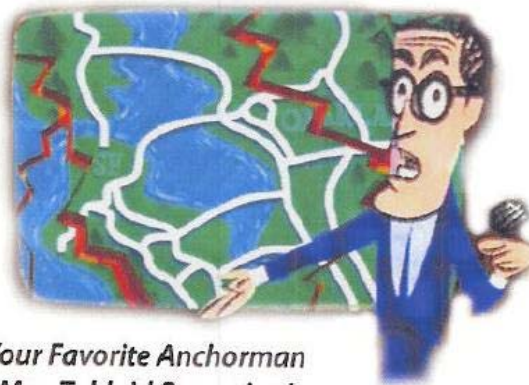
*Skid-in Phase = about 12 hours* 40

# Asset Management of the YBI VIADUCT Seismic Robustness

## A SPAN IN TIME

The Dramatic Story of the 2007 Labor Day Weekend  
Bay Bridge Demolition and Replacement Project

<http://www.aspanintime.com/>



Your Favorite Anchorman  
Max Tabloid Reporting!



*Brown, David, Director, DVD, 30 MINUTES*

*Animation by Charlie Canfield*



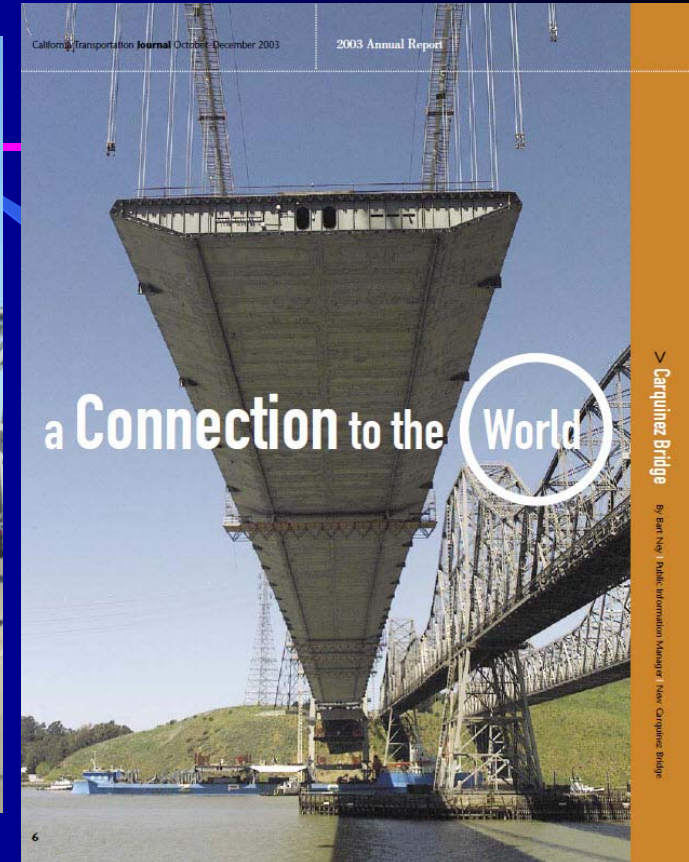


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# Asset Management of Alfred Zampa Bridge



**Built 2000-2003: 1st Aerodynamic "Wing-Shaped" Orthotropic Suspension**

# Asset Management - Shipping

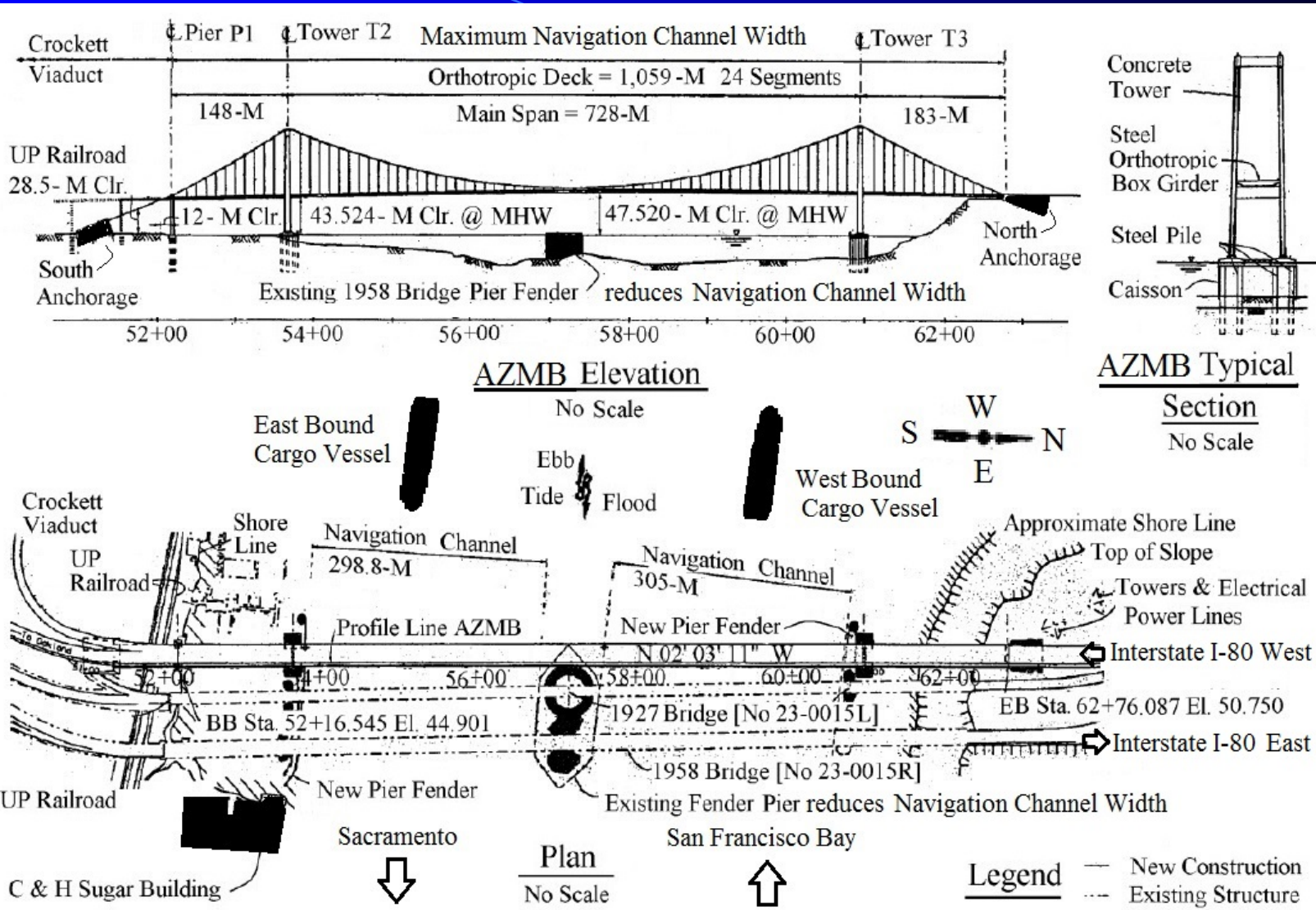
## Alfred Zampa Bridge

- *2003 Suspension*
- *1927 Truss*
- *1958 Truss*
  
- *Center Piers*



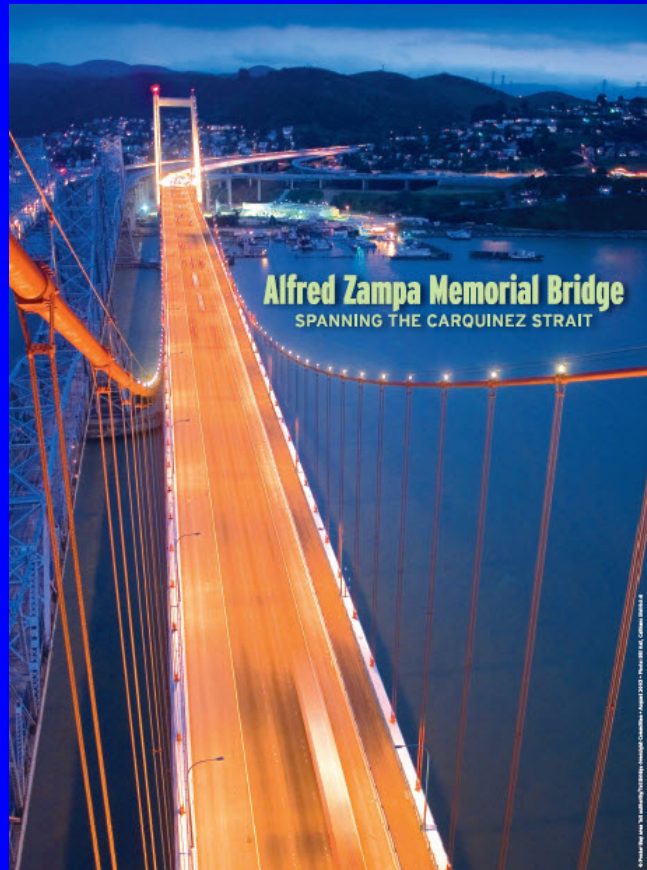


# Asset Management of Alfred Zampa Bridge



2003 Suspension maximizes channel

# *Asset Management of Alfred Zampa Bridge*



*2003 Suspension – eliminates center pier*



# Asset Management of Alfred Zampa Bridge



- *24 Japanese Fabricated orthotropic sections lifted from Chinese Semi-submersible ship from suspension cables*



# Asset Management of Alfred Zampa Bridge



**Caltrans OSC (Office of Structure Construction)**

# *Asset Management - Shipping* *Alfred Zampa Bridge*

**SPANNING  
THE CARQUINEZ STRAIT**

The Alfred Zampa  
Memorial Bridge

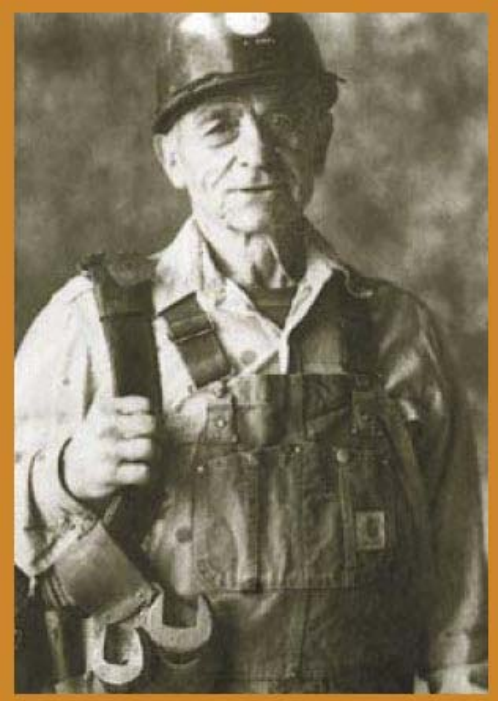


# Asset Management of Alfred Zampa Bridge





# *Asset Management of Alfred Zampa Bridge*



*Alfred Zampa*

*-Ironworker*

*"Halfway to Hell" Club*



*Caltrans Documentary on CD-Roms – limited number*



# Asset Management - Shipping

## Alfred Zampa Bridge



### AL ZAMPA MEMORIAL BRIDGE

"This site is brought to you by the Al Zampa f

OFFICIAL WEBSITE

Homepage

[Al Zampa](#)

[Bridge Celebration](#)

[Bridge Construction](#)

[Photo Gallery](#)

[Links](#)

[Articles](#)

The new Al Zampa Memorial Bridge across the Carquinez Strait in the San Francisco Bay is the first new suspension bridge built in the United States since 1973. The new Carquinez Bridge Opened Saturday November 8th 2003.



# *Alfred Zampa Bridge Background*



*Scenic Trail Around  
San Francisco Bay*





# *Asset Management - Shipping*

## *Alfred Zampa Bridge*



*Scenic Trail Over look display—  
original laced members + photos* 54

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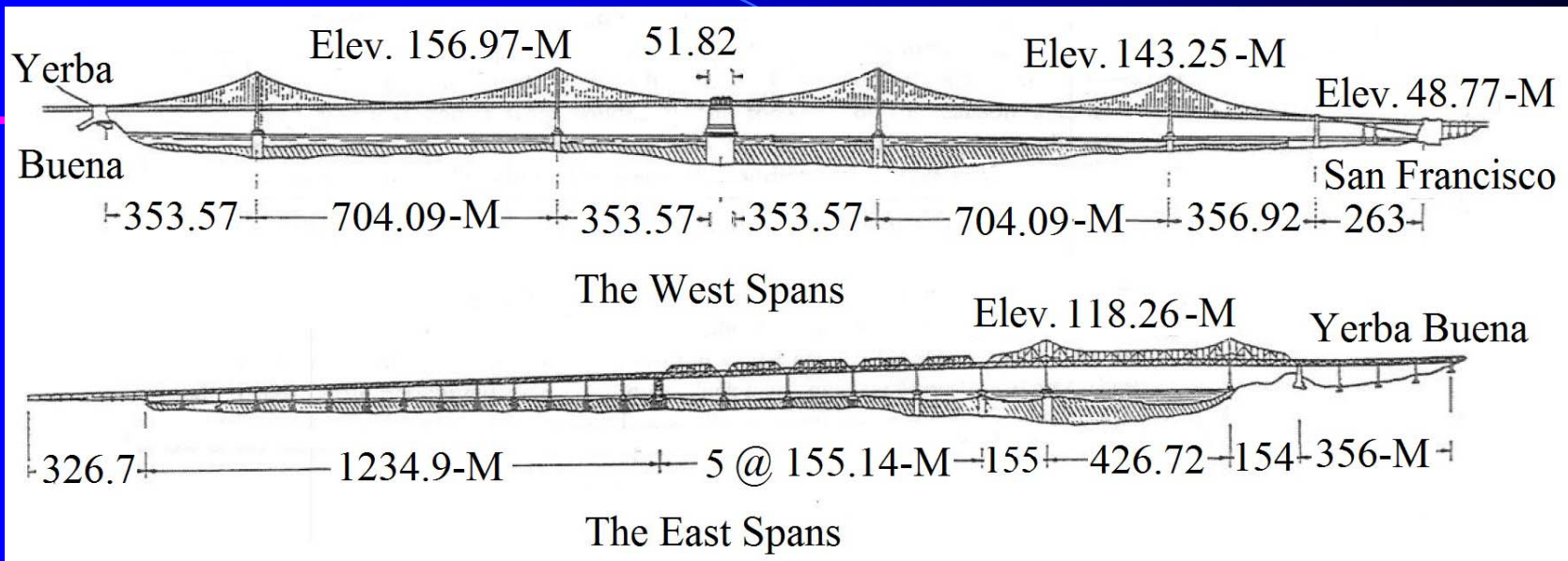
# ***Asset Management of East Spans SFOBB***



***Walk or bike across this iconic orthotropic bridge***



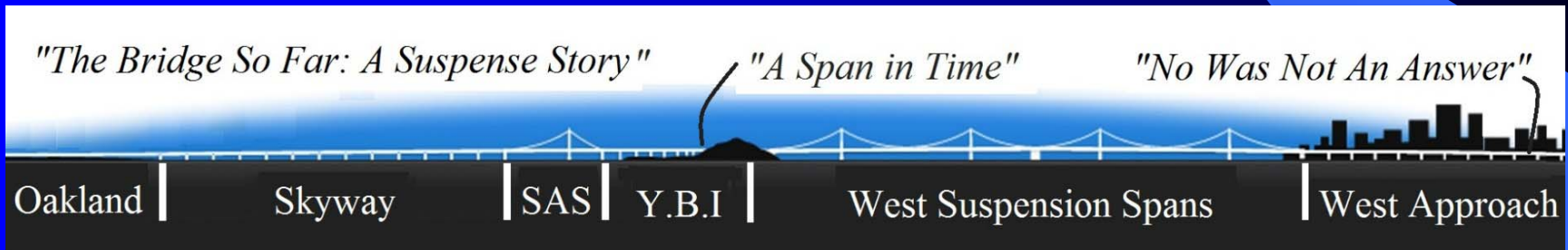
# Asset Management of East Spans SFOBB



- ❖ *Original Bridge Built 1934 to 1937*
- ❖ *Damaged by 1989 Loma Prieta Earthquake*
- ❖ *Replacement opened to Traffic Sept 2013*

# Asset Management of East Spans SFOBB

- ❖ **1989-2013 Seismic Retrofit and Replacement of spans due to Loma Prieta Earthquake damage**



- ❖ **More than three documentaries**

# Asset Management of East Spans SFOBB



## *The Bridge So Far: A Suspense Story*

*"The Bridge So Far: A Suspense Story"*

Oakland

Skyway

SAS

Y.E



*Politics on Type selection  
of East Spans of SFOBB*



# Asset Management of East Spans SFOBB

artwork Copyright PEGG used with permission

SAS = Self Anchoring Suspension Bridge

Governor Schwarzenegger

Governor Gray Davis

White House

Mayor Willie Brown

City of San Francisco

US NAVY

Bridge Plans / Concepts

Governor Pete Wilson

Concrete Viaduct

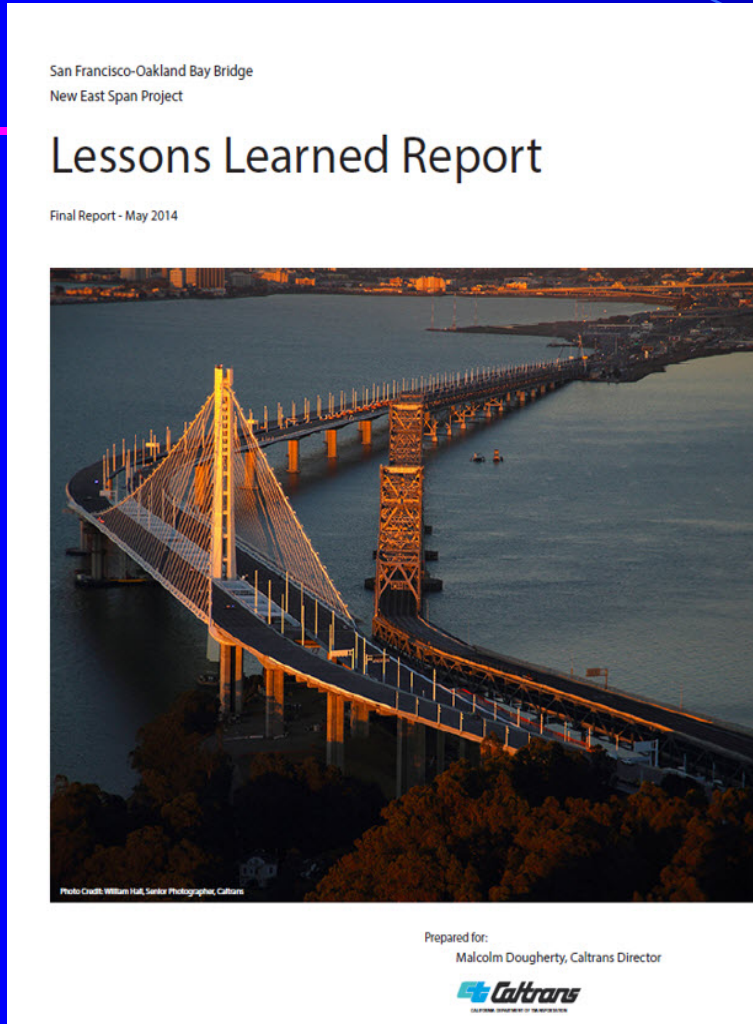
SFOBB Truss Bridge

Damaged by Loma Prieta Earthquake

*"The Bridge So Far: A Suspense Story"*

Oakland | Skyway | SAS | Y.F.

# Asset Management of East Spans SFOBB



***Lessons Learned –  
Today Risk  
Management  
Mandatory***

***Success or Failure?***

***Logo – Golden  
State Warriors***

***Bike Trail***

***Tolls***

**2004 + 2008 + 2013 + 2015 PROCEEDINGS FOR SALE  
ASCE ORTHOTROPIC BRIDGE  
P.O. BOX 161114, Sacramento, CA 95816  
Phone & Fax: 916-961-2723 E-mail: [asce@asce-sacto.org](mailto:asce@asce-sacto.org)**

**[www.orthotropic-bridge.org](http://www.orthotropic-bridge.org)**

**VISIT CALIFORNIA [WWW.5OBC.ORG](http://WWW.5OBC.ORG)**

**Summer 2018 for 5th Conference**

**Hosted by ASCE Structural Engineering  
Institute San Francisco**



**Walk, drive,  
or bike  
across two  
orthotropic  
bridges**





# Ten minutes of three movie clips

- ❖ <http://www.thebridgesofar.com/>
- ❖ <http://www.amazingmaze.org/>
- ❖ [www.aspanintime.org](http://www.aspanintime.org)
- ❖ **Sorry no popcorn !**



# QUESTIONS ?

*La Land' High-Flying Highway Opening Scene: How'd They Do That*



**105/110 Century Freeway Interchange - Los Angeles**

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**916.227.8247**