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

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

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

Bolting Steel Girders to Concrete Beam

Last girder installed at the jobsite
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
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Asset Management of I-5 “The Boat Section”

Depressed Freeway Section: Built in 1960s

Sacramento River → Tower Bridge → Old Sacramento

South-bound I-5
- west retaining wall
- varies 3-lanes ramp
- 14.630-M
- internal drain
- Tension pile field

North-bound I-5
- west retaining wall
- 3.3
- 3-lanes
- 14.630-M
- storage box
- pumps

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

A 29 – MINUTE PBS TV Show

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

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

Demolition Phase = ABC
Asset Management of the YBI VIADUCT
Seismic Robustness

Demolition Phase
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Demolition Phase Completed

3.

Asset Management of the YBI VIADUCT

Seismic Robustness
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

Skid-in Phase = about 12 hours
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/

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

MAKE A DIFFERENCE!

We don’t just make history... we BUILD IT!

Caltrans OSC (Office of Structure Construction)
Asset Management of Alfred Zampa Bridge

1958 Truss Bridge
1927 Truss Bridge
2003 AZMB Bridge

1958 & 1927 Piers reduce the navigation channel width
SPANNING THE CARQUINEZ STRAIT
THE ALFRED ZAMPA MEMORIAL BRIDGE

Caltrans Booklet – 93 pages
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 M

OFFICIAL WEBSITE

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 Overlook display—original laced members + photos
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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"

Politics on Type selection of East Spans of SFOBB
Asset Management of East Spans SFOBB

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

artwork Copyright PECG used with permission

"The Bridge So Far: A Suspense Story"

Politics on Type selection of East Spans of SFOBB
VISIT CALIFORNIA 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
- Sorry no popcorn!
La Land’ High-Flying Highway Opening Scene: How’d They Do That

QUESTIONS?

105/110 Century Freeway Interchange - Los Angeles

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