Update on the San Francisco-Oakland Bay Bridge East Span

California Transportation Commission Meeting

October 21, 2015
Item 23

Dan McElhinney, Caltrans

Bay Bridge East Span Skyway and SAS

SAS Tower Looking East

East Span Towards YBI 2014

Looking North 2015

Bay Bridge West Span

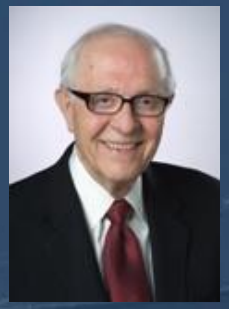
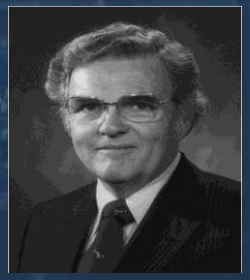
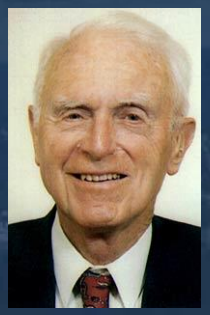
Bay Bridge West Span

SAS from Treasure Island

Toll Bridge Program Oversight Committee 2015

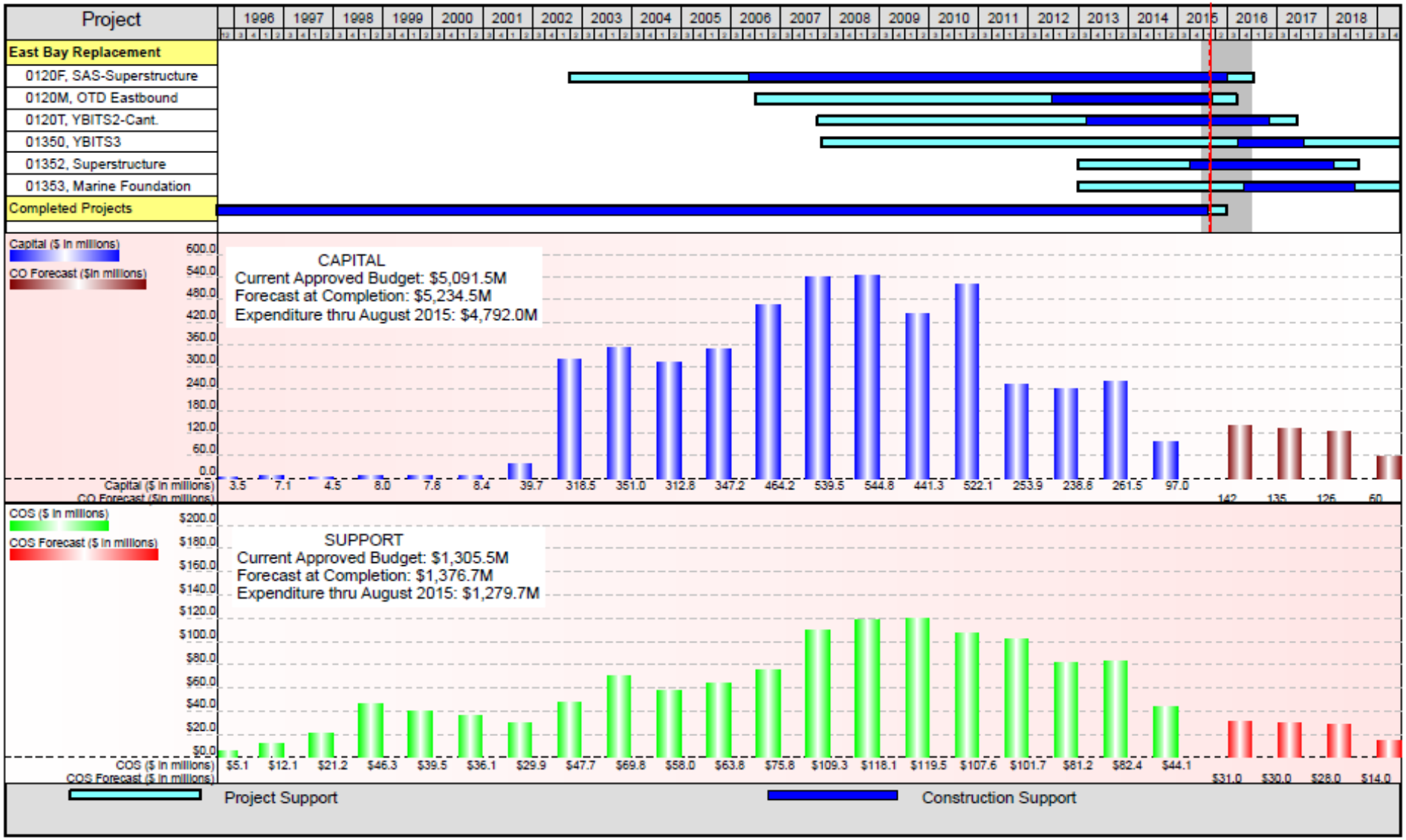
- Chair Steve Heminger, Executive Director of the Bay Area Toll Authority (BATA)
- Malcolm Dougherty, Director of the Department of Transportation (Caltrans)
- Will Kempton, Executive Director of the California Transportation Commission (CTC)

The Toll Bridge Seismic Safety Peer Review Panel (TBSSPRP)

- TBSSPRP has been involved to various degrees in the review of the State's highly valued long span Toll Bridges.
- Regularly involved with the new East Span of the SFOBB
- Has been informed of all significant decisions on the new East Span of the SFOBB
- Caltrans has considered input from TBSSPRP members regarding all significant decisions on the new East Span of the SFOBB
- Operates as an adhoc committee, meeting on the request of Caltrans.
- TBSSPRP current and past membership includes:
- Dr. Frieder Seible, Mr. Joe Nicoletti, Dr. I.M. Idriss, and Dr. John Fisher.

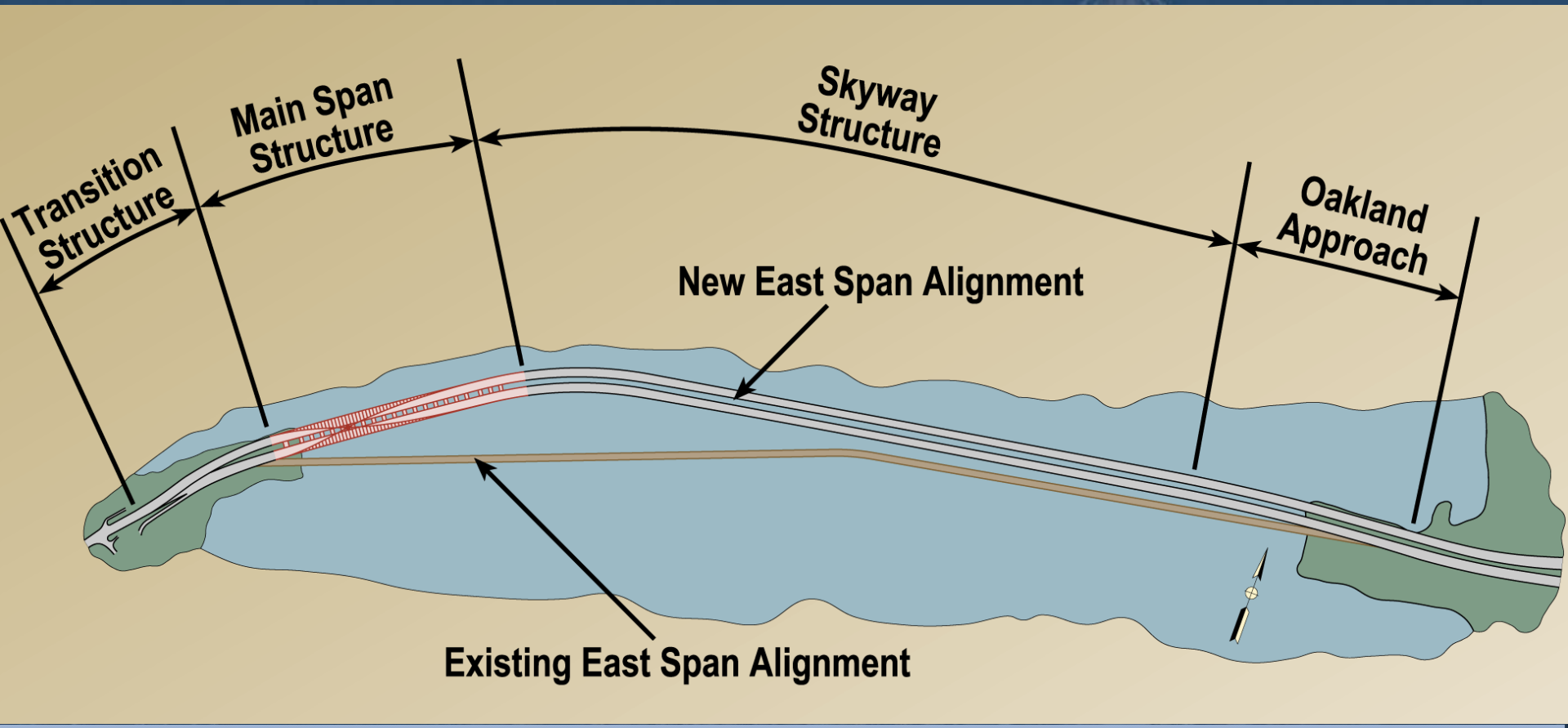
Toll Bridge Seismic Retrofit Program
CO and COS Cash Flow for East Span Projects
Expenditure thru August 2015

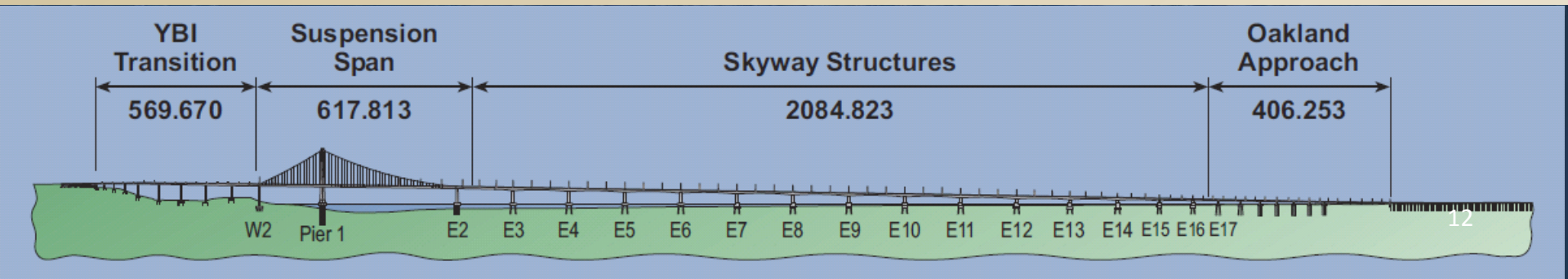


Date: 10/21/15

Notes: 1) CO and COS forecasts are based on 2nd quarter 2015 Financial and Risk Management Reports.
2) Forecasts include risk of $143M CO, and $71M COS.
3) FY 14/15 COS expenditures include A&E expenditures from FY 13/14.

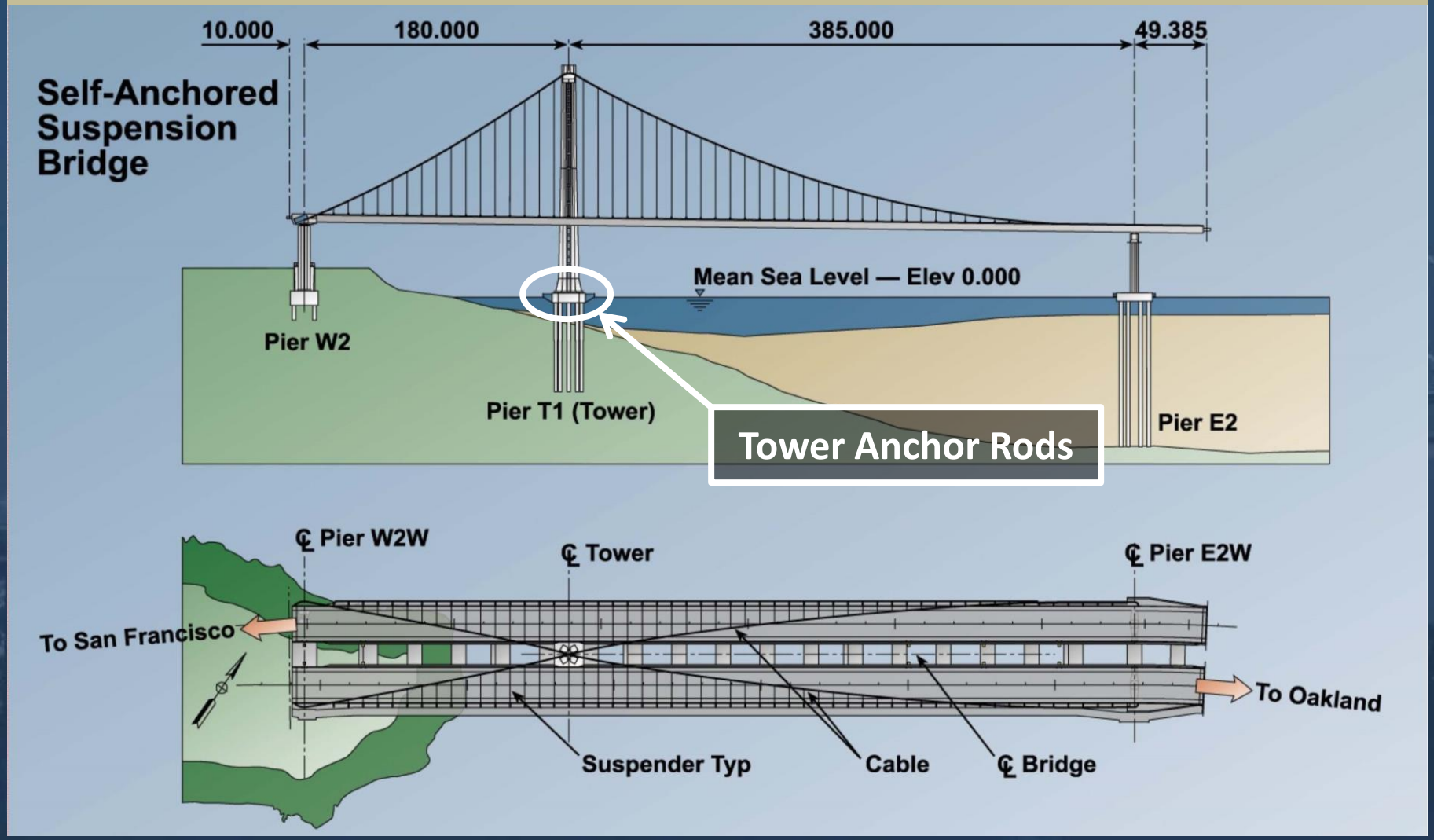
New East Bay Bridge Span

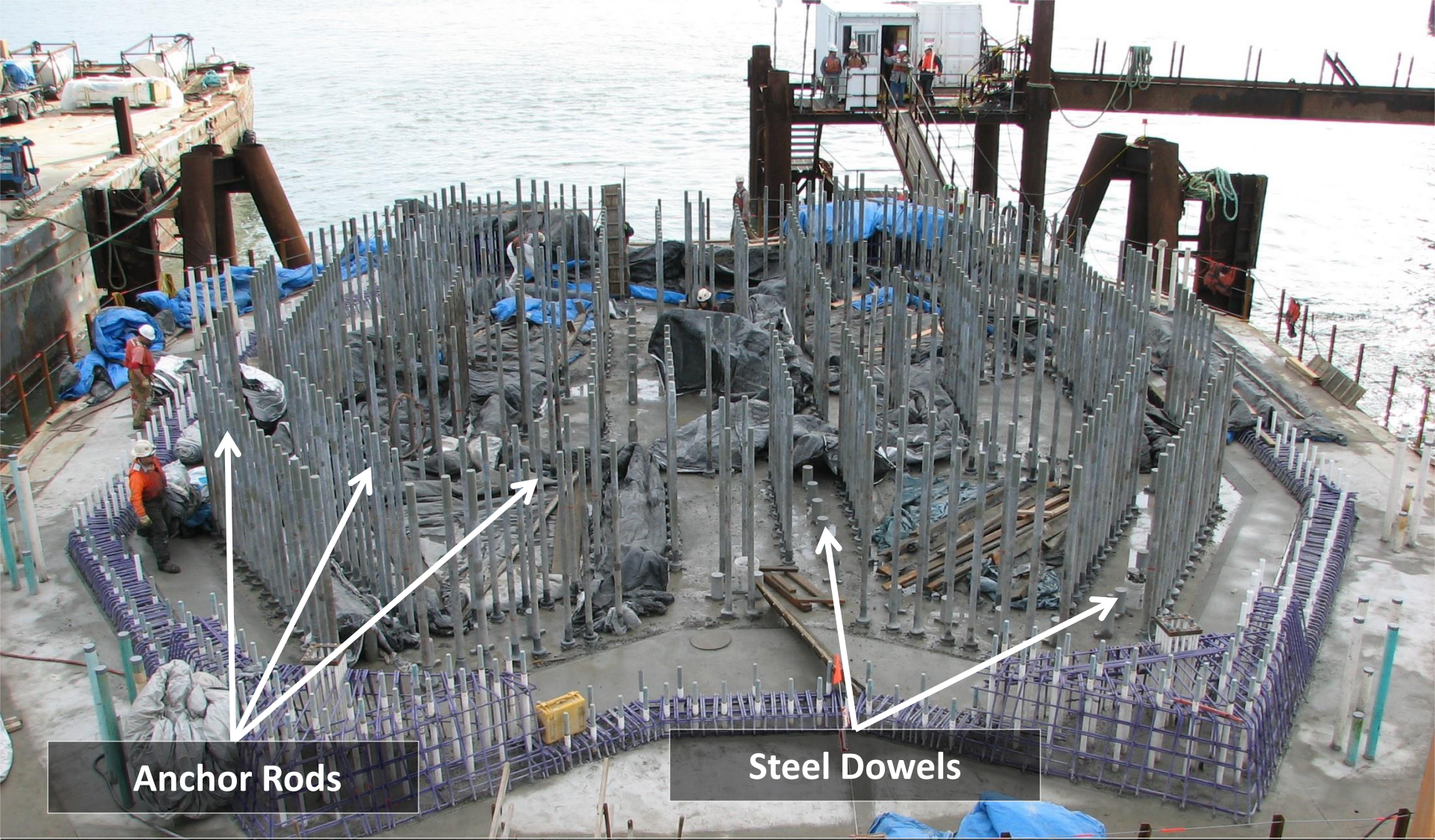




SAS Looking North 2015

Tower Anchor Rod Grouting

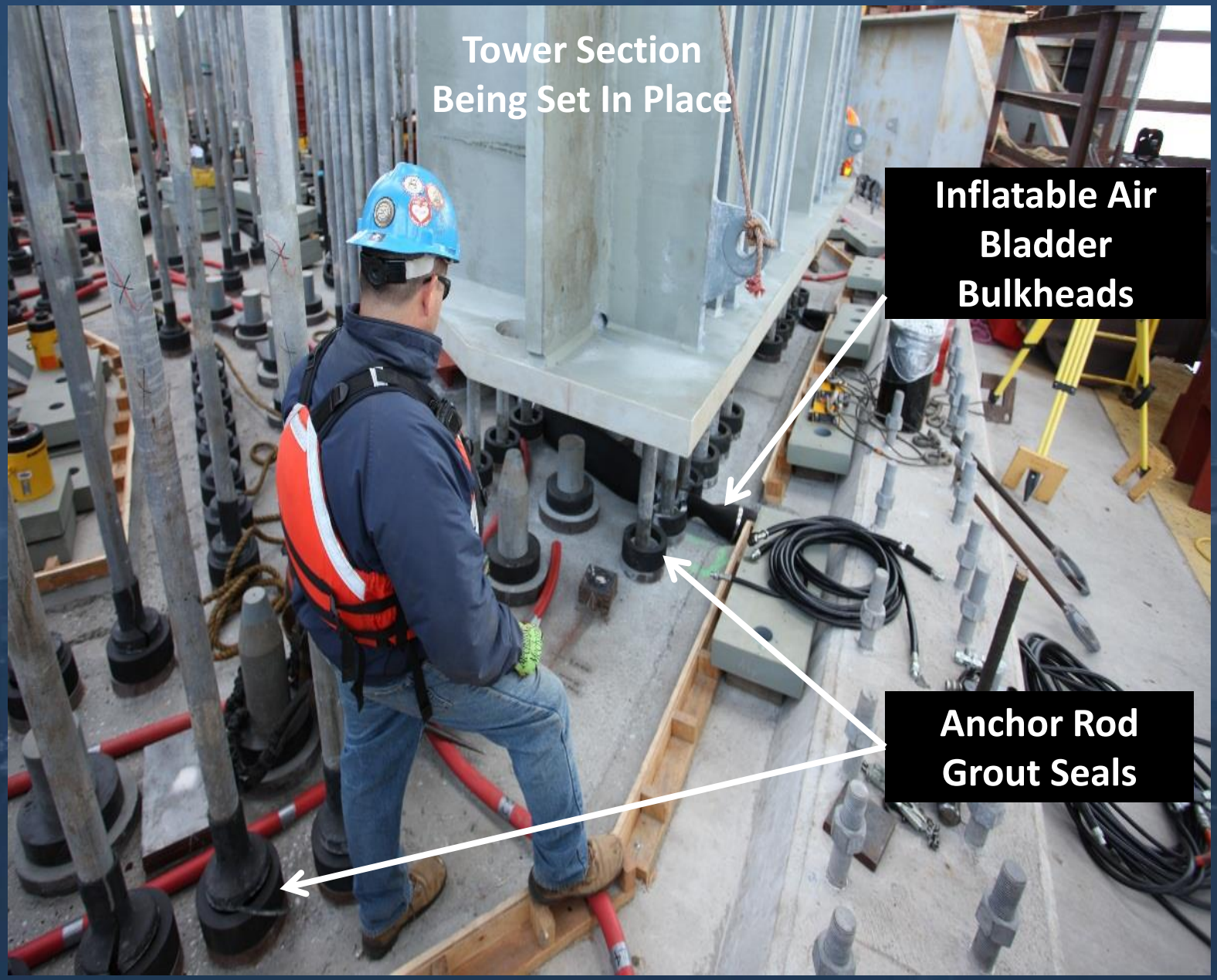




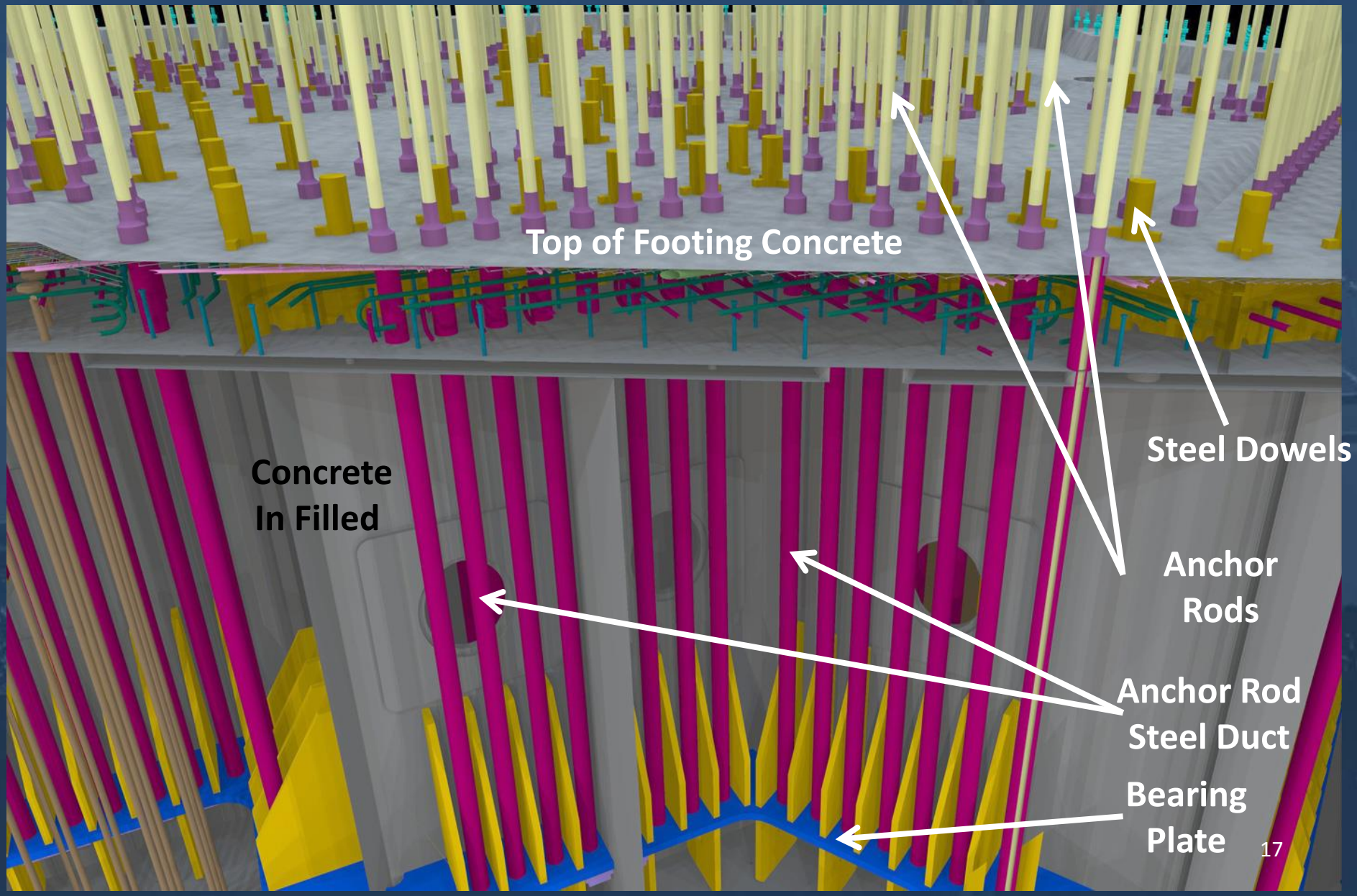
Tower Footing – 424 Tower Anchor Rods

- Length - Approximately 26 feet Long
- 388 – 75 mm Diameter Anchor Rods
- 36 – 100 mm Diameter Anchor Rods
- 152 steel dowels

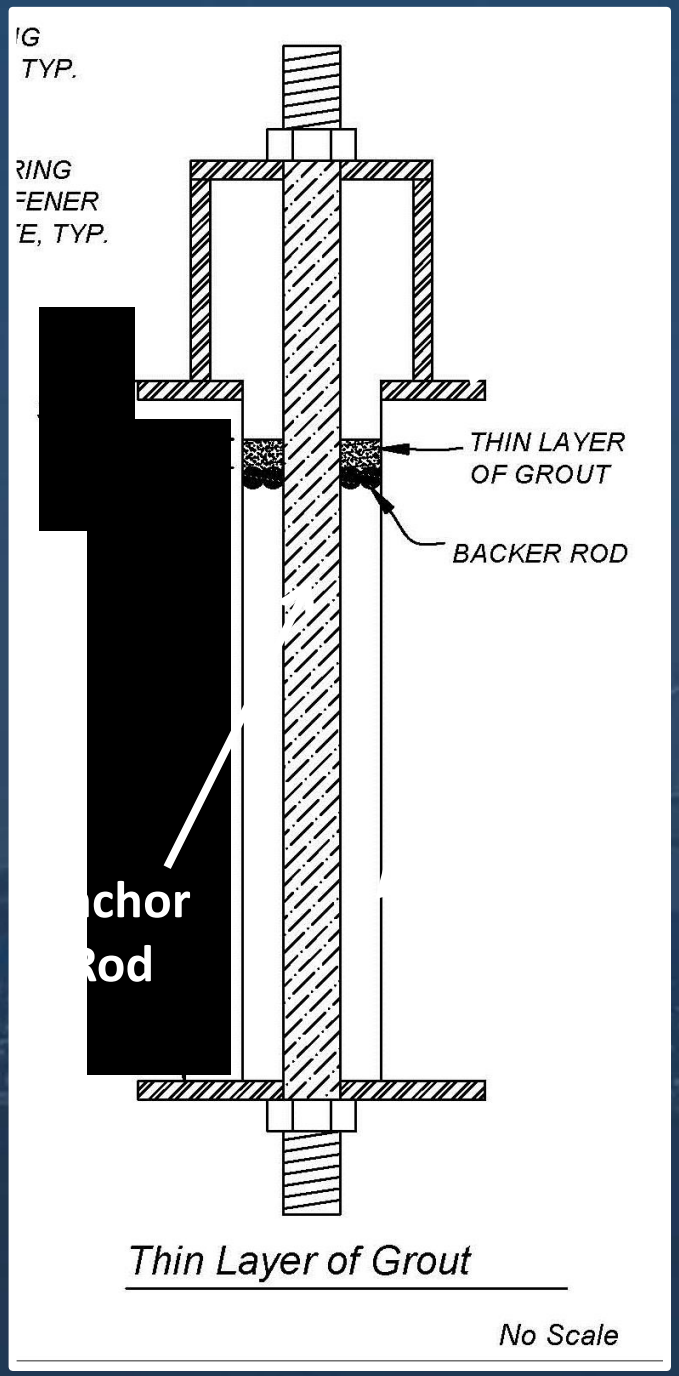
Tower Base Grouting Operation



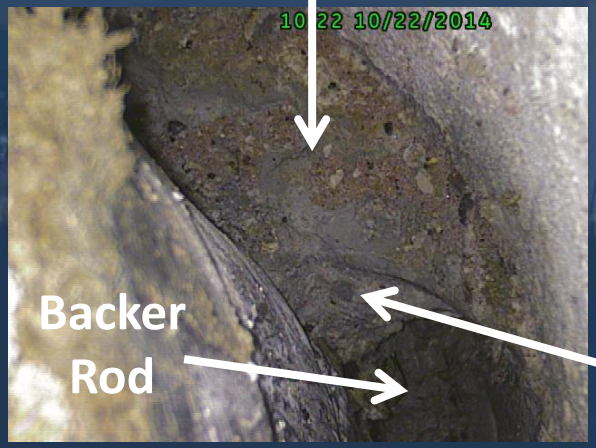
Tower Footing Illustration



Anchor Rods at Air Bladder Bulkheads



Top of Grout

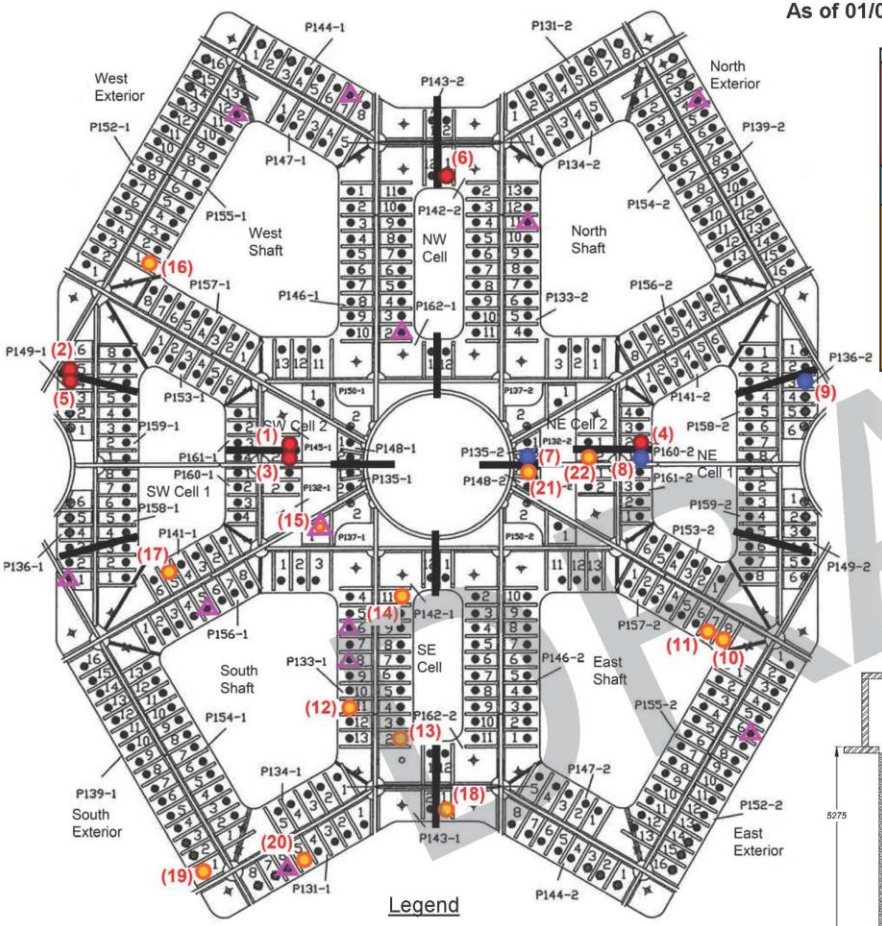


Ungrouted Rod

Approx. 150 mm
layer of Grout

Anchor Rod Grout Inspection Hole – Operation Visual Inspection (Borescope)

Tower Anchor Rods: Critical Findings
As of 01/07/14

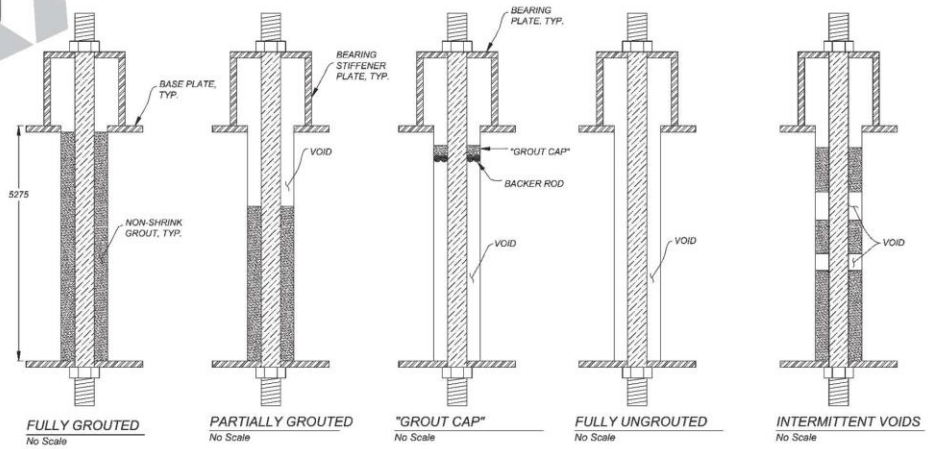


	Finding	Rod	Date	Condition	Notes, Water Sample Tested
Initial Inspection	(1)	145-1-1	9/24/14	Partially Grouted	Ungrouted 2.17 m, Yes
	(2)	149-1-5	9/28/14	Partially Grouted	Ungrouted 4.32 m, Yes
	(3)	145-1-2	9/29/14	Partially Grouted	Ungrouted 2.17 m, Yes
	(4)	160-2-2	9/29/14	Partially Grouted	Ungrouted 4.74 m, Yes
	(5)	149-1-4	10/7/14	Fully Ungrouted	Ungrouted 5.27 m
	(6)	142-2-1	10/8/14	Fully Ungrouted	Ungrouted 5.27 m (Grout Cap)
	Additional 12 rods were found to be partially grouted 350 to 500 mm				
Bladder Focused Inspection	(7)	135-2-2	10/22/14	Partially Grouted	Ungrouted 3.77 m (Grout Cap), Yes
	(8)	160-2-1	10/22/14	Partially Grouted	Ungrouted 4.74 m (Grout Cap), Yes
	(9)	136-2-3	11/14/14	Partially Grouted	Ungrouted 5.08 m (Grout Cap); Rod Removed, Yes
Post water-jetting Inspection	(10)	157-2-8	12/12/14	Fully Ungrouted	Ungrouted 5.27 m
	(11)	157-2-7	12/12/14	Intermittent Voids	
	(12)	133-1-11	12/12/14	Partially Grouted	Ungrouted 1.2 m
	(13)	142-1-2	12/13/14	Intermittent Voids	
	(14)	142-1-11	12/13/14	Intermittent Voids	
	(15)	137-1-1	12/13/14	Intermittent Voids	
	(16)	155-1-1	12/14/14	Partially Grouted	Ungrouted 1.6 m
	(17)	141-1-5	12/14/14	Partially Grouted	Ungrouted 1.2 m
	(18)	143-1-1	12/16/14	Intermittent Voids	
	(19)	139-1-1	12/16/14	Intermittent Voids	
	(20)	131-1-5	12/16/14	Intermittent Voids	
	(21)	148-2-1	12/18/14	Intermittent Voids	
	(22)	132-2-2	12/18/14	Intermittent Voids	

Notes: 1. This table is current as of 01/06/15 where 96% video evaluation has taken place

Finding	Rod	Date	Depth Ungrouted (mm)
1	133-2-11	9/27/2014	490
2	155-1-12	9/27/2014	400
3	144-1-7	9/28/2014	430
4	136-1-1	9/28/2014	420
5	162-1-2	9/28/2014	390
6	131-1-6	9/28/2014	350
7	137-1-1	9/29/2014	500
8	152-2-6	9/29/2014	450
9	139-2-4	9/29/2014	440
10	133-1-6	9/29/2014	420
11	133-1-8	9/29/2014	400
12	156-1-5	9/29/2014	360

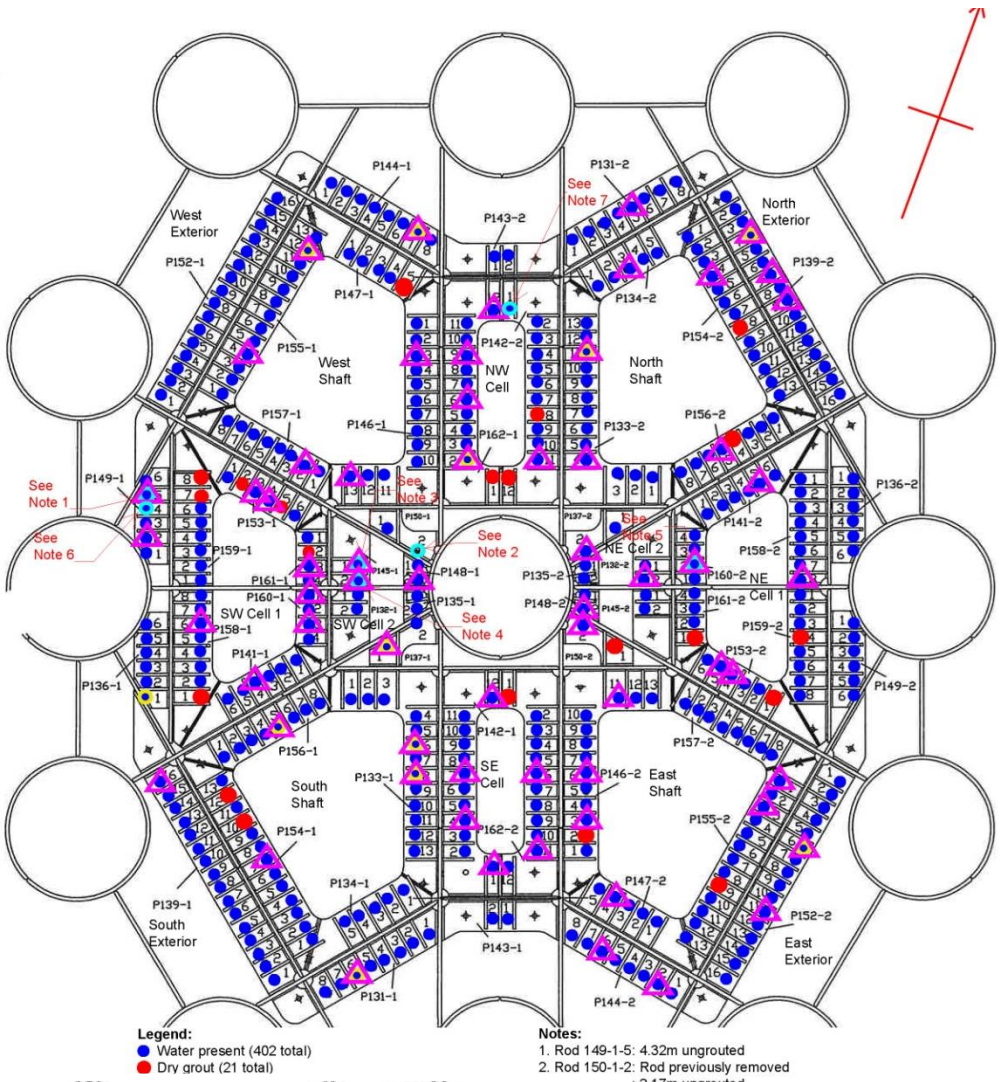
Summary of All Findings	
Fully Ungrouted	3
Partially Grouted, >500mm	10
Partially Grouted, 350-500mm	12
Intermittent Voids	9
Total	**34**



DRAFT

Replace the Grout to Seal

- 95% of rods were wet
- 138 Rods not fully grouted
  - 6 rods ranging from 2.17 m to 5.27 m ungrouted
  - 12 rods ranging from 350 mm to 600 mm ungrouted.
- 69 Samples of Water Collected (updated December 17, 2014)
  - 13 samples sent for chemical testing
  - 1 sample bay water sent for chemical comparison
  - 5 samples sent for biological testing



Legend:

- Water present (402 total)
- Dry grout (21 total)
- See Notes
- Water sample collected (66 total), including 1 sample from the bay
- 350mm-600mm ungrouted (12 total)

Notes:

1. Rod 149-1-5: 4.32m ungrouted
2. Rod 150-1-2: Rod previously removed
3. Rod 145-1-1: 2.17m ungrouted
4. Rod 145-1-2: 2.17m ungrouted
5. Rod 160-2-2: 4.74m ungrouted
6. Rod 149-1-4: 5.27m ungrouted
7. Rod 142-2-1: 5.27m ungrouted

T1 Anchor Rod Advisory Expert Team

- Alan Pense, Ph.D., M.NAE
- Louis Raymond, Ph.D., P.E.
- Jeffrey A. Gorman, Ph.D., P.E.
- John Kulicki, Ph.D., P.E., M.NAE
- Robert H. Heidersbach, Ph.D., P.E.
- Herbert E. Townsend, Ph.D., P.E.
- Karl H. Frank, Ph.D., P.E.
- Robert Bittner, P.E.
- Sheldon W. Dean Jr., Sc.D., P.E.
- Thomas J. Langill, Ph.D.
- Douglas E. Williams, P.E.

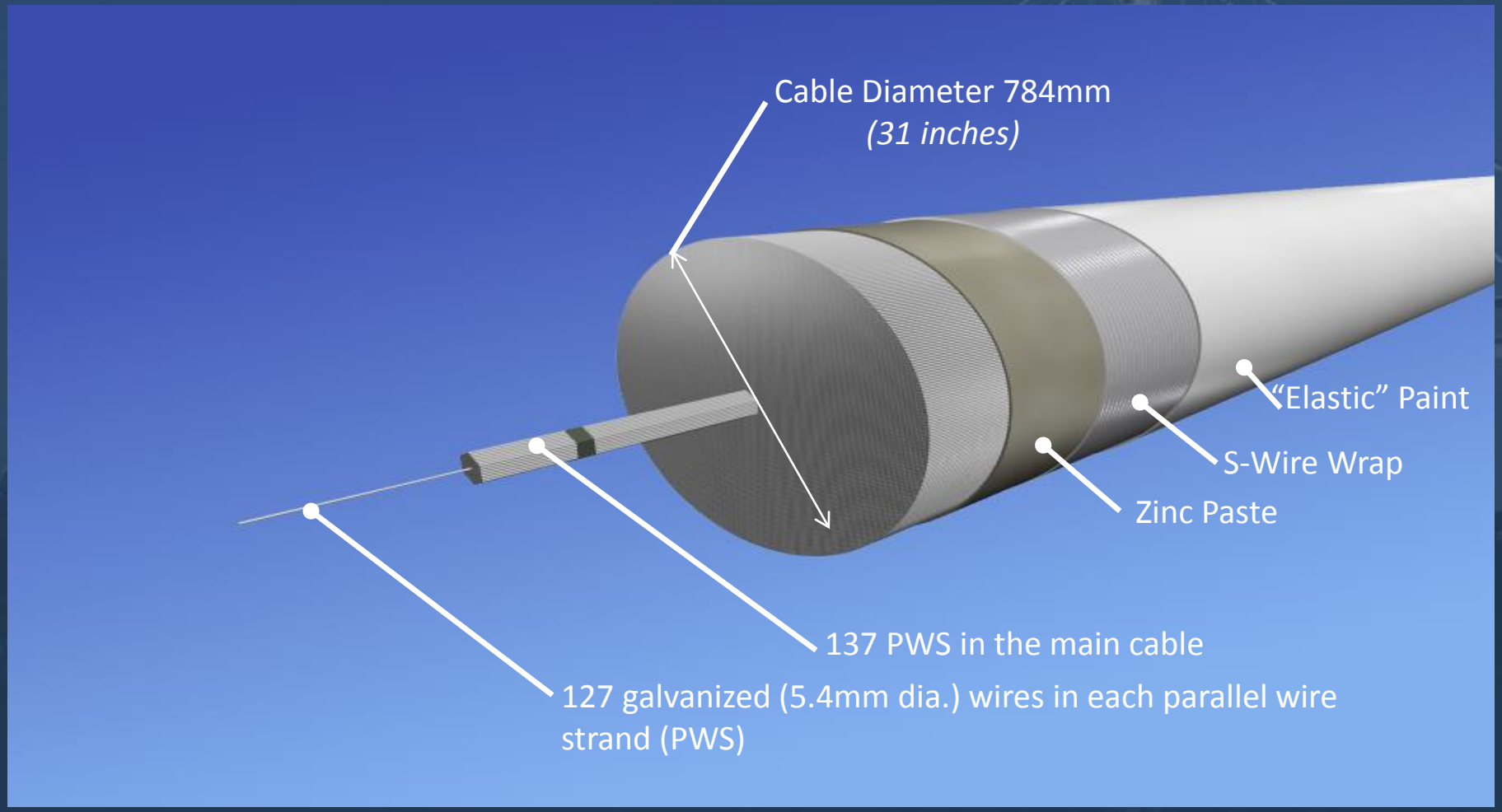
Peer Review Group of the Proposed Inspection and Maintenance of the SFOBB New East Span

Peer review expert group from the International Cable Supported Bridge Operators Association:

- Leif J. Vincentsen, Managing Director M.Sc., Sund & Bælt Partner A/S, Denmark (Lead Author)
- Barry Colford, CEng FICE, formerly Chief Engineer and Bridge Master, Forth Road Bridge, Scotland (Lead Author)*
- Chris Saladino, Facility Engineer, Bronx-Whitestone Bridge, MTA Bridge and Tunnels (Contributing)
- Jim Gibson, Highway Maintenance Manager, Tsing Ma Bridge, Hong Kong (Contributing)
- Ewa Bauer, Chief Engineer, Golden Gate Bridge (Participated only in preliminary meetings and site visit)

*Now preservation practice leader at AECOM

Main Cable Protective Coating



Application of Zinc Paste

Installation of S-wire Wrap

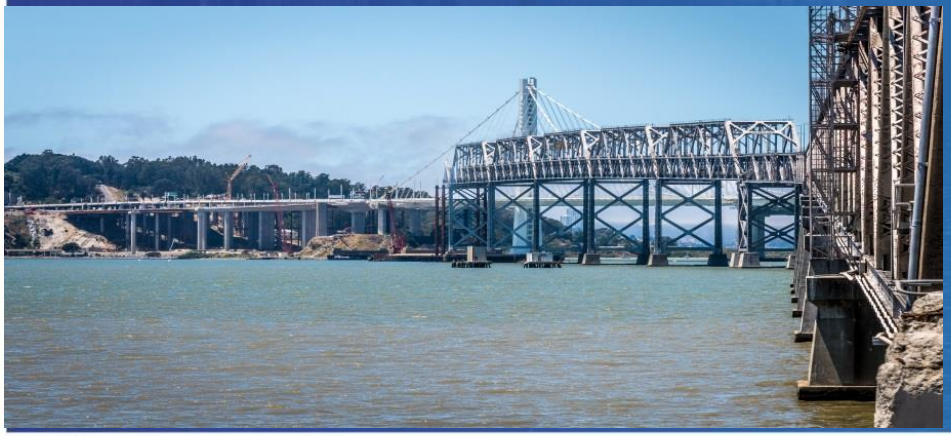
San Francisco-Oakland Bay Bridge Pier E3 Demonstration Project November 7, 2015 Demolition By Controlled Charges Implosion

California Department of Transportation

Pier E3 Blast Mat Installation September 2015

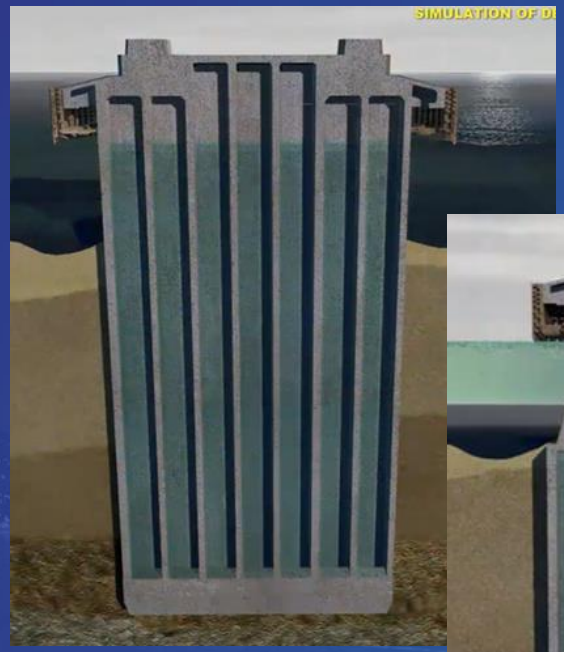
SFOBB Project Background & Updates

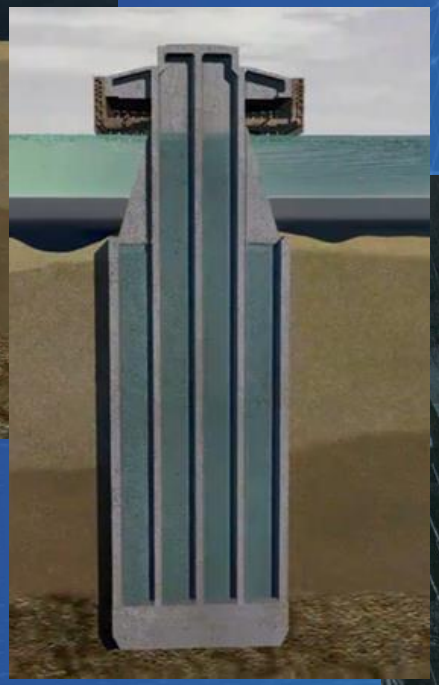
- New east span opened in 2013
- Dismantling split into multiple contracts:
  - YBITS-2
  - 504/288
  - Pier E3 Demonstration
  - Marine Foundations

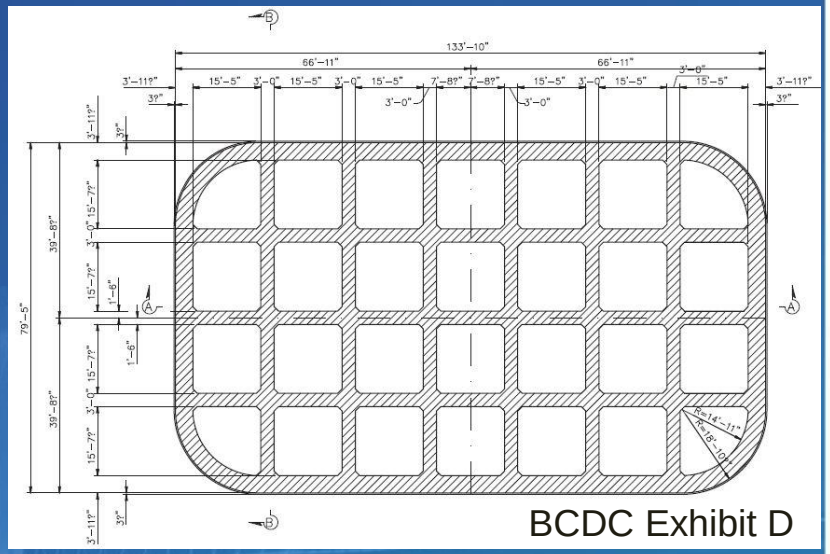


Dismantling Contracts

Description of Pier E3





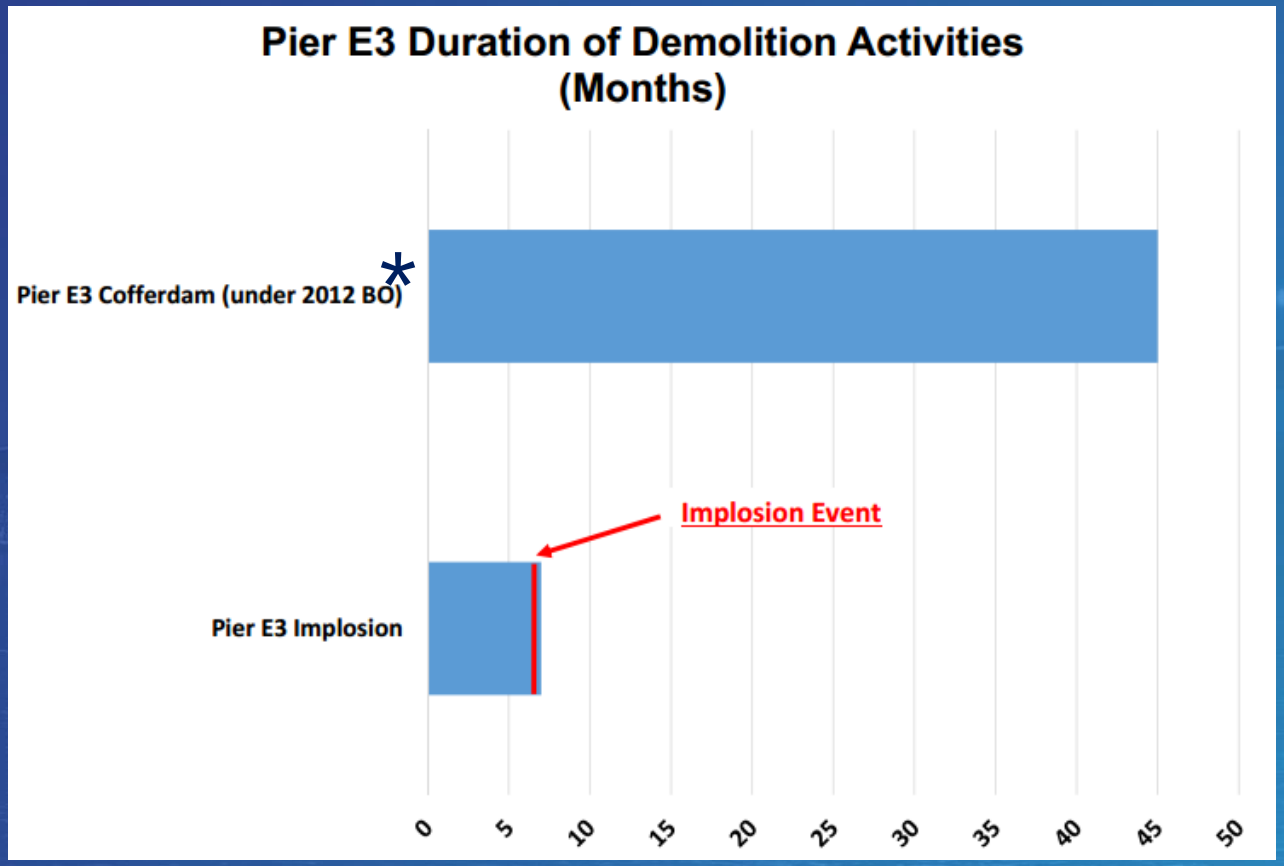


Pier E3 Alternatives Analysis:
Dismantling vs Implosion

Cofferdam	Estimated # Piles
54" Pipe Piles	36
24" Pipe Piles	18
King Piles (H-Piles)	170
Sheet Piles	170
Total	**394**

Alternatives Analysis

BCDC Exhibit G



*Duration estimate only covers construction of cofferdam under constraints of 2012 BO. Mechanical dismantling not included in duration.

SFOBB Project Background & Updates

- Project EIS – Finalized in 2001 (CEQA Exempt)
- Regulatory Authorizations Issued in 2001
- Permitting for Pier E3 Demonstration began in 2013
- Permit amendments were required for E3 Implosion

McAteer-Petris Act Section 66605

Restoration of open water to the Bay is considered a public benefit, therefore in compliance with the McAteer-Petris Act

Restoration of 79,000 cubic yards of open water from removal of all marine foundations

Pier E3 alone represents 20% or ~17,000 cubic yards

Biological Resources

BCDC Exhibit K

Bird Protection

Potential Impacts

- Pressure waves (if diving)

Avoidance and Minimization Measures

- Establish 500'Exclusion Zone for Listed Diving Birds:
  - CA Least Tern (CESA – Endangered)
  - Brown Pelican (CFGC – Fully Protected)
- Avian Biologists will monitor for species
- Deter diving birds prior to implosion
- Implosion delayed if listed species dive into Exclusion Zone

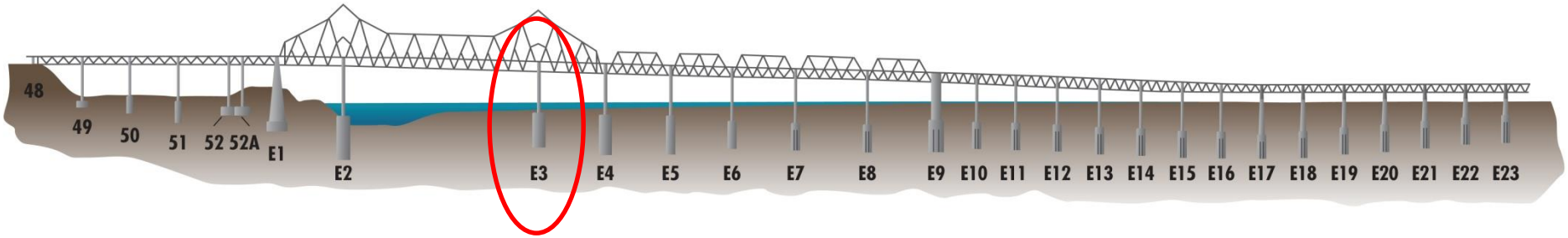
Federal Regulations

NOAA NMFS-Incidental Harassment Authorization

Level A Harassment - Potential for permanent hearing loss, injury or death

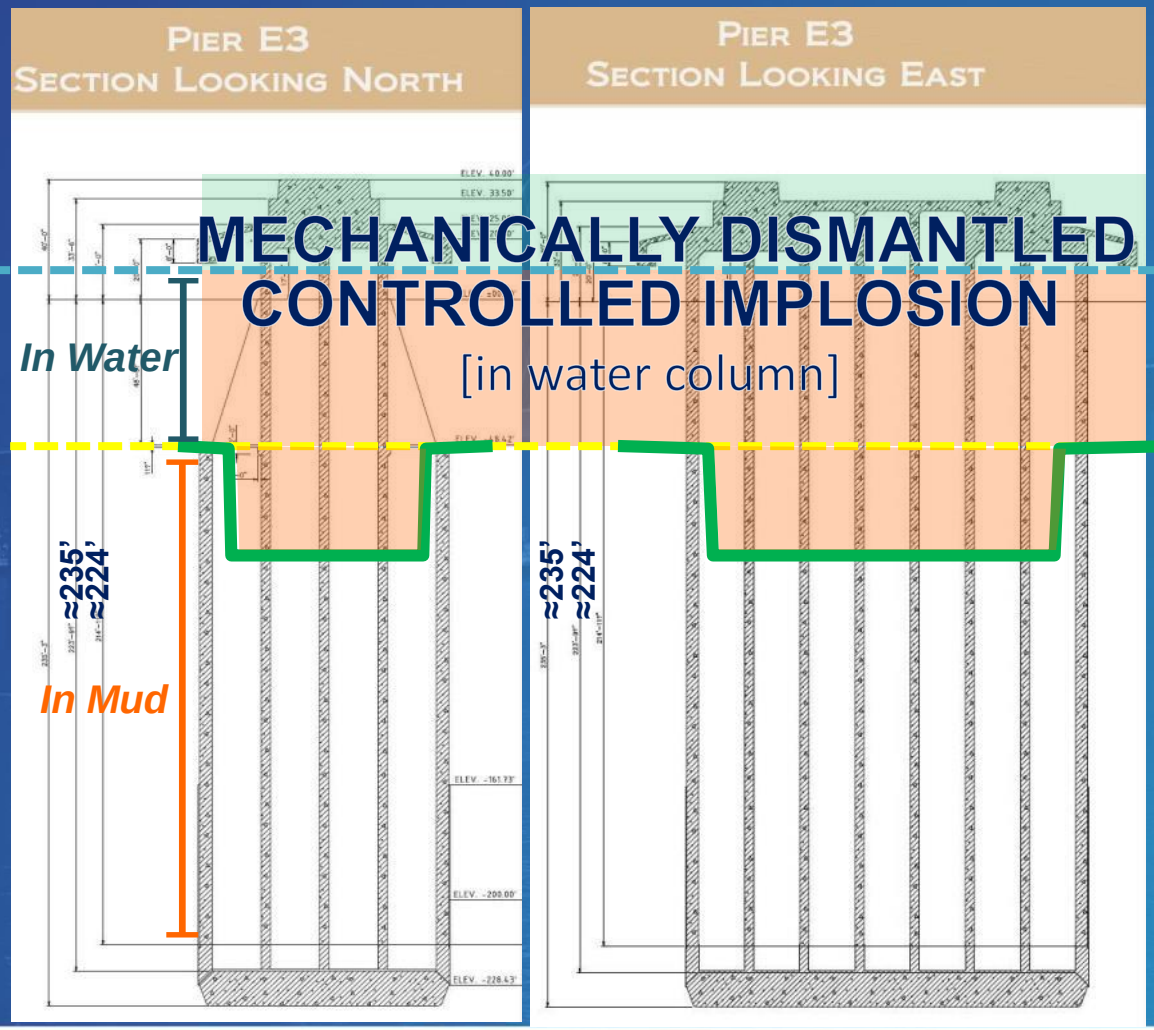
Level B Harassment - Potential behavioral impacts or temporary hearing loss

Pier E3 Demonstration Project Status



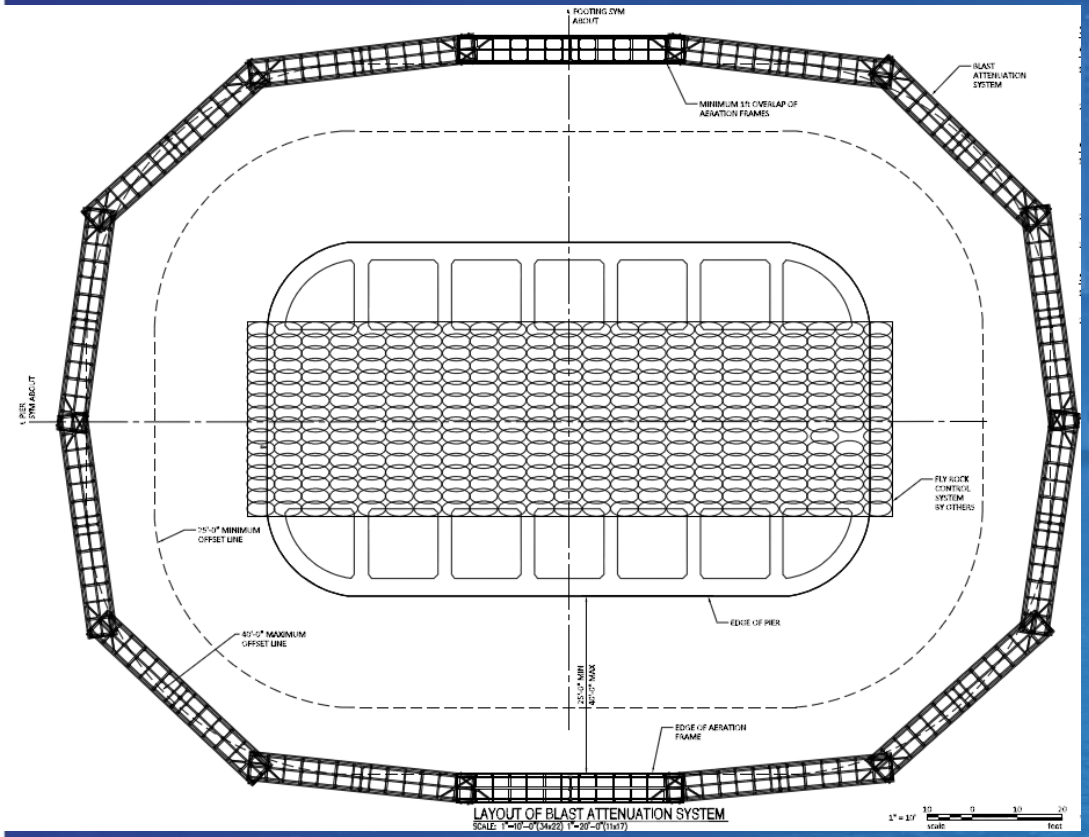
Pier E3 Demonstration Project Status

Depth/Elevation of Removal



BCDC Exhibit H

Blast Attenuation System



BCDC Exhibit I

Pier E3 Blast Plan Review

Design and Quality Control/Check

KIEWIT/MANSON, AJV

Contract Drilling & Blasting LLC

Quality Assurance/Independent Review

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

Caltrans

ENGINEERED EXPLOSIVE SERVICES, LLC

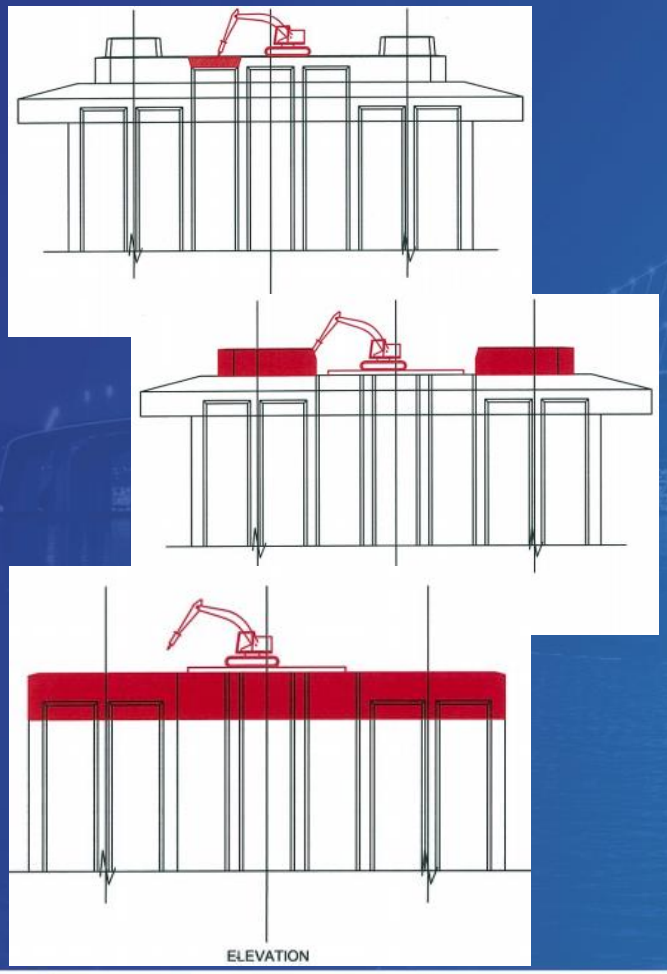
Demonstration Project Phasing

Dismantling of Pier E3 will take place in 4 phases:

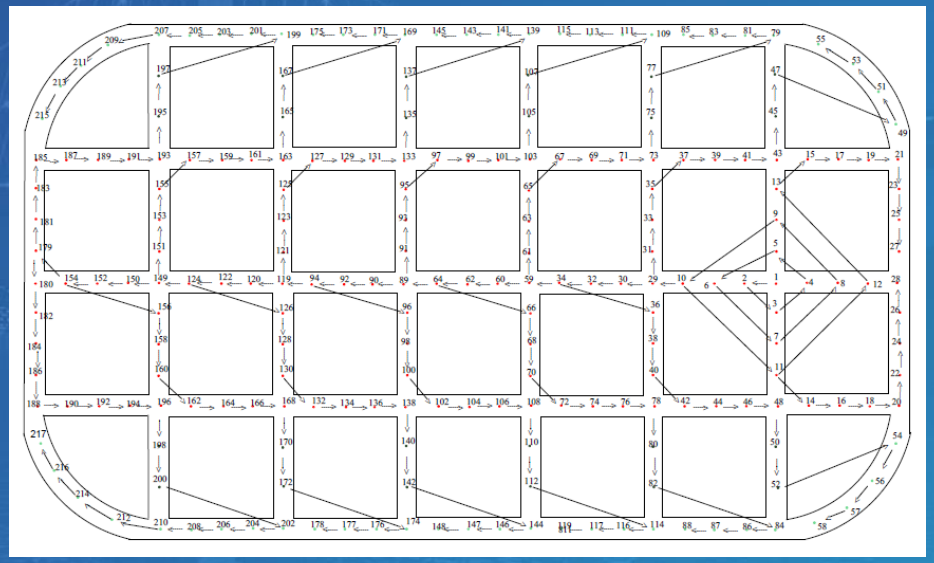
Phase	Status
1. Dismantling of pier cap and fender system	Completed August 2015
2. Drilling of bore holes into caisson and buttress walls and installing the Blast Attenuation System (BAS)	Work started September 8, 2015
3. Installing charges, activating the BAS and imploding the pier	Load Charges – November 1, 2015 Blast – November 7, 2015
4. Management and removal of remaining dismantling debris	November 16-24, 2015

Pier E3 Controlled Blasting Blast Plan

Side View



Top View



Total Borings: 159

Implosion Scheduled for November

	J	F	M	A	M	J	J	A	S	O	N	D
Harbor Seal			■	■	■	■	■				■	
California Sea Lion			■	■	■	■	■				■	
Elephant Seal	■	■	■								■	■
Gray Whale	■	■				■	■	■	■	■	■	■
Longfin Smelt				■	■	■				■	■	■
Pacific Herring	■	■									■	■
Chinook Salmon[1]	■	■							■	■	■	■
Green Sturgeon[2]	■	■	■	■	■	■	■	■	■	■	■	■
Nesting Birds	■								■	■	■	■
Diving Birds							■	■	■	■	■	

[1] Juvenile Chinook salmon densities around Pier E3 are low (highest value of 0.25indv/10,000 sq. meters in May

[2] Green sturgeon have potential to occur around Pier E3 year-round, but in very low densities

Optimal times for Pier E3 blast based on presence of biological resources.

■ Green boxes are months when a species is not expected around Pier E3 or at low densities.

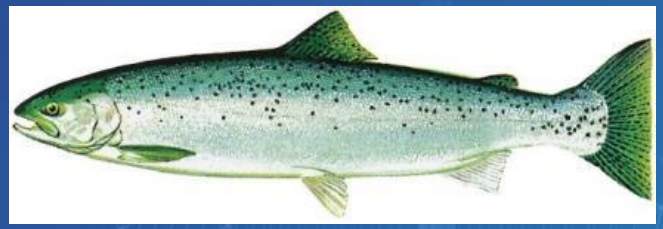
BCDC Exhibit L

Protected Fish Species

Chinook Salmon

36 inches

Steelhead



Up to 45 inches

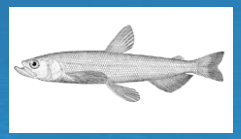
Coho Salmon

28 inches

Green Sturgeon

7 feet (84 inches)

Longfin Smelt



3 inches

BCDC Exhibit N

Critical & Essential Fish Habitat

BCDC Exhibit O

BCDC Exhibit P

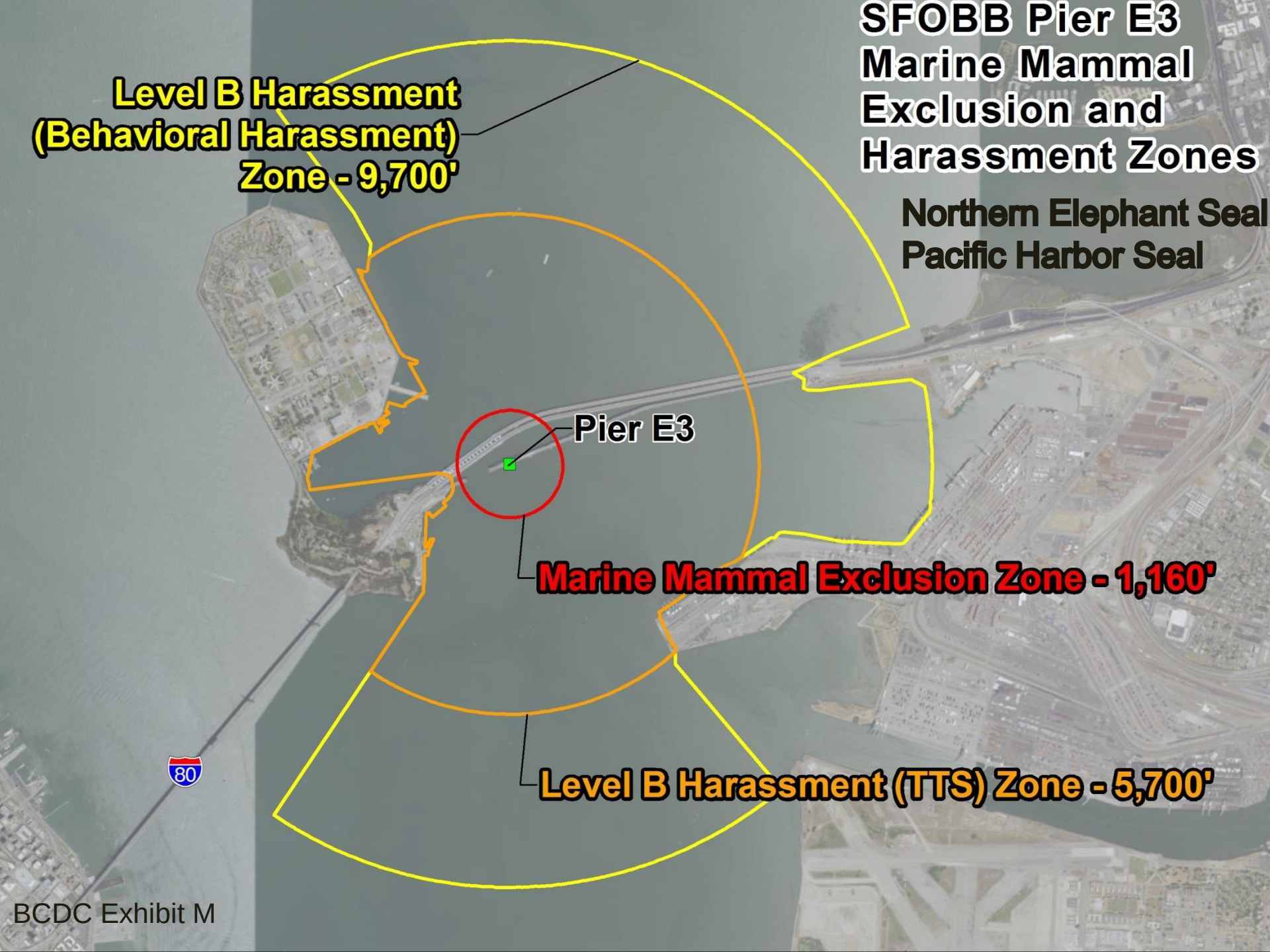
Pier E3 Avian Deterrents

Direct: Human presence

Auditory: Sound Cannons

Visual: Lasers/lights

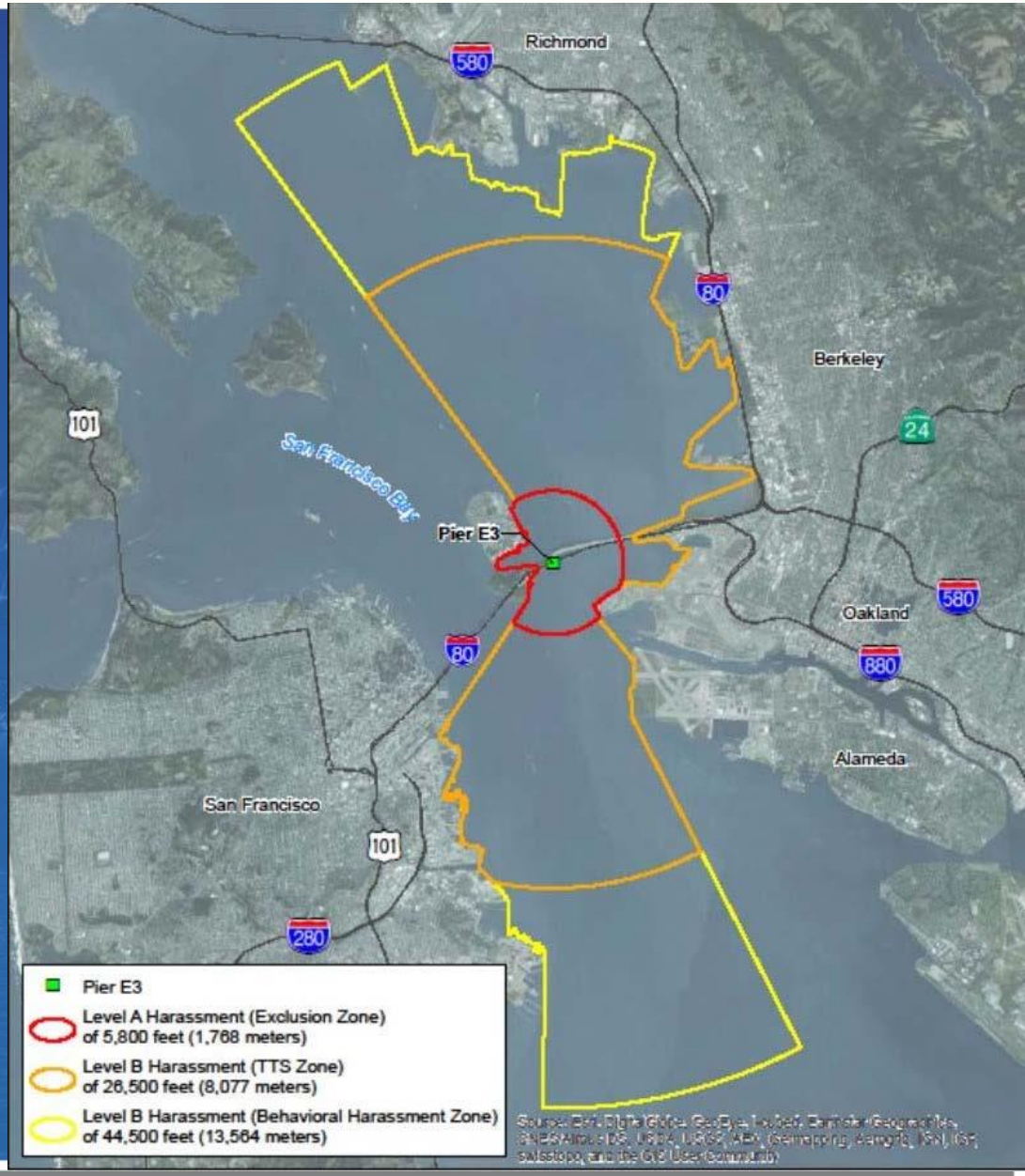
Marine Mammals

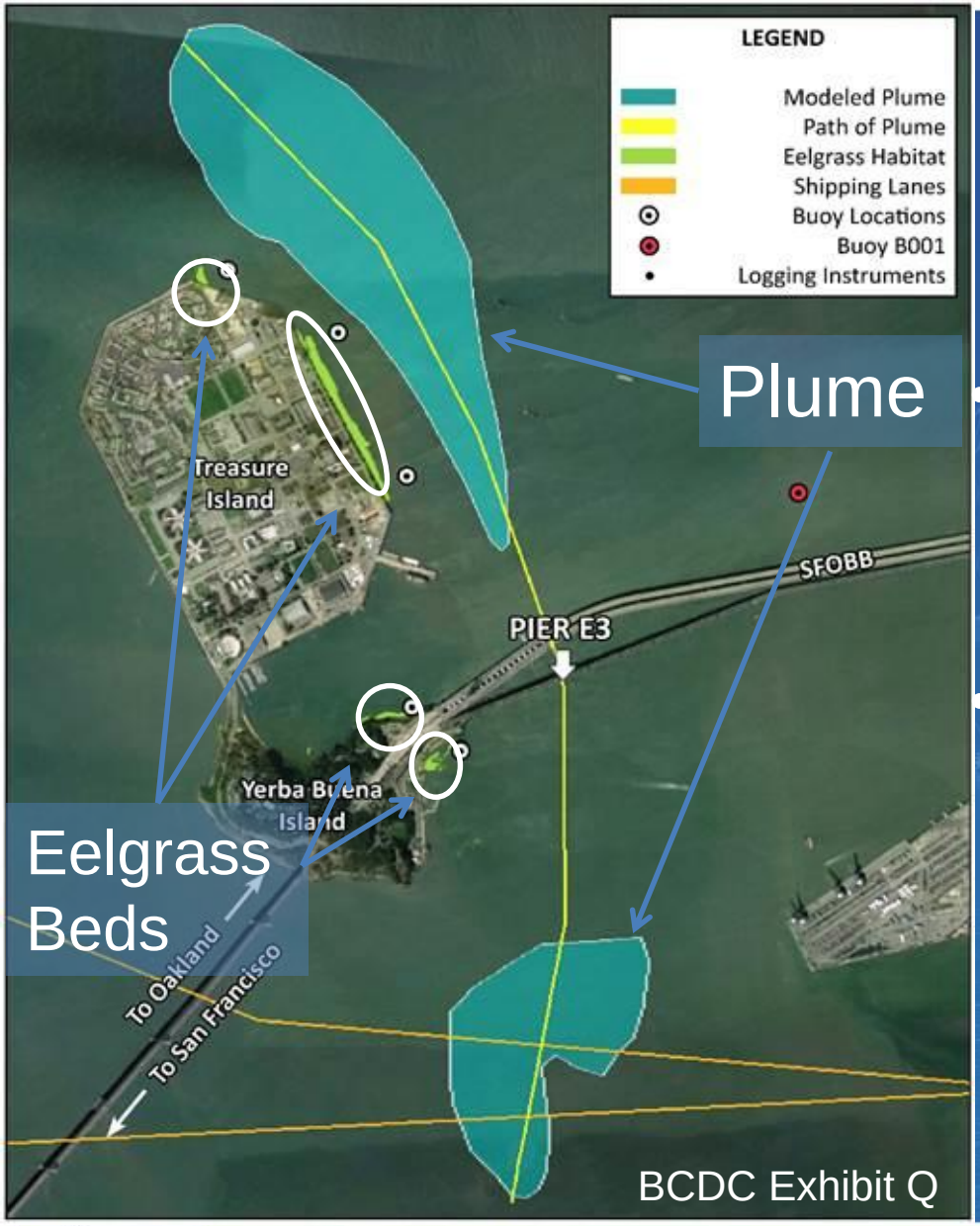


BCDC Exhibit M

Harbor Porpoise Harassment Zones

Level A –Harassment Zone	5,800 feet
Level B TTS Harassment Zone	26,500 feet
Level B Behavioral Harassment Zone	44,500 feet





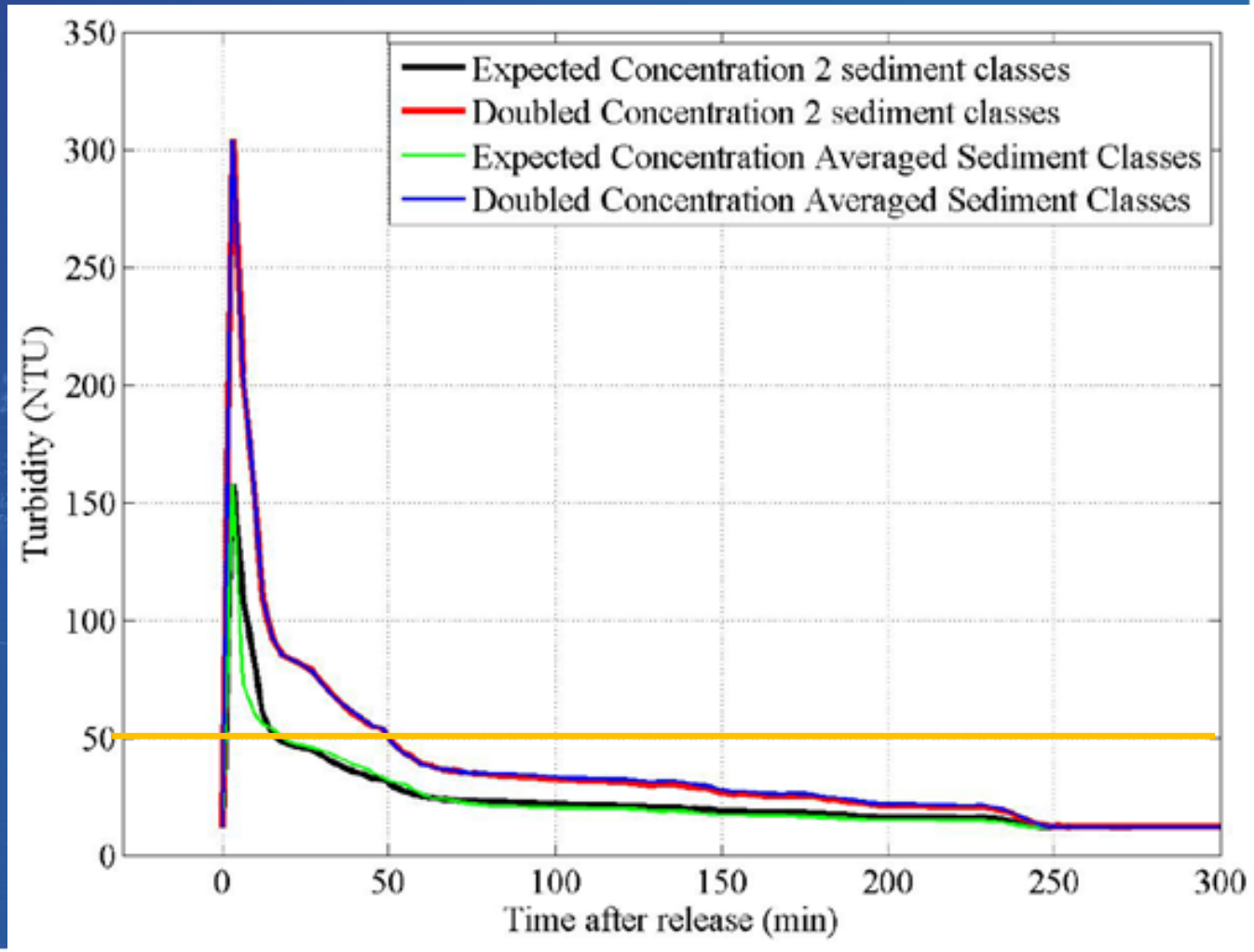
Water Quality Monitoring

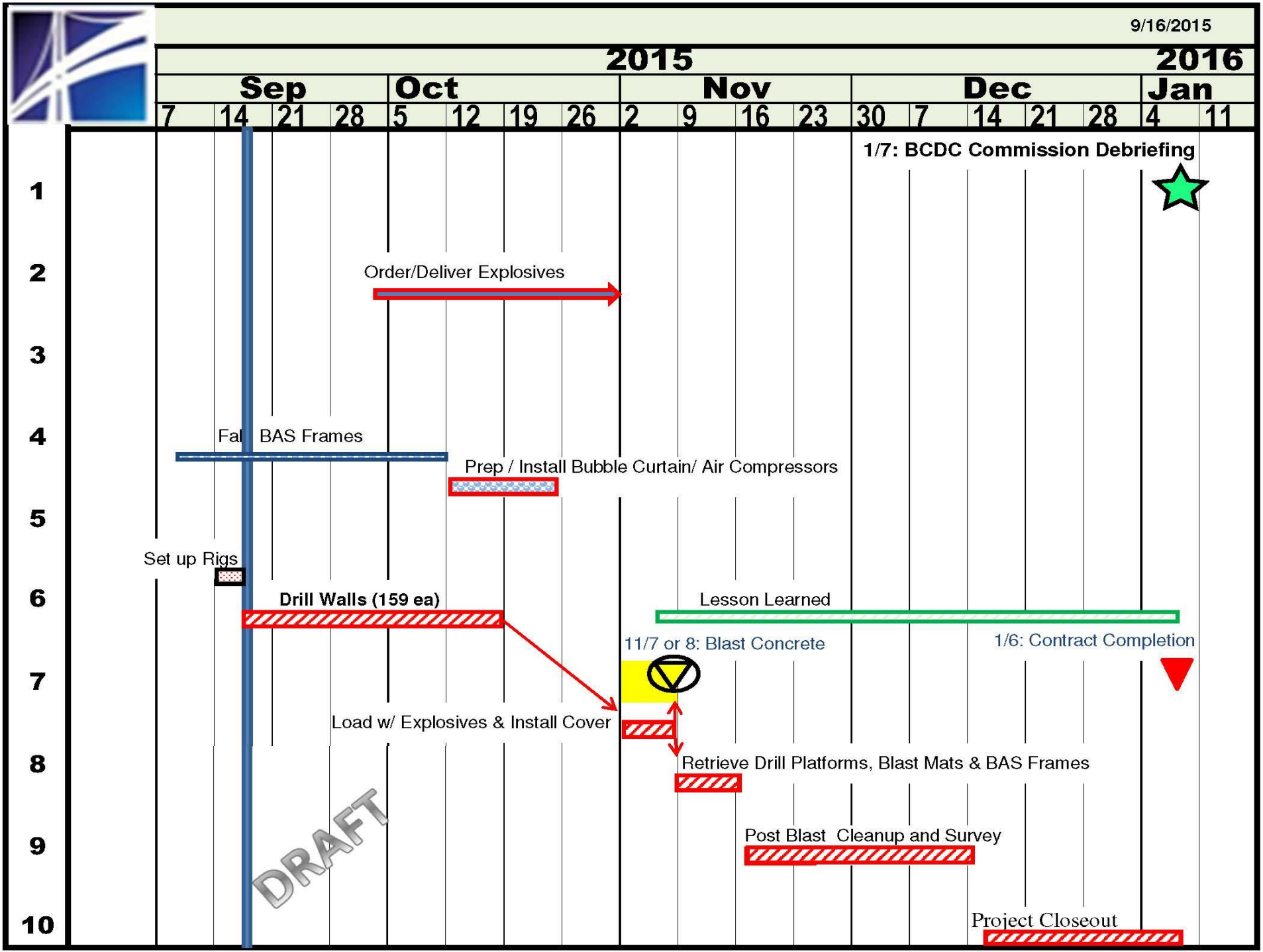
- Potential Water Quality Impacts
  - ↑ pH from implosion of concrete
  - ↑ Turbidity from disturbing bay sediment (1-2 hours anticipated)
- Extensive Monitoring Program
  - Sediment: pH, Toxicity
  - Plume Mapping South then North
  - Water Quality Grab Samples

Transient = No Permanent Impacts

Expected Turbidity Drop-off

- Receiving Water Limits per RWQCB WDRs, Board Order No. R2-2002-0011




9/16/2015
2015
2016
Sep
Oct
Nov
Dec
Jan
7
14
21
28
5
12
19
26
2
9
16
23
30
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14
21
28
4
11
1/7: BCDC Commission Debriefing
1
2
3
4
5
6
7
8
9
10
Order/Deliver Explosives
Fal BAS Frames
Prep / Install Bubble Curtain/ Air Compressors
Set up Rigs
Drill Walls (159 ea)
Lesson Learned
11/7 or 8: Blast Concrete
1/6: Contract Completion
Load w/ Explosives & Install Cover
Retrieve Drill Platforms, Blast Mats & BAS Frames
Post Blast Cleanup and Survey
Project Closeout
DRAFT

Pier E3 Implosion Simulation

Please Start E3 Video

Thank You