

Toll Bridge Program Oversight Committee
Department of Transportation
Office of the Director
1120 N Street
P.O. Box 942873
Sacramento, CA 94273-0001

May 8, 2013

Mr. Vincent Mammano
California Division Administrator
Federal Highway Administration
650 Capitol Mall, Suite 4-100
Sacramento, CA 95814

Re: East San Francisco Oakland Bay Bridge Seismic Safety Project

Dear Mr. Mammano:

The Toll Bridge Oversight Program Committee (TBPOC) requests assistance from the Federal Highway Administration (FHWA) to conduct an independent review of our findings and recommendations concerning the galvanized high strength bolts on the new east span of the San Francisco-Oakland Bay Bridge.

The TBPOC is tasked by the California State Legislature to oversee the new east span project and comprises the Director of the California Department of Transportation (Caltrans), the Executive Director of the Bay Area Toll Authority (BATA), and the Executive Director of the California Transportation Commission (CTC). As we work our way through resolution and repair, we ask that FHWA assemble a team to double check our findings and recommendations to ensure that our investigation is comprehensive and our solution is the best and safest possible.

In early March 2013, we discovered 32 galvanized A354 BD bolts that are embedded in Pier E2 had failed days after tensioning (see attached graphic). After a methodical and thorough investigation, we concluded that the bolts failed due to hydrogen embrittlement, with the source of hydrogen being both internal and external. We are currently in the process of designing a retrofit solution to replace all of the bolts, that were manufactured in 2008 and embedded in Pier E2. In addition, there are numerous similar galvanized A354 BD bolts on Pier E2 and at other locations on the new bridge that we are now reviewing, testing, and evaluating to determine if

V. Mammano

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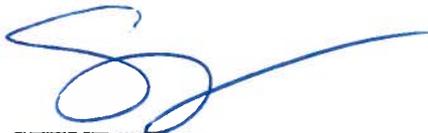
there is any further remedial action required. Please see the attached spreadsheet entitled "Galvanized ATSM A354 BD Material Contract 04-0120F4 SFOBB SAS" dated April 26, 2013, that defines the other locations and uses of these bolts on this bridge that have the same specification.

At the end of this investigation, we intend to classify bolts into three categories for inspection and repair:

1. Bolts that are to be replaced before opening the bridge to traffic,
2. Bolts that are to be replaced after opening the bridge, as a precautionary measure to avoid premature failure due to stress corrosion,
3. And bolts that are to undergo a regular inspection schedule, and replaced as necessary if damage is observed in routine use.

We are asking your team to provide an arms-length review of our analysis and strategy proceeding in that fashion. We believe that resolution of these questions will determine the schedule for opening the new span. We thank you in advance for ensuring the safety of the traveling public and reassuring public confidence by taking on this review. Because time is of the essence we ask that you not hesitate to contact the members of the TBPOC, with any questions your team has regarding this request.

Sincerely,



STEVE HEMINGER
TBPOC Chair
Executive Director
Bay Area Toll Authority



ANDRE BOUTROS
Executive Director
California Transportation Commission

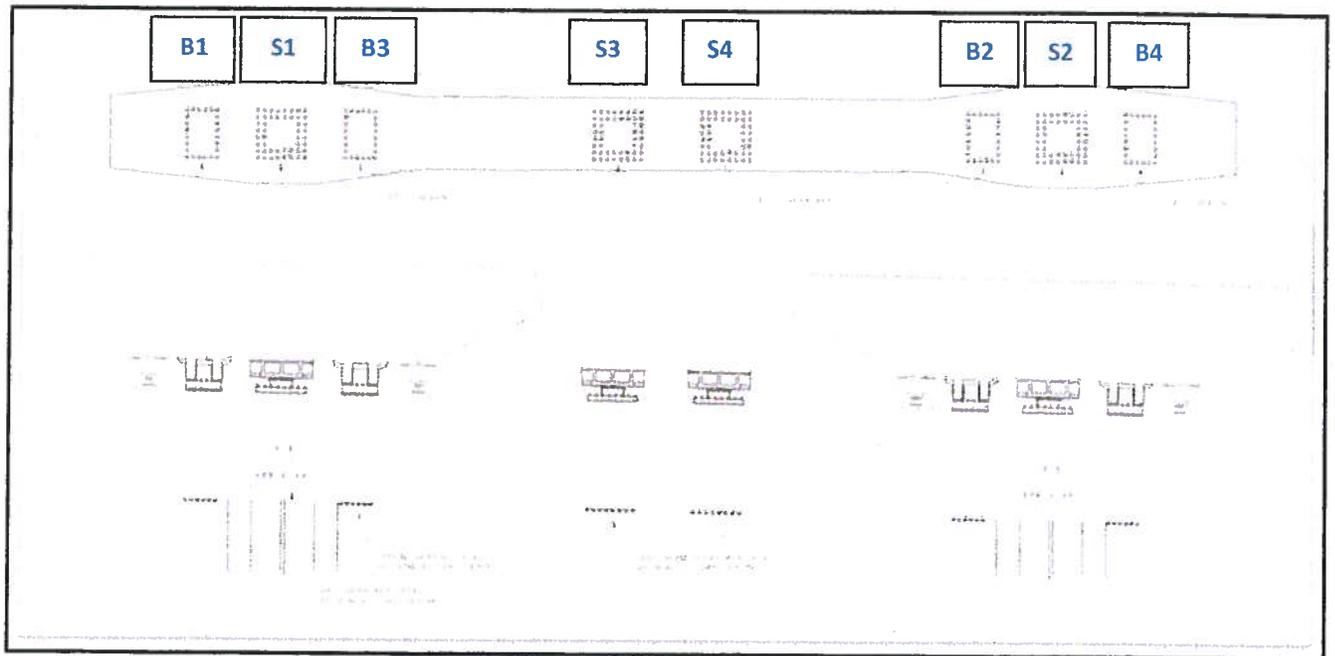


MALCOLM DOUGHERTY
Director
California Department of Transportation

Attachments



Location of Pier E2



Locations of Shear Keys (S1, S2, S3, and S4) and Bearings (B1, B2, B3, and B4) at Pier E2

Location and Item	Component Description	Rod (no head) or Bolt (with head)	Threads Cut or Rolled	Supplier	Diameter (in)	Overall Length (ft)	Overall Length (mm)	Quantity Installed (not including spares)	De-Humidified Zone?	Tighten Method	Final Tension (fraction of Fu or UTS)	Date Tension or Loading Complete	Date Re-Inspected (by 4/8/13)	Date Re-Inspected (by 4/23/13)	Date Re-Inspected (by 5/5/13)	Notes			
E2 Bearings and Shear Keys	1	E2 Shear Key - Connect to Concrete - Above Column, Under OBG [S1, S2]	rod	Cut	Dyson	3	17.2 10.0	5235 3035	60 36	96	No	Tension	0.7	3/5/2013	daily check	daily check	daily check	32 of 96 rods broke after tensioning, then tension level lowered	
	2	E2 Shear Key - Connect to Concrete - Above Bent Cap, Under Crossbeam [S3, S4]	rod	Cut	Dyson	3	21.9	6676	96										192
		E2 Bearing - Connect to Concrete - Under OBG [B1, B2, B3, B4]	rod	Cut	Dyson	3	22.6 22.2	6902 6777	64 32										
	3	E2 Shear Key - Connect to OBG [S1, S2]	rod	Cut	Dyson	3	4.4 1.8	1337 537	96 64	320	No	Tension	0.7	9/12/2012	4/6/2013 4/8/2013	4/17/13 to 4/23/13	5/3/2013		
		E2 Shear Key - Connect to Crossbeam [S3, S4]	rod	Cut	Dyson	3	4.3 1.7	1312 512	96 64										
		E2 Bearing - Connect to OBG [B1, B2, B3, B4]	rod	Cut	Dyson	2	3.6	1105	224										No
	5	E2 Bearing Assembly Bolts (Spherical Bushing Halves)	rod	Cut	Dyson for Lubrite for Hochang	1	2.4	733	96	No	Tension	0.61	July 2009	not accessible	not accessible	not accessible	Connect 2 halves of the spherical bushing assembly housing together at Lubrite; rods are internal to bearings and all rods are not accessible after bearing assembly at Hochang (December 2009 & January 2010); rods tensioned to 0.7 Fy.		
	6	E2 Bearing Assembly Bolts (Retaining Rings)	Socket Head Cap Screw	Cut	Dyson for Hochang	1	0.2	55	336	No	snug + 1/4 turn	~0.4	January 2010	4/6/2013 (for 32 accessible bolts)	4/23/2013 (for 32 accessible bolts)	5/3/2013 (for 32 accessible bolts)	Bolts thread into drill and tap holes to attach retaining rings that secure the Lubrite spherical bushing assembly in the bottom housing; bolts are mechanically galvanized, not hot dip galvanized; bolts are internal to bearings and not accessible after bearing assembly at Hochang, except for a small number of bolts in limited areas -> 32 of 336 bolts are accessible.		
	Cable Anchorage	7	PWS Anchor Rods - PWS Socket to Anchorage	rod	55 Cut (20%) 219 Rolled (80%)	Dyson	3-1/2	27.9 to 31.8	8500 to 9700	274	Yes	Load Transfer	0.26	9/26/2012	4/6/2013	4/20&22/2013	5/4/2013		With DL after load transfer (current condition)
													0.29	N/A	N/A	N/A	N/A		With DL + Added DL
0.32													N/A	N/A	N/A	N/A	Service Load (Group 1)		
0.35													N/A	N/A	N/A	N/A	SEE (Seismic)		
Top of Tower	8	Tower Saddle Tie Rods	rod	Rolled	Dyson	4	6.0 to 17.5	1840 to 5325	25	Yes	Tension	0.41	7/14/2012	4/6/2013	4/19/2013	5/3/2013	Tensioned to 0.5 Fy		
	9	Turned Rods at Tower Saddle Segment Splices	rod	Cut	Dyson	3 @ Threads [-3-1/16 @ Shank]	1.5	463	100	108	Yes	Tension	0.45	4/6/2011	4/6/2013	4/19/2013	5/3/2013	Located at the 2 field splices connecting the 3 tower saddle segments; 100 rods tensioned prior to saddle erection; 8 rods only snug tight after tie rod tensioning due to conflict with tie rods.	
							1.4	415	8			snug	~0.1	7/14/2012					
	10	Tower Saddle to Grillage Anchor Bolts	Hex Bolt	Cut	Dyson	3	1.2	360	90	Head Yes, Nut No	snug	~0.1	3/25/2013	4/6/2013	4/19/2013	5/3/2013	Snug tightened before and after load transfer		
11	Tower Outrigger Boom (for Maintenance) at Top of Tower	Hex Bolt	Cut	Dyson	3	2.1	630	4	No	snug	~0.1	July 2012	4/6/2013	4/19/2013	5/4/2013	Act as pins for swinging out and then securing the maintenance outrigger boom at the top of 2 of 4 tower head chimneys. At each boom, one bolt is loaded and other bolt is unloaded in the current boom position. The currently unloaded bolt will be installed snug tight when the boom is swung out for use (future position).			
Bottom of Tower	12	Tower Anchor Rods - Tower at Footing (3" Dia)	rod	Cut	Vulcan Threaded Products for KOS for KFM (04-0120E4)	3	25.6	7789	388	Yes	Tension	0.48	4/17/2013	N/A	4/20/2013 4/22/2013	5/5/2013	Tensioned to 1800 kN = 404.7 kips Tension before and after load transfer		
	13	Tower Anchor Rods - Tower at Footing (4" Dia)	rod	Cut		4	25.7	7839	36	Yes	Tension	0.37	4/17/2013	N/A	4/20/2013 4/22/2013	5/5/2013	Tensioned to 2530 kN = 568.8 kips Tension before and after load transfer		
East Saddles	14	East Saddle Anchor Rods	rod	Cut	Dyson for JSW	2	2.6	800	32	Yes	snug	~0.1	May 2010	4/7/2013	4/21/2013	5/3/2013	specified gap under nut/washer at one end of rod and 2 nuts snug against each other at other end of rod -> snug tight for portion of rod		
	15	East Saddle Tie Rods	Hex Bolt	Cut	Dyson	3	4.7	1420	18	Yes	snug	~0.1	4/13/2012	4/7/2013	4/21/2013	5/3/2013	Snug tightened before load transfer		
East Cable	16	B14 Cable Bands - Cable Brackets - at East End of Bridge - Strongback Anchor Rods	rod	Rolled	Dyson	3	10.3 to 11.1	3129 to 3372	24	No	Tension	0.16	2/8/2013	4/7/2013	4/21/2013	5/4/2013	neoprene between strongback and cable band is in the grip		
W2 Bent Cap	17	W2 Bikepath Anchor Rods	rod	Cut	Dyson	~1-3/16 [Metric M30]	1.5	460	43	No	Not Determined Yet	N/A	N/A	N/A	N/A	Details for bikepath connections are being redesigned and are not final. The 18 anchor rods at the bottom connections will be abandoned. The 25 anchor rods at the top connections will be used and supplemented with additional anchor rods. These rods will be tensioned on the separate YBITS-2 Contract.			

Total = 2306