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To: Stefan Galvez, California Department of Transportation
From: Jared McDaniel
CC: Ivy Edmonds-Hess, Parsons Brinckerhoff
Courtney Cacace, Garcia and Associates
Date: November 6, 2009
Re: **San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, Self-Anchored Suspension Span**
Subject: **T1 Temporary Access Trestle Installation – Hydroacoustic Measurements For November 5, 2009**

The California Department of Transportation (Department) is in the process of replacing the existing East Span of the San Francisco-Oakland Bay Bridge (SFOBB) with a new bridge immediately to the north. To facilitate the construction of the Self-Anchored Suspension Span portion of the new East Span, twenty 36-inch diameter steel pipe piles will be installed to support a temporary access trestle (see Figure 1). Hydroacoustic data was collected during impact pile driving of three piles with the bubble curtain in operation. The piles were identified from Figure 1 as pile number 1, 2 and 3.

Underwater sound measurements were collected at three locations 10 meters (33 feet), 28 to 30 meters (92 to 98 feet), and 123 to 202 meters (403-662 feet) from the piles, at a depth of 2-3 meters (7-10 feet) on November 5, 2009 during impact driving. The driving was completed using the Delmag 30-32 diesel impact hammer.

On November 5, 2009 the impact driving for Pile 3 began at 1102 hours and ended at 1110 hours. There were approximately 238 pile strikes in this time period. The peak criteria of 206 dB re: 1 μ Pa at 10 meters (33 feet) from the pile was not exceeded. The accumulated SEL criterion of 187 dB re 1 μ Pa-sec² at 28 meters (92 feet) from the pile was exceeded during the driving.

For Pile 2, driving began at 1132 hours and ended at 1137 hours. There were approximately 193 pile strikes in this time period. The peak criteria of 206 dB re: 1 μ Pa at 10 meters (33 feet) from the pile was not exceeded. The accumulated SEL criterion of 187 dB re 1 μ Pa-sec² at 28 meters (92 feet) from the pile was exceeded during the driving.

For Pile 1, driving began at 1236 hours and ended at 1243 hours. There were approximately 244 pile strikes in this time period. The peak criteria of 206 dB re: 1 μ Pa at 10 meters (33 feet) from the pile was reached. The accumulated SEL criterion of 187 dB re 1 μ Pa-sec² at 30 meters (98 feet) from the pile was exceeded during the driving.

The daily accumulated SEL at 10 meters (33 feet) from all three piles was approximately 204 dB re 1 μ Pa-sec². The daily accumulated SEL at 28 meters (92 feet) from all three piles was approximately 203 dB re 1 μ Pa-sec². The daily accumulated SEL at the distant measurement location (123 – 202 meters [403-662 feet]) from all three

piles was approximately 183 dB re 1 μ Pa-sec². The measurement results including accumulated SEL are summarized Table 1 and Table 2 below.

Table 1: Summary of Measured Sound Levels for November 5, 2009

Pile	Time	Location	Peak		SEL	
			dB re: 1 μ Pa		dB re: 1 μ -sec ²	
			Mean	Range	Single Strike	Cumulative
3	1102 - 1110	10 meters	198	184-204	177	197
		28 meters	202	180-205	178	199
		175-202 meters	170	165-176	151	173
2	1132 - 1137	10 meters	198	171-203	177	197
		28 meters	202	178-207	178	198
		140 meters	178	165-184	157	177
1	1236 -1243	10 meters	202	183-206	179	201
		30 meters	201	181-203	175	198
		123 meters	180	165-182	157	178

Table 2: Summary of RMS Measured Sound Levels for November 5, 2009

Pile	Time	Location	RMS	
			dB re: 1 μ Pa	
			Mean	Range
3	1102 - 1110	28 meters	188	181 - 191
2	1132 - 1137	28 meters	188	182 - 191
1	1236 - 1243	30 meters	187	180 - 189

Figure 1

