

# Memo

505 Petaluma Blvd South  
Petaluma, CA 94952  
Ph (707) 766-7700 Fax (707) 766-7790  
Email – jreyff@illingworthrodkin.com  
www.illingworthrodkin.com

**To:** Stefan Galvez, California Department of Transportation

**From:** Keith Pommerenck

**CC:** Ivy Edmonds-Hess, Parsons Brinckerhoff  
Courtney Cacace, Garcia and Associates

**Date:** November 3, 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 2, 2009

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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 piles number 10, 8 and 7.

Underwater sound measurements were collected at three locations 10 meters (33 feet), 28 to 30 meters (92 to 98 feet), and 105 meters (345 feet) from the piles, at a depth of 2 meters (7 feet) on November 2, 2009 during impact driving. The driving was completed using the Delmag 30-32 diesel impact hammer.

On November 2, 2009 the impact driving for Pile 10 began at 0821 hours and ended at 0825 hours. There were approximately 141 to 145 pile strikes in this time period. The peak criteria of 206 dB re 1 $\mu$ Pa at 10 meters (33 feet) from the pile was exceeded. The accumulated SEL criterion of 187 dB re 1 $\mu$ Pa-sec<sup>2</sup> at 30 meters (98 feet) from the pile was exceeded during the driving.

For Pile 8, driving began at 1359 hours and ended at 1407 hours. There were approximately 160 to 196 pile strikes in this time period. The peak criteria of 206 dB re 1 $\mu$ Pa at 10 meters (33 feet) from the pile was exceeded. The accumulated SEL criterion of 187 dB re 1 $\mu$ Pa-sec<sup>2</sup> at 28 meters (92 feet) from the pile was exceeded during the driving.

For Pile 7, driving began at 1431 hours and ended at 1435 hours. There were approximately 105 to 114 pile strikes in this time period. The peak criteria of 206 dB re 1 $\mu$ Pa at 10 meters (33 feet) from the pile was not exceeded. The accumulated SEL criterion of 187 dB re 1 $\mu$ Pa-sec<sup>2</sup> at 28 meters (92 feet) from the pile was exceeded during the driving.

The daily accumulated SEL at 28 meters (92 feet) from all three piles was approximately 204 dB re 1 $\mu$ Pa-sec<sup>2</sup>. The daily accumulated SEL at 105 meters (345 feet) from all three piles was approximately 190 dB re 1 $\mu$ Pa-sec<sup>2</sup>. The measurement results including accumulated SEL are summarized Table 1 and Table 2 below.

**Table 1: Summary of Measured Sound Levels for November 2, 2009**

Pile	Time	Location	Peak		SEL	
			dB re: 1 $\mu$ Pa		dB re: 1 $\mu$ -sec <sup>2</sup>	
			Mean	Range	Single Strike	Cumulative
10	0821 – 0825	10 meters	205	203-207	179	201
		30 meters	206	202-207	180	202
		105 meters	185	175-190	162	182
8	1359-1402 & 1405-1407	10 meters	208	203-211	182	203
		28 meters	204	200-207	178	200
		105 meters	188	175-191	166	187
7	1431-1435	10 meters	203	201-206	178	198
		28 meters	204	200-206	177	197
		105 meters	185	175-189	162	183

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

Pile	Time	Location	RMS	
			dB re: 1 $\mu$ Pa	
			Mean	Range
10	0821 – 0825	30 meters	193	187-194
		105 meters	170	164-173
8	1359-1402 & 1405-1407	28 meters	190	184-193
		105 meters	174	166-175
7	1431-1435	28 meters	190	184-192
		105 meters	171	167-173

Figure 1

