

# Memo

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

**To:** Stefan Galvez, California Department of Transportation  
**From:** JAMES REYFF  
**CC:** Ivy Edmonds-Hess, Parsons Brinckerhoff  
Courtney Cacace, Garcia and Associates  
**Date:** November 2, 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 October 30, 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 one pile with the bubble curtain in operation on October 30, 2009. The pile is identified from Figure 1 as pile 9.

Underwater sound measurements were made at positions 10 meters (33 feet), 30 meters (98 feet), and 105 meters (345 feet) from the piles, at a depth of 2 to 3 meters (7 to 10 feet) during impact driving. Unfortunately, equipment problems occurred at the 10- and 30-meter (33- and 98-foot) monitoring locations. The hydrophone at 10 meters (33 feet) did not respond to the signals and the problem was not diagnosed until pile driving was completed. Pile driving only lasted for 3 minutes. At the same time, the gain setting for the 30-meter (98-foot) position was accidentally set too high, which caused the system to overload. Data was not collected for the entire driving event. The data will need to be further analyzed at a later date to determine at what point the overload occurred. Pile driving was measured at 105 meters (345 feet) successfully. This memorandum presents data from measurements at 105 meters (345 feet) from the pile being driven.

The impact driving was conducted using the Delmag 30-32 diesel impact hammer. There were approximately 130 pile strikes during the driving of pile 9. Since pile driving was not measured at the 10-meter (33-foot) location, it is unknown if the peak criteria of 206 dB re: 1 $\mu$ Pa was exceeded. The data will need to be further analyzed at a later date to determine if the accumulated SEL criteria of 187 dB re 1 $\mu$ Pa-sec<sup>2</sup> at 28 meters (92 feet) was exceeded

Measurements were made at 105 meters (345 feet) south-southeast in a continued attempt to identify the distance to the 187 dB accumulated SEL level. These measurements indicate that the accumulated SEL for the one pile at 150 meters (345 feet) was about 179 dB.

The measurement results including accumulated SEL are summarized Table 1. Root-Mean-Square (RMS) sound levels are summarized in Table 2 below.

**Table 1: Summary of Measured Sound Levels for October 30, 2009**

| Pile | Time         | Location   | Peak    |               | SEL                   |               |                 |
|------|--------------|------------|---------|---------------|-----------------------|---------------|-----------------|
|      |              |            | Maximum | Range         | Typical Single Strike | Range         | Accumulated SEL |
| 9    | 1400 to 1403 | 10 meters  | NA      | NA            | NA                    | NA            | NA              |
|      | (185 sec)    | 30 meters  | NA      | NA            | NA                    | NA            | NA              |
|      |              | 105 meters | 184 dB  | 178 to 184 dB | 158 dB                | 157 to 159 dB | 179 dB          |

**Table 2: Summary of Measured RMS Sound Levels for October 30, 2009**

| Pile | Time          | Location   | RMS         |         |
|------|---------------|------------|-------------|---------|
|      |               |            | dB re: 1µPa |         |
|      |               |            | Mean        | Range   |
| 9    | 9:57 to 10:00 | 30 meters  | NA          | NA      |
|      |               | 105 meters | 167         | 166-170 |

Figure 1

