

Improving Audio - Bells Ring at Veterans Tribute Tower

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One of the most satisfying aspects of my consulting work is offering useful electrical solutions for projects involving our military veterans. If my work can somehow honor their sacrifice and memory, it is a privilege for me to be part of the process.

It was a special honor to create design drawings for the carillon. The formidable Veterans Tribute Tower at San Diego's Miramar National Cemetery is 30 feet tall. It contains the digital carillon – an electronic bell set – that plays over 100 patriotic songs several times a day, with a 250-pound cast metal bell made of custom-cast bronze. Located at the highest point of the 313-acre cemetery, the tower is “a focal point for patriotic reflection and reverence for those that paid the ultimate price for our country,” explains Dennis Schoville, President of the Miramar National Cemetery Support Foundation and a Vietnam War Army helicopter pilot (See Foundation [video](#) illustrating this memorial).

Before creating the drawings, I walked the construction site with electrician Jeff Simonides of [Triple S Electric](#). While walking, I measured the distance with my large measuring tape. The distance was approximate, since we weren't sure of the location of the underground plumbing. It turns out there is a very large water pipe running through the site. The site was also moved slightly, right before foundation excavation began. It took longer than usual due to the bedrock at the site.

Based on the distance, I selected a heavier (thicker) conductor to avoid a voltage drop. Such a drop would cause poor audio or a misfiring bell ring. Jeff was impressed that the voltage level had almost no drop at the far end of the line, especially under a full equipment load.

I insisted that a ground conductor for lighting protection be used instead of a 10-foot buried ground rod. The conductor is called an [Ufer](#) after its inventor Herbert G. Ufer, an engineering executive at Underwriters Laboratories, who assisted the U.S. military with ground-resistance problems at installations in Arizona. Ufer's findings in the 1940s proved the effectiveness of concrete-encased ground electrodes. I recommended using the Ufer instead of a deep ground connection, because the site contained difficult-to-dig bedrock.

The \$400,000 project was funded from various donations, including contributions from local businesses across San Diego. The addition of the bell is the largest private gift to date for the six-year-old veterans' cemetery and provides a sense of peace and remembrance for those visiting. When the carillon plays, it shows respect for our military veterans.

The tower is especially dedicated to soldiers of the U.S. 3rd Infantry Division who fought in the June 1953, Battle of Outpost Harry during the Korean War and also honors veterans of all U.S. military services. The Miramar National Cemetery Support Foundation, which coordinated funding and construction of the tower, sponsored its dedication on Veteran's Day in 2016. For more information, contact John Whitcraft at (858) 229-8722.

References: (with hyperlinks)

[Whitcraft Engineering Solutions, Inc.](#)

[Miramar National Cemetery Support Foundation video](#)