



August 8, 2012

Peter McDonnell
Conversion Management Associates, Inc.
455 Market Street, Suite 950
San Francisco, CA 94105

Re: Marin Catholic Stadium Sound System

Dear Peter,

Per your request, the design of the new sound system for the football field at Marin Catholic has been executed with one primary goal in mind, "minimizing impact on the surrounding neighborhoods". Several design approaches have been taken and technologies incorporated that differ from those present in the existing system, which will serve to reduce impact on neighboring homes.

The existing system design and equipment is typical of its age and is adequate for basic speech reinforcement, but makes no effort to contain sound only to the venue. Sound containment was likely not a consideration at the time of its design. There is much room for improvement as outlined below.

1. Loudspeaker Type

Paging horns, designed to send clearly intelligible speech over long distances, as are present in the current system, will not be used. Instead, small, short-throw, high fidelity speakers intended to work up to 40 or 50 feet will be used. Speakers of this type provide very uniform high quality sound near to the loudspeaker, but do not have the ability to focus sound for transmission over long distances.

2. Loudspeaker Placement

In the current system, all the loudspeakers are mounted to the top of the press box in a cluster type design. The new design uses numerous distributed speakers, significantly reducing the average distance between listeners and the speakers. Because the distance to the audience is less, the sound system will not need to be "turned-up" as loud to provide an adequate sound pressure level.

3. Visitor Side Speakers

Currently, the visitor side seats are covered by speakers mounted to the press box aimed across the field. With this arraignment, sound easily continues past the visitor bleachers and in to the neighborhoods behind. The new design utilizes speakers located on the visitor's side of the field for these seats. With speakers directly adjacent the visitor seats, the volume generated by the speakers will be approximately $\frac{1}{4}$ that of the speakers in the old design, further reducing leakage.



4. Loudspeaker Aiming

In all cases, the loudspeakers will be aimed directly down onto the audience from a nearby mounting location. In no instance will speakers be aimed so they project out and across seats and on to neighborhoods beyond.

5. Reflected Energy

The average mounting position for loudspeakers in the new design will be higher so that sound energy reflected off of surfaces such as the bleachers or track will on average be directed up and out of the venue more then out and across the venue and into neighborhoods.

6. Microphone and system compression

No user definable sound pressure level limits exist in the current system. The existing system relies entirely on the skill of the operator and announcer to function at a consistent volume. The new design employs a sophisticated DSP (Digital Signal Processor) that can be set to a predetermined sound level and make automatic adjustments should the operator inadvertently attempt to operate the systems louder. This will eliminate the unusually and unnecessarily loud event that may randomly occur currently.

Each of the above items represents an incremental improvement to the performance of the system as it relates to sound leakage. Sound from events held in this venue will still be audible in the surrounding neighborhoods, but it will be as little as is technically possible.

Barry Grzebik
Managing Director