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January 29, 2014

The Honorable Ben Kessler
Mayor, City of Bexley, OH
2242 East Main Street
Bexley, Ohio 43209

Re: Capital University Stadium Sports Lightng and Sound System Recommendations - **Revised**
Bexley, OH

Dear Mayor Kessler,

We have reviewed the information submitted by Moody Nolan for the Bernlohr Stadium Improvements at Capital University in Bexley, Ohio. The design information provided by your office is at the schematic design stage so specific recommendations regarding a finalized design are not practical at this time. Our recommendations are based on industry standard design practices with commentary regarding the proposed systems.

Sound System:

The presentation provided by Moody Nolan indicated the intent to place six (6) speakers behind the stadium seating. These speakers would be mounted to six (6) 20'-0" poles mounted on top of seating. The information indicates that the sound level nearest to the speakers will be 78dB. The residences on the east side of the stadium, along Euclaire Avenue, experiencing sound levels in the range of 55dB to 58dB.

The 78dB sound level is a moderately low sound level for a system intended to produce intelligible speech to those in attendance at a sporting event. There are industry standard design practices for sound systems that can assist with identifying the expected ambient noise levels that can be anticipated from particular systems.

The system design should produce a minimum sound level that is 10dB above ambient noise, i.e. crowd noise. The preferable level of sound is in the range of 10dB to 25dB above ambient noise. These ranges allow the system to produce effective sound levels so the event attendees benefit from the material being broadcast by the system.

We are not able to quantify the typical crowd noise at an NCAA/NAIA outdoor event. However, we would anticipate that the local neighborhood (ambient) noise and crowd noise was in excess of 65dB – 70dB during events. This means that the proposed sound levels (78dB) proposed by the design team would need to be the absolute minimum if the design team is to achieve any benefit from the system.

Our recommendation is to locate the speakers as directly as possible over the stadium seating and aim the speakers straight down at the attendees. The physical limitations of the proximity to the attendees and the fact that the sound would be directed down, as opposed to across the seating, would produce the best scenario and minimize the amount of sound directed at the residences. **This method of placement is utilized often for stadium sound systems that are located in urban/suburban areas. The method of placement proposed by the design team is not clear from the documentation presented although they do indicate the new system will manage the sound more effectively than the existing system.**

Lighting System:

The presentation prepared by Moody Nolan indicated the intent to install four (4) 110'-0" poles to illuminate the playing surface. The site conditions indicate that this is possibly the only potential



arrangement of the poles due to conflicts with surrounding structures. The location and height of the poles have a major impact on the quality of the field illumination. Industry standard design practices and guidelines issued by the Illuminating Engineering Society (IES) recommend, for the safety of the player, the ball should be illuminated from all angles. This illumination can be achieved with either an 8-pole, 6-pole or 4-pole arrangement. The poles are arranged along the sidelines at specific locations defined by the IES guidelines.

The foot-candle information indicates that the residences on the east side of the stadium, along Euclaire Avenue, will experience light levels in the range of 5 foot-candles at the western most curb to 0.5 foot-candles in the front yard. For comparison purposes, most non-retail parking areas are illuminated to approximately 1 foot-candle, shopping center parking areas are generally illuminated to 3 foot-candles.

Location of the luminaires on the pole, or the mounting height, is one of the most important considerations for any sports lighting project. IES recommends that the upper limit of the beam pattern of the luminaire should not exceed 80 degrees above nadir. Lower mounting heights increases the potential of glare to the players, which could result in injury, and increases the overall glare on the site, causing an unpleasant environment for the attendees and the surrounding neighbors. Additional considerations for the design of sports lighting is the impact of spill light onto adjacent properties and contribution of the illumination to the night sky.

The information presented indicates that the Class of Play, as defined by IES, is defined as a Level II, requiring 50 foot-candles of illumination. A Level II facility is defined as a facility with spectator capacity under 5000. This level is the minimum IES recommended classification for collegiate stadium illumination. (The next highest classification is a Level I facility of which IES recommends almost twice the illumination.)

Our recommendation is to minimize the height of the poles while paying careful attention to the spill onto the adjacent properties. Additionally, the overall IES recommended mounting height of the luminaires should be maintained for player safety and for the prevention of overall glare on the site. **The design team will need to apply an iterative process during the design of the system. Each iteration will change the height of the pole until the IES recommended foot candle level and mounting height is satisfied all while achieving the minimum spill and glare onto adjacent properties. We would recommend that the design team provide the photometrics, complete with spill and glare, for the 110'-0" proposed poles, 100'-0" poles and 80'-0" poles.**

Feel free to contact me if you have any questions or additional information.

Respectfully,

KOHR'S LONNEMANN HEIL ENGINEERS, PSC

Donna J. Miller, P.E.
Principal