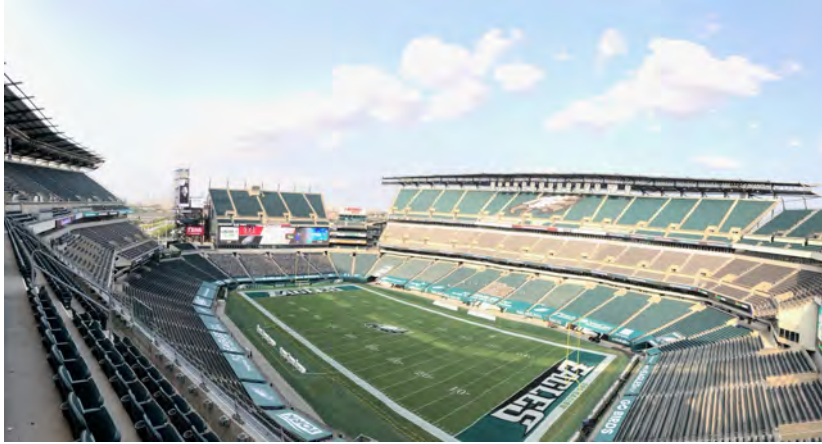


# Lincoln Financial Field

Designed and Installed by Diversified



Lincoln Financial Field opened in 2003 as the home stadium for the Philadelphia Eagles NFL team. In addition to Eagles football, it regularly hosts the Temple University Owls, the Army-Navy game and many soccer games each season. In 2017, the Stadium staff asked Diversified to design a new, upgraded audio system for the seating bowl. Diversified developed a comprehensive design, installed in multiple phases during off-seasons starting in spring of 2018.

### Challenges

- Increase system output while maintaining good speech intelligibility and smooth, uniform coverage.
- Improve low frequency extension and impact to enhance musicality and energy, both of which are important for NFL-caliber stadia.
- Phase/coordinate installation so as not to interrupt the stadium's event schedule.

### Solution

The Philadelphia Eagles wanted to raise the bar for audio performance within the stadium. "The fan experience across the NFL has been improving for a number of years," says Jeff Sanderson, Senior Design Engineer at Diversified. "A lot of teams are renovating or building new stadiums. The Eagles wanted Lincoln Financial Field to sound as good or better than anything else in the NFL. Speech intelligibility and musical experience is a critical part of that."

Diversified proposed a Fulcrum Acoustic-based solution for the system upgrade. Diversified had experience with Fulcrum products from other projects and knew that the combination of output, fidelity and control would provide the solution that the Eagles were seeking. Jeff Sanderson used EASE modeling software to design the new sound system incorporating AH, FH, and GX series products as well as Passive Cardioid™ subwoofers. Fulcrum's ability to provide any model with WR (weather resistant) construction was also an important factor.

Rigging structures were pre-fabricated for fast installation. Fulcrum worked closely with Diversified to phase deliveries of products to the Stadium to keep the installation moving efficiently. Where possible, Diversified reused existing speaker locations and wiring. This reduced the amount of new wiring required, adding to the overall installation efficiency. To avoid conflicts with the Stadium's schedule, the installation was to occur in the off-seasons and phased as follows:

- Spring/Summer 2018 – Upper Seating Deck
- Spring/Summer 2019 – Club Level and Lower Seating
- Spring/Summer 2020 – End zones and fill speakers

The COVID delay of 2020 postponed a portion of that year's work. Nevertheless Diversified did proceed with installation of approximately 160 customized loudspeakers to provide coverage for seats shaded from the main system.

### Project Details

#### Location

Philadelphia, PA

#### Product Category

Sports Stadiums and Arenas

#### Project Type

69,796-seat capacity stadium

#### Fulcrum Products

- (67) AH65-WR High Output Coaxial Horn 60° x 45°
- (4) AH96-WR High Output Coaxial Horn 90° x 60°
- (4) AH463-WR Higher Output Coaxial Horn 60° x 30°
- (43) FH1565-WR Full Range Coaxial Horn 60° x 45°
- (331) GX1226-WR 12" Coaxial Loudspeaker 120° x 60°
- (65) CS118-WR 18" Subcardioid Subwoofer
- (148) ESB44 Custom Loudspeakers
- (8) ESB31 Custom Loudspeakers

#### Supporting Products

Lab Gruppen Amplifiers

QSC Q-SYS DSP Cores & I/O



## Lincoln Financial Field (Cont.)

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### Solution (Cont.)

#### Upper Seating Deck (Phase 1)

Diversified installed 40 speaker clusters from the sunshade at the top of the stadium to provide audio distribution to the upper deck seats. Each cluster is comprised of 1 AH65 60° x 45° High Output Coaxial Horn and 2 GX1226 120° x 60° Coaxial Loudspeakers. The high output and long throw of Fulcrum's AH Series loudspeakers provides coverage to the front half of the upper deck seats while the GX1226's cover the seats below and behind the cluster locations. Additional AH96s and AH463s were installed to supplement coverage beyond the extent of the clusters.

Individual CS118 Subcardioid Subwoofers were installed between each cluster and aimed downward for low frequency support. The CS118's Passive Cardioid design reduces rear low frequency radiation, thereby minimizing reflections off the roof structure for improved clarity.

#### Club Level (Phase 2)

The Club Level seats are located between the upper seating deck and lower level. For coverage here, Diversified used clusters of FH1565 60° x 45° coaxial horns and GX1226 loudspeakers attached to the underside of the Upper Deck overhang. The FH1565s provide coverage of the lower half of the Club Level seats while the GX1226s cover the seats near the clusters.

#### Lower Level (Phase 2)

Loudspeakers for the Lower Level are mounted to the underside of the Club Level overhang. Clusters of AH65 and GX1226 are used to provide both long throw and near coverage, similar to the configurations used in the upper seating levels. CS118 subs were again selected for their combination of high-impact performance and low frequency control.

#### Custom Fill Speakers (Phase 3)

To better match the output and fidelity of the new system, Fulcrum developed the ESB44 and ESB31 horizontal arrays. These provide supplementary coverage for seats shaded from the main system. While not originally part of the project, the performance of the existing fill speakers was not suitable for use with the new system. Fulcrum developed the ESB enclosure to duplicate the mounting of the original system. These are mounted to the face of a partial-height concrete wall spanning the length of the stadium.

Every loudspeaker for the project was constructed using Fulcrum Acoustic's innovative weather-resistant composite material to maintain strength and durability in the face of inclement weather. All speakers were finished in a custom color selected by the Eagles.

The COVID-19 pandemic forced a realignment of the remaining phases of work. Work planned for 2021 will add new loudspeakers for the end zone seating using DX12 and CX8 series speakers mounted to the Stadium's "Talon" structures. Additional custom ESB44 and ESB31 will be installed to complete the replacement of the existing fill speakers.

