

In March 1997, Jim Jensen, general manager of the Boston Harborlights Amphitheater, along with the Boston-based music promoter The Don Law Company (DLC), contacted A.Form Architecture (AFA) to assist with the relocation of the Boston Harborlights (BHL), home of Boston's summer concert series. The DLC was losing its land-lease on the amphitheater's prime location, Fan Pier.

BANKBOSTON PAVILION

DLC went searching for an appropriate location and discovered the Marine Industrial Park in South Boston. The Boston Redevelopment Authority,

DAVID WOODIN



Installation crewmembers prepare to raise and tension the BankBoston Pavilion fabric roof. Design by A.Form Architecture, fabric installation by Span Systems Inc.

A case study of the design and design development of a tensile fabric amphitheater

BY GREG SHEP

landowner of the Park, was targeting the area for long-term, mixed-use redevelopment. To the Authority, the proposed new music pavilion made a perfect anchor for the area's redevelopment. A lease was arranged. In turn, the DLC was able to negotiate venue-naming rights with BankBoston (recently renamed Fleet/BankBoston).

Early financial projections by the DLC suggested a covered venue to accommodate 5,200 seats with approximately 600 concourse seating areas. The new stage house would attract and accommodate premiere-level and popular performers.

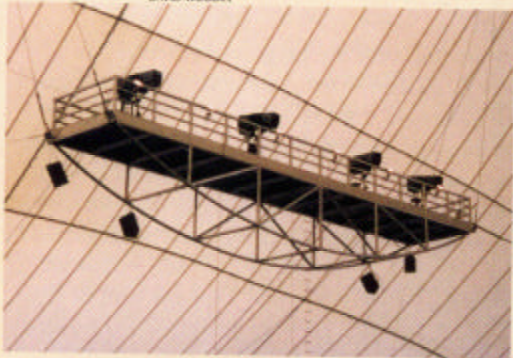
Calling upon his five years of experience at the original Boston Harborlights, Jensen worked closely with AFA president, Andrew Formichella, to optimize the facility's operational efficiency and to create an exceptional →

A finished pavilion glows in the night on South Boston's shores.



fabric structures

DAVID WOODIN



A rigging truss capable of supporting 18,000kg of lighting instruments hangs from the main structural arch.

The first design attempt

The preliminary scheme for the BankBoston Pavilion was a tensile fabric roof using three internal masts with a fan-shaped seating arrangement. (The original BHL had six masts and a circular seating arrangement. See *F/A* May/June 1995, p. 49.)

Production manager of the Pavilion, Mik Marchetti, assisted with the design of the stage house and other production facilities that would attract and support top-level entertainers. The four-story stage house had metal siding and containing an aluminum rigging truss to cover 486 sq. m (5,400 sq. ft.), with a performance

spectator experience for the new venue. To incorporate past experiences into the new venue design, Formichella met with each department head at the DLC. From maintenance to concessions, each department head was very specific about what worked well and what could have been improved at the original Harborlights. AFA was able to formulate a strong design program by listening to the dedicated, knowledgeable people at the DLC.

area of 324 sq. m (3,600 sq. ft.) The rigging-truss was designed to cover over the audience 7.9m (26 ft.) and support a load up to 18,000kg (40,000lbs). "It is state of the art in the eyes of the performer," says Marchetti. The fabric roof was integrated with the audience seating area. In the design, the stage house visually and structurally anchored the tensile roof and supporting arch to the site.

After developing the seating plan, the design team quickly realized that the facility's three masts would obstruct views of the stage for a large number of seats, and thus reduce potential ticketing revenue.

AFA's first design was submitted to the DLC in early spring 1995. During one of the regular design meetings, Jensen asked Formichella to "re-evaluate the roof structure, and reduce the number of poles" and in the next meeting challenged him to design the venue with no poles at all. →

fabric structures

Cooperation leads the design

During AFA's next design meeting with the project engineering firm, Buro Happold Consulting Engineers, U.K., the structure was critiqued and hand calculations were made to verify the structural concept. The conclusion, contrary to Jensen's challenge, was that four more poles were in order!

It was then time for AFA to spring on Craig Schwitter, Buro Happold's lead engineer on the project, the concept of having no columns in the structure. After a quiet and concentrated half-hour with his hand calculator, Schwitter



DAVID WOODEN

The saddle shaped roof over the seating area is acoustically friendly—only the back sloping portion of the roof needed acoustical augmentation.

exclaimed "I've got it; Let's try an arch!"

With a coat hanger, pizza box, and panty hose, Formichella, AFA designer David Burke, and Buro Happold engi-

neers worked for hours on the arch concept. At this point, cooperation was leading the design process. In a three-hour session of burning the midnight oil, concepts gelled into the present music pavilion design. It was a wonderful evening of synthesizing architecture, engineering, and business principles. Working side by side, architects and engineers enhanced the efficiency of the development process as well as the final product.

The next day, AFA contacted Jensen, and the bold idea of covering 5,200 unobstructed seats was immediately accepted. AFA quickly revised seating plans and created a sketch architectural model and, with Buro Happold, drew up preliminary engineering drawings. Most importantly, the architectural design concept had appropriate engineering input during schematic design. In other words, a feasible, buildable scheme was presented to the client from day one.

The site plan also developed in a similar manner—the process of design took over. By AFA directly addressing site issues (identified by Jensen), the final site design became an efficient use of space that was sensitive to the Boston Redevelopment Authority and surrounding businesses.

Engineering

Based on the preliminary architectural drawings and a physical model, Buro Happold developed a computer model to determine the sizes and feasibility of the primary structural components such as the supporting steel and cable as well as the fabric structural characteristics, and reaction loads for the estimated foundations. →

The computer model was then transferred to the acoustic consultant, Cavanaugh Technical Associates Inc., who critiqued and analyzed the general shape and materials of the proposed structure. Their analysis proved the shape was acoustically friendly—only the back sloping portion of the roof needed to be treated with an acoustical fabric. With the engineering and acoustical consultants in agreement, it was full steam ahead.

The main truss, the signature structural feature of the amphitheater, spans 750 ft. (260 ft.) at the base and 300 ft. (100 ft.) at the apex. The main members are 30.5 in. (12 in.) in diameter with 20.5 in. (8 in.) web members. The fabric used is a

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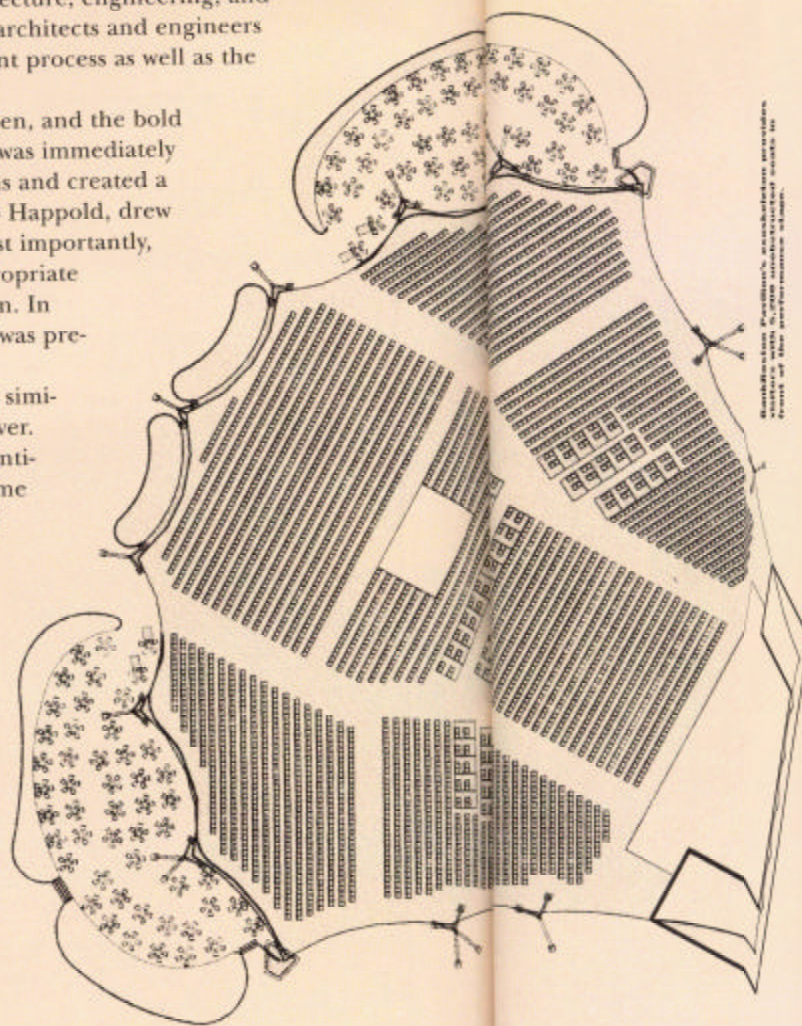


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