

# AL

architectural lighting

## DYNAMIC LIGHT

How Projects Incorporate Daylighting Strategies

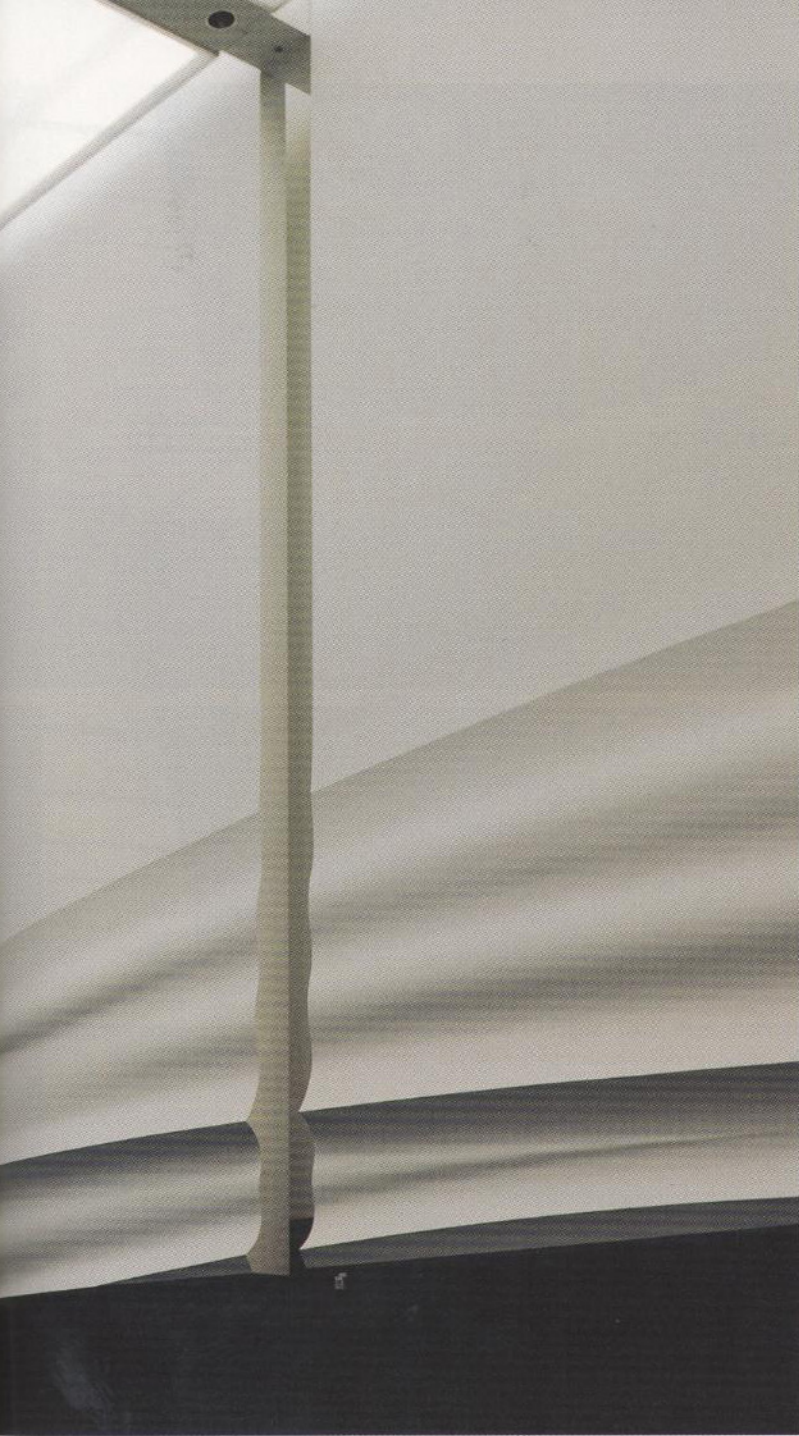
\* LIGHT AND HEALTH REPORT

\* LAMPS, BALLASTS, AND CONTROLS UPDATE



Daylight pours into the Bartle Hall Ballroom via clerestories on the north, east, and west sides of the room. Like the ceiling's translucent stretched-fabric panels, the sculpted wall panels take on the various qualities of light and shadow, revealing exterior conditions and time of day (right). Below from left to right: At night, the ballroom takes on a lantern-like quality and allows views inside. With the partition wall open, the prefunction area becomes part of the ballroom. Suspended custom ring LED luminaires convey the presence of a chandelier and are a metaphor for drops of water. The lobby, attached to the ballroom on its east side, also employs natural light and creates a brightly lit entrance to the convention center. At night, the space is illuminated by compact fluorescent downlights and ceramic metal halide wallwashers.





## (UN)STRICTLY BALLROOM

A design inspired by daylight and water offers an ever-changing atmosphere.

**RANKED AMONG THE 10 LARGEST CONVENTION CENTER BALLROOMS IN THE NATION, KANSAS CITY, Missouri's Bartle Hall Ballroom is, needless to say, enormous, encompassing a vast 46,450 square feet. Even more monumental was local lighting design firm Derek Porter Studio's task of lighting the large-scale space so it could yield numerous environments for a variety of functions while capitalizing on daylight to conserve energy and introduce natural light into the space.**

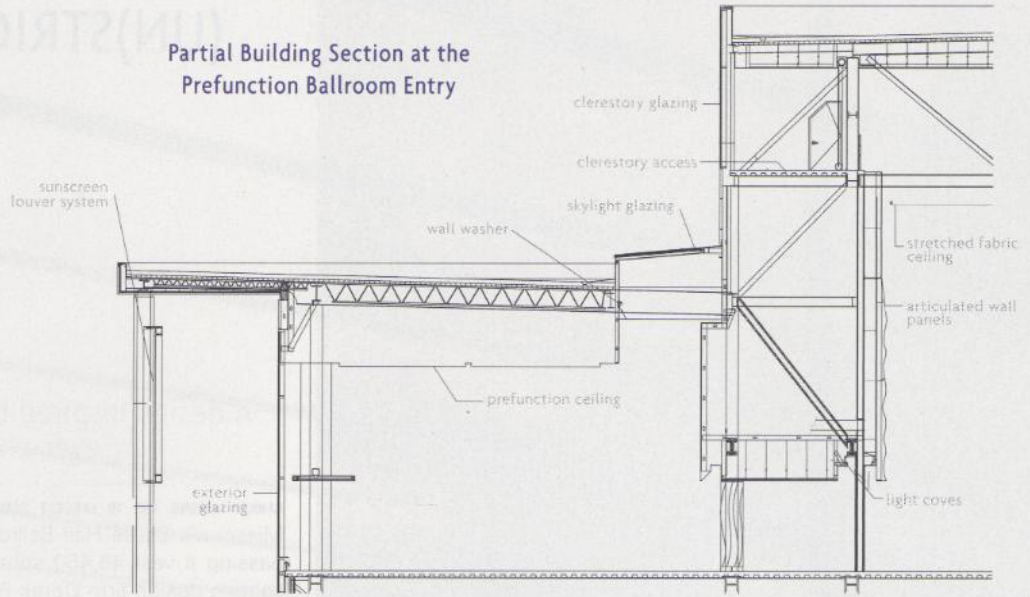
Just one part of a multiphase expansion of the convention center, the new state-of-the-art ballroom not only provides more flexible space to the facility's repertoire of offerings (for events including exhibits, lectures, performances, and galas), but also strengthens the convention center's role as an anchor for the revitalization of the downtown area, which is experiencing unprecedented growth with the new Sprint Center arena, a nine-block entertainment and residential area known as the Power & Light District, and the Kauffman Center for the Performing Arts.

In a departure from traditional "black box" ballrooms that offer no context to site orientation or exterior surroundings, daylight pours through clerestories on the north, east, and west sides of the room. Translucent stretched-fabric panels measuring 8-, 15-, and 30-feet, respectively, on the north, west, and east sides of the ballroom border the ceiling perimeter, diffusing the sunlight as it moves across the space over the course of the day. "Being time-based, the light is always changing and revealing the exterior condition in various ways, so you really feel the dynamic changes of the room and how natural light sculpts and gives orientation to the space," explains Derek Porter, principal designer and owner of Derek Porter Studio. "We purposefully wanted those shadows and projections to move across the translucent ceiling surface so you see the exposed structure inside the light-well, revealing the temporal presence of daylight as well as diffusing the direct sunlight entering the room."

The natural light has proved to be Porter's favorite element of the design. "Feeling the light move through the space naturally and diffusely through the stretched fabric is just magical," he says. Providing both visual animation and orientation while offering energy conservation and substantial functional illumination, the daylight footcandle level (with no electric lighting) ranges from 60 footcandles underneath the stretched-fabric panels to 20 footcandles in the middle of the room. However, for those events requiring a specific theatrical scene with electric lighting, motorized black-out shades in the clerestories can be employed.



Partial Building Section at the Prefunction Ballroom Entry



A partial building section at the prefunction ballroom entry shows the relationship between the ballroom's suspended ceiling, the stretched-fabric panels, and the clerestories (right). The translucent stretched-fabric panels measure 8-, 15-, and 30-feet, respectively, on the north, west, and east sides of the ballroom, diffusing the sunlight as it moves across the space from early morning (facing page, top) to mid-day (facing page, center) to late afternoon (facing page, bottom).

Working independently of and in concert with the natural light, electric lighting can be used to create seemingly countless illumination combinations. A variety of light sources and fixtures were used to meet the diverse programmatic needs, providing both general illumination and task lighting, including 250W PAR38 recessed halogen downlights; photocell-controlled dimmable 18W, 26W, and 42W compact fluorescent downlights; 14W and 28W T5 and 54W T5HO linear fluorescents that run continuously and transversely across the ceiling; and 39W and 150W T6 ceramic metal halide wallwashers. To keep the focus on the design, fixtures were carefully incorporated within the ceiling and other interior design elements.

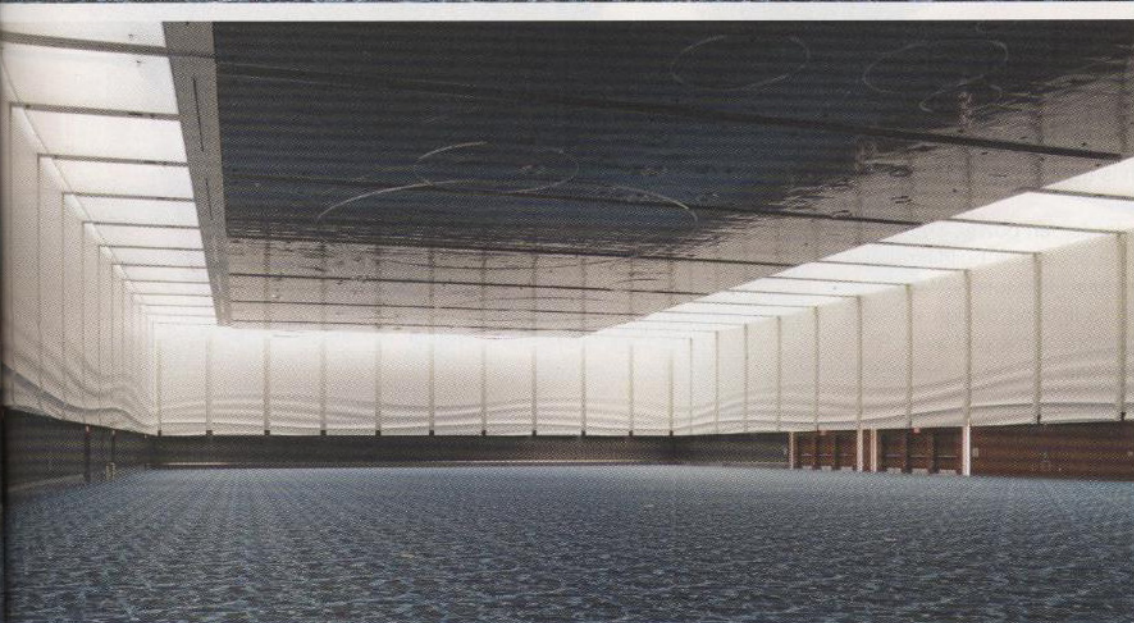
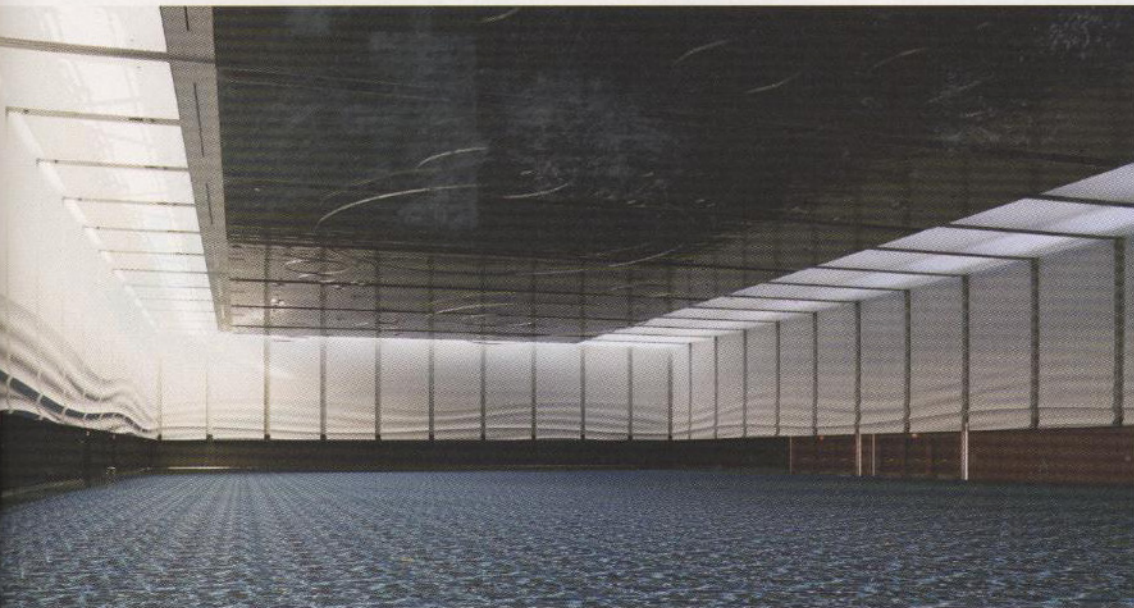
However, two aspects of the electric lighting scheme stand out. First are the custom polished aluminum ring luminaires suspended from the ceiling which, according to Porter, convey "the presence of a chandelier" and add a decorative edge to the space. Ranging in size from 2 1/2 feet to 50 feet in diameter, they house warm-white LEDs (oriented upward) that reflect in the specular metal panel ceiling. "Their physical form is a metaphor for drops of water," Porter explains. "Because you only see an image of the lights, it adds a layer of spatial depth, translucency, and reflectivity." Second is the sophisticated LED lighting system made up of two banks of LEDs: one to backlight the stretched-fabric ceiling panels and the other to graze the 30-foot-tall white-painted glass fiber reinforced gypsum (GRGF) wall panels that line three sides of the room. Developed with narrow, medium, and wide beam distributions to minimize the physical massing of hardware in the clerestory vaults, the custom color-changing luminaires can be programmed for any purpose. While standard scenes of fixed colors are pre-set, "the ceiling and walls are all programmed independently of each other, so it can be quiet and conventional, and then you can have some glitzy ceremony with flashing lights and music," Porter says.

Like the custom ring luminaires that abstractly reference the project's theme of water—a fitting choice given the city's location on the nexus of the Kansas and Missouri rivers and its identity as the "City of Fountains"—the GRGF panels take on various qualities of light and shadow and make a more literal reference to water with their sculpted wave pattern. In addition, sus-

pended, perforated, specular ceiling panels (with an acoustical absorption property) reflect qualities of the interior environment, adding another layer of depth to the space.

With such an integrated and elaborate daylighting and electric lighting system, the ballroom requires equally sophisticated controls. Consequently, each fixture can be independently programmed so the lighting can be adjusted to accommodate specific room configurations. Custom networking and LCD control panels were developed to link three disparate systems—DALI (digital addressable lighting interface) for the house lights, theatrical controls for the color-changing LEDs, and another set of controls for the facility management system—to improve usability, address diverse programmatic needs, conserve energy (through daylight harvesting controls), and "achieve the advanced end goal while not making it so apparently visual," Porter notes. To put the scope of the ballroom's controls in perspective, the custom LCD control panel contains a digital color wheel that controls 361 color-changing LED luminaires tied to 930 channels.

With all of these components, the project was not without its share of challenges. "On one level it was a luxurious project because there was a lot of ambition and the client and design team were totally on board," Porter explains, "but at the same time it was a city project and there are budgets and maintenance factors that had to be considered, people you had to convince of desired intent, and color combinations, mock-ups, and technology that had to be worked out." But, in the end, Porter says, "It was all worth it." Very much a collaborative effort among the team of architects, interior designers, lighting designers, and other consultants, the project strikes a balance between conceptual and practical objectives, a great asset for a project where the design team could have pursued typical layout strategies—inward-focused spaces devoid of connection to the outside and light. Rather, the design strategy, initiated by Porter and his team, provide the unexpected—daylight—and in turn create a compelling space not usually associated with the building typology of a convention center or ballroom. Thanks to the incorporation of daylight, the space is given a sense of scale, and its occupants a sense of time and place. **SALLIE MOFFAT**



#### DETAILS

**PROJECT** | H. Roe Bartle Hall, Kansas City Convention Center Ballroom Expansion, Kansas City, Missouri

**CLIENT** | City of Kansas City, Missouri

**ARCHITECT/INTERIOR DESIGNER** | HNTB, Kansas City, Missouri

**LIGHTING DESIGNER** | Derek Porter Studio, Kansas City, Missouri

**SUSTAINABILITY DESIGN CONSULTANT** | BNIM, Kansas City, Missouri

**ELECTRICAL ENGINEER** | Henderson Engineers, Lenexa, Kansas; Lightworks, Weston, Missouri

**LIGHTING CONTROL DESIGNER** | Jones & Phillips, Lafayette, Indiana; Derek Porter Studio, Kansas City, Missouri

**PROJECT SIZE** | 135,000 square feet (including the 46,450-square-foot ballroom)

**LIGHTING COSTS** | \$55 million (including lobby and prefunction areas)

**WATTS** | .8 (lobby and prefunction areas); 2.4 (ballroom)

**PHOTOGRAPHER** | Michael Spillers, Kansas City, Missouri

**DAYLIGHTING STRATEGY** | Sunscreen louver system on exterior façade; skylight system in prefunction-area; and perimeter clerestories/light-wells with diffusing panels for natural light in ballroom.

#### MANUFACTURERS | APPLICATIONS

**ARMSTRONG** | Prefunction-area ceiling

**BEGA** | Exterior steplights

**CEILING PLUS** | Ballroom metal ceiling

**CONSTRUCTION SPECIALTIES** | Prefunction-area louvers

**DRAPER** | Prefunction-area shades

**ELLIPTIPAR** | Asymmetric wallwash in prefunction-area and ballroom

**ETC (WITH CITY THEATRICAL CEILING MOUNT)** | Ballroom podium lighting

**ETC PHAROS** | Color-changing LED controls

**FOCAL POINT** | Prefunction-area recessed linear fluorescents

**H.E. WILLIAMS** | Prefunction-area staggered strips outlining entry stairs

**INFINITY** | Prefunction-area hallway downlights

**KURT VERSEN** | Prefunction-area, ballroom, and exterior recessed downlights

**LITECONTROL** | Prefunction-area and ballroom perimeter lighting

**LOUIS POULSEN** | Exterior pedestrian poles

**MODULAR** | Ballroom adjustable downlights

**MODULARARTS** | Ballroom sculpted GRGF wall panels

**NATURALITE SKYLIGHT SYSTEMS** | Prefunction-area skylight glazing

**NEWMAT USA** | Ballroom stretch-fabric ceiling

**OLDCASTLE GLASS** | Prefunction-area storefront glazing; ballroom clerestory glazing

**OSRAM** | Lamps throughout the project

**PERFORMANCE SOLUTIONS** | Blackout shades at ballroom clerestories

**PHILIPS** | Lamps throughout the project

**POWER VECTOR** | Ballroom color-changing LEDs

**SELUX** | Exterior area lights; ballroom linear fluorescents

**STARFIELD CONTROLS** | DALI controls; interior photocells; interior occupancy sensors

**TRIDONIC** | DALI ballasts

**WINONA LIGHTING** | Decorative rings at prefunction entry and ballroom; ballroom color-changing LEDs; prefunction-area asymmetric wallwash