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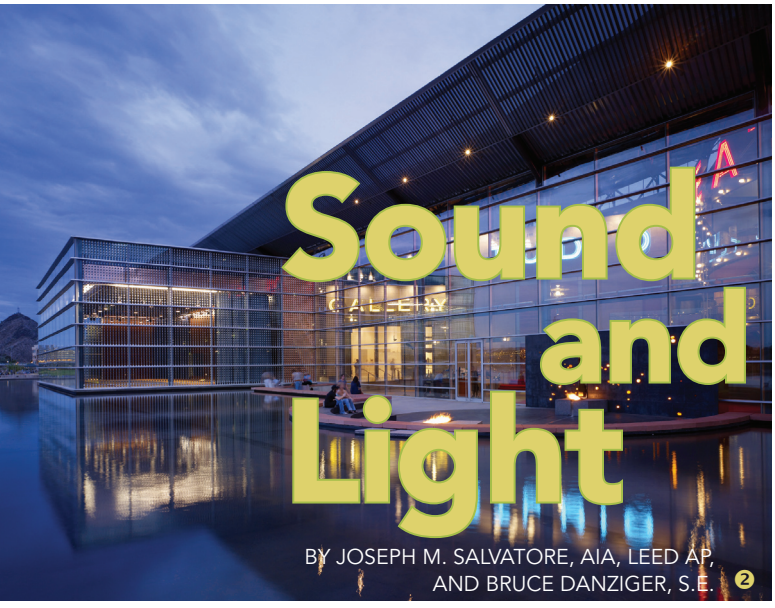
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Sound and Light

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PHOTOS BY JOHN LINDEN


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Acoustic and visual requirements drive the design of an Arizona arts center.

THE GOOD NEWS ABOUT THE NEW TEMPE CENTER FOR THE ARTS is its scenic and central location. The 90,000-sq.-ft performing and visual arts center sits on the south bank of Town Lake in downtown Tempe, Ariz.

The bad news is, well, also the location. It's exactly two miles east of the center runway of Phoenix's Sky Harbor International Airport, one of the busiest in the nation. It is also one-quarter mile west of a heavily used railroad bridge spanning the lake and a stone's throw from a ten-lane freeway directly across the lake. In other words, this theater is bombarded with noise from all directions *and* above—not an ideal situation for a performance venue. As such, elimination of noise infiltration was a top priority for the design team.

The solution was a "boxes within a box" approach, effectively creating buildings within a larger building, using the interstitial space as a sound buffer. The various functions of the complex are separated into individual buildings enclosed by an overarching high roof. The enclosed buildings include the main theater with fly tower, a studio theater, a gallery, a multi-purpose room, and a donor bar. The high roof mitigates the airborne noise and vibration caused by the close proximity of air traffic and along with the rest of the outer building, also gives the Center its iconic shape. The multi-faceted roof resembles a stealth fighter designed to deflect radar waves while the overall shape of the building is reminiscent of the nearby buttes.

The structure for the Center uses a combination of concrete and steel systems. All of the walls and a portion of the floor and roof slabs are reinforced concrete, while the remaining floors and roof slabs are formed from composite systems of metal deck and concrete. Reinforced concrete walls and slabs envelope the main theater and fly tower. The studio theater, gallery, multi-purpose room and donor bar have concrete walls with steel composite framing for the floors and roof. The high roof uses long-span steel trusses supporting canted planes of composite deck. A circular lobby balcony area cantilevers from the back of the main theater with steel-framed composite floors hung from stainless steel tension rods. Steel-framed bridges with composite decks connect the lobby balcony to the donor bar, and a long circular reinforced concrete wall envelopes the perimeter of the project. This combination of steel framing and reinforced concrete required many steel plates embedded within the concrete to support the steel members.

❶ The building uses a "boxes within a box" approach, apparent from the lobby.

❷ A reflecting pool provides a tranquil meeting place that offers views into the building.

❸ Angular roofing at the west entrance.

❹ The lobby is a patchwork of steel trusses and HSS-supported bridges.

Complex truss connections are featured throughout the building.

The High Roof

The roof planes are built in several layers with 6 in. of normal-weight concrete acting as the sound collection mass. Rigid insulation and a standing seam metal roof give the building its thermal and moisture protection as well as its identifying "strata" appearance. Supporting the roof planes nearly 100 ft above the lobby floor is a hollow structural section (HSS) truss system with the visual impact of the flying ribs of the great gothic cathedrals in Europe. These trusses were placed 24 ft on center with a stiffened steel deck spanning them and supporting the roof's concrete.

Additional support at the top of the high roof over the fly tower is provided by small columns (W10s) that have laminated bearing pads (rubber with internal steel plates) at their base on the fly tower roof below. These pads provide a somewhat soft support so that vertical loads are resisted by the fly tower and at the same time mitigate the airborne vibration from aircraft.

Three "fissure" trusses were designed into the system to allow daylight to illuminate the steel truss geometries. The entire roof assembly is supported on thirty 16-in.-diameter columns, and 16-in.-diameter steel cross-bracing and HSS sheer structures support these columns, eliminating almost all solid shear walls. This allows the roof to "float" on 4-ft-high clerestory windows, bringing more natural lighting into the building.

Reasons for Looking Up

With the overall theme of artistic achievement in mind, the designers decided to celebrate the large roof structure with uplifted HSS outriggers at each support column and span those outriggers with perforated decking, providing transitory lighting for patrons upon entering the building from the intense Arizona sun.

On the other side of the weather spectrum, another feature of the steel structure is the building's celebration of rainfall. It does not rain a great deal in Arizona, so when it does, the designers decided that the building should take full advantage and included a special waterspout off the large roof. At the east end of the roof structure the HSS outriggers fold downward to create a waterspout sheathed in copper. Water collected from the large roof finds its way to the spout and drops onto a conical shaped "island" of Mexican beach pebbles in the middle of the Center's expansive reflecting pool.

A Pleasing A/V Experience

Due to the desire to maintain the steel as an eye-catching element, intumescent paint was used for fireproofing. All steel in the building that is not stainless or galvanized is coated in silver or gray Hammerite paint to give it a glazed and intricate texture, keeping it in line with the high aesthetic standards that the design team hoped to achieve. These tight visual parameters, along with the strict acoustic requirements, make for an audio-visual experience that extends beyond the art and performances within the building, into the building itself. MSC

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