TWISTS & TURNS

UNIQUE WALLS AND CEILINGS TEST CONTRACTOR'S INGENUITY

BY MARY LOU JAY

Eye-catching walls and ceilings help establish the personality of public spaces like museums. Finding ways to translate an architect's vision into reality for these surfaces can often pose constructability challenges for general and specialty contractors. Here's a look at a project where the contractor had to draw upon its experience and ingenuity to get the job done.

THE TEMPLATE INSTALLATION BELOW THE BALCONIES SERVED AS A GUIDE FOR THE SLOPING AND TWISTING SHAPE CREATED THROUGHOUT THE THEATER.

WORKING FROM WALLS TO CEILING

Located at 300 D Street SW in Washington, DC, the new Museum of the Bible opened in November 2017. It is a 430,000-square-foot, eight-floor structure dedicated to the history, narrative and impact of the Bible. The complex project, designed by Smith Group JJR, included major renovations and additions to a brick building, built in 1922, that formerly served as a refrigerated warehouse. The brick façade of the old building was preserved, but inside the structure, every other floor was demolished to create space for the new exhibits. A previous addition was also demolished and a new concrete structure rebuilt in its place, with two floors added beneath. Three new floors were built on top of the combined renovated and new building sections.

Clark Construction Group, LLC was the general contractor for the project; Manganaro Midatlantic LLC served as a specialty contractor. "We had a greater scope of work on this project than we've had on other projects," said Steven Osorio, Manganaro's project manager. "The building is right next to a railroad track with the Metro underneath. Most of the work that we did for this museum was contingent on sound absorption and making sure that this building was isolated from outside noise." Manganaro installed sound isolation clips and ceiling springs throughout the building.

The drywall and acoustical ceiling package required for the project was far from an ordinary scope of work. In addition to Manganaro's standard product lines, which include drywall and acoustical ceiling work, the Museum of the Bible project incorporated a number of scope items that are not often seen in other commercial buildings, including:

- Fabric-Wrapped Ceiling Panels
- Venetian Plaster
- Suspended Decorative Grids
- Sound Isolated Ceilings & Walls
- Acoustical Panel Ceilings (BASWA Phon)
- Ballistic Fiberglass Panels
- Ceiling-Hung Picture Rails
- Acoustically-Engineered Ceilings (Decoustics)

SPRING VIBRATION ISOLATORS WERE INSTALLED ABOVE THE FRAMING AT THE PERFORMANCE HALL TO FURTHER ISOLATE SOUND FROM THE ROOM. THE MAJOR EMPHASIS ON SOUND ISOLATION AND ABSORPTION RESULTED IN TRULY OUTSTANDING THEATER ACOUSTICS.

VIEW FROM THE MAIN STAGE OF THE PERFORMANCE HALL, WHERE THE FINAL DESIGN OF THE "RIBBONS" CAN BE SEEN, AS WELL AS THE FRAMING FOR THE THEATER SEATING.

THE COMPLEXITY AND DEPTH OF THE FRAMING ALONG THE "RIBBONS." ENGINEERED METAL STUDS WERE USED TO ACCOUNT FOR THE LOADS AT THE PERFORMANCE HALLS.

PROGRESSION PHOTO FOR THE "RIBBONS" LOCATED IN THE PERFORMANCE HALL THEATER. METAL FRAMING AND DRYWALL WERE INSTALLED THROUGH THE USE OF A WORK PLATFORM BELOW THE CEILING.

PRIOR TO WRAPPING THE "RIBBONS" IN FABRIC FOR SOUND ABSORPTION, THE DRYWALL WAS INSTALLED AS THE SUBSTRATE.

The Museum of the Bible is the largest completed project in the nation to use BASWA Phon. It reduces significant reverberation and is made of a mineral fiber, which is then hand-troweled with a micro-porous coating. Tackling this large project didn't come without difficulties, however. Aside from the fact that BASWA Phon is a new and upcoming product, training employees to understand and install it correctly was a challenge. Because it is a natural, hand-troweled product, it easily lends itself to improper installation and inconsistent leveling. Manganaro self-trained the expert finishers who completed the quality installation. Through constant training and on-site mentorship, Manganaro was able to successfully complete the project with minimal repairs. The process began on the lower floor, which was the most difficult area due to the constant change of substrate heights and the number of finishing reveal beads.

CURVES AND TWISTS

The company's biggest challenge came in the fifth-floor, 472-seat performing arts hall. According to the museum, the walls of the theater are inspired by the sacred tabernacle of

Moses' time, with a curved design intended to evoke an ancient tent flapping in the wind. A digital 3-D mapping technique transforms the theater into an immersive experience, with images projected on the walls and ceilings.

The curves are created by eight "ribbons" that travel 30 feet up the walls and across the 60-foot ceiling; they are covered with fabric to serve as projection screens. It was Manganaro's job to design and fabricate the framing and install the drywall to support the fabric material.

"It was one of the most, if not the most, complex framing systems that we've ever seen," said Osorio. None of the eight ribbons were the same; each had unique twists, turns and curves.

Manganaro worked from the information provided by the architect, which included the trajectories of the east side and the west side, the radiuses and the curvature dimensions. "From there we had to figure out how we were going to connect these two lines, how we were going to build them and how we could do it so that it made sense to the people creating it," Osorio added.

ABOUT BASWA PHON

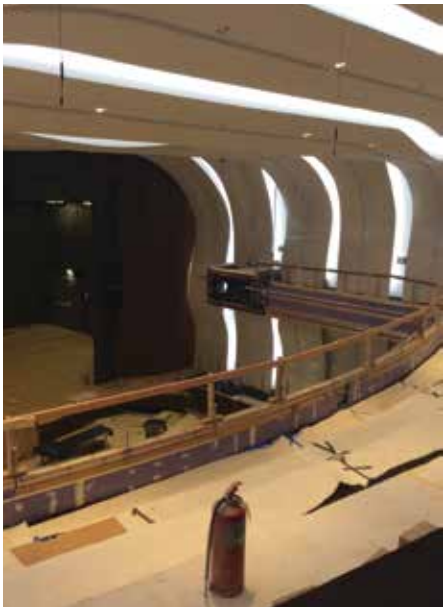
The founder of BASWA acoustic, Hans Sulzer, was prone to innovation in varying building materials. Originally, per chance, Sulzer developed a floor-leveling compound that improved sound transmission within a multi-story restaurant, leading Sulzer to direct his focus to acoustic solutions. Ultimately, BASWA Phon was developed as the first sound absorbing acoustical plaster system.

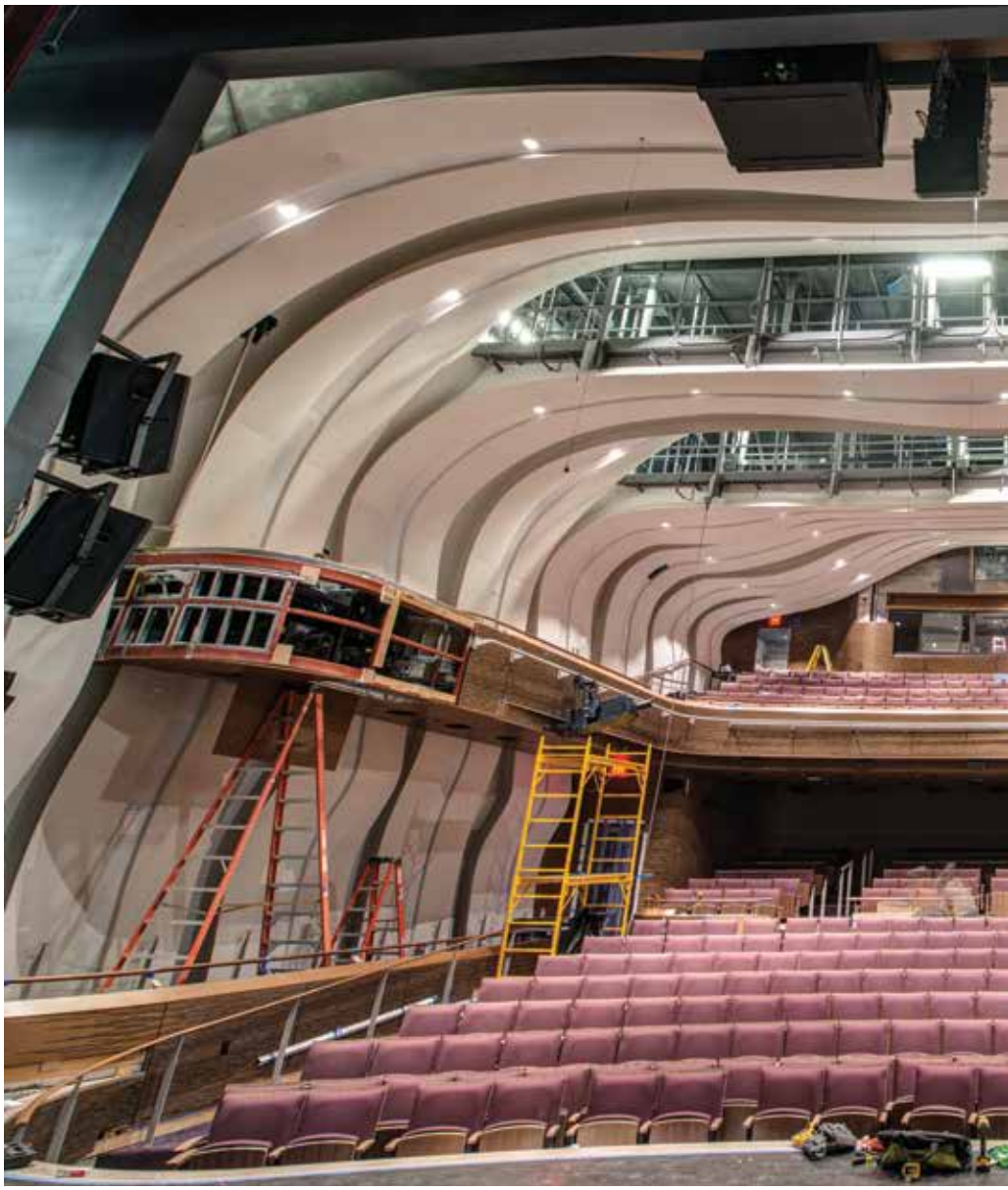
Sulzer is quoted as saying, "At first, I had no clue how to reduce noise and reverberation. However, the lack of well-founded know-how proved to be the ace in my deck of cards. I consulted numerous experts and always listened to the same claims; 'that's how we've always done it,' or 'that's just how it's done.' So, I resolved to do my own thing. I began to try out different things in my small workshop."

BASWA Phon is unique due to limitless design possibilities, architectural freedom in form, the use of recycled raw materials in production and the finished smooth, marble surface as a completed aesthetic. Most importantly, BASWA Phon has been developed with sustainability in mind. BASWA acoustic strives to improve long-term occupant health and well being by remedying excessively reverberant spaces to prevent the negative effects noise has on human health.

BASWA acoustic is featured on projects internationally and has an extensive portfolio of work in varying markets.

WHITE FABRIC IS STRETCHED ACROSS THE FRAMING, WHICH WILL THEN SERVE AS SCREENS FOR PROJECTIONS THAT ARE DISPLAYED THROUGHOUT THE THEATER.





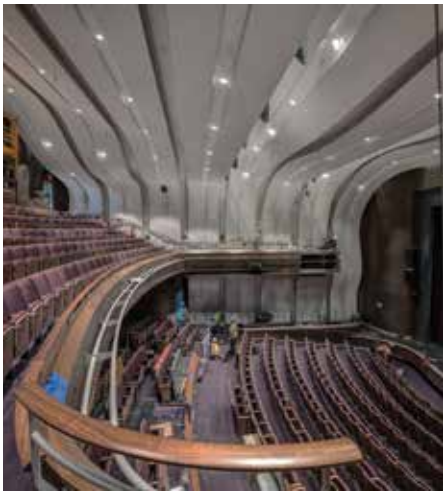
After doing trial runs of several different approaches, the construction team decided to use its new drywall layout tool. The rapid positioning tool takes information from architect's drawings and pinpoints certain points on walls and ceilings to indicate where drywall should be placed. But Manganaro found it could solve the constructability problem by using the tool in a different way.

"We thought that if we could create a stencil template on drywall, install the drywall and then build our framing to it, we could actually make it very simple for the people installing it to understand," Osorio said.

The Manganaro crews laid out 30-foot by 60-foot rectangles of drywall on the floor. The two IT-savvy workers who operated the layout machine then pinpointed, every eight inches, where the curved lines of the ceiling ribbons would fall on the drywall. After they created a template, the team cut the drywall to follow that line, then installed the templates perpendicular to the floor, using temporary supports to hold them in place.

VIEW FROM THE MAIN STAGE OF THE PERFORMANCE HALL, WHERE THE FABRIC HAS BEEN INSTALLED ON THE "RIBBONS," AND THE THEATER SEATING HAS BEEN FITTED.

NORTH VIEW FROM THE BALCONY AT THE THEATER, WHERE THE COMPLETED CEILING CAN BE SEEN.



Once the drywall template was in place, the crews built the metal stud framing and installed lighting down the center of each ribbon. "Usually we have all the framing installed prior to installing the drywall. This time, we had the drywall template installed first and then worked the framing up to that dimension," said Osorio. They started with the walls and worked outwards across the ceiling.

Building the ribbons took several months. "We started with the walls, then we had to assemble a scaffold to be able to reach all the high ceilings; the theater was scaffolded all the way through," he said. After Manganaro completed its work on each ribbon, another subcontractor installed the fabric to create the projection surfaces.

Osorio said that Manganaro began using the layout machine so that it could take on large scale, complex projects like the Museum of the Bible's theater. But he also credited lead foreman Mark Shelton, a 35-year Manganaro veteran, and other experienced members of the team with much of the project's success. "When you combine our experience with the technology that we have available, we are able to create something unique," he said. ■

MANGANARO BEGAN WORKING ON THE PROJECT IN JULY, 2015, AND COMPLETED ITS WORK IN NOVEMBER 2017.