The Buddy Holly Hall of Performing Arts and Sciences

ENTUITIVE

Project Summary

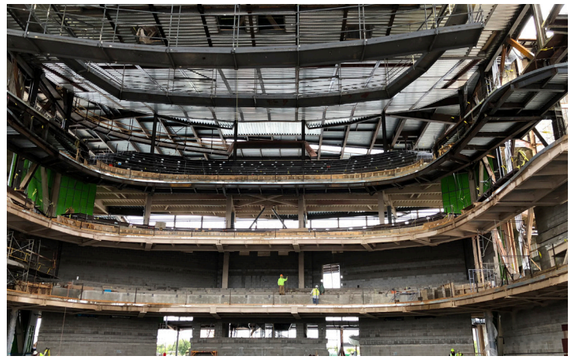
The Buddy Holly Hall of Performing Arts and Sciences in Lubbock, Texas, was completed in early 2021 and has fulfilled the aim of creating a hub for the arts and culture community as well as a venue capable of attracting top talent for world-class performing arts events. Collaborating with the Lubbock Entertainment and Performing Arts Association and a talented team of AEC industry professionals, Entuitive's structural engineers designed the 2,297 seat Helen DeVitt Jones Theatre and the Christine DeVitt Lobby, including the lobby's monumental stair. With two world-class theaters, a multi-purpose room, a ballet studio, and a bistro, The Hall anchors the cultural arts district and is serving as a catalyst for downtown revitalization.

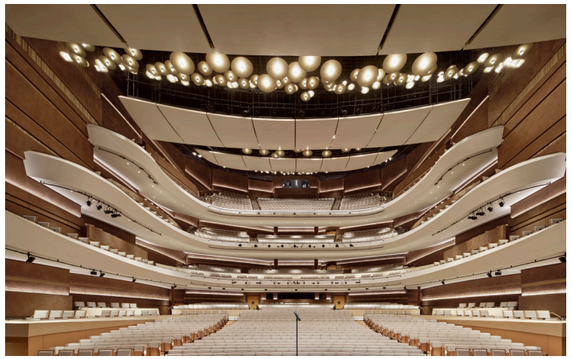
Photo Credit: Casey Dunn

Innovation

Buddy Holly Hall was completed in early 2021 and has fulfilled the aim of creating a hub for the arts and culture community as well as a venue capable of attracting top talent for world-class performing arts events. The Hall is named for Lubbock native Buddy Holly, who sparked a cultural revolution in the 1950s with his music, songwriting, and big framed glasses. The project required innovation throughout from the balconies in the theatre to the monumental stair in the lobby.

The theatre features an audience chamber with a large main level and three horseshoe shaped balconies that serve to enhance audience proximity to the performers on stage. A series of steel rakers cantilever up to 10 meters from columns placed just behind the theatre back wall to achieve unobstructed views. Vibration from rhythmic activities on the balconies was a major consideration given the large cantilever length of the rakers. To meet the vibration limits for audience comfort, Entuitive used the curved horseshoe shape to its advantage by adding a steel tension ring member near the front of the balcony.





Helen Devitt Jones Theatre (Left: Photograph by Entuitive, Right: Photograph by Casey Dunn and courtesy of Diamond Schmitt).

The horseshoe nature of the balconies also required each of the structural steel members for the risers to be bent to follow the curvature of the space. On the lower balconies standard beam sections are used for the risers which span between the rakers, support concrete on deck for the treads, and serve as formwork for the concrete risers. However, on the uppermost balcony, the height of the risers meant that the use of standard steel sections was not practical or cost efficient. An innovative custom steel 'Z' profile was created that was not only curved but varied in height to follow the profile of the seating. This was created first by bending an angle for the top and an angle for the bottom flanges of the 'Z' profile followed by welding on a variable height steel plate for the web.

Upper Balcony in Helen Devitt Jones Theatre (Photographs by Entuitive).

The main lobby is a three-story volume that includes a large gathering space. The staggered balconies are a point of interest, giving the space a playful feel. But the most striking element of the lobby is the monumental stair. The stair measures over 17 meters tall and features the use of 130 tons of steel. The aesthetics of a thin outer edge and glass guard are contrasted with the solid white plastered central spine. To achieve a column-less design, a central spine supporting cantilevering stair treads that vary in length between 2.4 and 4.2 meters is used. A truss utilizing the full height of the central spine with hollow structural section (HSS) top and bottom chords and vertical HSS members are used at each tread location. To form the helical shape of the stair, the steel for the central spine and outer stringer were bent in two directions through induction bending. The long spans, slender profile, low mass, and low damping ratio of the stair resulted in a low-frequency system that was particularly vulnerable to vibrations from human activity. Through finite element modeling and analysis, it was found that supplementary damping was required to meet the vibration limits and a tuned mass damper (TMD) was added on the second and third flights of the stair.

Monumental Stair in Christine Devitt Lobby (Top Left: Photograph by Entuitive, Top Right: Photograph by Casey Dunn and courtesy of Diamond Schmitt, Bottom Left: Courtesy of Diamond Schmitt, Bottom Right: Photograph by Entuitive).

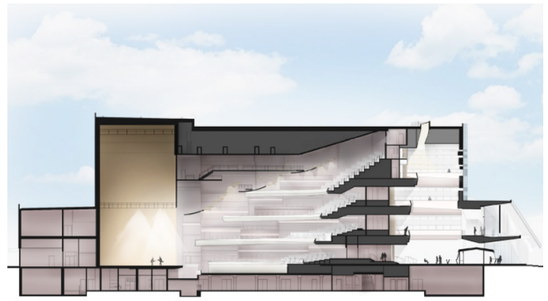
Complexity

Guests will first notice the exterior of the building and how it reflects the colors and shapes of the surrounding landscape. But perhaps what they will not appreciate is the inherent complexity required to achieve the dynamic elevation at the main entrance.

The exterior wall has a distinct shift inward at the upper levels. This was driven by aesthetic and acoustic considerations. To keep the lobby space column-free, a truss spanning over 45 meters was introduced along this line. From this 41-tonne truss, hangers extend down to support alternating bands of windows and cladding as well as a sloping roof that pushes out from this line. This sloping roof is supported by columns along the curtain wall below before cantilevering past to provide a sunshade to the curtain wall from the Texas sun.

Back inside round, slender, architecturally exposed structural steel hangers emerge from below the sloping roof and extend down to support one end of custom tapered steel plate girders at level 2. These custom tapered plate girders then cantilever out 7.6 meters to create the main entrance canopy which is a modern take on the marquee.

The hall also offers a unique outdoor performance space known as The Bird's Tail. The Bird's Tail is unique in that it is supported by one central column that splays out at four acute angles. The Bird's Tail takes its name from the two separate sections of the roof that go in alternate directions — one flips down, and one flips up.



Christine Devitt Lobby (Top: Photograph by Entuitive, Bottom: Courtesy of Diamond Schmitt).

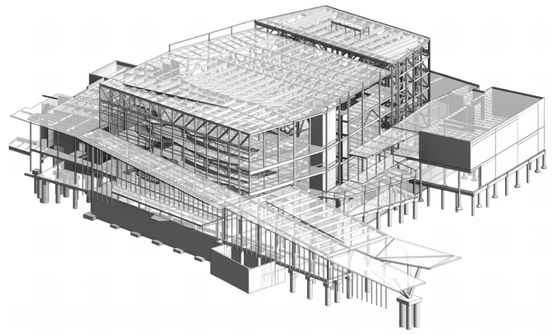
Social and Economic Benefits

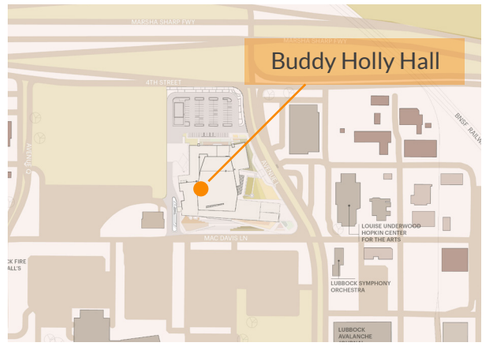
Lubbock's downtown core was sadly devasted by a large tornado in the 1970s and sections of the downtown have lain barren for some time. Buddy Holly Hall represents a community-led project to promote arts and culture in the region and is serving as an economic cornerstone for downtown revitalization. The Hall is named for Lubbock native Buddy Holly, who sparked a cultural revolution in the 1950s with his music, songwriting, and big framed glasses.

The Hall has brought together multiple stakeholders including the Lubbock Symphony Orchestra, Lubbock Independent School District, and Ballet Lubbock, along with a variety of professional touring productions.

The inclusion of the Lubbock Independent School District (LISD) as a first priority user in a License Agreement with the Hall is a trendsetting relationship between a world-class performance facility and a local school district that creates performance and educational opportunities that otherwise would not be possible. The students also have access to unique educational opportunities to interact with professionals in several cultural fields in their own environment.

> The project team created a place that is not only top tier in every way, but is warm, inviting and will serve as the 'living room' for our community to gather.
>
> - Tim Collins, Board Chairman, LEPAA





Structural Building Information Model from Revit and Overall Site Plan (Left: Image by Entuitive, Right: Courtesy of Diamond Schmitt).

Environmental Benefits

The building's façades are innovations in integrated design. Targeting LEED Silver, the building's façade works to counter the temperature fluctuations of West Texas and significantly reduce cooling loads. Most buildings in this climate are either opaque or have massive air-conditioning loads, as heat gain is overwhelming in summer. The team designed a long overhang, angled fins, and deep-set ribbon windows to act as architectural drapery, shading and filtering light without obstructing the vistas surrounding the Hall.

In particular, the introduction of glass fiber reinforced concrete fins to the main elevation of the lobby contributes to shading the large expanse of curtain wall, while adding a dynamic aesthetic element. Extensive sun studies determined the best angles for the custom fins to maximize shade and view.

The challenge for Entuitive was how to support the undulating fins that are 1.5 meters off the curtain wall while giving them the appearance of floating. The solution was to fit a slender steel element within the profile of the fin. This element required sufficient strength to support the fin weight and sufficient stiffness to prevent wind-induced fluttering. Many steel sizes and profiles, such as circular and rectangular hollow structural sections (HSS), that were strong and stiff enough were considered but would not fit within the sleek architectural profile for the fins. Oval HSS, rare for North America, were chosen as the optimal shape. These minimized the visibility of the supporting steel, provided the strength required, and maintained the architectural profile of the fin. The oval HSS hangers are supported by the sloping roof overhang above and vary in profile over their height with three sections spliced together. Inside the fin an Oval HSS 11x6 was used and above and below the fin smaller Oval HSS 8x4s were used. The height of each architectural fin varies which means that no two of the supporting steel elements are the same.

Meeting Client's Needs

The roots of this project go back to 2011 when a group of citizens identified the community need for a new performing arts space. This led to the formation of the Lubbock Entertainment and Performing Arts Association (LEPAA). LEPAA had the primary goal of raising private funds to design and construct a building that would meet the needs of the community and become a destination on the High Plains of Texas for world-class artists and performers. The broader mission of LEPAA includes educational and community programs that will support, enhance, and expand appreciation for arts and culture. In addition to raising funds for the $158m project, LEPAA also owns and operates the Hall.

A pre-development strategic plan was conducted including a needs assessment/market study, a facility program, a programmatic development budget, project schedule, and a financing and fundraising plan. From there, the larger team worked closely to adhere to the budget, buildable area, the needs of stakeholders, and LEPAA's aspirations. The final product met the Owner's demands and expectations for this state-of-the-art performing arts center within the Owner's approved budget, notwithstanding budget and schedule challenges presented by unforeseen events that arose during construction, including the COVID-19 pandemic.

Buddy Holly Hall (Top Left: Courtesy of Diamond Schmitt, Top Right & Bottom Left: Courtesy of Lee Lewis, Bottom Right: Photograph by Casey Dunn and Courtesy of Diamond Schmitt).

Ultimately, the successful collaboration and early involvement of key stakeholders allowed the project team to deliver on LEPAA's aim of creating a destination for arts and culture in West Texas. The facility opened in January 2021 and has begun to host performances and programs. The layout of the interior spaces will accommodate the Hall's wide-ranging performance line-up – from hosting ballet, symphony, school, opera, pop and country performances to Broadway productions to statewide band and choir competitions.

> The structural team brought an almost limitless depth of creativity to this remarkable project. We're all thrilled by the way the building is adding to life in West Texas and proud to hear that it is inspiring engineers and designers across North America.
>
> -Matthew Lella, Principal,
> Diamond + Schmitt Architects

Tour of Buddy Holly Hall by Tim Collins, board chairman of LEPAA

Diamond Schmitt Architects tell the story of Buddy Holly Hall

Introducing the Buddy Holly Hall of Performing Arts and Sciences

Exclusive Tour inside the Buddy Holly Hall of Performing Arts and Sciences

Collaborators

- Owner: Lubbock Entertainment and Performing Arts Association
- Developer: Garfield Public/Private LLC
- Design Architect: Diamond Schmitt
- Architect of Record: Parkhill
- Associate Architect: MWM Architects, Inc.
- Structural Engineers: Entuitive / MWM Architects, Inc. / Parkhill
- Civil Engineer: Parkhill
- MEP Engineers: Crossey Engineering Ltd. / Parkhill
- Acoustics: Jaffe Holden Acoustics
- Theater Planners and Consultants: Schuler Shook
- General Contractor: Lee Lewis Construction, Inc.
- Structural Steel Fabricator: Basden Steel
- Monumental Stair Fabricator: Beck Steel, Inc.

Photo Credit: Casey Dunn