

Architectural Significance in Metal Buildings: An Educational Series

# ARBOGAST PERFORMING ARTS CENTER

Troy, OH



Created in coordination with MT Studio,  
Brentwood Builders, Inc. and Foundation Steel, LLC

Photo courtesy of MT Studio • Photographer Steven Bullock









Photo courtesy of Foundaton Steel, LLC

# CONTENTS

|   |    |
|---|----|
| PROJECT DETAILS.....                        | 1  |
| PROJECT DESCRIPTION.....                    | 3  |
| History & Community Engagement.....         | 5  |
| Planning & Design Priorities.....           | 5  |
| Architect's Statement.....                  | 6  |
| PROJECT CHALLENGES, GOALS & OBJECTIVES..... | 7  |
| RELEVANCE FOR STUDENTS.....                 | 13 |
| RESOURCES/RELATED READING.....              | 15 |
| CREDITS.....                                | 16 |



Photo courtesy of Foundaton Steel, LLC

## PROJECT DETAILS

**Building:** Arbogast Performing Arts Center

**Location:** Troy, Ohio

**Client/Owner:** Arbogast Performing Arts Center and Troy Christian Schools, Inc.

**Building Function:** Multi-purpose arts center designed for family and student education, entertainment, community programming and business events

**Size:** 39,000 square feet

**Site:** Approximately 26 acres

**Budget:** \$11 million

**Completion:** 2021

**Metal Building Manufacturer:** Butler Manufacturing

**Metal Building Supplier:** BlueScope Construction

**Architect:** MT Studio

**Construction Manager:** Brentwood Builders

**Constructor/Erector:** Foundation Steel, LLC

**Acoustical Engineer:** Haverstick Designs

**Structural Engineer:** Pinnacle Engineering, Inc.

**Civil Engineer:** Community Civil Engineers, LLC

**Plumbing, Mechanical, Electrical Engineer:** L2 Engineering, LLC

**Aluminum Wall Panel Supplier:** Kalzip

**Steel Wall Panel Supplier:** Fabral, Inc.







# PROJECT DESCRIPTION

Located in the small town of Troy, OH—just 19 miles north of Dayton—the Arbogast Performing Arts Center (APAC) serves more than 100,000 residents throughout the Miami Valley region. Though the 39,000-square-foot community arts center sits on the campus of Troy Christian Schools, Inc., one of the region’s largest private school systems, the multi-purpose venue provides a home to community concerts and events and a meeting space for corporate gatherings, symposiums and conferences, as well as a site of school-hosted plays, concerts, internships, family and student education and weekly chapel meetings. (1)



Image courtesy of MT Studio







## History

The \$11 million project, which was in the planning stages for more than a year, began as a Troy Christian Schools initiative until Troy community residents Dave and Linda Arbogast walked into then-Assistant School Superintendent Jeanne Ward's office. The couple offered a \$2 million donation and an expanded vision to build a community venue that could serve the entire Upper Miami Valley region. The building project, funded through capital campaigns, soon morphed into a community-based project with an independent board of directors and Ward at its helm as APAC's executive director. (2)

## Community Goals

According to the APAC nonprofit's website, the goal of the performing arts center is to "bring added value to regional schools and the greater Miami Valley area with enhanced programs in performing and visual arts." APAC seeks to offer a dynamic venue that provides "numerous opportunities for residents to learn, gather and enjoy, having a positive impact for decades to come." (3) The performing arts center opened to a full house October 30, 2021, with a performance by the Texas Tenors. In its inaugural 2021-2022 season, APAC presented nine performances and welcomed over 6,500 visitors. (4)

## Evolving Design Priorities

Based on their experience constructing several metal buildings on the Troy Christian Schools' campus, leaders at Brentwood Builders, Inc. (Brentwood) felt a metal building solution would also be a good fit for the performing arts center. "The most economical means of construction for this project was a metal building," said Chad Coe, vice president of business development for Brentwood.

As the project shifted from a modest school auditorium into a community venue, the list of amenities began to grow, and the Brentwood team decided to engage a design and engineering team. "Instead of a multipurpose educational building with a large flat floor for things like chapel presentations and other school events, the center now required a sloped floor and a balcony with fixed seating," Coe said.



Brentwood then approached architect Mike Twiss, principal of MT Studio, to participate in the design. Twiss was excited. "Any time you're involved in designing a performing arts center, it's a great opportunity.

"The addition of the second story with a theater balcony, lobby/art gallery, conference room, offices and a recording studio added to the complexity of the project," Twiss said. "When Brentwood engaged MT Studio for the project, we brought a whole team of engineering experts on board."

Coe noted that the building evolved into a hybrid structure with a metal building exterior and conventional steel components inside. "The steel components primarily included the second story and balcony structure, as well as an added cafe on the first floor," he explained.





Photo courtesy of MT Studio • Photographer Steven Bullock

### Creating a Versatile Space

While the team knew the venue would serve the community, one of the first decisions centered on the type of performances APAC would host. “Was this going to be a theater for Broadway plays?” asked Twiss. “Did we need fly space above the stage or an orchestra pit? Once we determined we didn’t need those amenities because the venue would host smaller-scale performances, the challenge was to design a multipurpose center that could host a large variety of events—everything from a TED Talk to a play to a musical act or a corporate conference.”

The resulting venue is versatile, providing a wide array of spaces for both large and small events. A dramatic entrance on the corner of the performing arts center welcomes visitors into a spacious 27-foot-tall atrium, which features a cafe with a coffee bar where espresso,

pour-over coffee and other concessions can be purchased. The atrium space can be converted to accommodate 180 guests with banquet tables and a mini stage. In the auditorium, tiered seating for up to 1,200 people provides unobstructed views of the stage. The area in front of the stage can be transformed into an event space with 200 stackable chairs or banquet seating for 100 guests. A green room, conference room and dressing room lie hidden behind the theater auditorium.

The second story of APAC not only provides balcony access to 400 of the 1,200 auditorium seats, but also five offices, a conference room for community and corporate events and a lobby/art gallery that has enough space to provide banquet seating for up to 100 guests. A future recording studio, to be located on the second floor, will meet the needs of local recording artists.



# PROJECT CHALLENGES, GOALS & OBJECTIVES



Photo courtesy of MT Studio • Photographer Steven Bullock

## Land Acquisition

Before anything could be built, the nonprofit needed to acquire a parcel of land large enough to accommodate the performing arts center and associated parking. "If you look at the beautiful campus we have here today, you can't even imagine there were four homes on the site," Coe said. "Troy Christian Schools and the APAC board of directors had to purchase those homes and thankfully that went well. That was initially a major obstacle." (5)

Combining and rezoning these former residential properties required an extensive planning and development process in coordination with the city of Troy. "It took a lengthy amount of time but actually ended up benefiting the project," Twiss said. "We could now do things like increase the size of the building and the size of our signage."

APAC not only features two 35-foot signs, but also multiple 25-foot, LED-lit screens, which stretch across three sides of the building. "From a donations standpoint, it is important for future donors to see that this isn't just another

educational building. This is something for everyone in the community to enjoy. The lighted screens transform the exterior and really help to distinguish the performing arts center from other buildings on campus," Twiss added.

## Building Constraints

Another project obstacle was the location of the existing utilities infrastructure. "On the west side of the property is a large gas pipeline that feeds a significant portion of the town, and on the east side of the property, we have parking and other utilities. Those constraints determined the placement of the building and its southeast corner entrance," Twiss said. "That corner entrance, though, really helps to draw people's attention to the building."

Twiss chose a cool color palette to compliment APAC's blue logo. The exterior features variations of light, medium and dark greys. Those cool colors continue into the interior with notes of blues, grays and charcoal blacks, offset by refined touches of granite and wood grain.



## Exterior Challenges

While the lighted signs and screens help to distinguish the venue from other buildings on campus, there were challenges in creating the dramatic exterior. “All the metal panels had to be perfectly level and the joints perfectly plum vertically so the effect would be pleasing to the eye,” said Brad Gordon, estimator and project manager of Foundation Steel, LLC, which erected the metal building and key building components. It was also tricky to install an aluminum frame on the top of the exterior wall framing. “The screen wall wraps around three sides of the building,” he explained. “This galvanized tube steel screen wall framing is clad with easy-to-clean-and-maintain aluminum panels, according to Gordon.”

The exterior of the building is clad with 12-inch, horizontal panels. “Horizontal siding with hidden fasteners distinguishes the structure from typical metal buildings,” Twiss noted. “Beneath the panels, the building is insulated with a layer of 5/8-inch fiberglass mat gypsum sheathing with 6 inches of batt insulation on all exterior walls.” (6)

“[With metal building components] you can do just about anything. You can change the directions of the panels mid-wall; you can vary the color or type of panels. We just completed another building where we created a shaded area in the contour of a panel. You can add architectural cladded panels for framing. It’s very easy, and the construction process is pretty quick.”

— Brad Gordon, Estimator and Project Manager,  
Foundation Steel, LLC





## Hybrid Building System

One of the most distinct aspects of the project is APAC's hybrid design, as the building combines elements of a metal building system with conventional steel construction. "The second floor necessitated steel framing because this is a performing arts center with a stage and we didn't want to see any framing or structural supports," Twiss explained. Thus, the entire second floor is a cantilevered balcony that hangs from the metal building's main structure. This eliminated the need for interior columns and created unobstructed views of the stage. "There's not a bad seat in the house," he said.

To accomplish this feat, Foundation Steel temporarily supported the cantilevered second floor at the ends until the structural decking and all the structural reinforcements were installed. "Everything had to be installed and completed, including all the wood flooring, before the second floor could support itself," Gordon explained. The building is topped with a Butler MR24 metal roof.

Gordon explained that the construction process began with the frame of the metal building. "Once the frame was up, other trades could begin the interior work while we started on the panel roof system." Once the roof was complete, the team at Foundation Steel began work on the exterior trim and siding, eventually making their way indoors, where they installed the cantilevered balcony and framing for the stage, sound system and lighting. Additionally, the team added the exterior guardrail for the stairs and ramp. "The cantilevered system was particularly challenging," noted Gordon. "However, the project really shines a light on the skill and craftsmanship of our employees. That's what makes me excited about this project."

## Assuring Superior Sound

Another critical component was engineering and fine-tuning the acoustic design of the auditorium. "Acoustics can become an afterthought. But with this project—especially because this was a performing arts center—







Photos courtesy of Foundaton Steel, LLC

wanted the acoustical engineer involved from the get-go," Twiss said. The company brought in Gavin Haverstick, acoustical consultant at Haverstick Designs, to engineer, design and fine-tune the performance center's acoustical elements. "Gavin did a phenomenal job in building the acoustical model along with our Revit® software," he said. (7) "We've heard nothing but rave reviews about the acoustics in the auditorium."

### Building During a Pandemic

One of the challenges of the 13-month construction project was building during the COVID-19 pandemic. "The pandemic lengthened the construction schedule due to supply chain issues; however, that ended up benefiting the project since there was more time for fundraising," Twiss said. "And, because we weren't under any pressure to open early—no one was going to pack 1,200 people into a theater during the pandemic—the construction delays ended up working in our favor."

"So, while the pandemic created some issues, construction was never shut down and we were able to work at a reasonable pace as funds continued to pour in from various donors," Coe concluded.

### Benefits of Metal Buildings

Gordon noted that the use of a metal building can cut construction time in half. "When you're building with brick or block, it takes much longer to install than metal siding. It definitely speeds up the construction process."

Coe added: "With a metal building, construction is easier. Building materials cost less, and you have the ability to create large clear span spaces with no interior columns."

Gordon also appreciates the versatility of metal building components, such as metal panels. "You can do just about anything," he said. "You can change the directions of the panels mid-wall; you can vary the color or type of panels. We just completed another building where we created a shaded area in the contour of a panel. You can add architectural, cladded panels for framing. It's very easy, and the construction process is pretty quick."

He said that building additions are also much easier with metal buildings. "If you decide to expand, it's very easy to tie an addition into an existing structure. There's not a lot of demolition that needs to take place for that expansion."



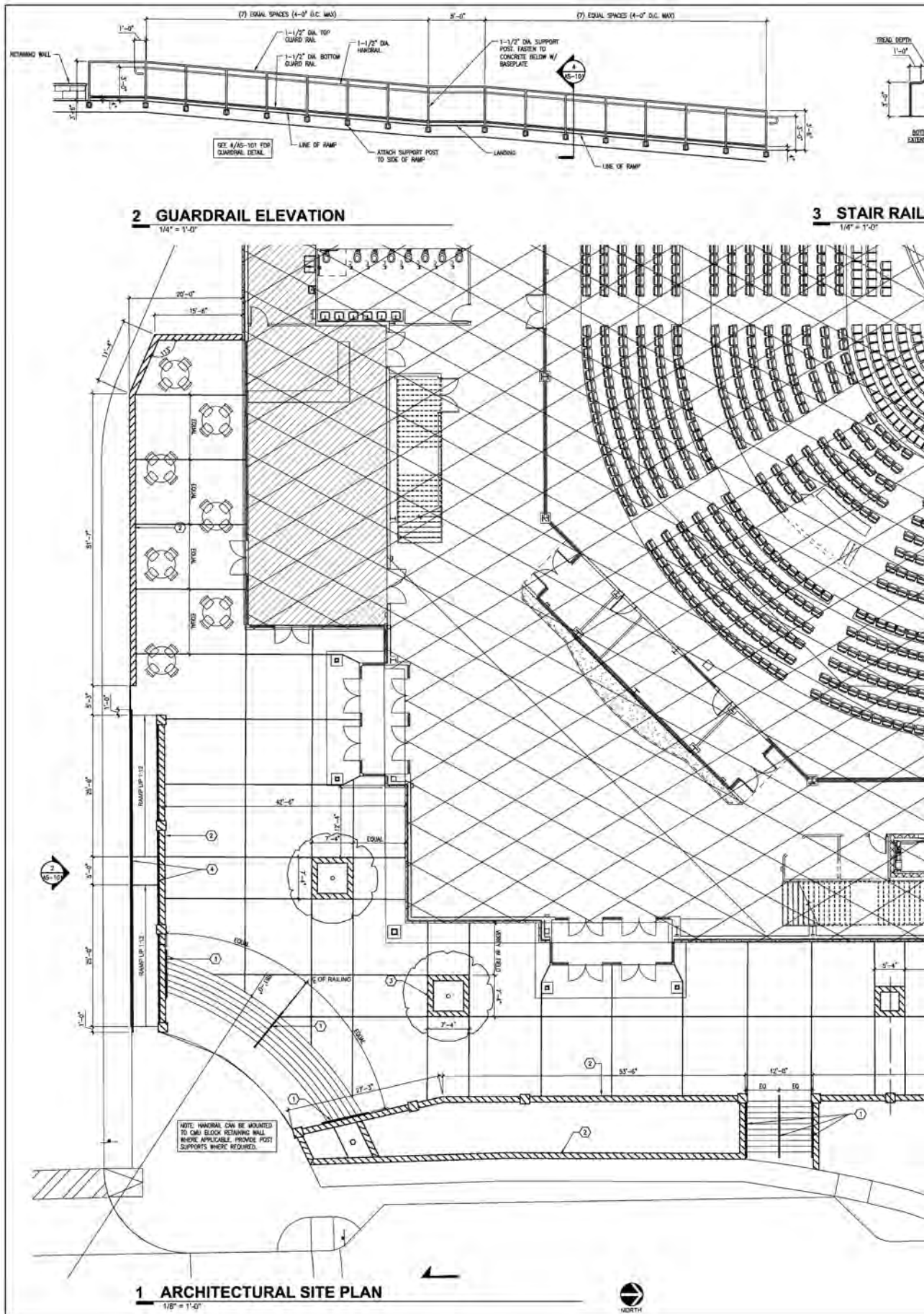
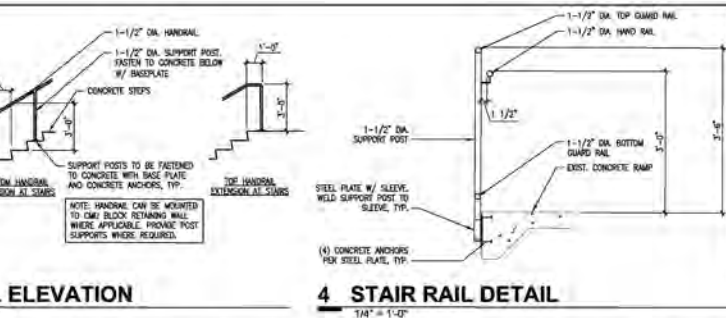
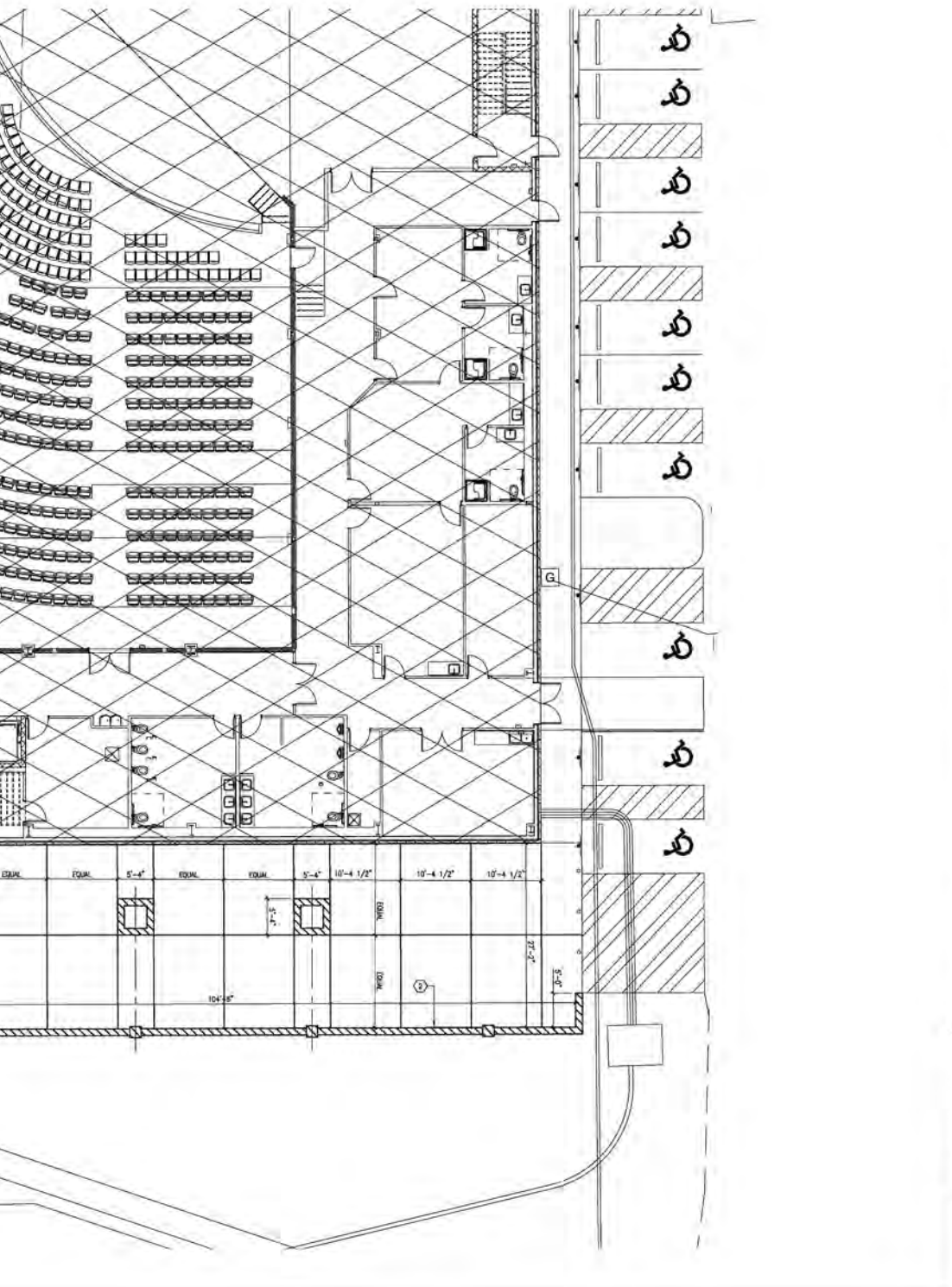


Image courtesy of MT Studio





- SHEET NOTES**
1. STAIR HAND RAILING LOCATION. 1'-0" RAIL EXTENSION AT TOP AND BOTTOM. SEE DETAIL 404A-101.
  2. RETAINING WALL LOCATION. SPLIT FACE CMU BLOCK WITH SOLID PRECAST STONE TOP. SEE STRUCTURAL DRAWINGS FOR DETAIL. TOP OF WALL AT 1'-0" ABOVE PATIO CONCRETE SLAB.
  3. TREE PLANTER LOCATION. SPLIT FACE CMU BLOCK WITH SOLID PRECAST STONE TOP. SEE STRUCTURAL DRAWINGS FOR DETAIL. TOP OF WALL AT 1'-0" ABOVE PATIO CONCRETE SLAB.
  4. RAMP GUARDRAIL / HANDRAIL LOCATION, SEE ELEVATION 404A-101.
  5. EXISTING STORM WATER DRAIN GRATE LOCATION.



Ground-Up Construction for  
**ARBOGAST PERFORMING ARTS CENTER**  
 500 S. Dorset Rd.  
 Troy, OH 45373

MT STUDIO PROJECT NUMBER: 10006

DATE: 07/24/2009

ARCHITECTURAL SITE PLAN

AS-101



# RELEVANCE FOR STUDENTS

Twiss admitted he's an oddity in the field of architecture, as he owns two firms—an architecture firm and a construction company. "I'm a huge fan of involving consultants and contractors early on in the process. It eliminates potential problems in the field. The more you're on the same page with your subcontractors and contractors, the fewer headaches later on."

Twiss also said he advises students to get as much real-world experience as possible before graduation, by participating in cooperative (co-op) work experiences, for example. "Our firm has a good relationship with the University of Cincinnati, which sends us architecture students on a rotational basis. The more practical experience you have, the better qualified you'll be when you go out and look for a job."

And, for Twiss, practical experience means getting out of the design chair and into the field. "When you're drawing and designing, you need to put yourself in your contractor's shoes. How is this really going to be built? And to do that, you need to understand how these structures are built from the ground up. You need to get out in the field and experience the construction process."

According to Twiss, the less of an ego, the better. "The field of architecture is full of huge egos. I've found the less ego you have, the more successful you'll be as an architect." And that starts with listening to the client. "During my initial meeting with a client, I'm just there to ask questions and to listen. What is your vision or dream? 'What are your programming needs? What do you want this building to do?' There may be 12 different building options for a particular project. I've found that if you're willing to listen to a customer, the right building type makes itself known."







Photo courtesy of MT Studio • Photographer Steven Bullock

## Practical Application

1. When Brentwood first proposed a metal building solution, the Arbogast Performing Arts Center was planned as a modest school auditorium. With a sizable donation, however, the project vision evolved into a larger, more complex community venue. What added elements required reconsideration from the standpoint of architectural and structural design and why?
2. Chad Coe of Brentwood calls APAC a hybrid structure with a metal building system plus some conventional steel components inside. How did the team bring together these two different building styles to create a cohesive structure? Discuss how the second floor was constructed and supported by the metal building. Would you have designed this differently? If so, how?
3. What advantages do a metal building and a metal roof offer for an open space like an auditorium or a performing arts center? How could a conventional steel structure complicate sight lines and seating arrangements? How does a metal building structure naturally create clear spans?
4. When APAC evolved into a larger community venue, architect Mike Twiss of MT Studio came onboard, bringing with him a whole team of engineering experts. What about the project necessitated additional subject-matter experts? What do you think they brought to the table?
5. Twiss said that the first thing his team needed to determine was the type and size of performances that would be held at APAC. What are the design ramifications of a Broadway play versus a TED Talk? What are design elements that need to be added for a play or concert and in what ways does this impact the design of the performing arts center?
6. Why was acoustical engineering particularly important for this project? Research the impact a metal structure can have on the acoustics of a building. Is it different from other building types? How can the design be modified to enhance the acoustics?
7. Research the sound impact of thermal expansion on metal. Does thermal expansion of metal create a sound impact? What kinds of design additions could mitigate or prevent this potential impact?
8. What design elements help to distinguish APAC from other buildings on the surrounding campus? What are ways to transform the look and feel of a metal building to create a distinctive appearance?
9. What were the key advantages of a metal building for APAC? Research other advantages of the use of metal building systems in high-end design.



# RESOURCES/RELATED READING

## Related Reading

- [Building Solutions: Educational](#)
- [Case Study: Educational Campus Facilities](#)
- [MBMA NAIMA Acoustical Performance Guide](#)

## Video Resources

Over 50 videos highlighting metal building architecture, engineering, design and application can be accessed at [www.youtube.com/mbmamedia](http://www.youtube.com/mbmamedia). We recommend you begin your educational process with the following programs:

- [How It's Made: Metal Building Innovations Are Revolutionizing Low-Rise Commercial Construction](#)
- [How It's Built: Metal Building Construction Raises the Bar for Low-Rise Commercial Structures](#)
- [An Introduction to Metal Building Systems](#)
- [Metal Building Systems 101](#)
- [How Do I Know a Metal Building is Right for My Project?](#)
- [What Do You Know About Metal Buildings?](#)

## References

1. Heimbürger, Jen. 2022. "Pre-fabrication Meets Custom Features." Rural Builder, August 9, 2022. <https://ruralbuildermagazine.com/pre-fabrication-meets-custom-features>
2. Moss, Meredith. 2021. "Arbogast Performing Arts Center Opens in Troy." Dayton Daily News, October 23, 2021. <https://www.daytondailynews.com/lifestyles/arbogast-performing-arts-center-opens-in-troy/6P23DIR5T5DFNH67ADMAFEVJTU>
3. Arbogast Performing Arts Center. n.d. "Benefits to the Miami Valley Region." Arbogast Performing Arts Center. Accessed November 5, 2022. <https://www.arbogastpac.com/center-info>
4. Staff Reports. 2022. "Arbogast Performing Arts Center 2022-2023 Season." Miami Valley Today, August 31, 2022. <https://miamivalleytoday.com/arbogast-performing-arts-center-2022-2023-season>
5. Metal Building Contractors & Erectors Association. n.d. "Interview Transcript Log: Chad Coe." Metal Building Contractors & Erectors Association. Accessed November 5, 2022.
6. Foundation Steel. LLC, 2022. "MBCEA Building of the Year Awards Submission." Foundation Steel, LLC, February 11, 2022.
7. Autodesk. n.d. "Revit: BIM Software for Designers, Builders and Doers." Autodesk. Accessed November 5, 2022. <https://www.autodesk.com/products/revit/overview?term=1-YEAR&tab=subscription>



# CREDITS



## Managing Editor

W. Lee Shoemaker, PhD, PE  
MBMA Director of Research & Engineering

## Production Design & Management

TWI Publishing

## Photography & Drawings

Steven Bullock  
MT Studio  
Foundation Steel, LLC  
Arbogast Performing Arts Center  
Brentwood Builders, Inc.

## Information Sources

Mike Twiss, Principal, MT Studio  
Chad Coe, Vice President of Business Development,  
Brentwood Builders, Inc.  
Brad Gordon, Estimator and Project Manager, Foundation  
Steel, LLC

## Editorial Advisory Board

Tony Bouquot, MBMA General Manager  
Donna Kacmar, FAIA, Professor, University of Houston  
Gerald D. Hines College of Architecture and Design  
Greg Snyder, Associate Professor of Architecture/  
Undergraduate Program Director, School of Architecture,  
University of North Carolina-Charlotte



Photos courtesy of MT Studio • Photographer Steven Bullock

Robert Tiffin, MBMA Architect Committee Chair

David Tomchak, MBMA Folio Task Group Chair

Marci Uihlein, PE, Associate Professor, Associate Director  
of Undergraduate Studies, University of Illinois School of  
Architecture

John Underwood, MBMA Education Committee Chair

## Learn About Other Intriguing Projects

Additional educational folios may be downloaded for free  
at [www.mbmaeducation.org/resources/](http://www.mbmaeducation.org/resources/).

For more information about the educational programs  
available through the Metal Building Manufacturers  
Association, visit [www.mbma.com](http://www.mbma.com) and [www.mbmaeducation.org](http://www.mbmaeducation.org) or speak directly with MBMA General  
Manager Tony Bouquot at [mbma@mbma.com](mailto:mbma@mbma.com).

Copyright ©2023, Metal Building Manufacturers  
Association





Photo courtesy of MT Studio • Photographer Steven Bullock

Metal Building Manufacturers Association Educational Series  
[www.mbmaeducation.org](http://www.mbmaeducation.org)