

ARCHITECTURE



# The Spirit of the Beehive



## The new Prior Performing Arts Center embodies the principles of transparency and collaboration

By: David Barbour

The oldest Roman Catholic college in New England has gotten an up-to-date new facility. The Prior Performing Arts Center, located at the College of the Holy Cross in Worcester, Massachusetts, is a laboratory of multidisciplinary education incorporating performing and visual arts. Arranged around a central area, known as the Beehive, are four pavilions, containing a 400-seat convertible concert hall and proscenium theatre for opera and music, a 200-seat flexible studio theatre, an art gallery, classrooms, and rehearsal and production spaces.

In a notably intricate arrangement, the four pavilions are placed inside two pairs of walls that, intersecting, form a nine-square grid, the corner of each featuring a courtyard garden, amphitheatre, outdoor teaching area and workshop, and meditative and sculpture gardens. According to the building's design architect Diller Scofidio + Renfro, "The paired walls twist, rise, and interlock, the wall of one pavilion becoming the roof of its neighbor, forming a chain around the center and creating arched entries directly into the heart of the building. The opposing precast concrete and weathering steel walls reinterpret the brick and limestone of the historic campus."

Charles Renfro, partner at DS+R and partner-in-charge for the performing arts center, says, "The new Prior Performing Arts Center is an uncommon commons. The building is uniquely perched on a hill overlooking the campus and Worcester yet straddles the intersection of multiple cross-campus paths. While its world-class facilities provide a singular new home for Holy Cross' performing arts students, its atrium invites the broader student body

Above: The Beehive can also function as a performance space. "It has built-in infrastructure for easy lighting and audio setup," Campbell says. Right: The building is uniquely perched on a hill overlooking the campus and Worcester yet straddles the intersection of multiple cross-campus paths.



Large photo, left: Brett Beyer/Courtesy of DSR; inset below: Ivan Baan/Courtesy of DSR

## ARCHITECTURE

to participate in casual and unscripted creative activities. The building's dual identity is also expressed in its materials, which are tough and industrial without sacrificing warmth and comfort. We're excited for the performing arts center to welcome students and faculty into a new kind of space for Holy Cross—one that puts intersectionality, inclusion, and interdisciplinarity at its heart."

Working with the theatre consultancy Fisher Dachs Associates and the acoustic and AV consulting firm Jaffe Holden, the project, which cost \$110 million, is notable for its flexibility and transparency, the latter feature realized in the overt use of glass walls that puts most of the activity in the building on display. It's a kind of factory of the arts, in which the methods of manufacturing are always visible.

### The concert hall

Luth Concert Hall is a convertible space and proscenium theatre equipped with a full fly tower; it is the main venue for symphonic music, chamber music, jazz, and gamelan, in addition to opera, musical theatre, and dance. The stage is framed in warm wood tones sitting inside a sleek, metallic gray interior. The attention to detail extends to the seating supplied by Series Seating. "[Diller Scofidio + Renfro] designed two types of fabrics for the seating," says Bob Campbell, principal of Fisher Dachs. "The main floor has a different color pattern versus the balcony. You start at the front of the room with a gorgeous millwork look, which gets darker as you go back and higher in the room."

The key to the room is its flexibility. "The ability to go from a full symphonic to a musical theatre program is completed by moving six shell towers and three over-stage tip-and-fly acoustic reflectors," Campbell says. "At the rear is a fixed acoustic wall, which is part of the shell and also creates a 5' crossover on the 40'-deep stage." (The full stage is 85' wide, he adds.) The shell system is designed to blend seamlessly into the room's architecture. "The auditorium side walls are of the same character as the shells onstage. The downstage proscenium walls pivot, making them adjustable for different types of music or dramatic presentation. Rather than having masking flats that go from side to side, the walls fold in, reducing the width of the proscenium from 48' to 40'." The system was designed and specified by Wenger/J.R. Clancy. "They did the shell towers onstage, the shell ceilings, and the pivoting walls."

The hall also features a full rigging system in addition to the reflectors built into the shell system. "We couldn't have a fully automated system, but the ceilings are motorized," he says. "It's a standard tip-and-fly system on motors. It gives them the ability to go from one configuration to another in only a few hours." Also supplied by Wenger/J.R. Clancy, it features 39 general-purpose line sets in addition to the acoustic ceilings, house, and fire curtains.

Another big item on the Fisher Dachs to-do list was providing enough lighting infrastructure for various kinds of



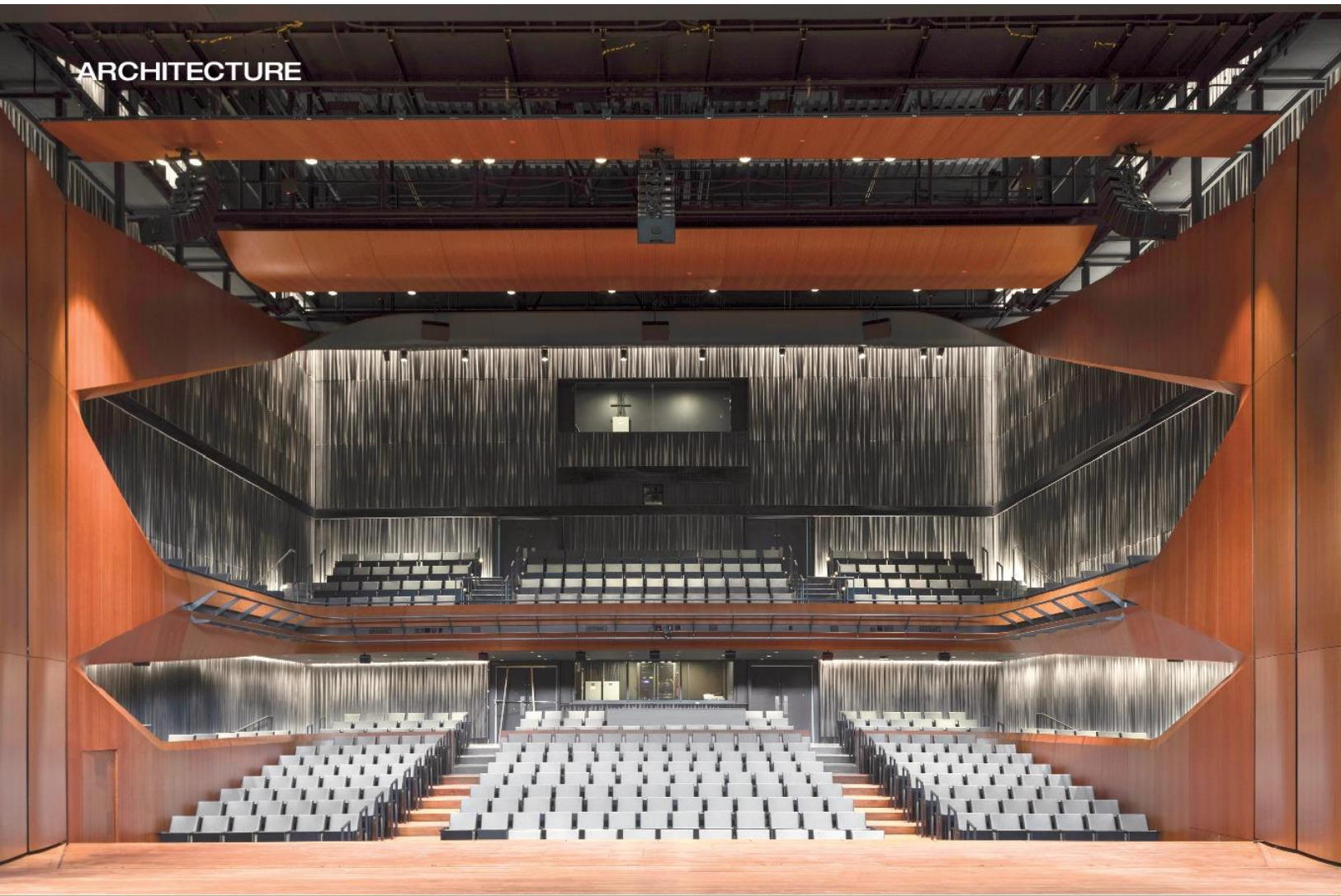
presentations. "In a room like this, we implement what I call a 'double hang'," Campbell says. "One part is a concert lighting setup in the catwalks and over-the-stage reflectors, offering white concert lighting. It gets set up and is never moved. The front lighting catwalk fixtures are set



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at a steeper angle, to not get in the musicians' eyes." It's a very simple system, he notes: "When a concert is presented, someone can go the panel, hit the button, and the

lighting already is set up for rehearsal or full concert events. Then there's another system for opera and musical theatre. Front lighting fixtures are placed on a lower level



Noting that the client wanted natural acoustics, Bausher says, “We started with the idea of non-amplified orchestral performing, the optimum acoustical environment consisting of a reverb time of two seconds, for a feeling of warm envelopment; we also needed to have an appropriate room height to support this.”

on the catwalks to allow for more traditional theatrical lighting angles.” Having two systems is, he notes, ultimately more efficient. “We didn’t want to make the theatre students change the concert system for musical theatre, then have to reset it for each event.”

The stage lighting fixtures (and equipment for the entire building) were specified in-house, with lighting designer Aaron Copp serving as a consultant. Matthew Wasser, lighting director, says, “We ordered about 100 [ETC] ColorSource Spots, 26 ColorSource PARs, six High End Systems SolaFrame 750s, two ETC Series 3 LED spots with City Theatrical followspot kits, 21 ColorSource Cycs, and 12 Chroma-Q Color Force II 48s also as cycs. ETC very kindly swapped the ColorSource Spots for ColorSource V Spots. We also picked up 140 used HPL Source Fours from the McCarter Theatre in Princeton, New Jersey. Only one of our venues has dimmers, so we also have twenty ES750 backpack dimmers for halogens in our black-box theatre.”

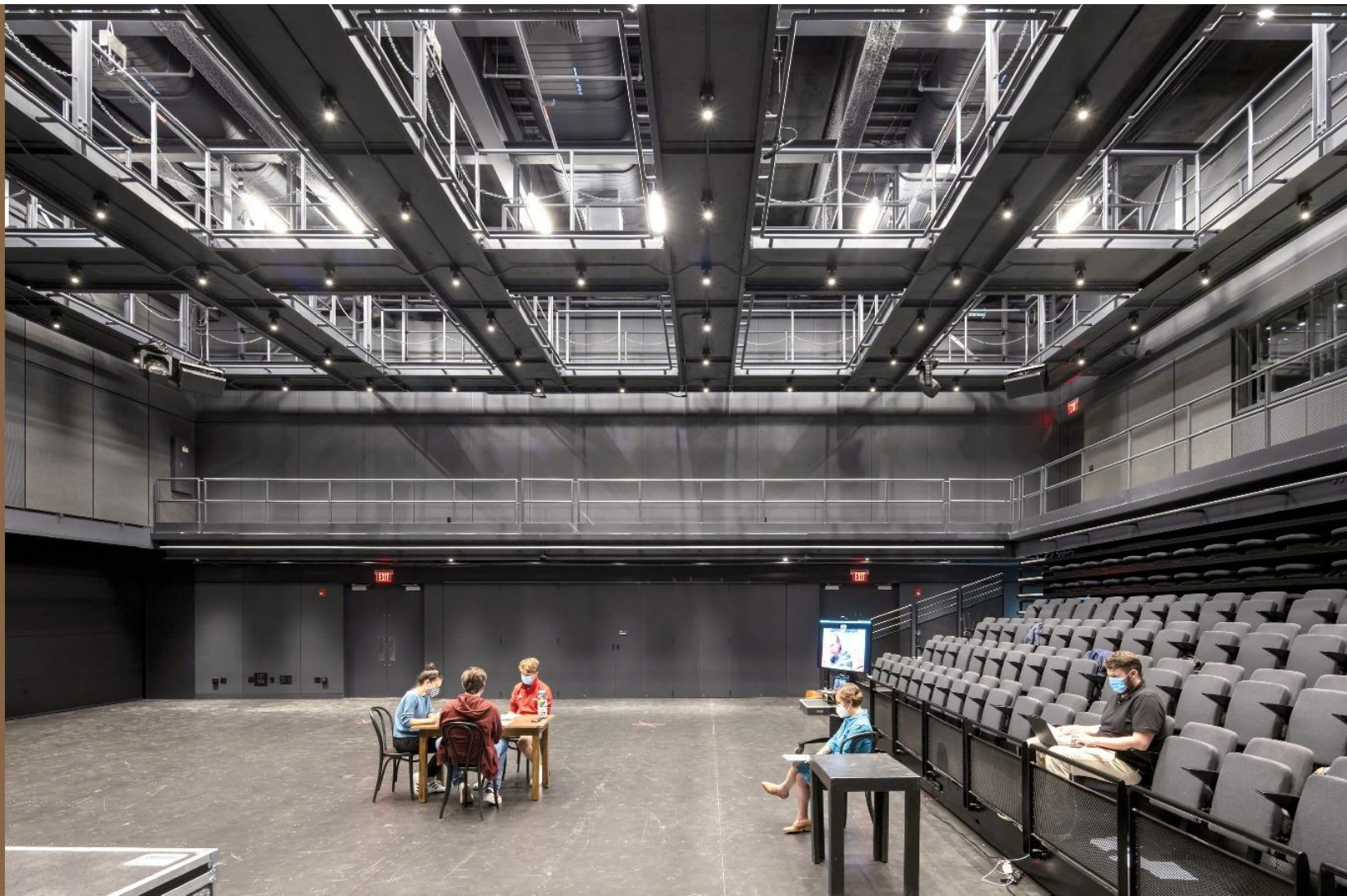
Wasser adds that High Output, the project’s lighting gear supplier, “also added a City Theatrical SHoW Baby

system to the concert hall to control the built-in lighting in the shell clouds. I haven’t had a chance to use it for anything else, but it’s been dead reliable.”

For control, he notes, “We have two new ETC Ion XE 20 consoles, plus an ETCnomad [USB key] and we’re waiting on an RVI [remote video interface]. We’re also using a classic Ion for our lighting design classes, and, fascinatingly enough, a vintage ETC Express 24/48 for the amazing new concert hall—the Ion XE20 is great, but there’s nothing quite like having 50 faders on a console!” He notes that due to supply chain issues, the industry’s current scourge, some of the gear has yet to arrive.

### Concert hall sound

Matt Nichols, principal at Jaffe Holden, notes that the biggest acoustic challenge has to do with the transparency dictum, which resulted in all those glass walls. “The Beehive opens to practice rooms, galleries, and studios, with glass everywhere. It’s a major acoustical challenge. We used a lot of thick laminated glass and box-in-box construction, along with a curtain wall overlooking over of



The Boroughs Theatre is a 200-seat, fully flexible theatre. Located overhead is an extensive catwalk system with an additional layer of rigging steel placed higher up.

the studios and practice rooms.”

Turning to the concert hall, he says the client “wanted natural acoustics. We started with the idea of non-amplified orchestral performing, the optimum acoustical environment consisting of a reverb time of two seconds, for a feeling of warm envelopment; we also needed to have an appropriate room height to support this.” The acoustical banner system supplied by Wenger/J.R. Clancy, he says, consists of “thousands of square feet of banners that can drop down to various settings. The banners are stored for acoustical ensembles, such as symphony performances,” and are lowered in for electronic music of various kinds.

Fisher Dachs installed the banners in the concert hall. Noting that such systems can seem challenging to theatre staff without technical backgrounds, Campbell says, “We didn’t want to compromise the balance between musical theatre and full concert mode. Therefore, the system is motorized. A faculty member can hit a preset for, say, a choral presentation, and the drapes will adjust themselves. They don’t have to think about it.”

Nichols says the walls themselves are constructed of

GFRG, glass fiber-reinforced gypsum, a panelized system designed to replicate acoustical diffusion. They are also designed to look like drapes. “The challenge was how to construct wavy, drape-like materials to reflect and diffuse sound for orchestral performances. It’s a panelized system that we designed to replace a natural diffusor; using a mathematical equation, we incorporated a pattern into the design and tested it in the laboratory to make sure that the panels didn’t resonate, which would not be ideal.”

Another major challenge was something you don’t see in a concert hall every day. “There’s glass on the upstage wall,” Nichols says. To create the desired acoustical isolation, Jaffe Holden came up with a triple-layer solution. “It features insulated glass on the exterior side and laminated glass on the interior with a large, heavily vented, air space between them.” The team also worked to isolate the concert hall from the parking lot outside. “The hall’s rating in NC-15; when you have a space that quiet, any external noise can be detected. We put heavy Plexiglas on the wall; it allows light to pass through and can be blacked out.”

Ben Bausher, associate principal, audio/video, Jaffe

## ARCHITECTURE

Holden, says the loudspeaker system in the concert hall consists of T-Series, d&b audiotechnik's smallest line arrays. "The room is about 50' from the proscenium to the back wall," he says. "It's very wide, but you don't have to put out a great deal of sound to the back of the room." The system is laid out as left, right, and center proscenium arrays with additional units for the underbalcony and fill for the extreme left and right sides. "There's also a distributed horizontal sub array on the catwalk," he says. "I'm a fan of all d&b products; they have a very consistent voicing. Tuning the system is much easier than with others that don't have that characteristic."

Interestingly, sound is controlled using an Allen & Heath DLIVE S7000 mixer. "They have one in each space," Bausher says. "The client wanted a console that supports 96kHz. With it, the theatres can act as live rooms for the

recording studio [located on the building's third floor], being linked to it via Dante. Allen & Heath has been a leader in having 96kHz on its consoles and the dLive had the right feature set, including lots of matrices, channels, and outputs." The audio package also includes a full microphone kit drawing on Shure's ULX-D line. A mixing booth is located at the rear of the room, with space also provided for a house mixing position. "Everything goes into Dante to move the audio around, with portable stage box interfaces for extra inputs," says Rich Gold of Metinteractive, the building's AV gear supplier. "The theatre is wired with panels to patch in audio inputs as needed, and there are patch bays in the equipment racks for maximum flexibility." Because the school already owned a Panasonic projector, a full Crestron control system was also installed, along with infrastructure for a surround sound system.

Photo: Iwan Baan/Courtesy of DSR



Above and opposite: "The idea of the Beehive is that it is transparent to all the spaces facing into it," Campbell says. "You see all this activity going on around you. It's part of a trend to get the arts more integrated with each other. It's all about cross-pollination."

## Studio theatre

The Boroughs Theatre is a 200-seat, fully flexible theatre. "It's a very traditional black-box-style space with a wrap-around gallery on three sides," Campbell says. Adding to the flexibility is a Jezet telescopic seating system that can be set in one of three distinct configurations.

Again, transparency is one of the theatre's biggest features: A motorized 50'-wide by 10'-tall movable garage door that opens directly into the Beehive. "It's a way of capturing additional floor space in the case of, say, theatre festivals," Campbell says. "The Beehive and Boroughs Theatre are on the same lighting network, with one dimmer room. Lighting designers and crew can operate a single larger event using combined controls for both spaces."

Located overhead is an extensive catwalk system with an additional layer of rigging steel placed higher up. "The

client wanted the ability to fly drapes or scenic material within the catwalk system," Campbell says. "This allows them to go directly from the catwalks and anywhere between." In addition, he notes, lighting positions are placed at the gallery level and in multiple levels around the catwalks. A curtain track running along the inner gallery allows for the addition of a surround curtain, creating off-stage actor paths anywhere along the perimeter of the theatre. The lighting booth is large enough to hold classroom instruction.

Nichols says, "We installed an integrated acoustic treatment in the ceiling and incorporated a wood acoustical treatment. The architect wanted a wood look. The wood is slotted and perforated to partially reflect sound back, letting the rest through to the absorptive material located behind it." The Boroughs is outfitted with QSC speakers,

Photo: Brett Beyer/Courtesy of DSR







The costume shop gets plenty of sunlight.



The building also includes various classrooms.

with connections at the stage level and catwalks, and an Allen & Heath DLIVE S3000 digital audio console. Audio gear was supplied by Metinteractive.

### Support spaces and Beehive

Support spaces include a scene shop, costume design studio, recording studio, lighting and set design studios, and multi-use spaces, along with the Iris and Gerald B. Cantor Art Gallery and, of course, the Beehive. “The rest of the building has a lot of transparency,” Campbell says. “There are windows in the rehearsal rooms and shops. The scene and costume shops are open to the outside, separated by glazed windows. The idea of the Beehive is that it is transparent to all the spaces facing into it. This includes the media lab, which is a multimedia space; the scene shop; and classrooms. You see all this activity going on around you. It’s part of a trend to get the arts more integrated with each other. It’s all about cross-pollination.”

Many spaces can also be used as classrooms. Wasser notes that each dressing room is fitted with wall stations, complete with mirrors and lights, accommodating up to 15 people. “But there’s also enough space for a seminar table. We can probably handle a class of 15 or 20.”

The Beehive can also function as a performance space. “It has built-in infrastructure for easy lighting and audio setup,” Campbell says. “The wraparound corridors and a grand staircase have projections that create informal sit-down spots and places to hang out. One of these is set up with infrastructure to plug in lighting and sound controls.” Nichols adds that acoustical felt treatments can be added to control reflections on the surrounding walls.

“The Prior Performing Arts Center is architecturally interesting with its big plus-sign shape,” notes Gold, who worked with project manager Don Ellis and technical project manager Kyle Passaro. “One of the key drivers in our building-wide AV system was that audio and video could be sent from any space to any space. So, for example, a performance in the proscenium theatre could overflow into another space and the dressing rooms could hear and see activities in the center. We created a network infrastructure

across the building so audio, video, and control data flow back and forth everywhere. It’s challenging to move large amounts of this kind of data and to interconnect to the campus network. Networks for AV systems don’t work the same as corporate IT networks do—they’re unique and critical to operations and use very specialized switches.”

In an additional sign of interactivity, Marshall Electronics cameras, mounted in the proscenium theatre, studio theatre, and small rehearsal space, can be routed to displays, such as digital signage in the Beehive, and can stream onto the campus network. Most displays are 55", 65", and 86" Samsung 4K LED monitors and include three digital signage displays in the Beehive. Panasonic projectors in the proscenium theatre work in tandem with a 16'-by-10' Da-Lite screen and, in the multimedia lab, with a large, motorized Da-Lite Wireline Advantage screen.

“The building has a Clear-Com HelixNet system connecting separate four-channel analog party-line systems for each theatre,” Wasser notes. “We’ve brought over some old Clear-Com belt packs/headsets to work with and an eight-channel Eartec wireless comms system. We’ve had that one for a few years now and have been really happy with it—and, actually, we just ordered a second eight-channel set. We’ll be ordering a Clear-Com wireless system over the summer as well, and, once it comes in, we’ll be able to see how the two compare.” Plans are afoot to purchase a stock of Panasonic PT-RZ120 projectors.

Despite the pandemic and supply chain issues, the Prior Performing Arts Center is now up and running. Wasser, talking about a student fashion show held in the Beehive, says, “We opened the garage door from the studio theatre to the Beehive, turning it into a runway. We’ve also done one major theatre department production in the studio theatre, and we used the garage door as an audience entry. It was exciting; we could build a whole front-of-house. The garage door closed at the start of the performance. We were shocked at how acoustically isolating it is. That was really done right.” The spirit of the Beehive, it seems, is alive and well. 📶