

The Mystery BOX

After years of delays, the Perelman Performing Arts Center rises on hallowed ground

By: David Barbour





New York City has many extraordinary performing arts venues, but few come with the complex provenance of the Perelman Performing Arts Center at the World Trade Center (PAC NYC), which opened in September to a chorus of praise after years of false starts. As part of the rebuilt World Trade Center, PAC NYC rests on the site of the 9/11 attack, making it the rare such venue to be erected on hallowed ground. (It sits directly across from the 9/11 Memorial, designed by Michael Arad and Peter Walker.) PAC NYC is also poised to play a key role in the ongoing transformation of the city's Financial District, which has been dramatically reshaped since 9/11. In addition to making a bold architectural statement, PAC NYC is also the latest thing in flexible venues. Two months ago, we looked at Lindemann Performing Arts Center at Brown University, which pushes the flexibility concept to new limits. Two participants in that project—the architecture firm REX and Threshold Acoustics—here working with the theatre consultancy Charcoalblue, have created another, even more inventive, variation on the theme.

Getting to opening day was a long and sometimes difficult struggle, however. Plans for the building were first announced by the Lower Manhattan Development Corporation in 2004. Many visions were articulated, and possible tenants included Signature Theatre, the Joyce Dance Theatre, and New York City Opera. Questions about budgets and designs were debated, with some skeptics insisting that erecting any kind of theatre in a commercial neighborhood with few residents was, in fact, a folly. The original architect, Gehry Partners LLP, eventually departed, leaving the project temporarily in limbo.

However, the new team worked with consulting artistic director David Lan (a longtime artistic director at London's Young Vic Theatre) to envision the building as it is today. Adding momentum were major gifts from the philanthropists Ronald Perelman and former New York Mayor Michael Bloomberg. As construction began, Bill Rauch, best known for his successful tenure at Oregon Shakespeare Festival, signed on as artistic director, with Khady Kamara, previously of Washington, DC's Arena Stage and New York's Second Stage, joining as executive director. And, even as the project underwent various starts and stops, the surrounding area became increasingly residential, creating the opportunity to establish PAC NYC as a vital neighborhood center.

By then, PAC NYC had coalesced into a venue for theatre, music, and dance, especially multidisciplinary work. It opened with *Watch Night*, conceived by the choreographer/director Bill T. Jones, which combined theatre, dance, and opera. December saw a pair of dance presentations: *Is It Tuesday Yet?*, by Jenn Freeman and Sonya Tateh, and *The March*, presented by Big Dance Theater. Coming up

are *Between Two Knees*, a co-production of Oregon Shakespeare Festival and Yale Repertory Theatre; *Like They Do in the Movies*, a solo show written by and starring Laurence Fishburne; *An American Soldier*, an opera by Huang Ruo with a libretto by David Henry Hwang; and *Cats: The Jellicle Ball*, which reframes Andrew Lloyd Webber's musical through the filter of ballroom culture.

Described by the *New York Times* as "the most glamorous civic building to land in New York in years," the Perelman Performing Arts Center packs an enormous amount of functionality into its 129,000 sq. ft. Yet, given its façade of Portuguese Estremoz Luminati marble, the face

it presents to the world is resolutely enigmatic. Joshua Ramus, of REX, uses the term "mystery box" to define it. Thanks to its shapeshifting interior, it has the potential to keep patrons amazed for some time to come.

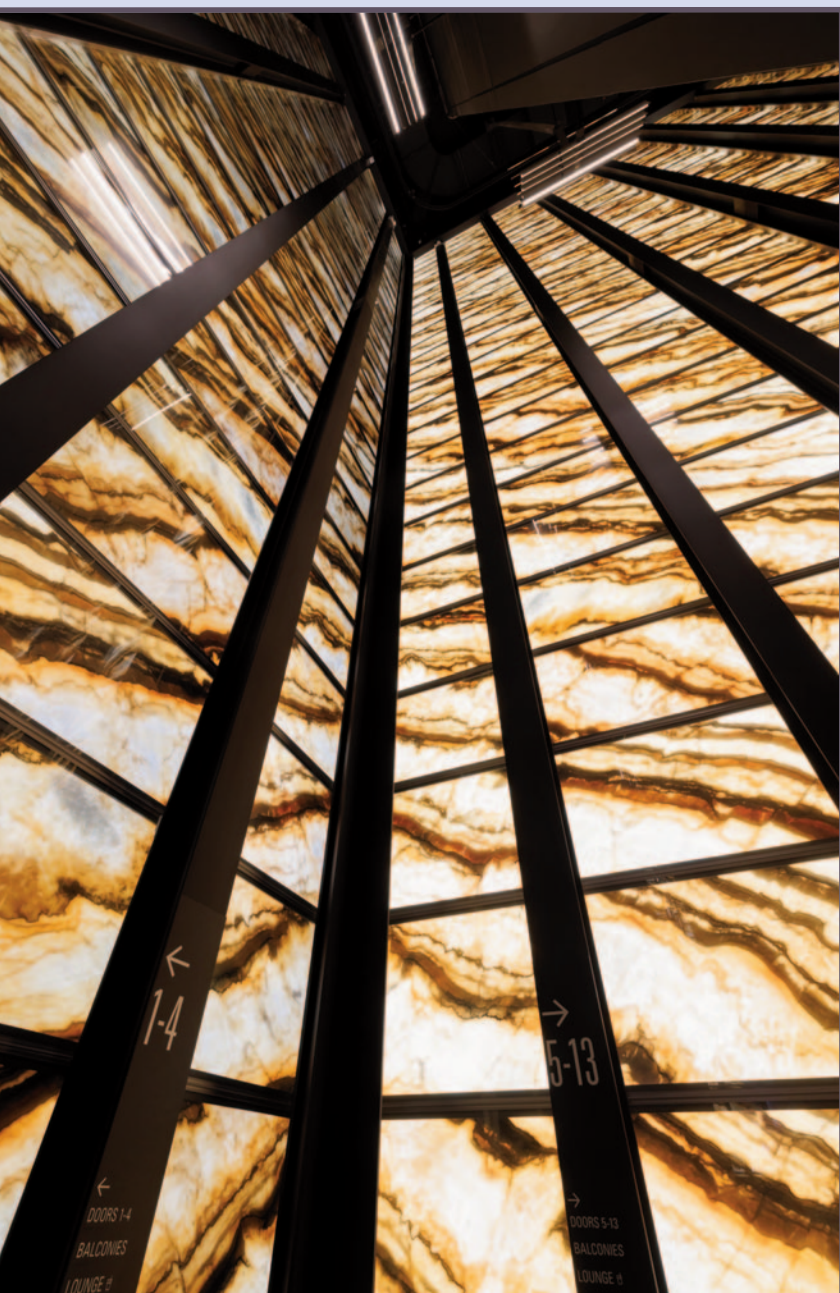
Wrestling with the site

Ramus notes that PAC NYC's design was shaped by a series of "constraints and pressures" inherent in its unique location and mission. Because of the site's tragic history, he says, "Quietude seemed the most appropriate response. We therefore looked for a pure, elegant form that would be deferential to the memorial." At the same time, he adds, "We looked for some manner in which the building could assert itself in a respectful, independent way," especially in the evening, when it, not the memorial, would be the primary point of destination.

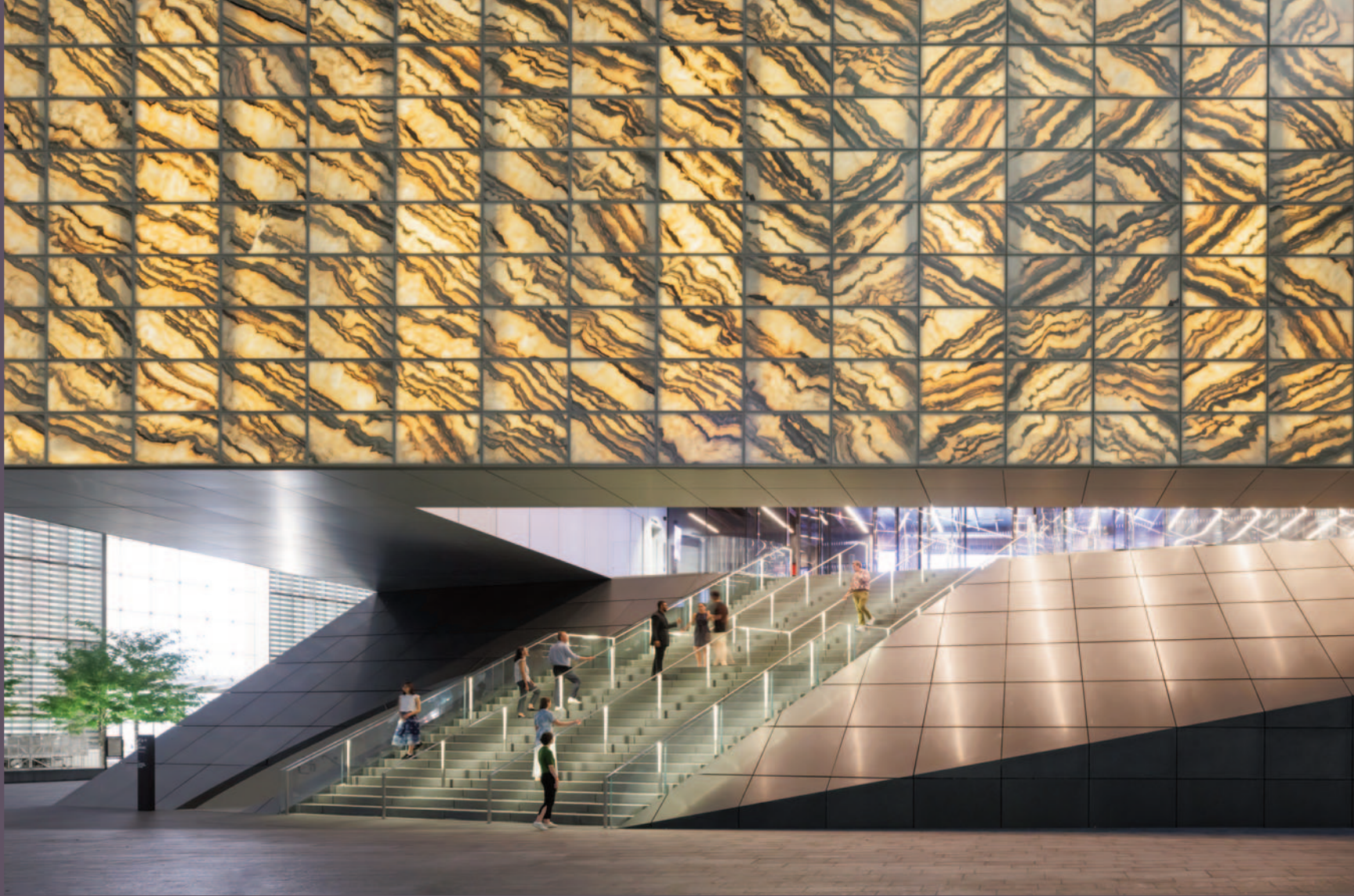
Furthermore, Ramus notes, that the guidelines in the World Trade Center's master plan restricted any obvious signs of commercial activity: "You shouldn't see ticket sales, you shouldn't see the restaurant, you shouldn't see intermissions. The idea of wrapping the building and hiding its contents was a direct response to that." At the same time, the program for the building's interior called for extreme flexibility. "Instead of a building that reveals itself over time," the architect notes, "our focus was a building that mystifies the users more and more. Every time they use it, they encounter a different situation."

The building floats above its site rather like a UFO, with entry via a grand staircase. (Elevators are, of course, available.) "The first 21' above grade and the four stories below grade are programmatically not ours; they're all Port Authority infrastructure," Ramus says. "At the lowest level are the PATH trains that come and go from [the transportation hub] the Oculus, arcing out directly under our building. Above that is the 1 Train [part of the city's subway system]. Above that is a subterranean highway that connects all the loading docks in the World Trade Center site, also at the same level. Then there's a pedestrian connection that goes from the Oculus to One World Trade Center. Finally, above grade is the vehicle entrance in which incoming trucks are searched. They get approved, then travel down an enormous spiral ramp two stories to the subterranean highway."

"At some point," Ramus continues, "not knowing if Gehry's project would be built, [the Port Authority] had to move forward. They took his design at the time and built foundations suitable to support his building. The problem is that the Gehry design spanned the entire site, so the foundations they constructed are on the north and south sides of the site only, assuming the building would bridge over all the infrastructure in the center. However, also based on his design, his loading dock and scene elevator accommodations were built in the middle of the site. When we came along with our building, which is about half the



The perimeter surrounding the three theatres is a soaring 78' space.



The building floats above its site rather like a UFO, with entry via a grand staircase. The marble façade is infused with ferrous oxide. Sliced into very thin panels and sandwiched between panes of glass, it glows at night, thanks to a backlighting system created by Tillotson Design Associates.

size of Gehry's design and has the 'L' of reconfigurable auditoria, we put it in the only place possible for the theatres to access the scene elevator: right in the middle of the site where there's no bearing capacity.

"So, we had to reverse-engineer the structure. Our structural engineers [Magnusson Klemencic Associates] found seven points under our design's footprint where super-columns could thread through all of that operational infrastructure and then spread out like spiderwebs to grab onto anything they could to find, off of which we could bear the building. We resolved these seven super-columns into a massive, occupied plate floating above the site, ringed by a huge belt truss."

Making things even more complicated, Ramus continues, "Our building has two huge performative requirements. First, it's in a high-security blast zone. We had to design the building to meet the Port Authority's stringent anti-terrorist measures for the World Trade Center for explosive threats. The second is that it is built over the five-floor infrastructure mentioned earlier, all of which rumbles—and it's a performing arts center! The way you normally

solve both these problems is with mass—either concrete or heavy masonry—but we don't have the bearing capacity under our building for this. The entire building is therefore fabricated out of steel." This framework, he adds, "created a kind of big bucket that was pretty ideal for implementing a box-in-box construction," a suitable way of isolating theatres from outside noise. "The auditoria float on the interior of that box on 1'-thick, high-density rubber pads. They're isolated from the building and isolated from each other. If you have any two of the four acoustic guillotine walls down, you have perfect sound attenuation between them."

The building's design turns all these challenges into what Ramus calls opportunities for "suspension of disbelief. By virtue of that 21' belonging to the Port Authority, the grand staircase was a given, but we leaned into it," creating a dramatic entry into the lobby. Inside, he notes, spatial tricks help to create a feeling of disorientation. "You circulate the perimeter, which is 78' tall, yet very narrow. Then you go into a sound and light lock [before entering one of the theatres] and it goes down to 8 ½'. As you do so, you enter another world. Disorientation and that sense of dra-



matic compression are age-old architectural tools for creating suspension of disbelief.”

Even the building’s exterior has its transformable qualities. The marble façade is infused with ferrous oxide, which turns it from cream-colored to amber when light shines through it. Sliced into very thin panels and sandwiched between panes of glass, it glows at night, thanks to perimeter chandeliers also illuminating the interior perimeter circulation, created by REX and Tillotson Design Associates. “We developed chandeliers for the ‘safe zone,’ which is the primary circulation space,” Ramus says. “They’re shaped like big chevrons with linear LEDs. On top and bottom, the LEDs are the brightest; they get less and less intense as they get to the center. So, we can throw a uniform level of light onto the stone behind it. That’s what’s illuminating the building at night.”

Pursuing flexibility

Inside PAC NYC are three theatres: the Zuccotti, which seats 450; the Nichols, with 250; and the Duke, with 99. They can be rearranged into 60-plus configurations, accommodating as many as 900–1,000 patrons when fully combined. Explaining the multiplicity of formats, Jon Sivell,

director, of Charcoalblue, says, “There are some fundamental configurations based on the potential combinations of rooms and interstitial spaces, which we refer to as ‘scene docks.’ The possible matrix of room combinations is 12. Within that, you have various arrangements of seating and stages and some fundamental formats like the end stage. But there are many variations on those formats.”

For example, Sivell says, “The Zuccotti Theater has two fixed balconies at the north end that partially wrap around the east and west sides. But the room also has 4 three-level mobile seating towers that can either complete the circle for an in-the-round setup or rest flat against the sides to extend the side balconies in a traditional horse-shoe arrangement.” In addition to parterres that are semi-permanent, the bulk of the seating, supplied by Kirwin and Simpson, can be affixed either to the Staging Concepts/Sightline decking system, to Gala lifts, or to the seating towers by Hudson Scenic, depending on their locations. Gala, Sivell adds, supplied “a series of lifts in somewhat unusual shapes, which allow the room to adapt to the in-the-round format.”

“Really, we’ve given them a kit of parts,” says Jerad Schomer, director, of Charcoalblue. “It allows an artist to



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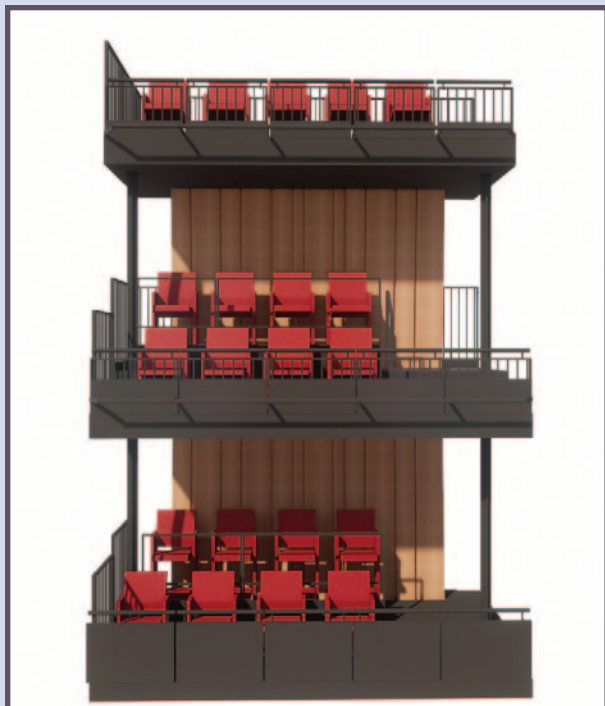
configure the venue in an infinite number of ways.” Such flexibility comes with certain demands, he notes. “It’s not done with push-button automation. You don’t walk into the venue, push the master control, and it goes into configuration number 35. It’s a lot of manual handling and that’s by design. The idea is to give true artistic freedom to companies and directors for creating a relationship between performers and audience that suits the work they’re doing, and the audience and venue size they want.” Sivell adds, “There are double guillotine acoustic doors that raise and lower between each space; you have four acoustic doors in total that do the divide-and-combine functions.” A fourth space on this level is for rehearsals and technical support.

Schomer notes that a variety of rigging solutions are employed. “The permanent grid in the Zuccotti aligns with the grid in the Nichols and a pipe grid in the Duke that also aligns with the demountable catwalk lighting datum in the adjacent space.” Schomer adds, “One big thing, from a combined venue standpoint, is that each of the two larger spaces has a double-level grid system with catwalks for lighting and sound below and a fully walkable grid for

scenery rigging above. The catwalk levels are different, but the grid levels align.” Chicago Flyhouse supplied automated point hoists, multi-line pipe hoists, and some chain hoist control as well; the company also supplied the demountable catwalk system, based on a modular truss structure.

Each space has plenty of lighting and audio positions, notes Eric Furbish, senior consultant with Charcoalblue. “In each of the scene docks is a handful of system pipes, and all of the sidewalls of the theatres have Unistrut channels, so basically anywhere they want to mount something, they can.” Also, located on the sides of the demountable catwalks are flipping outriggers that provide additional lighting positions. Schomer adds, “One proof of the rigging concept is that when the Nichols is acting as the stage house for the proscenium-style theatre, you can completely remove the lighting catwalks and have a full stage house at the same height as the grid in the Zuccotti.”

Schomer adds, “What’s atypical about the balcony lighting bars in the Zuccotti is all their hardware is demountable. You can strike them off the balcony faces if you need to. You can also take components off the mobile



Above: The Zuccotti Theatre has 4 three-level mobile seating towers that can complete an in-the-round setup or rest flat against the sides, extending the side balconies to make a horseshoe arrangement. Opposite: A map showing the layout of the theatres plus a fourth space used for rehearsals and technical support.

seating towers. We tried to standardize the hardware, so we used a lot of Unistrut fittings. The idea is that some pieces might be left in place 99% of the year but, for that special show, you can take pieces of the interior away.

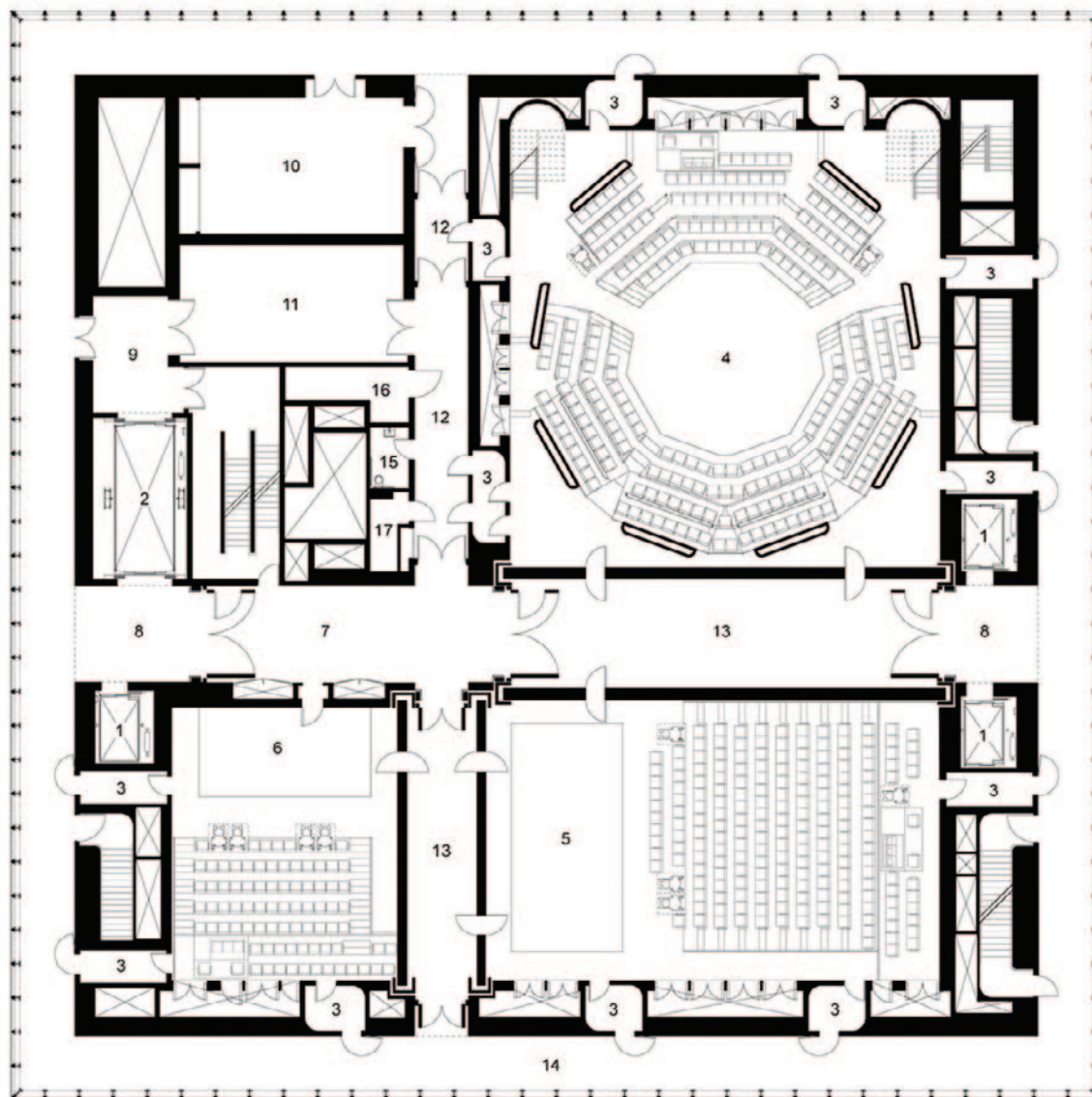
“With the moving architecture of the towers come electric services that need to be wired up,” he continues. “This is generally provided by custom cable looms from the grid. The towers themselves are patched into the lighting system through boxes placed at a high level. There are full AV services on the tie-ins for loudspeakers, microphones, video, projection, whatever they need for any of these configurations.” Sivell notes, “Each tower is on an air caster system that uses compressed air to move across the floor. They go fairly effortlessly, but they need a full-size crew of, I think, six people to control the movement and guide them into place. In addition to lighting and AV power, the towers are fully set up with sprinklers, so when they get moved into place, they need to be connected to the fire safety system.”

The lighting systems, Furbish says, are set up for “a mixture of incandescent and LED lighting, although mostly LED at this point. The Zuccotti has six dimmer racks, partly with ThruPower modules so they can switch between relays or dimmers if they choose. The rest are relays.” Barbizon Lighting supplied an ETC equipment package that includes Paradigm architectural lighting control, Sensor 3 dimmer/relay racks, Sensor IQ and Echo relay panels, electrical distribution boxes and connector strips, BlueSystem running lights, Response DMX distribution, and Source

4WRD house light engines. Also featured in the Duke are Aquarii Axceleron downlights centered within the openings of the pipe grid. Tobin Neis, of Barbizon, says, “The network was engineered to give the greatest amount of flexibility to the site staff to ensure that while there is a cohesive lighting network between all the various space possibilities, operating these spaces together when needed and independently when required are paramount.” (Barbizon also worked with Tillotson Design Associates on the lobby and façade lighting. “The system employs an astronomical clock coinciding with sunrise/sunset throughout the year as well as override capabilities for the building staff for special events,” Neis says.) Barbizon’s Tom Luczak (senior system integrator) and Stephen Call (project management supervisor) worked with Sciame Construction, LLC and installer Solar Electric.

In addition, 4Wall Entertainment supplied a performance lighting package that includes 245 ETC Source Four Series 3 X8s with XDLT shutter barrels, 25 ETC ColorSource Spots with EDLT shutter barrels, 25 ColorSource Spot Deep Blues, 35 CHAUVET Professional COLORado 3 Solo LED wash units, 35 ETC Fos/4 Panel Lustr X8s, six High End Systems SolaWash 1000 Ultra-Brights, 12 High End SolaFrame Theatres, Chroma-Q Color Force IIs, two Lycian M2 followspots, and one Look Solutions Touring Unique 2.1 hazer. Control is provided by an ETC Eos Apex 10 console.

Dressing rooms are located one level below the theatre; they include two chorus rooms, four rooms that can



- 1 Elevator - passenger
- 2 Elevator - scene
- 3 Sound and light lock rooms
- 4 John E. Zuccotti theater
- 5 Mike Nichols theater
- 6 Doris Duke Foundation theater
- 7 West cruciform
- 8 Elevator lobby
- 9 Antechamber
- 10 Rehearsal room / lounge
- 11 Production zone
- 12 North cruciform
- 13 Theater scene dock
- 14 Perimeter circulation
- 15 Restroom
- 16 Bar storage
- 17 Janitor's closet



THEATER LEVEL

+367'-0"

0 10' 20' 40'

The Living Room

The architect and theatre scenic designer David Rockwell has often described the importance of the “reveal” when working on new restaurants. A theatrical entrance, he feels, is intrinsic to the patron experience. Indeed, the PAC NYC offers a richly dramatic entry, via the grand staircase, leading to the lobby and restaurant areas. (Of course, elevators are available, but we recommend the stairs to get the full theatrical value.)

“I was thrilled to get the call about the project, for

marble box and how we would welcome people into it.” Interestingly, he adds, “We realized pretty quickly that the ceiling was the welcome mat, the element that would greet you as you are coming up the stairs. We used that to organize the ground floor and create a warm embrace of a space; it’s kind of like the soft underbelly of the stone building.”

At the same time, Rockwell notes, “We knew there were problems to solve.” For example, “Access to the building is north/south, through the big cross-bracing; we knew that the restaurant would also lay itself out north/south, ending with the small terrace in the back. But, during showtime, audience members have to move east and west to get to the theatres on the higher levels. To create cross-circulation that would lead to the elevators, and responding to the theatres’ flexible construction, he decided “there would be no solid walls between the restaurant and lobby bar, other than furniture groupings to create rooms within rooms. For example, the little stage in the lobby has banquettes that create a mini-amphitheatre, and the restaurant has a series of banquettes around the perimeter and back-to-back banquettes around the bar, which is in front of the kitchen.”

Commenting on the striking ceiling, made out of Sapele wood, he adds, “It’s a series of [internally illuminated] ribs that sit on perforated metal with sound absorption above it. It became the lighting for the space; also, the visible architecture of the ceiling, which dips down toward the walls, which are stacked felt, is a soft counterbalance to the hard materials found in the building.” (Carl Giegold, of Threshold Acoustics, adds, “The ceilings in the lobby and restaurant have acoustic absorption above the perforated metal that spans between the sapele ribs. It keeps loudness under control in what are relatively low-ceiling spaces that would otherwise overload when packed with people and/or presenting amplified music.”)

The restaurant, Metropolis by Marcus Samuelsson, brings the celebrity chef downtown from Harlem. But, in addition to fine dining, the lobby is open all day, offering drinks and snacks; it can function as a place for meet-



many reasons,” Rockwell says. Indeed, he was a kind of first responder to the site in 2001, working with the architects Kevin Kennon, Liz Diller, and Ric Scofidio to design and raise funding for a viewing platform soon after the original World Trade Center was destroyed. (The platform’s success in creating a dignified way of experiencing the tragedy arguably helped set the stage for the 9/11 Memorial.)

“I was asked to think about [PAC NYC’s] elevated ground floor, looking at how to integrate a restaurant,” Rockwell says. “There were so many concepts about how a restaurant might fit into the flow of people. It was a chance to think about this beautiful, pristine, glowing

each accommodate four performers, and several more that accommodate one or two. This level also contains a green room and musicians’ dressing room. A vocal warmup room is fitted out with extra acoustic isolation, allowing it to serve as a recording studio; it can also be used as an offstage space for musicians if, for example, a band is too large for a theatre or if certain instruments need to be separated from the rest.

Because of the flexibility on offer, Sivell notes that Charcoalblue “built a full sightline model” that “includes all the configurations, so production design teams can previusualize” how their designs will fit into the designated space. “We developed the software using the Unity engine,” he adds. “It can be run either in a VR headset or on a desktop format for display on a laptop-type screen. It’s a tool that allows you to change room combinations to



Left: The restaurant Metropolis by Marcus Samuelsson. Above: The lobby. The ceiling, made out of Sapele wood, “is a series of [internally illuminated] ribs that sit on perforated metal with sound absorption above it,” Rockwell says. “It became the lighting for the space; also, the visible architecture of the ceiling, which dips down toward the walls, which are stacked felt, is a soft counterbalance to the hard materials found in the building.”

ings, a spot for a quiet glass of wine, or a chance to enjoy music thanks to a built-in lobby stage. “Our goal was to have it be a space that people want to return to,” Rockwell says. “The National Theatre in London is amazing in many ways, including its many spaces to gather and have a conversation before or after a show. It was so great to contribute to a building that provides a version of that.”

The Lobby Stage is equipped with d&b audiotechnik E-Series loudspeakers (E8, E6, and E12-X units), a Yamaha

QL1 console, and ETC lighting gear. The program is eclectic; the January lineup includes jazz saxophonist Augie Bello, jazz artist Stéphane San Juan, DJs Monolithic and Peter X, and several dance programs.

Indeed, says Jared Schomer, of Charcoalblue, the lobby space is also meant to be “a gathering place for everyone to mingle and decompress after the show. It is as much for the performers as the patrons. That’s very much baked into the building’s DNA.”

understand, as an end user, how the building works. It can help them understand what the kit of parts can offer as a baseline, inspiring their thinking from there.”

Acoustics for flexible spaces

Carl Giegold, of Threshold Acoustics, cites the “multiplicity of configurations” as the big challenge in designing the theatres’ acoustics. “When there are so many ways to

place the performers and audience in relationship to each other, how do you ensure a uniformly positive acoustic experience? It’s really a brain teaser on many levels.”

First, however, he and his team had to deal with the acoustic isolation cited above by Ramus. “The building is so structurally challenging because the foundations were already there and there was a limit to what they could hold in terms of the building’s overall weight,” he notes. “We

found these seven locations for the bulk of the weight, the super columns. We decided it was neither practical nor necessary to isolate the public and back-of-house spaces—the lobby, the kitchen, etc. The theatres needed to be isolated from that, and they needed to be isolated from each other. So, we conceptually made each theatre an independent structure and isolated each from the superstructure of the building and each other.”

Therefore, he says, “It’s as if we put three separate buildings, each of which is isolated on a network of rubber pads, about 1' thick, right next to each other inside the overall superstructure.” The pads work so well that, he says, “I don’t know that anyone has ever noticed that trains are running underneath.” (A recent visit to the theatre confirms the lack of transportation noise.) “It’s an elegant and simple concept, but the devil is in the details. Like any building, they have to be resistant to lateral forces, like wind loads and seismic forces. Being supported on rubber pads, they can move a bit, along with the whole building, in response to wind loads; they must be resiliently braced so the three theatres don’t move too much and collide with each other.”

The theatres are located 2" apart. “Each theatre’s perimeter walls are two separate lines of studs and dry-wall,” Giegold says. “One line is on the theatre side of the isolation joint, and the other is on the superstructure side. That 2" gap is what separates the floating theatres from the rigid superstructure.”

When it comes to conceptualizing the acoustics of each theatre, Giegold takes a theoretical turn. “Our cultural expectations, certainly in the West, were developed indoors. Everything, from Habsburg Empire ballrooms to the concert halls of today, depends on a sense of acoustic enclosure. However, our hearing got to be so exquisitely accurate outdoors, in more diffuse environments. This is a duality we live with and there’s a balance we need to achieve in our architecture that acknowledges it. In the Perelman, we had to respond to the fact that we couldn’t nail down exactly where the stage would be, or how the audience would be arranged. We started to think about the most forgiving environment we could create. The acoustic metaphor for the interiors became a clearing in the forest.”

If the concept sounds surprising, it comes with many advantages, Giegold notes. “It’s a boundary-less environment and it’s made of objects in space, such as tree trunks, branches, and leaves. They’re objects of different sizes and different textures; the scale of tree bark is different from tree trunks, and the trees are spaced apart at different distances. Sound created in that environment gets reflected and shaped by each of those differing scales scattered as they are through space—perfect diffusion.”

Using these ideas as guides, Giegold says, “We distilled this thinking down to developing a screen that consists of objects in space, in front of a hard surface.” To create the



The March, a dance piece, made use of the in-the-round configuration in the Zuccotti.

diffusion, he adds, “We needed something that would be relatively straightforward to fabricate. Walnut became the material of choice and, working with REX, we developed a plank system that could be shaped on a large router. The dimensions between the planks and the walls behind them ranged from 8" to several feet; we allowed for three different plank profiles which can be inverted to yield six possible plank types. These are mounted in singles, pairs, and triples. The textures essentially correspond to the scale of bark on a tree. The groupings of the planks could be compared to the difference in the sizes of tree trunks. The slots between the groupings, which also vary in width, allow some of the sound energy to bypass the walnut surface and get reflected off the back wall. Not all that energy comes back through the screen after reflecting from the wall; some of it gets re-reflected off the back of the screen and hits the wall again. There’s this very slow release of energy into the room. We’re basically scattering sound in time as well as in space.”

The patterns of the walnut diffusion surface were developed, Giegold says, using “an algorithm that we had written ourselves in MATLAB software; we analyzed, I think, 50,000 different options with REX by our side, making aesthetic judgments. We’d generate a version; if the acoustic data fell within a certain range of acceptability, it got put into the ‘good’ pile, which we whittled down from there. Then we’d feed the good ones back into the program, saying, ‘Give us another 200 having these parameters.’ We’d run more analyses iteratively, always keeping the best performers. We did this thousands of times. Eventually, we got to one mathematical model that did exactly what we wanted and met REX’s aesthetic requirements. Then we built a half-size mockup and tested it to make sure it matched what the computer was predicting. With that proven, we had five full-size panels made, each 5' wide and 9' tall; we played music, using our staff as musicians, and we had spoken performances. We listened with REX, PAC NYC, and Charcoalblue to be certain we saw and heard what we wanted before committing to it as part of the design. It was a two-year process to develop this diffu-

sion. We were essentially designing the design process while using the design process to develop the design.”

“What we found,” he says, “is the room is as friendly for amplified music as it is for unamplified voice and music.”

Additional flexibility is provided by a banner system, developed by Chicago Flyhouse, that can obscure the walnut in the upper volume of each theatre, but the theatres’ acoustics are heavily driven by the system described above. Noting that Threshold explored a not-dissimilar scheme at EMPAC, the performing arts center at

boxes from the V-Series [V8s, V10ps, V12s, V-Subs, and SL-Subs]. The Lobby Stage [see sidebar] is based around E-Series boxes, with some of the smaller boxes hidden in the mesh ceiling. d&b has been a great partner throughout, reviewing designs and offering advice. Part of what’s exciting is having DS100 Soundscape processors, which allows the PAC to do object-based mixing. Bill Rauch is very excited about the idea of the Nichols and the Duke as a sort of sound designer’s laboratory, where they can do experimental immersive work.” In addition to the gear

already mentioned, the rig also includes M4 and M6 stage monitors and 10D, D20, and D30 amplifiers, plus DS10 network bridges for the Soundscape system.

Audio control is provided by Yamaha RIVAGE PM5 and PM3 consoles supplemented with a mix of RPIO and RIO stage boxes. Effects playback is handled by Apple Computers, set up with Figure 53’s QLab software, and RME interfaces. Additional audio gear includes Shure Axient wireless mics plus a wide range of wired mics, Shure’s P10 in-ear monitors, and Aviom personal mix systems for pit musicians. Also featured is an extensive Riedel communication system made up of an MFR-128 Artist mainframe; RSP-1232HL, DSP-2312, and RSP-1216HL SmartPanels;

Director and MediorNet software, and C3 wired and Bolero wireless belt packs. Williams AV assisted listening and audio description systems are available; captions can be provided using GalaPro controllers and software.

Following the kit-of-parts concept, Loar says, PAC NYC is outfitted with “strong video tools” that include Panasonic PT-RQ35K, PT-RQ13K, and PT-FRQ50 projectors; the units’ noise is controlled using Vicom projector whisper boxes.

The AV network includes Luminex and Netgear network switches, the former providing the backbone and the latter used for smaller, flexible connections such as the stage managers’ desks. Video capture is handled by Marshall CV Series cameras and sent to Samsung 32" displays in the dressing rooms. Also featured are AJA Kumo matrix routers, AJA Ki Pro recorders, Kona 4 capture cards, Blackmagic SmartView and MultiView monitors, and Kramer multiviewers and distribution amps.



Above: PAC NYC opened with *Watch Night*, which combined theatre, dance, and opera.

Rensselaer Polytechnic Institute in Troy, New York, Giegold adds that his project came with plenty of unique complications. Still, the extensive testing process gave everyone confidence that it would work. “It was an organizing idea in the room’s interior design; it was something more than just applying a treatment.” Testing, he adds, “allowed people to understand the rooms before they were built. The diffusion was integral to how we collectively thought about the rooms right from the start.”

AV systems and ancillary spaces

Josh Loar, senior consultant at Charcoalblue, says, “The theatres’ PA is based around d&b audiotechnik gear. Given the flexible format, we again went with the philosophy of a kit of parts, providing a range of options, allowing them to accommodate many different configurations. We have a bunch of xS-series [8S and 44S] point-source boxes plus units from d&b’s Y-Series [Y10Ps and Y-Subs] and array



The mechanical room.

The building's program and paging system includes JBL Control 23-1, Control 128WT, and Control 25 speakers plus Bosch LB1 Series units and Amina LFi4eMT hidden in-wall speakers. DSP is provided by Symetrix's Radius NX Series processors.

Digital signage throughout the building is handled by a TriplePlay TPS0750 server and PLAY3R-SP1 media players, delivering images to Samsung QH55R, QM43R, and QM65R displays. The video wall in the lobby consists of Mitsubishi Diamond Vision XL-Series panels in a custom 4K+ aspect ratio. The discreet exterior video pylons, designed in keeping with the building's glitz-free exterior, are ElationLogic weatherproof displays. "The TriplePlay system allows a huge range of flexibility in how they promote upcoming productions and coordinate live feeds from the stages," Loar says. "They can take over the entire venue with any kind of content, and they can control the system flexi-

bly via an iPad."

Schomer notes, "There's a hybrid flexibility throughout the AV connections. They've got analog and network lines as well as fiber lines throughout much of the building. They can manipulate signals in whatever way they choose around the three venues, in the lobby, and in other spaces. He adds, "At one point in the planning process, the building was going to have a dedicated broadcast control center. It ended up getting taken out as a dedicated space, but the existing infrastructure allows them to set up a temporary broadcast control position in several locations, and to park a broadcast truck outside."

With its eclectic premiere season and architectural interest, PAC NYC is already attracting crowds downtown. Creating a new hub in an area of the city where none existed, it may remake the map of New York's performing arts community. 📶