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The Rady Shell at Jacobs Park:

San Diego's New Music Venue

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Music by the Bay

The Rady Shell provides the San Diego Symphony and the concert touring market with a stunning new venue

By: David Barbour

"A new reason to be proud of San Diego." So says the website for the Rady Shell at Jacobs Park, and it's a point that's hard to argue with. Having opened on August 6, it gives the San Diego Symphony a new outdoor venue that has been compared to the Hollywood Bowl; it arrives at the perfect time, providing audiences with a safe place to hear music. "It was planned before COVID, but became prescient with the timing," Martha A. Gilmer, the symphony's chief executive told the *New York Times*. "We just decided we're going to stay outside and do the fall concerts outdoors."

The venue opened with a flourish, beginning with a new fanfare composed by Mason Bates. According to the *Times*, "The projected image of the orchestra's music director, Rafael Payare, instantly recognizable to this crowd, filled a scrim raised nearly to the top of the 57'-high stage. After a few build-up-the-tension moments, the scrim dropped to reveal Payare and the orchestra, ready to play. That drew the first of many standing ovations."

The $85-million project, which replaces a temporary venue at Embarcadero Marina Park South, a narrow piece of land jutting out into San Diego Bay, represents a major upgrade for the symphony, which previously offered summer outdoor concerts in rather more temporary conditions. In addition, it looks to become a prime concert-touring destination, having already hosted Gladys Knight, and with Jason Mraz, Bobby McFerrin, Pat Metheny, and The Indigo Girls on the calendar; other offerings include tributes to classic record albums like Pink Floyd's *The Dark Side of the Moon* and The Beatle's Abbey Road as well as a concert presentation of the Broadway musical *Chicago*.

The Rady Shell is the fruit of a collaboration among Tucker Sadler Architects, theatre consultants Schuler Shook, sound consultant Shawn Murphy, and acoustical and technology engineering firm Salter, as well as other specialists. It was an unusually complex project that required the expertise of many contributors. Greg Mueller, design principal and CEO, Tucker Sadler, estimates that 136 professionals in varying disciplines contributed to the project.

Photo: Courtesy of San Diego Symphony

Working on the constrained footprint and keeping in mind that the promenade around the venue had to be not only maintained but expanded, Tucker Sadler worked to pack in many amenities into a small space. ("The Shell is very carefully, surgically positioned on this site in the harbor," says Josh Grossman, consultant, Schuler Shook). In addition to the covered stage and back-of-house facilities, the venue includes a behind-the-stage patio, flexible seating on 1.25-acre site that can accommodate up to 10,000 audience members, terraced seating with unobstructed stage views, new public restrooms, an expanded public promenade, environmentally sustainable landscaping and trees, and sand-based synthetic turf (in the main seating area and pre-event spaces) designed to reduce water consumption. A dual staircase provides direct access to audience seating; stairs are formed by architectural-grade white concrete retaining walls treated with a lighting wall wash. The adjacent Prebys Plaza is a 12,875-sq.-ft. open-air dining area. Beneath it are 64 permanent restrooms and first-aid rooms, plus office space.

The Rady Shell stage features concentric widening oval rings as its canopy, a structure that reaches a height of 57' and a width of 92' at the front of the stage, which spans 4,800 sq. ft. Working with Tucker Sadler, Soundforms, the British designer and manufacturer of tensile performance structures—and its partners Flanagan Lawrence, Expedition, and ES Global—expanded its mobile acoustic performance shell to accommodate a large orchestra with chorus and soloists. Australia-based Fabritecture oversaw technical design, fabrication, and installation of the tensile structure and backstage support spaces. The shell structure also features 3,386 individually controllable Traxon LED nodes for artist-programmed light shows. Horton Lees Brogden was the site's architectural lighting designer.

Schuler Shook's Grossman says, "We worked from the start with Soundforms and Tucker Sadler on figuring out how to integrate [the tensile structure] into the challenging site and designing buildings that wrap around the shell, providing the production and artists with support spaces."

Mueller says, "We looked at other venues, including Tanglewood and the Hollywood Bowl, before ultimately choosing to go with the Soundforms mobile shell structure. We previously used a tensile fabric at the San Diego airport expansion and rental facility. Also, the local convention center has a sail pavilion using tensile-style fabric; it does very well in the salt air of the San Diego bayfront. We were also looking for something that would be cost-effective and have a uniqueness when illuminated.

"We started with the fundamental design of a smaller performance shell that Soundforms previously developed," Mueller continues. "But it was evident that their shell wasn't big enough. We expanded the shell and its side portions to meet the needs of the venue, using as a model a nautilus shell which [the medieval mathematician] Fibonacci did his numbers sequence to. That's why the shell canopy feels like it belongs on the bay. Fabritecture worked with us and created the structure, which is steel truss, and helped with the design of the fabric, getting it to the size that it needs to be over the truss." He adds that the canopy consists of three components: polytetrafluoroethylene (PTFE), a Teflon-based outer fabric, polyvinyl chloride (PVC)-for the perforated inner liner of the shell, and ethylene tetrafluoroethylene (ETFE), a lightweight clear fabric at the back of the shell.

The six surrounding towers were similarly conceived. "They were part of the design from the beginning," Mueller says. "But as Schuler Shook gave us additional requirements, the towers grew, increasing in diameter to support the speakers and lighting that would be placed on them. Each tower is a nautilus shell, twisted 4.5° every 18". The design has a nice rhythm of its own, paying tribute to the site and using nature to do it." In another nature-inspired touch, he says, "The multicolored blue glass on the sides of the shell and the support spaces is also done in a Fibonacci sequence."

Mueller notes that the site posed numerous challenges. "Getting everything out there and having it arrive on time with the pandemic slowed us down a little bit. And the soil was not as good as we originally expected, so we had to put in caissons for the stage and seating area to land on. Now it's one of the safest places to be in California."

Staging Concepts fabricated a system of 92 platforms for the orchestra and seating risers. Designed by Schuler Shook, the system is comprised of Staging Concepts' SC90 single-sided, portable platforms, which can be reconfigured or removed as needed. Built using structural plywood with black polypropylene surface laminate to resist scuffing, they are also lightweight and engineered to withstand the San Diego heat. Certain platforms were custom-designed to match the beauty and elegance of the shell structure. With the platforms, Grossman says, "The stage can be configured for a full orchestra and chorus or for a full orchestra to be set upstage behind a headliner."

In addition to the portable platforms, Staging Concepts also provided 6,000 red chairs to give the venue a bit of color, plus 288 table attachments in select seating areas. These customized extensions offer a convenient surface for refreshments and event programs. The tablets fold away when not in use or may be removed altogether. The company also created carts for transporting platforms and seating attachments to and from the site.

Onstage, Grossman says, "Catwalks are built into the shell, and the lighting positions are accessed from them." Achieving those positions took some figuring, he adds. "There isn't a right angle or a flat plane anywhere in that structure. We wove lighting positions into it around the built-in acoustic devices. All of them have precise positioning requirements. We were fortunate to have a really con-

The Rady Shell stage features concentric widening oval rings as its canopy, a structure that reaches a height of 57' and a width of 92' at the front of the stage, which spans 4,800 sq. ft.

Photo: Courtesy of San Diego Symphony

structive relationship with the symphony's technical director, Jason Rothberg. He's also their in-house lighting designer."

Grossman adds, "Wenger provided all of the rigging and controls, including motorized cable reels for the amplification mics over the stage and [Meyer Sound's] Constellation [system]. The rigging system also deploys high-capacity hoists for the LED video wall. There are three positions: downstage, midstage, and upstage," allowing for different stage configurations.

Acoustics

Jason Duty, senior vice-president, Salter, notes that his colleague David Schwind was originally tapped for the project by Murphy. (Murphy came to the project through his long professional association with Martha Gilmer.) When Schwind retired, Duty took over, focusing on acoustics while Tom Schindler, also of Salter, dealt with AV, telecommunications, and security systems.

"Once it was identified that a Constellation system was being used, the idea was to make a space that wouldn't cause problems for it," Duty says. "We wanted to give some natural early reflections back to the orchestra. We also dealt with the mechanical system noise and plumbing noise, to make sure it doesn't bleed onto the stage." (Among other things, a kitchen area sits adjacent to the playing area.) Of course, given the location, there is plenty of ambient noise: "Navy vessels and helicopters go by, and party boats, including a modern version of the old New Orleans steamer that it docks almost right behind the stage."

The canopy, Duty says, is "a big steel structure with outer and inner scrims. Between these are lighting, catwalks, and access ladders. A secondary structure, consisting of an Unistrut grid, holds up the acoustical system that we specified. A mixture of absorptive, reflective, and diffusive panels was put there." The lower panels are reflective and diffusive, with a checkerboard pattern of absorptive and reflective panels above that and all absorption at the top.

Production audio and video systems

Reviewers and audience members alike have commented on the Rady Shell's high-quality sound, comments that are

surprising given the venue's location next to a busy waterway and near an airport. The impressive result was the work of many hands: In addition to the Salter team, Murphy has been the scoring mixer on hundreds of films, including the forthcoming *West Side Story*, directed by Steven Spielberg. "I was the symphony's traffic cop in the audio department," he says. "My background is in theatre technology; I advised them on a route that would be beneficial for the musicians and good for the symphony as a rental facility. I advocated for Constellation and the main reinforcement, which is a film-style surround system." He also collaborated with Francois Desjardins, of Solotech, provider of audio and video gear and AVL infrastructure.

Murphy notes, "The structure is unusual. We had to think about potential acoustic effects. The canopy's outer layer is weatherproof, but the inner is acoustically trans-

The Optocore System

Brandon Coons, of Optocore, explains the audio networking system of the Rady Shell:

"Solotech's approach to this system builds on their previous success designing and building systems for Cirque Du Soleil's Las Vegas residencies and the National Arts Centre in Ottawa, Canada. These installations required state-of-the-art technology and forward-thinking designs; to accommodate the massive channel counts and data that needed to be distributed freely around these venues, Optocore fiber optic networks were deployed. For San Diego, 2GB Optocore networks capable of up to 1,024 channels and 24 network IDs were implemented throughout the outdoor concert hall.

"The facility has two Optocore rings running in parallel: one for the DiGiCo consoles and SD-Racks at the stage inputs, the other purely for Optocore units that carry the PA inputs and distribution, tie lines between locations, and stems from the stage racks for recording. The DiGiCo network consists of SD consoles at the front of house and monitors and three SD racks in their own cases that can be deployed as needed.

"At the heart of each system is an Optocore AutoRouter that actively monitors each fiber connection plugged into the unit for light data. As soon as a rack or console is connected to a remote patch point, the AutoRouter reconfigures the network matrix to maintain a redundant star topology to all active nodes. This ensures that all active devices always have full connectivity, and the techs on-site don't have to worry about jumper cables or manually connecting patch bays. Optocore units in fixed racks are always connected to the AutoRouter and constantly stream through hardwired installed fiber. Mobile connection points around the facility—including front of house, monitors, stage left, and stage right—can be activated simply by plugging in a rack.

"Each of the SD-Racks has a local Optocore DD4MR-FX MADI unit, which takes a split of the front-of-house system's main inputs and routes them straight off for archiving and recording purposes. Each of the DD4MR's MADI BNC ports can transmit or receive up to 64 channels at 48kHz or 32 channels at 96kHz. By default, Optocore's MADI units transmit high-speed MADI at 96kHz, to support the SD-Racks that only have S/MUX MADI ports; a special firmware was made by Optocore to modify the DD4MRs ensuring maximum connectivity.

"At the front of house, the main console can feed into the Optocore network via another DD4MR. Sixty-four MADI I/O at 96kHz are available, capturing the highest-quality audio without interference or signal loss. Anything from channel mixes to the main PA sends are transported via the MADI connection onto the Optocore network, where they are available at any other location. In the stage left equipment room, the main mixes are sent from Optocore to Meyer Sound Galaxy processors via a DD32R-FX outputting AES. The signal then goes back into the same DD32R's inputs, where the final polished PA feeds are sent to the local amp racks for each L-Acoustics line array. The DD32R allows for 64 AES I/O and can be configured to any combination in groups of eight, making it the perfect unit for high-channel-count interconnects of digital audio.

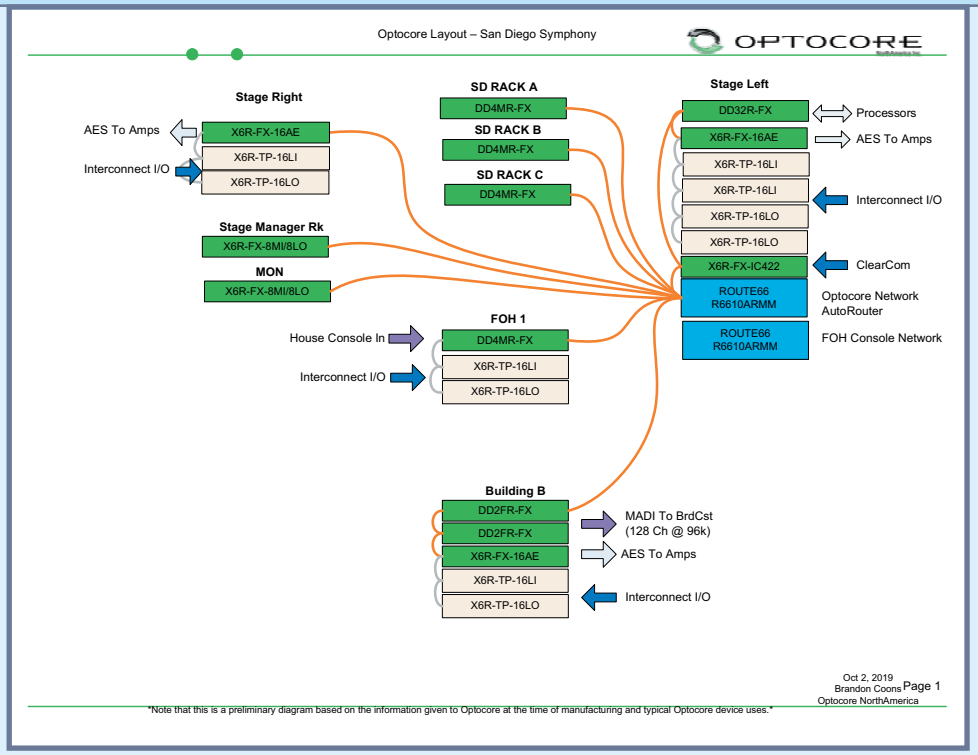
"The three amp rooms are at stage left—where the main interconnect is—and at stage right, with another in a separate building at the rear of the audience for delay speakers. Each stack of amplifiers is fed AES from an Optocore X6R-FX-16AE. These X6Rs have a single 16-channel AES card that can be set to 16 inputs, 16 output, or 8/8. AES, word clock, and control are transported over the same fiber network, simplifying cable runs and distances. As the system is completely digital from the stage input to the final amplifier input, the dynamic headroom of the system offers the best performance achievable. Using fiber to distribute that audio ensures there is no electromagnetic interference or ground loops, which keeps the quality of the signal is pristine.

"Instead of typical analog tie lines between locations, Optocore's AD/DA converters are used to fill any other audio requirements and distribute them around the facility as needed. The cross-network interconnect largely utilizes the X6R-TP hardware versions. Where the X6R-FX has dual redundant fiber ports and requires one of the 24 available network IDs, the TP versions daisy-chain off FX units on a

parent, with the Constellation placed behind it and the fill speakers behind them. Also, certain loads and overhangs were not accomplished, based on the structure Fabritecture designed. The structural engineer had to move certain supports, which affected the positioning of some speakers."

Murphy and Desjardins specified an L-Acoustics loudspeaker system, using the company's Soundvision previsualization software. Aaron Beck, business development manager and senior engineer at Solotech, noting that the interior of the canopy is covered in white scrim, says, "L-Acoustics was able to provide the entire K2 system in white to match it. It's only the second one like it; the other is at The Hollywood Bowl."

The main loudspeaker system comprises two main arrays of 16 K2s per side, flanked by two hangs of eight



CAT5. Up to seven TP units can connect to a single FX unit, allowing for a huge range of I/O options while maximizing ID locations and channel count. X6R-TP-16MIs give 16 mic/line inputs, with phantom power and 1dB remote gain control onto the audio network while X6R-TP-16LOs offer 16 line outputs with four gain settings. Each TP unit also can have up to 32 AES I/O, independent of the mic/line cards on two DB25 ports. The main interconnect is with the DD32R and X6Rs for the PA in the CER at stage left and has four units totaling 32/32 I/O. Additional units are in the stage right amp room, front-of-house rack, and the Building B amp room, each with 16/16 I/O.

"Additional system connectivity is provided by a pair of X6R-FX-8MI/8LOs in the monitor rack and at the stage manager's desk that allows for eight mic inputs and eight line outputs for whatever local I/O might be needed there, from specific mic channels of instruments to the mix for the PA. The stage manager's desk has a small Ashly console, allowing the system operators the flexibility to run talkback or RF mics through Optocore to the PA without having to wheel out the entire DiGiCo rig.

"Behind the audience, built into the grass hill is Building B, which holds the main washrooms, offices for first aid and security and a video control room. From the stage to this building is more than 300' and the cabling runs between the control room in Building B and the equipment rooms in the main shell being much longer. Fiber offered the most flexible and dependable way to interconnect these locations without any limitation on channel count, drop in audio quality, or latency which in Optocore is permanently fixed at 41.6 s.

"In the Building B equipment room are an X6R and the amplifiers that feed the delay/surround speakers. Here, they can also output 128 MADI I/O on fiber via two DD2FR-FXs. These units are essentially the same as a DD4MR but, instead of BNC ports, they have two SC optical ports that support both single-mode and multimode MADI. At this location, the stems taken from the SD-Racks can be output from the network and exported to any recording rig or production mobile.

"Another component of the Optocore system and how it interconnects everything is an X6R-FX-IC422 unit in the CER. This unit connects to the Clear-Com Eclipse HX-Delta frame that provides the facility's intercom. With Clear-Com's development partnership with Optocore, digital intercom and control can be passed right over the network like any other audio channel through a specifically designed I/O card for the X6Rs. In this application, program audio is fed out of Optocore into the frame to pass along as an intercom channel. Paging from the intercom system can also be sent through Optocore and into a QSC Q-SYS system managing the back-of-house audio."

Because of the outdoor location, a community sound monitoring control system continuously measures and logs sound levels at the edge of the venue property and the bay near a residential area on Coronado Island. “It’s an NTi Audio ‘NoiseScout’ unattended noise-monitoring system,” Schindler says. “There are monitoring stations at the rear of the property and across the bay on Coronado, right at the water. The NTi system records audio files; set a sound level threshold and you get an audio file of what is happening when that threshold is exceeded. You can identify the sound source and can differentiate between the venue sound and other noises that are not associated with the venue.” Opposite: The 80'-wide and 43'-tall opening-night Kabuki was supplied by Sew What?

cardioid-configured KS28 subs per side and a center array of nine K2s. Another 16 KS28s, also in cardioid configuration, are located underneath the stage. In addition, the six towers comprise the surround elements of the 7.1-type system design: two side-surround towers per side (for a total of four) hold four A15 Focus speakers each, with the rearmost tower on each side also holding six Kara IIs with mechanically adjustable high-frequency-steering fins. Two rear-surround towers are fitted with four Kiva IIs and two SB15m subs each. The system is powered by two dozen LA12X amplified controllers, with system processing by L-Acoustics’ LA Network Manager.

“The surround is designed to create an envelope around the venue,” Desjardins says. “We create a room, an electronic shell, onstage with the Meyer Constellation system. The goal of the surround towers was to envelope the crowd with some reverb. When we were doing testing and rehearsal with the band, people said, ‘We don’t hear those speakers,’ which was perfect. You don’t have the feeling the sound is coming from them, but if you turn them off, they say, ‘What happened?’”

Beck adds, “One way we’re achieving that sense of immersion is by taking some of the reverb returns from the front-of-house console and sending them to the surround speakers, which enhances the immersive effect.” He adds that the large number of subwoofers has less to do with impact than with directionality. “It’s not so much about output as it is about control of the low frequencies. There are very strict noise-control measures in place here and on nearby Coronado Island, and the KS28 subs in the cardioid configuration give us tremendous ability to steer that energy where we want it to be and away from where we don’t want it.” The same, he says, goes for the K2 Panflex horizontal steering technology, which combines mechanically adjustable fins with DSP algorithms effective from 300Hz.

Joel Watts, the symphony’s audio director, notes that the asymmetric configuration and precise placements of the speakers allow the orchestra to avoid exceeding the

Photos: Courtesy of San Diego Symphony

noise restrictions: “We have full dispersion to one side of the system and virtually none to the other side, thanks to the fins on the K2. It focuses the sound and keeps it on the seats. It never crosses the lease line.”

Desjardins says, “I worked with André Pichette at L-Acoustics on tuning the system. He did a first pass, to see where we were. We reserved three days to do it. At the end of the first day, we were in a good place, so we could spend the next day doing spot checks. Because we were using a P1 [L-Acoustics’ AVB processing and management platform] with M1 [suite of measurement tools] inside, it dramatically reduced the time of tuning and the time of interference with different departments.”

The speakers were also chosen for their ability to stand up to the outdoor environment, with its rising/dropping temperatures and the omnipresent corrosions of saltwater. The loudspeakers are rider-friendly, to make life easy for touring acts—a concern that came into play when selecting all of the audio and lighting gear.

Which probably explains why three DiGiCo consoles were chosen for the task. A Quantum7 is installed as the front-of-house mix desk, with an SD10 for monitor mixing and an SD12 on hand for auxiliary mix and processing needs. The three consoles—three SD-Racks located onstage, and a Mini-Rack in the amp room—are on a dual Optocore network, and the entire system was designed and integrated by Solotech.

Beck enumerates the consoles’ advantages: “First, there’s capacity—the Quantum7 can run 200-plus inputs. Then there’s the Quantum processing power.” He cites features like Quantum’s Mustard Processing channel strips, Spice Rack plug-in-style native FPGA processing options. and Nodal Processing as standout features. “Plus, there’s the overall quality of the sound, which is exceptional,” he says.

Beck advocated for the Optocore network. (He was a longtime employee of Cirque du Soleil in Vegas, where Optocore systems are used in shows such as *Viva Elvis*.) Watts says the way the consoles are networked on their own Optocore loop, along with an Optocore AutoRouter, makes the entire console infrastructure effectively modular: “A single orchestra show here is 90 inputs, so being able to use all of the consoles, if necessary, as a single system is extremely helpful and efficient. And console features like Snapshot really add to that. It lets us manage a large number of inputs easily.” (See sidebar on page 40.)

Watts notes that the 32-bit “Ultimate Stadius” microphone pre-amps on the SD-Racks are similar to high-end mic pre’s used in studios for recording classical orchestras: “My background is in studio production, and we’re recording most of the performances here for later postproduction, and the DiGiCo mic pre’s sound fantastic. We’re doing all of our television streaming of concerts through them, too. No coloration, fully transparent—that’s what you want for classical music. It makes it sound like a CD. You couldn’t ask for more from a console in this kind of situation.”

Schindler says that Salter also consulted on the venue's video system, which consists of 3.9mm pixel pitch Planar LED video walls. "They're capable of 5,000-nit brightness," he says. "There are two permanent image-magnification (IMAG) displays on structures either side of the stage plus a flyable stage display that can be rigged for movie night

The shell structure also features 3,386 individually controllable Traxon LED light nodes for artist-programmed light shows.

or if a pop act wants additional IMAG. The video camera system can be controlled locally for quick moves but there's a multi-operator room in Building B behind and under the seating area." A remote OB truck hookup, located at the end of the parking lot, will facilitate TV broadcasts and video streaming.

Other features designed by Salter and supplied by Solotech include a QSC Q-SYS paging/monitor setup system tied into the Clear-Com Eclipse HX-Delta communication system, a VPN hookup between the Rady Shell and Copley Symphony Hall (the symphony's indoor venue), and Cisco Meraki wireless Wi-Fi.

The Constellation system

The Rady Shell features the first Meyer Sound Constellation system for stage acoustics in an outdoor venue.

The Salter team was given a two-fold brief: design baseline stage acoustics that would support Constellation but would also provide a good environment when Constellation was off. "The acoustic signature inside the shell is quite similar to a large Hollywood sound stage," Duty says. "It has a mixture of reflective, diffusive, and absorptive elements, but little for reflection across the stage because that is handled by Constellation. We didn't want it totally dry, as they wanted the stage to have a bit of life when the system was off. We definitely understood what the Constellation team was looking for."

He adds, "Constellation is incredibly helpful in situations like this. Having the control to let musicians clearly hear players on the other side of the stage is beneficial. In addition, there is the flexibility to adjust the acoustics to what you are hearing in the moment."

The Constellation system comprises 25 UPM-1XP and 22 UPJunior-XP remotely self-powered speakers, with 12 UMS-1XP remotely self-powered subwoofers to extend the reverberation envelope to the lowest registers. DSP for driving the system is supplied by an eight-module D-Mitri digital audio platform, with two modules dedicated to hosting the patented VRAS variable room acoustic algorithm. Ambient sensing for the regenerative reverberation is provided by 20 Schoeps MK 41 microphones with CMC6 preamps.

Murphy says, "It's partly an education process and partly a getting-used-to process in choosing when to use Constellation, when to have people to turn their monitors down, when to ask people to use in-ears. Constellation is going to amplify everything that's acoustical onstage. It's worth taking the time to talk to people and work out the levels as much as people. It's talking, it's musicianship; it's listening to each other."

Of course, installation was complicated by COVID. "The venue was closed after Labor Day 2019 and had construction equipment on-site on that Tuesday," Beck says. "It was originally a ten-month construction schedule. We started getting gear ordered in Vegas and were ramping up to get on-site in March. Then the world changed. We left the site that afternoon and, at that point, construction was deemed an essential business. We finally got on-site in May 2020 and were there until the end of the year. We had temperature checks, masks, and contact tracing if someone tested positive. We finished our installation work and began fine-tuning with L-Acoustics and Meyer in June." This was followed by several weeks of test concerts that allowed the working out of any kinks in the system.

Lighting system

The original lighting specification was made by Schuler Shook, but as often happens, when the time drew near to purchase the gear, it was decided that an update was needed. Rothberg, who spent 12 years in concert touring as a lighting designer/director before coming onboard at the symphony, worked with Schuler Shook and Chicago-based JRLX on the revised system, which consists of gear from Elation Professional.

"As a touring LD and having worked in many venues over my years on the road, I knew we wanted the design to be very tour-friendly, rider-friendly, and LD-friendly," says

Photo: Courtesy of San Diego Symphony

Rothberg, who has toured with Imagine Dragons, Alt-J, The Lumineers, and Sufjan Stevens, among others. “The idea was to have a super-simple, clean, symmetrical design that uses only a few fixture types, something anyone could come in and clone from, to make any kind of show happen.” Jason Reberski, of JRLX, adds, “The demands placed on the system would be tremendous; throw distances of 300-plus feet, overcoming daylight, the need to be flexible and capable of achieving many different aesthetics, and all while needing to be 100% IP65-rated.”

The last point was, in many ways, the key. As with the sound gear, the concern was finding units that would stand up to the outdoor environment.

While ease of use for lighting pros who come into the venue was essential, the rig had to work best for the symphony, which meant lots of top-down white light. With trim heights ranging from 25' – 40', a fixture was needed that could get wide enough at the lower trims but retain its brightness from the higher positions.

“We wanted to avoid ugly-looking enclosures, so we needed the rig to be fully IP-rated,” Rothberg says. “When I came onto the project, there were 12 [Elation] Proteus Maximus on the original spec, for the towers out on the lawn, but I didn’t know anything about them. As I looked into them and the rest of Elation’s IP-rated line, I discovered they had all the options we needed—Leko, moving wash, static wash, and profiles.”

Onstage, 42 Proteus Maximus hang from five overhead electrics; an additional 12 units are hung from the six towers as additional audience light, and to light and texture the front “hoop” of the shell.

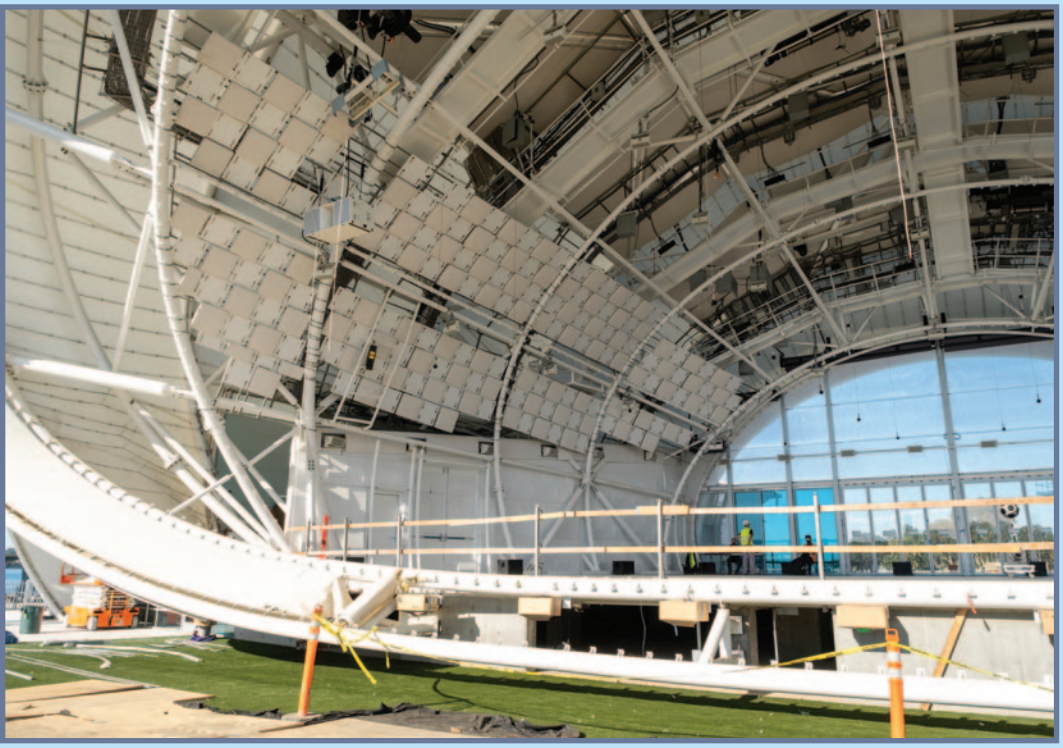
“Even from 320' away, the Maximus is insanely bright hitting the stage,” Rothberg says. “We originally thought we’d use them as followspots from the lighting towers but found that the first catwalk position is the perfect angle. We get a tight beam with virtually no light spill from that position.” Thirty-six compact Paladin Cube RGBW floodlights internally illuminate the six towers.

Reberski also specified the Follow-Me automated followspot system. “We did four control stations for the Follow-Me, so they have discrete systems of key light and backlight. With it, the console can control everything, including color temperature and intensity.” He adds, “We recommended the Follow-Me system since it was ‘open-source’ and with so many automated fixtures in the rig, I knew we could get moving key light and back light almost anywhere on stage or in the audience.”

Also on the five overhead electrics are thirty-four IP65-rated Proteus Rayzor 760 wash and special- effect units. “We use them as wash lights or eye-candy pixel effects and can access the SparkLED technology for sparkle effects for a special look,” Rothberg says.

Paladin Panels, outdoor floodlights with fifty 15W RGBW cells, work from electrics 2 – 5 for top-light washes for the orchestra; the units double as strobes for other shows. “Jason Rothberg and I were discussing the symphony top-light plan at the beginning of the COVID quarantine inf 2020,” Reberski says. “I was searching for a solution that was adaptable as a powerful, traditional stage wash system but with the enhanced color-changing flexibility he required. I sent him an Elation Paladin Panel, as I had previously tested them for another long-throw wash application. He would run an extension cord out to the middle of his street at night during quarantine and focus the unit onto his garage door to reach the throw distance required to meter the fixture. We shared a lot of text-messaged photos and DMX value suggestions to reach the desired foot candles at 3,200K color temperature. One aspect that I’m particularly happy with is the use of the Paladin Panels’ custom City Theatrical egg crate louvers. We designed the accessories to both reduce glare and accommodate an internal filter media frame to accept holographic diffusion

Photo below: Thomas Clarke/Courtesy of Salter



In the acoustical system, under installation above, the lower panels are reflective and diffusive, with a checkerboard pattern of absorptive and reflective panels above that and all absorption at the top.

so that, as the fixture trim height changes, we can achieve a homogenous stage wash. When Jason [Rothberg] mixes a CTO, it looks like a traditional tungsten top-light system. Additional Paladin Panel fixtures work from all six towers to illuminate the audience area."

Providing front light from the first three catwalks and the first two towers are WW Profile HP IP LED ellipsoidals. Ten fixtures on the towers are equipped with 5° lenses while 32 stage units use 19° or 26° lenses. Nine DTW Blinder 350 IP variable-white LED two-lights work from the downstage electric. The rig consists of 248 fixtures. Reberski credits John Dunn, from Elation Professional, for facilitating demonstrations and aiding in the specification process: "John had just completed a similar theatrically sensitive installation at the Metropolitan Opera and his experience there was beneficial on this project."

Rothberg notes other challenges. During installation, the lighting pipes needed to be lowered to fit into the overall canopy structure. Also, he says, the catwalks are hung at 15° – 20° angles, with all the fixtures pointed at dead cen-

Photos: Courtesy of San Diego Symphony

Paladin Panels, outdoor floodlights with fifty 15W RGBW cells, work from electrics 2 – 5 for top-light washes for the orchestra; the units double as strobes for other shows. For the opening, an additional 48 Paladins were provided by Aspect Lighting to uplight the interior and light the front "hoop"'of the canopy.

ter. This made programming difficult, so Matt Shimamoto, at [Burbank-based] Volt Lites/SOLID Industries, built custom fixture levelers that clamp onto the pipes at the right angle and allow the fixtures to hang perfectly level.

The venue's lighting console is an MA Lighting grandMA3 full-size. "I pushed for that as well," Rothberg says, adding that it is the most rider-friendly of the available controllers. The entire lighting network is by ETC.

Overture

Indeed, the yearlong delay in opening carried some unexpected benefits. "It allowed us to really fine-tune the theatrical nature of the shell, from lighting and acoustic standpoints," Mueller says. "It gave us time to test, retest, and make adjustments, so that is was perfect." The result, he says is "a great gift to San Diego, to California, and to the world. There's no better place than San Diego to have live performances on the bay."

Opening weekend pyro was supplied by Fireworks America.

Opening Night Imagery

The official opening weekend at the Rady Shell featured the San Diego Symphony offering classical and Broadway-themed programs on Friday and Saturday, followed by Gladys Knight on Sunday. The first two nights featured spectacular projections designed by Wendall K. Harrington.

The performance began with the orchestra behind a Kabuki curtain on which was seen the silhouette of conductor Rafael Payare; the curtain fell, and the orchestra played Mason Bates' occasional composition, Soundcheck in C Major, which, says the *New York Times*, featured "the composer, 44, sitting in the percussion section, playing an Akai drum machine and two MacBook Pros. It was composed with this sound system in mind, Bates said in an interview, and written to evoke Wagner, Pink Floyd, and Techno beats (he is a DJ as well as a composer.)"

For the rest of the evening, Harrington provided imagery on the shell, surrounding the orchestra in stunning colors. The looks included Russian folk drawings for Stravinsky's *Firebird Suite* and towering skyscrapers for Gershwin's *Rhapsody in Blue*.

Harrington notes that, given the 7:30 pm start time, darkness had not yet arrived; to make sure the silhouette effect at the top of the show could be seen, considerable firepower was required from the projectors. "We had 60 lumens per sq. ft." One early-evening effect placed the names of the symphony's musicians on the shell.

Having designed more than one version of *Firebird Suite* for different ballet companies (See *LSA*, July 2020), Harrington had plenty of materials on hand. For *Rhapsody in Blue*, she drew the cover art from a well-known Andre Kostelanetz recording, as well as the paintings of Aaron Douglas, a Harlem Renaissance figure.

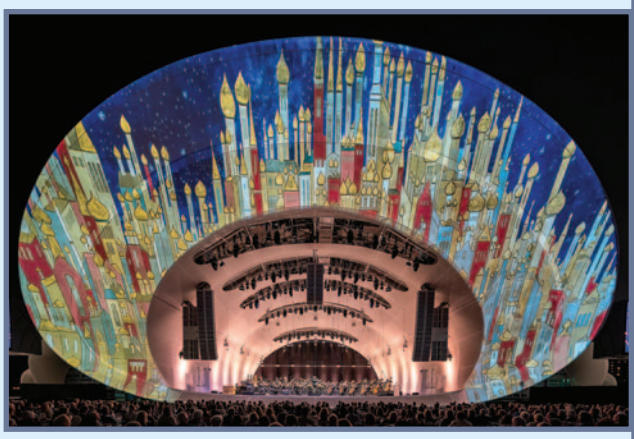
For the Broadway program, which featured musical theatre fan favorites Megan Hilty, Norm Lewis, Kelli O'Hara, and Adrienne Warren, Harrington says, "I tried to evoke Broadway's golden age, then I went show by show. I found a really great picture of the original set of *Annie Get Your Gun*. For *Call Me Madam*, I used an image of the album cover. For 'Suddenly Seymour' [from *Little Shop of Horrors*], I used thorny vines, to which I added roses."

Joey Moro, associate projection designer, says, "We were very much operating on an opera schedule: one dress rehearsal, three nights, and only four hours a night. And we had two completely different shows to prepare. Wendall and Nick [Hussong, the programmer] and I worked all day preprogramming, using the big TV in my hotel room. But we never got to see it all come out of the projectors until 8pm on Friday. That was very stressful."

Hussong says, "We were able to get a theatre in downtown San Diego to film the maestro," for the silhouette sequence, which recalled the opening of the Disney film *Fantasia*. It was especially tricky, Moro adds: "They wanted us to project [Payare] shadow, but you can't project the absence of light with the sun still up. We refocused the projectors to have about 120,000 lumens on the one spot to make the opening animation visible."

The media server chosen for the occasion was Watchout. Moro says that disguise was considered, for its ability to map images onto the canopy's unusual shape. "But," he says, "we had to work really fast and had no time to look at anything. Wendall has worked with Watchout since it was released; it was good to go with that experience. And with Watchout, you can do 64 layers of content and not bat an eye.

"The scale was a challenge, but an exciting one," he adds. "We had to consider how the perspective changes, the visible shape of the shell's surface is very different based on where one is sitting in the audience. We initially sat at the tech table, and the surface was too wide to see without turning your head, so we moved back 15 rows to take it all in. It was a beautiful landscape to work with."



Photos: Courtesy of San Diego Symphony

The gear was supplied by 4Wall Entertainment. "We asked Lars [Pedersen, of 4Wall] for the brightest units we could get," Moro says. "We ended up with six Barco 4K-32s and two 4K-40s. We used the latter for the opening Kabuki look and moved over one of the 32s to get the lumens we needed."

"The venue is gorgeous," Harrington says. "For me, the excitement of a place like this is the sense of community. It unites people in a unique, provocative way. I found the idea irresistible."