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Performing Arts/Media Facilities Planning and Design

An Acoustical and Lighting Upgrade for Littlefield Concert Hall

By: Mel Lambert

A Mills College institution is updated for its 80th birthday

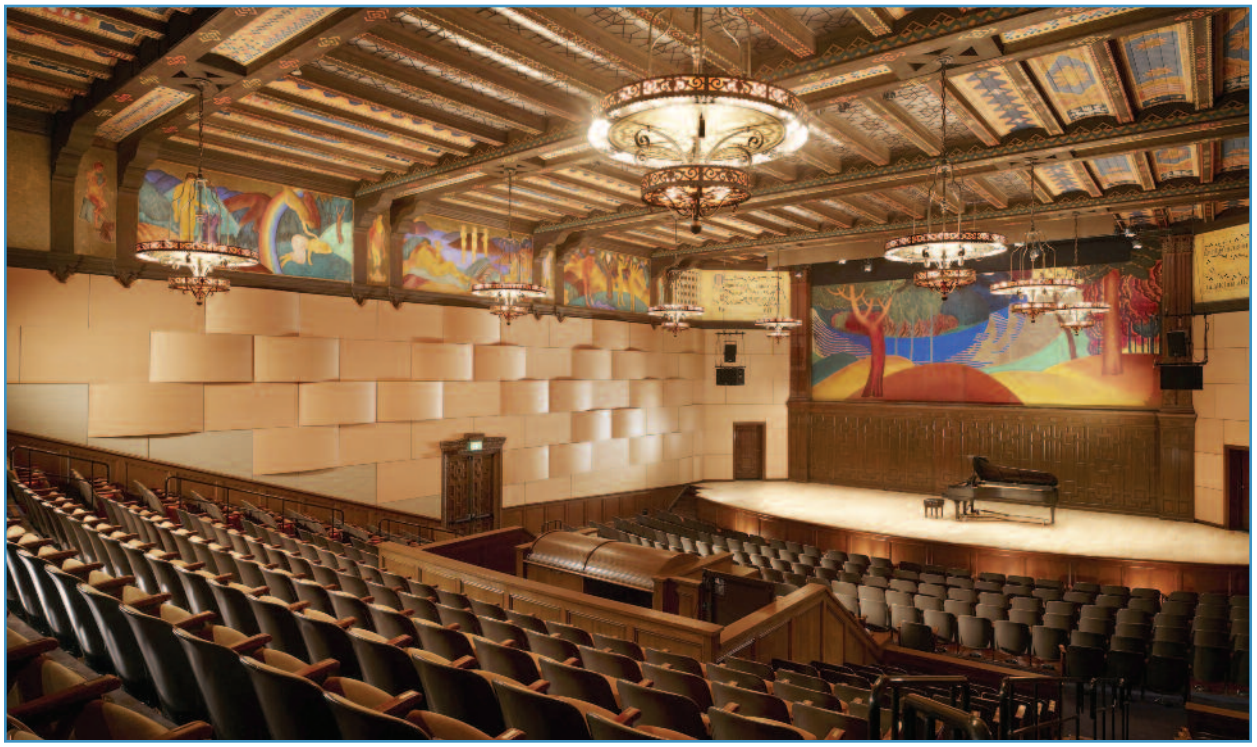

Photo credit: César Rubio Photography

For more than 150 years, Mills College has been known for its liberal-arts program. Located amid green rolling hills in Oakland, on the eastern shore of San Francisco Bay, the women-only institution also operates a co-ed graduate music program that is renowned for its cutting-edge work in composition and electronic music. Each year, Mills College serves close to 950 undergraduate women and 550 graduate students; alumni include Dave Brubeck, Morton Subotnick, Steve Reich, and William Bolcom. The 135-acre campus is heavily accented with Mediterranean-style buildings, several designed by the architectural innovator Julia Morgan as well as her contemporary, Walter Ratcliff, the architect and planner for Mills College and the designer of its music building and its historic concert hall.

Notably, Mills College's Center for Contemporary Music/CCM remains at the forefront of experimental forms, and currently is centered at the Spanish-style Jeannik Méquet Littlefield Concert Hall, named after another former alumna and philanthropist. "Since its inception, CCM has achieved a strong international reputation as a leading center for musical innovation," says David Bernstein, former head of the college's music department, currently on sabbatical leave. "Eight years ago, the concert hall came in for a renovation, when we needed to undertake a seismic retrofit and a soundproofing project for the roof to help reduce traffic- and aircraft-noise intrusion from the local airport."

To mark the concert hall's 80th

anniversary, Phase Two of the ongoing renovation started in the middle of 2008, and involved several important additions. "We extended the stage area approximately 3' into the existing audience seating [to provide greater depth for large ensembles], in addition to improving the acoustics in the hall," says Bernstein. "We also looked at reducing the amount of noise that came into the hall from the front lobby via the vomitorium entrance." Key elements of the renovation project included acoustic panels to enhance sound reflection and diffusion, an expanded stage area, installation of a dedicated mixing station, modifications to the original new seating layout with under-floor green "displacement" air HVAC systems, and ADA improvements. The anniversary was celebrated in early spring 2009 with the Mills Music Festival. The budget for Phase Two renovations and revitalizations was $11 million. Phase Three will involve a new building to house CCM offices and support services. Fred Frith is current head of the college's music department.

Revitalizing stage and concert-hall acoustics

The renovation project was lead by San Francisco-based EHDD Architecture, working with the theatre consultants Auerbach Pollock Friedlander and acoustical consultant Ewart "Red" Wetherill. According to Karen Fiene, Mills College's campus architect and a former member of the EHDD staff, "The installation of a combination of curved and flat wooden panels and cloth-covered panels produces a clearer, smoother, more focused, and spacious sound for performing and listening to both acoustic and electronic music." A new entrance from the lobby, with doors for sound control, she says, "makes the concert hall a prime venue for recording large ensembles, while the replacement of seating, floor, and wainscoting meet current code requirements and improve visitor comfort. The original construction had an entrance with no doors, which has been modified" to provide a sound lock. "Being able to close the doors to provide an acoustical seal and lock up the room has made a huge difference," she adds.

"During Phase One, the bulk of the work was limited to [remodeling] the entire roof as a monolithic, sealed unit that greatly reduced acoustical intrusions from traffic and overflights," explains Steve Pollock, a principal Auerbach Pollock Friedlander. "The original design had a large skylight over the lay light system. The upper skylight was not intact, and was subject to water intrusion. The lay light system was over-stressed and had already been protected by a sub-system of obscure [frosted] panes. Lay light glass was removed in Phase One, leaving the obscure glass as a luminous ceiling. The improved structure allowed a multi-point chain hoist system to be installed, supporting the use of amplified sound associated with contemporary live music performance, especially electronic music, a large component of the work produced by the Center for Contemporary Music. The pitched roof was clad along the underside with plywood, creating a structural diaphragm to stabilize the building." An intermediate, double-layer sheetrock ceiling was suspended below the roof to enhance noise control. Additional work was done to supplement theatrical lighting over the performance platform, using distributed dimming bars for flexibility and to provide the requisite quiet response.

"The enlarged stage now accommodates an 80-piece orchestra," Fiene continues. "And we also added a new, accessible mixing station, and a new projection screen for films and multimedia events." The remodeling also included replacing the original ventilation with a completely new HVAC system, with revisions to the existing exhaust air system; both systems now meet the noise criteria for music performance.

"Phase Two was anticipated as a follow-up of work that was not funded in Phase One," Pollock says. "It was literally a matter of remobilizing the team. The fact that Karen Fiene, the project architect from Phase One, had left EHDD to become Mills' campus architect was an incredible benefit to the project, since the client was a 'player' who benefited from the same project memory as the rest of the team. Reconfiguration of the center vomitorium added a lower landing with split entry to create a sound-and-light lock where none had previously existed. In the new T-shaped configuration, people entering the hall now go through doors at the left and right sides of the lobby and then ascend a short stair to a large central landing that continues the original vomitorium stair up into the mid-house cross aisle. Blank areas in the existing west lobby wall were converted to left and right lobby entrances."

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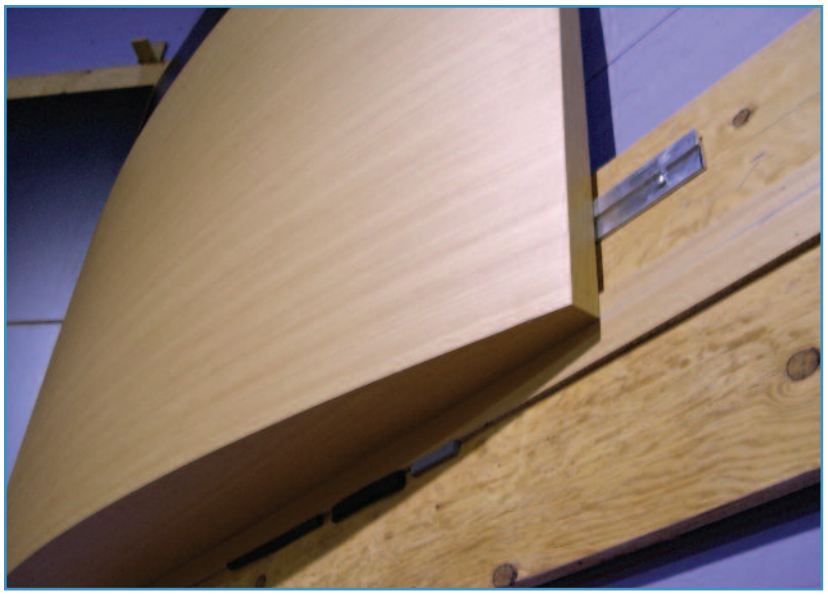
During the renovations, the central house-mix position was reconfigured and provided with an ADA-compliant lift. New items added to the scope of work were replacement of the hall's motorized motion-picture screen, and an increased number of dimmed presentation lighting circuits. Also added was an assistive listening system, as required by California Building Code. "We chose a Listen Technologies FM system because it was simple and



A detail of the acoustic wall panels.

cost-effective," says Auerbach Pollock Friedlander associate Howard Glickman. "The system is comprised of a fixed transmitter and antenna, mounted in the FOH cove position, and a shotgun mic for program audio. Using FM instead of IR was less expensive, and allowed us to place the LT-800-072 transmitter, antenna, and [Audio-Technica 8035 shotgun] mic over the audience but out of sightlines. We also provided 16 LR-400 portable receivers and LA-164 headsets, and five LA-166 Telecoil neck loop receivers for patrons who wear hearing aids."

"While the entire audience area was redesigned by Auerbach Pollock Friedlander to meet building-code and sightline requirements," explains Wetherill, "the ceiling and upper wall paintings were required to stay the same, apart from some restoration. The lower side- and rear-wall finish material had deteriorated badly, so the architects and I explored several alternatives to select a wall treatment that was compatible with the visual expression of the original design while retaining acoustical quality. In fact, although reverberation is governed by the largely sound-absorbing ceiling, the new wall configuration enhances communication on stage between performers and adds beneficial diffusion and liveness in the audience seating areas."

"The original interior wall panels were made of Celotex, laid up in an ashlar pattern on 12'' by 24'' rectangular panels, which was determined to be a fire hazard," says Fiene. "The new wall finish material is an integral piece of the acoustical design, which included improving the on-stage listening environment, controlling flutter echoes from side walls into the audience plus front- and rear-wall echoes. It also improves diffusion of sound through the rear seating area. To improve projection and spaciousness of the hall's sound, we elected to add a slight increase in HF reverberation time, to increase dispersion throughout the hall and enhance projection of acoustic sound sources."

Designed by EHDD and Wetherill, the new wall panels distribute sound reflections in varying angles throughout the hall, and absorb sound energy in other areas; they were conceived as modern versions of the original ashlar panels—in the same proportions, but larger in scale to suit the architecture. Reflector panels were designed as prefabricated wood veneer pieces, while the absorptive panels were made of fabric-wrapped fiberglass. "The radius we finally selected for the convex-side sound-reflecting panels was 10'," Wetherill says. "There were a few special sizes to accommodate architectural constraints at the ends, but a 3'-by-6' panel was standard. Code requirements limited projecting panels below a height of 7', so there are flat panels, some of which are sound-reflecting and some sound-absorbing—colored gray—just above the wainscot on the sides. On the rear wall, a mix of reflecting and absorbing panels was selected to avoid strong rear wall echoes. There is a trace of echo to the stage from the junction of upper rear wall and ceiling, but that can be controlled temporarily if it is ever of concern." Balliet Bros., a construction firm based in South San Francisco, fabricated the side wall panels. The mechanical consultant was Rumsey Engineers of Oakland. The cost of the entire acoustical-panel installation was close to $200,000.

The wall modules, placed in a geometric array of hard convex, hard flat, and/or soft flat panels, can be repositioned. "So far, there's been no need to adjust them," explains Les Stuck, technical director of Mills College's music department. During construction—, "the walls were stripped down to studs, sheetrocked, and then the [acoustic] modules attached with metal clips [to mitigate movement]," and continuously sealed with acoustical tape to eliminate vibration noise. "Red Wetherill's acoustical consulting was really hands-on, which is absolutely necessary," he adds. "During any remodeling project, architects and construction workers must make many changes as they go, and they don't necessarily understand the acoustical ramifications. Having Red climb up the scaffolding to check our seals and screws made a big difference!"

The sound-reinforcement system includes four Meyer Sound UPA-1P compact wide-coverage loudspeakers and two USW-1P compact subwoofers. The front-left and front-right positions each have a single UPA and a USW, while two rear positions are

Photo credit: Courtesy of Ewart "Red" Wetherill

outfitted with a UPA each. The college plans to add more speakers to these pre-wired positions. “We also used the roof construction project as an opportunity to install the infrastructure for our flown loudspeakers,” Stuck recalls. “There are nine locations—basically a 3 x 3 grid—each of which has a load-rated hang point, audio power, and hoist power. To address the age-old problem of twisting cables, each point has two chain motors with a custom-built controller so they work together flawlessly.

“It may seem strange that we went with a grid arrangement for the speakers rather than something more conventional, like a 5.1 setup,” he adds. “Because we do experimental electronic music, people are always trying out unusual arrangements. This way, we have that versatility. Furthermore, one of the pre-wired positions is directly overhead—a sound location that is very difficult to simulate for an audience using other means.” A donation from Leone Evans, a Mills alumnus and former faculty member, enabled the purchase of a 32-channel Yamaha M7CL digital console for the front of house. A Lightpipe-compatible input connects to a MOTU 828 module for direct connection via FireWire to students’ laptops for music playback.

One important rule Stuck learned from the construction process was to keep track of details. “Even a simple concept like providing separate power for the audio system required constant monitoring, double-checking countless blueprint revisions, making friends with the electricians, and standing firm in meetings,” he says. “We had weekly meetings for the entire year-and-a-half of construction, and that constant interaction was essential.”

Lighting and projection systems

Prior to the recent acoustical upgrades, a full rig of Strand Lighting instruments and controllers was installed. “Compatibility with existing equipment on campus was one issue,” Glickman says, “so we put 15A twist-lock connectors on all the outlet boxes, dimmer bars, and lighting fixtures to match the campus’ inventory of fixtures. Because we were also focused on preventing any additional noise in the room—the dimmer cabinets are located directly backstage—we went with Strand S21 IGBT dimmer bars and Strand A21 architectural lighting dimmer cabinets with IGBT dimmer modules. The A21 cabinets are convection-cooled and have no fans, while the IGBT dimmers eliminate the filament hum in the chandelier A-lamps.

“Using distributed dimming above the stage and in the FOH cove allowed us to replace and add dimmed circuits above the stage and house without a lot of extra electrical infrastructure, which helped to reduce costs. And again, the IGBT dimmers keep the lamps quiet. Distributed dimming also added flexibility and room for future expansion. We matched the receptacles for the dimmer bars over the stage and at the FOH position to the motor power receptacles added during Phase One. Should the college purchase more dimmer bars, they will be able to utilize these receptacles, since they are idle almost all of the time.”

Originally, the eight historic chandeliers were switched. “Working with the electrical engineer [Paul Woychesin, from Silverman & Light],” Glickman continues, “we put these on dimmers, allowing the three rings of lamps in the chandeliers to be controlled separately to illuminate the decorative ceiling, the audience egress lighting, and the internal chandelier illumination. We also added twist-lock receptacles on either side of the stage and provided [Motion Labs] Stringer boxes with multiple outlets for music stand lights, eliminating the tangle of extension cords and power strips that had to be navigated by the musicians.

“New architectural lighting control stations [via a DMX-based network] were added throughout the auditorium and support spaces. Single-button stations were placed at each entrance and four-button stations added backstage, at the FOH mix position and in the control booth, to allow a limited number of presets to be recalled without an operator at the console. We also added new console input stations at the FOH mix position and control booth.”

Auerbach Pollock Friedlander specified a single Strand A21 nine-space dimmer cabinet for the chandeliers (18 dimmers); a Strand A21 six-space dimmer cabinet for the other houselights and stage receptacles (12 dimmers); two Strand S21 6x1.2kW IGBT dimmers bars over the stage; a Strand S21 6x1.2kW IGBT dimmer bar for the front-of-house cove; a Strand 200 Series control console that can be configured as a 24-channel/two-scene or 48-channel/single-scene preset; 10 ETC Source Four PARs for use over the stage; and six ETC Source Four 19° ellipsoidals for the front-of-house cove. Holzmueller Productions, the lighting contractor, supplied the instruments and controllers.

“The rigging system was a relatively simple design and installation,” Glickman says. “To minimize the visual intrusion into the highly finished historic space while illuminating the stage for the musicians and performers, we created two fixed-pipe battens on which we hung a six-circuit dimmer bar and put five ETC Source Four PARs on each. The battens were hung as tightly as possible to the ceiling. Steel channel was installed in the attic above the ceiling to support the new battens. This new channel spans the steel beams which were installed in the attic as part of Phase One.”

The decision to replace the screen was an easy one. “The rigging and operating system of the old screen had deteriorated over the years,” Glickman recalls. “To match the old screen as closely as possible, and minimize the installation and future maintenance issues, we specified a Da-Lite Model 80847 motorized scenic roller. This 22.5'-by-30' screen has an

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integral motor and wire rope and pulley system. We were able to suspend this screen from a third dead-hung batten in the same space as the old screen, while eliminating all of the motors and wire rope drums in the attic. Control stations for the screen were provided at the stage manager's position just offstage and in the control booth." Jim Schelstrate, from Holzmueller Productions, supplied and installed the motorized screen.

"Solo, orchestral, and vocal performance and recording, which are the ultimate test of a music performance facility, have been fairly limited since rededication of the hall last February," says Wetherill. "From comments that I have received to date, the music faculty has indicated overall satisfaction with the outcome. For my part, I have seldom tackled such a difficult task of remodeling with an owner, design team, and builder who were so willing to explore new ideas and to collaborate in resolving design and construction issues to successfully meet the design goals. James Griffin Construction served as the general contractor, and was a key element in the success of the entire project."

"While acoustics are described in large part by technical criteria," says Fiene, "the ultimate goal is an artistic experience. After the opening concerts [in late February], reports from music department staff and students, and their allied performers from the music community, were unanimously favorable. Performers on stage have reported that they are better able to hear each other, and the rear-to-front echoes have been eliminated. In the audience, the overall sound character has the more spacious feel that the faculty desired, and the confusing flutter echoes have also been eliminated. Staff and students now have a sound mixing control station located in the ideal acoustical zone of the hall, which is fully accessible."

Mel Lambert has been intimately involved with production industries on both sides of the Atlantic for more years than he cares to remember. He is now principal of Media&Marketing, a Los Angeles-based consulting service for the professional audio industry, and can be reached at mel.lambert@MEDIAandMARKETING.com; +1/818.558-3924.

Poly International Plaza
Guangzhou, China
Photography:
Tim Griffith, (top)
Fu Xing, (bottom)

Verizon Wireless Amphitheatre at Encore Park
Alpharetta, Georgia
Photography: Chris Lee