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See Page 10

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INSIDE THIS ISSUE

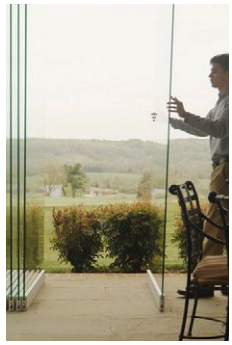
JULY-AUGUST 2018 // **VOL 9** // ISSUE 4

24

feature projects

HOME COURT ADVANTAGE

Renovations introduce sports theme and vibrant workflow to collegiate marketer's headquarters.



32

PERUSE SPORTS PROJECTS FROM AROUND THE COUNTRY:

- Nassau Veterans Memorial Coliseum, Uniondale, N.Y.
- Falcon Boxing Gym, Glenview, Ill.
- Ford Ice Center, Nashville, Tenn.
- Hot Yoga Studio, Harrisonburg, Va.
- Yankee Stadium, New York
- Target Center, Minneapolis
- Caves Valley Golf Club, Owings Mills, Md.

cover

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INSIDE THIS ISSUE

JULY-AUGUST 2018 // **VOL 9** // ISSUE 4

DEPARTMENTS

COLUMNS

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UNIQUE OPPORTUNITIES FOR CONTINUING EDUCATION

Last weekend, my husband and I attended the first of eight—that's right, eight!—weddings we're invited to this summer. I'm not a religious person but I respect the traditions of the church and the values that are taught within it. Therefore, I like to attend wedding ceremonies. I think the sermons offer good reminders of what creates a lasting marriage. I consider it continuing education.

Plus, I love peeking inside the churches of various religions and marveling at the high ceilings, stained-glass windows, intricately carved displays over altars, ornate woodwork and more. Craftsmen of yesteryear let their skills shine as they created stunning spaces in which to worship. As interest in organized religion continues to decline, however, it becomes burdensome for dwindling congregations to pay for these churches' upkeep. Unfortunately, many are demolished to make way for new structures much to the chagrin of former parishioners.

This wasn't the case in Boston's South End recently, however. Although land is scarce, historic character is plentiful in the neighborhood, and it's valued. Boston-based New Boston Ventures LLC has been building in the area for 25 years and jumped at the chance to purchase the 1871 German Trinity Catholic Church when it went on the market. The developer's goal from the get-go was to transform the church into 33 high-end condominiums—not necessarily the first use that comes to mind for a church or the easiest to execute.

"We saw potential immediately in the church," explains Marc Savatsky, LEED AP, CSL, development project manager for New Boston Ventures. "It had a great structure to it. Some features of it actually lent itself nicely to our condo vision, and we had a team of very talented architects at Finegold Alexander who helped us really start to picture what this might look like and helped us study it in terms of programming so we had the confidence to pursue it aggressively."

Read in "Multifamily", page 60, how modern engineering helped produce the volume the design team needed to create the new condo building, known as The Lucas.

Sometimes churches are underutilized simply because they are lacking the amenities needed to make them functional. Such was the case with Evergreen Chapel, which is located within Evergreen Cemetery in rural Berwick, Maine. The 1939 chapel was built to hold funeral services but had not been used in recent years because it wasn't connected to utilities, meaning no lighting or space conditioning. The architects at Lassel Architects PA, South Berwick, Maine, were charged with updating the chapel for use in the 21st century while respecting its historic character. "The new installations and fixtures selected respect the historic building without falsifying the history of the renovation," notes Michal Kaleta, CPHC, with Lassel Architects. Read about this charming project in "Inspiration", page 82.

Oftentimes, it makes the most sense to expand a facility's uses to make it more beneficial for a religious organization. For example, the Archdiocese of Portland (Oregon) decided to transform a modest 2,000-square-foot Midcentury Modern administration building for its Gethsemani Catholic Cemetery into a complete funeral home and crematorium. But, according to author Brian Libby, size was a concern. How would the design team at DiLoreto Architecture, Portland, introduce a chapel and all the attendant funeral-home capabilities on a limited amount of available land and retain portions of the office that had been renovated as recently as 2011? Find out in "Transformation", page 46.

Each of these facilities' renovations respect the original design and the work of previous craftsmen. Preserving the past is increasingly rare these days but encouraging today's design and construction teams to maintain historic character helps them improve their skills by learning from those who came before—yet another valuable form of continuing education.

CHRISTINA KOCH
Editorial Director

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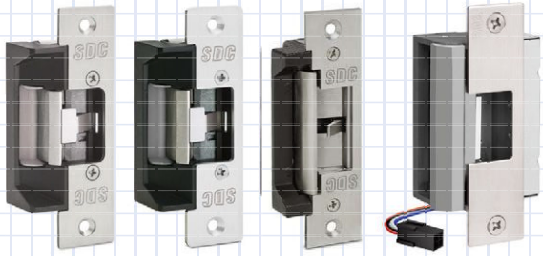

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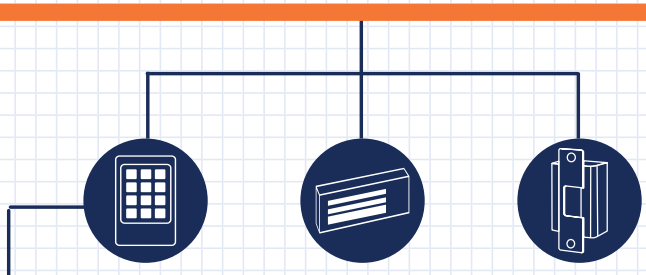

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CONTRIBUTING WRITERS

Maria T. Vargas is director of the Washington, D.C.-based U.S. Department of Energy Better Buildings Initiative. In "Energy", page 18, Vargas writes about season four of the Better Buildings Challenge SWAP, in which L'Oréal USA and General Motors swap energy teams to uncover new energy-efficiency strategies.

Kurt Kerns is principal and founder of St. Louis-based V Three Studios LLC. As a registered architect in more than a dozen states, Kerns has worked on projects across the country for clients, including Boeing, CBS and Learfield. His work on Learfield's Plano, Texas, headquarters is the focus of this issue's "Cover Story", page 24. The headquarters' unique sports theme and collaborative environment are helping the collegiate marketer evolve with the times.

Sachin Anand, P.E., LEED AP BD+C, principal at Chicago-based dbHMS, brings more than 15 years of diversified design, commissioning and management experience to the field of engineering. Because he believes the structure, site, lighting systems, HVAC systems, indoor environment and end use of a building should be viewed as an integrated system, he writes in "Component", page 42, about how to determine which HVAC technologies are most appropriate for an existing building.

Portland, Ore.-based freelance design journalist, critic and architectural photographer **Brian Libby** writes about how a modest 2,000-square-foot Midcentury Modern administration building for the Gethsemani Catholic Cemetery in Portland was transformed into a complete funeral home and crematorium. Read the story in "Transformation", page 46.

KJ Fields, a Portland, Ore.-based ***retrofit*** contributor, writes about the National Arts Centre in Canada's capital city, Ottawa, Ontario, in "Transformation", page 52. A recent rejuvenation project makes the 1.2-million-square-foot Brutalist building's entry transparent and accessible.

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ASTM Standard Helps Communities Form Resilience Plans

A new ASTM International standard will support cost-effective ways for communities to respond, withstand, and recover from a wide range of potential catastrophes, such as natural hazards, utility outages and human-caused disruptions. ¶ According to David Butry of the U.S. National Institute for Standards and Technology, Gaithersburg, Md., the new standard provides an economic

framework to evaluate investment strategies. It includes a seven-step approach to help communities formulate their own resilience plans. ¶ "Investments in community-resilience projects are difficult due to unknowns surrounding the frequency and magnitude of natural, technological and human-caused disruptions," says Butry, an ASTM International member. "Accounting for low-probability, high-consequence events challenge traditional economic evaluation methods, but this standard aims to fill that need." ¶ The new standard on "developing cost-effective community resilience strategies" (soon to be published as E3130) was developed by ASTM International's committee on performance of buildings (E06). ¶ "The new standard can be used to integrate community resilience plans with economic development, zoning, hazard mitigation, and other community planning activities that affect buildings, public works and infrastructure systems," Butry adds. ¶ He notes the standard is aligned with the U.S. National Preparedness System and complements NIST's Community Resilience Planning Guide. It can be used as part of a more comprehensive planning process. ¶ To purchase standards, contact ASTM International customer relations at (877) 909-ASTM or sales@astm.org.

retrofit CONFERENCE'18

2018 Retrofit Conference to Host Building Resilience Keynote and Session

retrofit's second-annual conference, to be held Oct. 9 at the Westin, Charlotte, N.C., will feature content about building resilience. Kicking off the resilience segment will be keynote speaker Ryan Colker, vice president, National Institute for Building Sciences, Washington, D.C. He will be followed by a panel discussion on resilience. Learn more about this and other sessions at retrofitconference.com.

AIA SUPPORTS DISASTER RECOVERY REFORM

The Washington, D.C.-based American Institute of Architects is urging Senate lawmakers to adopt the Disaster Recovery Reform Act (bit.ly/2JAlLFq) to ensure communities across America can recover from natural disasters more efficiently and cost-effectively.

AIA is supporting the legislation because it will prioritize pre-disaster mitigation and ensure post-disaster assistance enables communities to rebuild with the latest model building codes to ensure future resiliency.

"Strong, disaster-resilient building codes are a vital foundation to creating safer communities," says Rose Grant, chair of AIA's disaster assistance committee. "Adoption of these codes goes even further to help the built environment battle the onslaught of billion-dollar disasters."

Grant spoke at the AIA's educational briefing for policymakers in May. The briefing provided lessons architects have learned serving as responders with AIA's Disaster Assistance Program following hurricanes Maria, Harvey and Irma last year. The briefing also featured insight into how communities can prepare for the 2018 hurricane season that commenced June 1.

"As hurricane season approaches, architects stand ready to help communities prepare for and recover from the kind of weather-related events that victimized so many," adds AIA Executive Vice President and Chief Executive Officer Robert Ivy, FAIA. "We hope this discussion brings new insights and appreciation for how architects can assist communities in recovering from disasters and help to prepare for them in the future."

AIA's Disaster Assistance Program has trained thousands of architect volunteers in responding to disasters. Through the program, architects serve as second responders providing critical safety inspections of buildings and infrastructures following disasters. In addition, architects provide lawmakers with insight and lessons they learn in the field to help shape better policies around disasters, which includes resilient-building policies.

"Forging relationships between architects and local officials is key to mitigating and preventing the damage caused by weather-related disasters," notes Illya Azaroff, AIA, principal of +LAB Architect PLLC, New York. "Of the post-Sandy policies AIA recommended, nine were enacted into law in New York and 10 were included in the New York City building code. This is just one of the many examples where architects have been able to lend their expertise to shape policies that support a better built environment."

Visit bit.ly/2Jj1dBV for more information about AIA's Disaster Assistance Program.

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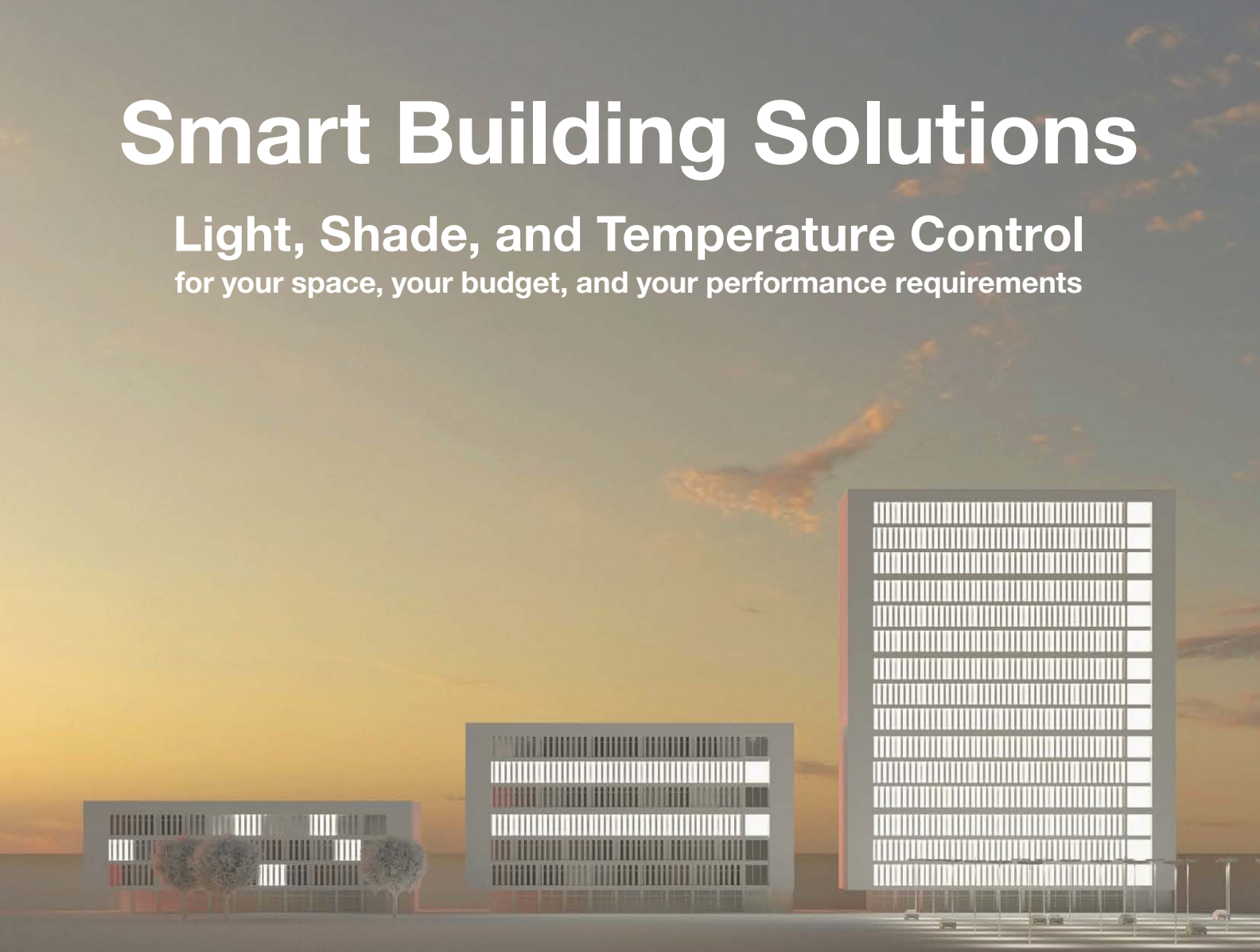

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L'Oréal USA Takes on General Motors in the Latest Better Buildings Challenge SWAP

BECAUSE WE ARE

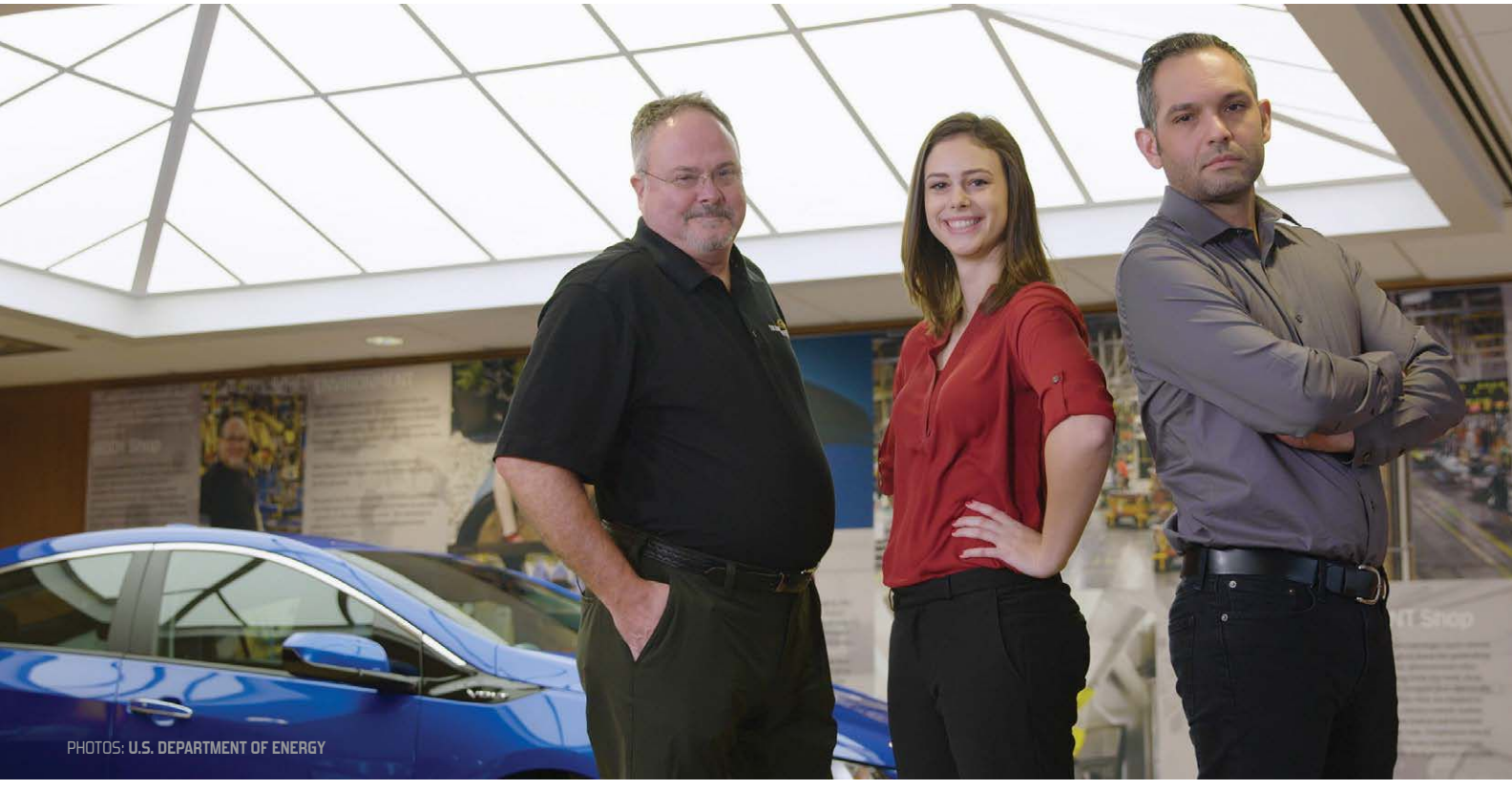
WRITTEN BY | **MARIA T. VARGAS**

At first glance, it may seem like they don't have a lot in common: the nation's third-largest carmaker and a world leader in beauty brands. But Detroit-based General Motors (GM) and New York-based L'Oréal USA are manufacturing giants that are committed to excellence when it comes to operations and energy efficiency. Moreover, they share a willingness to learn from others. The shared enthusiasm of both teams for finding significant energy savings through collaboration made these two companies a natural choice for the latest season of SWAP, the Washington, D.C.-based U.S. Department of Energy's Better Buildings Challenge reality-show-style online video series.

Now in its fourth season, the Better Buildings Challenge SWAP brings the energy-management teams of organizations together, then sets them loose in the other team's facility to find energy-saving opportunities; gain insight; and, ultimately, take away lessons they can apply in their own operations. DOE's cameras follow all the action to give viewers a behind-the-scenes look at what it takes to improve competitiveness through energy efficiency.

L'Oréal USA's North Little Rock, Ark., plant and General Motors' Detroit-Hamtramck assembly plant are finely tuned operations. At both locations, employees work alongside advanced robots (large and small) to create products the public uses

View DOE's creative videos from this season's Better Buildings Challenge SWAP.



PHOTOS: **U.S. DEPARTMENT OF ENERGY**

ALL WORTH IT

every day. The imposing scale of both operations means the energy challenges these organizations face are remarkably similar. Whether you're making beauty products in Little Rock or assembling cars in Detroit, the more efficiently you can turn raw materials into finished products, the better for the environment and your bottom line.

Driving Innovation

Like all Better Buildings Challenge participants, GM committed to a 20 percent reduction in energy intensity across its operations by 2020, which it has achieved ahead of schedule. One strategy that has helped the company reach its goal is "treasure hunts" conducted throughout its facilities—essentially a way of engaging employees to "hunt" for energy-saving opportunities, track down inefficiencies and correct them.

When L'Oréal USA's energy team arrived at GM's Detroit-Hamtramck assembly plant, team members brought fresh pairs of eyes to the "treasure hunt" challenge. They were impressed by the sheer size of the 4.1-million-square-foot facility and scale of the operation. At the plant, GM assembles four vehicles: the Buick LaCrosse, Chevrolet Impala and Volt, and Cadillac CT-6. In the body shop alone, which is the first step in the auto manufacturing process, there are 1,100 robots in operation.

The L'Oréal USA team noted many of the robots were powered up but not in use, identifying a potential source of energy savings. Another issue common to large manufacturing plants is air leakage in processes that use compressed

> "GM AND L'ORÉAL PERHAPS ARE MORE ALIKE THAN THEY SEEM. AS GM GLOBAL ENERGY MANAGER AL HILDRETH NOTES, **WE PAINT VEHICLES; THEY KIND OF PAINT PEOPLE.**"

THE VISITING GM TEAM NOTED THE VARIETY OF PRODUCTS L'ORÉAL USA IS ABLE TO MANUFACTURE IN A COMPARATIVELY SMALL SPACE REQUIRES CREATIVITY AND OPERATIONAL EFFICIENCY.

air; the L'Oréal USA team suggested regular "air walks" to identify any leak sources.

The walkthrough revealed many areas where GM's efficiency game was on point, from lighting to an integrated Energy Management System that allows the energy staff to monitor steam, electricity, natural gas and water use at any given time.

"They have a clear understanding of the highest-energy consumers in the plant," says Carlos Ruiz Rabago, L'Oréal USA's senior vice president of manufacturing, North America. "You need to go and really apply your efforts to the biggest opportunity and they're doing it."

GM also has succeeded in bringing employees on board the energy-efficiency train with workers at all levels invested in finding ways to save.

TIPS FOR MORE ENERGY-EFFICIENT BUILDINGS

ALWAYS BE MONITORING

As the saying goes, if you can't measure it, you can't manage it. Nowhere is that truer than with energy. Comprehensive energy-management dashboards allow real-time monitoring, tracking and identification of more ways to save. Benchmarking—before and after upgrades—allows you to see how your building (or factory) compares with others.

EMPLOYEE ENGAGEMENT IS KEY

All Detroit-based General Motors' employees are invested in reducing the facility's overall energy from plant managers all the way down to the people on the line. Everyone takes responsibility for shutting down lighting and other non-essential systems at the end of the day. New York-based L'Oréal USA also runs a global sustainability program called "Sharing Beauty with All" (or "Y'all" at the North Little Rock plant), which celebrates employee participation, ideas and success.

LOOK OUTSIDE YOUR FOUR WALLS

It's easy to understand why a manufacturer would stay laser-focused on what's going on inside on the shop floor. But thinking outside the box (and the plant) to engage with local businesses and the community can improve efficiency, too. GM's Detroit-Hamtramck facility is heated by steam that comes from a local waste-to-energy facility. In return, GM sends back the condensate to create savings for everyone.

HARNESS YOUR RESOURCES

There are resources all around you if you're willing to collect them. GM has its own pond system to collect rainwater that is used in cooling towers and to make high-purity, paint-shop water. GM and L'Oréal USA also have onsite solar arrays that provide a percentage of their facilities' electricity demand.

BRING IN FRESH EYES

Even the most seasoned energy managers can learn a thing or two from an outside perspective. Conducting energy "treasure hunts" can identify obvious and hidden opportunities to save. This is what SWAP is all about.

THE WALKTHROUGH REVEALED MANY AREAS WHERE GM'S EFFICIENCY GAME WAS ON POINT, BUT THE L'ORÉAL USA TEAM NOTED POTENTIAL SOURCES OF ENERGY SAVINGS, AS WELL.

***retrofit* COVERS THE BETTER BUILDINGS CHALLENGE SWAP**

- **SEASON 1:** Whole Foods vs. Hilton Worldwide
  March-April 2016 issue, page 52, or www.retrofitmagazine.com/better-buildings-challenge-swap
- **SEASON 2:** U.S. Navy vs. Air Force
  March-April 2017 issue, page 58, or www.retrofitmagazine.com/navy-air-force-better-buildings-challenge-swap

Efficiency Is a Beautiful Thing

L'Oréal USA is focused on its 2020 goal to reduce water consumption, CO_2 emissions and transportable waste by 60 percent. At the North Little Rock facility, L'Oréal USA has invested in a 1.2-megawatt onsite solar array and composting program, as well as worked to build an internal culture of sustainability.

L'Oréal celebrates its employees' contributions to efficiency and empowers them with the tools to lead more sustainable lives at home. Building a culture of sustainability is relevant across sectors, and DOE has seen it implemented in each season of SWAP. Although it can be hard to measure the impact of empowering employees, giving them the opportunity to make a difference can be vital to success.

The North Little Rock plant at 830,000 square feet is much smaller than GM's, and the visiting GM team noted the variety of products L'Oréal USA is able to manufacture in a comparatively small space requires creativity and operational efficiency.

"We usually only have a few different types of cars running on the factory floor," notes Erin Lawrence, energy engineer at GM. "One thing that surprised me was the number of products they were able to manufacture all at the same time."

GM identified a few major potential savings sources from technical fixes, like retro-commissioning and maintenance on HVAC systems, to easy-to-implement measures, like improving insulation and a more frequent "tag and fix" program for air leaks. Combined, these actions could add up to almost $100,000 in energy cost savings during the course of a year.

In four seasons of SWAP, a few common themes have emerged. From retail to hospitality, municipal buildings to military academies, and now from manufacturing cars to concealer, leaders in sustainability are always looking for ways to improve, and they are open to ideas from a variety of sources. Sometimes, a fresh perspective is all you need.

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HOME COURT ADVANTAGE

WRITTEN BY | **KURT KERNS**

RENOVATIONS INTRODUCE SPORTS THEME AND VIBRANT WORKFLOW TO COLLEGIATE MARKETER'S HEADQUARTERS

PHOTOS: **CHRISTOPHER MANN, MANN PHOTOGRAPHY**

For more than four decades, Learfield has been a familiar name in the world of college athletics. In 1975, Learfield became the radio rights distributor for the University of Missouri Tigers, which was the starting point for its multimedia sports marketing focus of today.

Headquartered in the Dallas suburb of Plano, Texas, Learfield has roughly 130 offices across the country at the collegiate institutions, conferences and arenas the company has the privilege of representing. Whether it's Mustangs, Sooners, Tar Heels, Tigers or Wildcats, chances are, Learfield is involved.

Although Learfield has evolved over the years from a traditional broadcasting business to a broader media content creator, its work is still centered around a passion for college sports. Because of the company's growth, maintaining brand consistency has been an essential goal. In addition, Learfield's executives sought a design partner for their facilities that understands the evolution of technology.

St. Louis-based V Three Studios LLC, a full-service architectural firm with an emphasis on designing media and communications facilities across the country, has partnered with Learfield since the mid-2000s. V Three Studios has worked with Learfield in seven states and has used a consistent material palette and architectural vision throughout all Learfield's facilities. The design firm has had the privilege of developing Learfield's offices into functional spaces that convey a "sports-centric" theme throughout.

The first sports-themed renovation occurred in 2004 at Learfield's technical office center in Jefferson City, Mo. The changes connected the employees back to the universities they represent and immersed them in the product they were selling.

"We've had a long-standing relationship with V Three, because they understand our identity and passion for college sports," states Matt Lear, project manager at Learfield. "Continuing to work with V Three ensures consistency

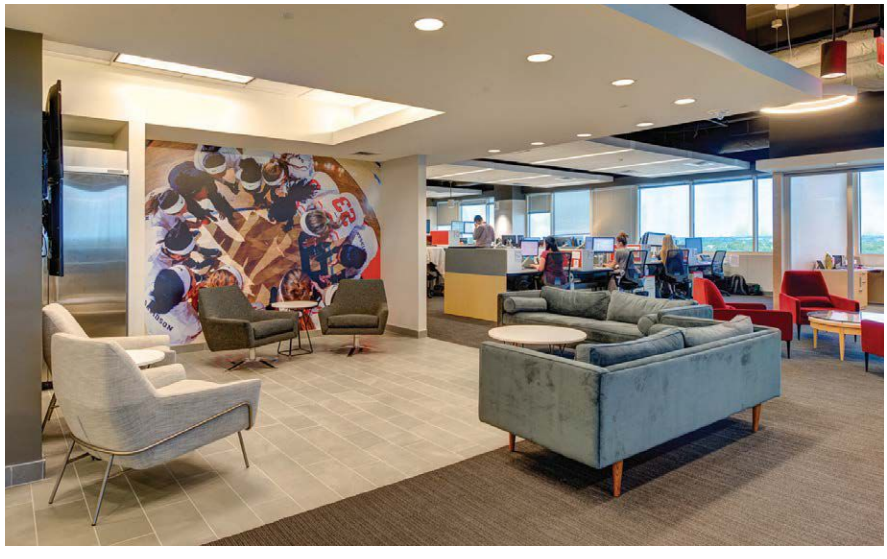
THE **NEW DESIGN** ALLOWS LEARFIELD'S MARKETING, SALES AND CONTENT DEVELOPMENT TEAMS TO WORK SIDE BY SIDE TO BEST SERVE THE FIRM'S MORE THAN 100 COLLEGIATE CLIENTS.

throughout all of our locations around the country."

WIDE OPEN

In 2017, Learfield executives recognized the company's suites at the Park Center Building in Plano were not meeting the demands of today's media technology. The space was unable to provide collaborative idea-driving environments for Learfield's innovative staff. Learfield executives decided it was time to renovate and reached out to V Three Studios for help retrofitting the space into an inspirational environment.

"When considering renovations to our space, we didn't want to look like we work in your typical office building," Lear claims. "We wanted to marry the excitement of a stadium's or arena's atmosphere with a day-to-day business office, and V Three has been



able to capture that with these renovations."

After considering the projected future of the company, creating a collaborative space for Learfield's internal teams became a top goal of the project. It was essential that marketing, sales and content development teams were able to work side by side to best serve the firm's more than 100 collegiate clients.

No longer working in silos, ad hoc teams can quickly form with experts in graphic design,

V THREE STUDIOS LITERALLY BROUGHT THE COLLEGE SPORTS ATMOSPHERE TO THE LEARFIELD HEADQUARTERS RENOVATION THROUGH RECYCLED STADIUM SEATING, TELEVISIONS DISPLAYING SPORTS PROGRAMMING AND SPORTS-THEMED WALLCOVERINGS.

research, marketing and digital to produce a high-quality package that will meet a client's needs. This allows everyone to utilize his or her strengths to produce a package in a timely manner.

By using fewer walls and specifying glass where acoustical separation was needed, V Three Studios was able to create the desired open environment. The design team also minimized private office spaces, which broke up any company divisions and allowed employees to become more connected, ultimately saving time and money for the company. Smoother and faster collaboration is crucial to a company like Learfield as the media world transitions from analog to more digital.

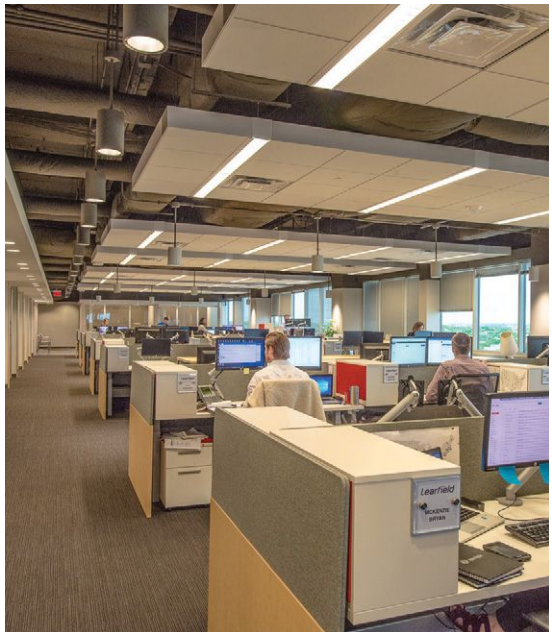
"We needed a space that was more collaborative and flexible," Lear states. "We want our employees to be able to work as small teams, so we needed functional pods where people who worked on different teams could tackle projects together."

V Three Studios worked with Learfield to create an Ideation Suite, which serves as an environment in which interdisciplinary groups can work together on collective ideas, or smaller groups can perform problem-solving exercises. Known as the "X's and O's

Room" by the staff, the space is highly flexible in terms of furniture and technology. The large, well-designed room easily adapts to the various demands of the suite and can be adjusted to serve multiple purposes. For example, the suite is capable of hosting board meetings and catered events while also serving as a classroom with a white board, projection systems and seating that can be arranged in a theater style for lectures.

SPORTS-CENTRIC

V Three Studios quite literally wanted to bring the college sports atmosphere to the Learfield



Retrofit Team

INTERIOR DESIGNER AND ARCHITECT OF RECORD // V Three Studios, St. Louis, www.vthreestudios.com

STRUCTURAL AND MEP ENGINEER // AOS Engineering, Plano, Texas, www.aos-engineering.com

GENERAL CONTRACTOR // Abstract Construction Co., Carrollton, Texas, www.abstractconstruction.com

MILLWORKER // Genesis Millwork LLC, Garland, Texas, www.genesis-millwork.com, and R & R Millwork Inc., Mills Point, Texas, www.randrmillwork.com

Materials

PAINTS // Sherwin-Williams, www.sherwin-williams.com

FURNISHINGS // WRG Texas, www.wrgtexas.com, and West Elm, www.westelm.com

TEXTILES // Designtex, www.designtex.com

DESKS // Herman Miller Renew Link (Benching) and Herman Miller Canvas (Private Offices), www.hermanmiller.com

CHAIRS // Herman Miller Verus, www.hermanmiller.com

TVs // Taurus Technologies Inc. (Audio, Video and Video Conferencing), www.taurustechinc.com, and ANC (LED Displays and Software), www.ancsports.com

> "We wanted to marry the excitement of a stadium's or arena's atmosphere with a day-to-day business office. . . ."
>
> *—Matt Lear, project manager, Learfield*

office. Stadium seats given to Learfield by a partner organization were incorporated into the front lobby, and basketball flooring was repurposed on the walls, ceiling and reception desk in a lobby space. An LED video wall also was installed in the lobby.

Additionally, LED boards have been added throughout the office to emulate the atmosphere of an arena. These new boards each include a "score ticker," which showcases live sports scores and news. The LED boards can be customized to include messages welcoming Learfield's future and current clients as they visit the office.

These additions truly bring that classic "stadium feel" to Learfield's headquarters. The Ideation Suite and another Digital Suite reflect the excitement of college sports and the collective personality of this talented group. This is demonstrated in the interactive displays and graphics set against a material palette that has evolved over time. As spaces at Learfield's offices have been updated, the palette has been refined though it remains consistent in the use of Learfield's vibrant brand colors.

HIGHLIGHT REEL

V Three Studios found ways to integrate Learfield's partner institutions throughout the space. For example, glass shelves line the conference rooms and are occupied by helmets and basketballs from various schools.

Unique sports items also are integrated in the design throughout. A small-scale centrally hung scoreboard hangs over the break room as though it is a basketball court. Televisions throughout the space display games that can be watched during business hours.

When the project wrapped in April 2018, all parties involved were thrilled.

"V Three and all of the other companies involved in these renovations did a great job of modernizing our space," Lear asserts. "They were able to take our words and translate them into beautiful designs. We are very proud of our new space and its identity in the sports world. When someone walks into our Plano office, they know where our passion is."

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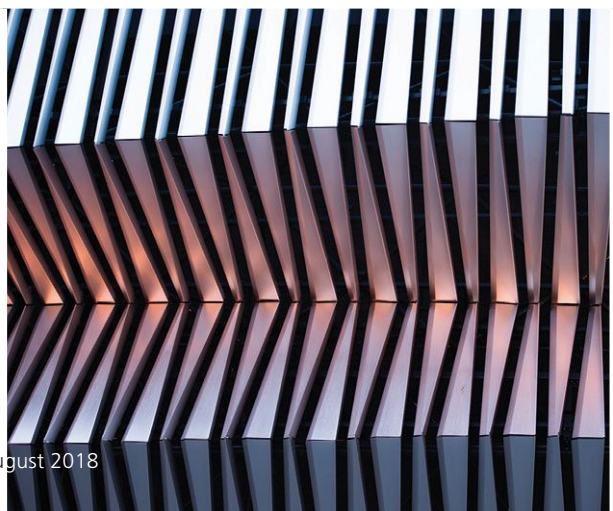
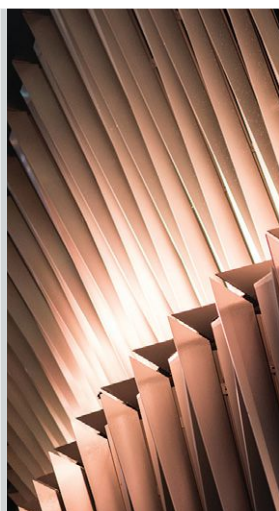
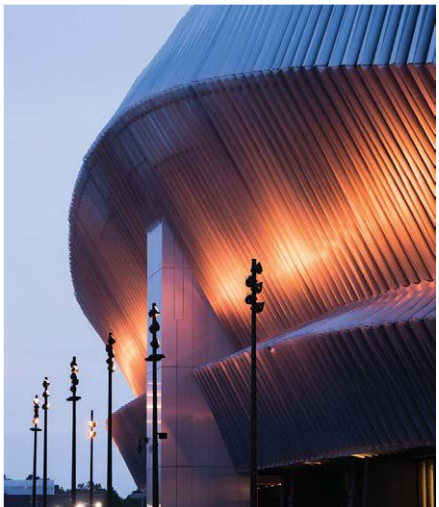
NASSAU VETERANS MEMORIAL COLISEUM | Uniondale, N.Y.

VIEW HOW COLLABORATIVE EFFORTS USING ACM TRANSFORMED THIS COLISEUM.





PHOTOS: JAMEY PRICE PHOTOGRAPHY



RETROFIT TEAM

ARCHITECT: SHoP Architects, New York, www.shoparc.com
DEVELOPER: Forest City Ratner Cos. LLC, New York, www.forestcity.net
GENERAL CONTRACTOR: Hunt Construction Group, Indianapolis, www.huntconstructiongroup.com
FABRICATOR: Sobotec Ltd., Hamilton, Ontario, Canada, www.sobotec.com
ACM INSTALLER: Crown Corr Inc., Gary Ind., www.crowncorr.com

MATERIALS

The intricate metal design system wrapping the 416,000-square-foot coliseum consists of approximately 4,700 unique aluminum "fins" created with 225,000 square feet of recyclable 4-millimeter Alucobond PLUS aluminum composite material (ACM) in the naturAL Brushed finish.

Alucobond was chosen to create the fins for its light weight and flexibility, according to John Cerone, associate principal and director of virtual design and construction for SHoP Architects. "Each of these fins has six folds," he says. "We knew this would be a complicated folding and routing process. We wanted clean lines and several fields of interest to look at as you walk closer to the individual fins. The Alucobond material expresses flexibility. It's very easy to form into precise shapes."

ACM MANUFACTURER: 3A Composites USA, 3acompositesusa.com

THE RETROFIT

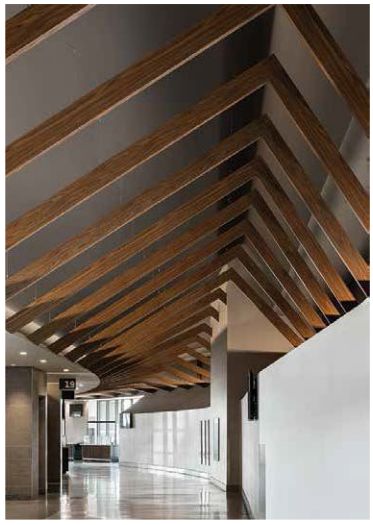
Nassau Veterans Memorial Coliseum presented by New York Community Bank was updated inside and out. It reopened in April 2017 after being closed slightly more than a year and a half for the $165 million renovation that was privately funded by Nassau Events Center LLC, a joint venture between Forest City Ratner Cos. LLC and Brooklyn Sports & Entertainment, both of New York.

The completed renovation has more than met Forest City Ratner's goal "to transform a 45-year-old coliseum into a first-class destination for entertainment and sports and to serve the Long Island community," according to Alexis Lenza, senior vice president, construction and design development, Forest City Ratner. "This building now is a piece of architecture and part of the community. This definitely was an iconic project. … It's not often that you get to renovate an existing arena and wrap its exterior in an undulating metal design system—let alone one in which every single element is unique."

NASSAU VETERANS MEMORIAL COLISEUM | Uniondale, N.Y.

WRITTEN BY | ZOË ZELLERS

PHOTOS: RICHARD CADAN



RETROFIT TEAM

ARCHITECT: Gensler, New York, www.gensler.com
GENERAL CONTRACTOR: Hunt Construction Group, Indianapolis, www.huntconstructiongroup.com
CEILING INSTALLER: Cord Contracting Co. Inc., Woodbury, N.Y., www.cordco.com

MATERIALS

After about four years of planning and construction, visitors to the roughly 400,000-square-foot interior encounter an environment that is inviting, airy and modern. Overhead, a custom configuration of High Profile Series ceiling elements—peaked metal beams with a decorated wood-look finish—lead the public through the curved concourse into the arena's bowl.

The main concourse received a wood rafter suspended ceiling feature along with revamped bathrooms, lighting and concessions. The solution pays homage to the arena's history by preserving the interior architecture while overhauling its infrastructure and material finishes.

Hunter Douglas' team customized and engineered High Profile Series Frameworks and Straight Baffle ceilings while working around existing ceiling conditions. The owner, architect, and contractors wanted minimal penetrations to the existing deck above because of pre-existing conditions and the overall aesthetic. The engineering team worked to carefully design each beam's length and angle, varying each to establish a visual "wave effect" that allows visitors to see movement as they walk around the coliseum.

The ceiling design and installation "was definitely unusual," says subcontractor Richard Meyer of Cord Contracting. "Luckily, we have state-of-the-art layout programs that let us take the architect's autoCAD file and lay out all the parts going around the building to ensure we kept the look they were looking for." Meyer says an engineer did pull tests to ensure it was "still going to be cost-effective and hold up in the long run."

ALUMINUM BEAMS MANUFACTURER: Hunter Douglas Architectural, HDarchitectural.com

THE RETROFIT

The coliseum had begun showing signs of age after hosting a steady lineup of concerts and sporting events in the four decades since its opening in 1972. In fact, fans of a rival hockey team had begun calling it "the mausoleum." After a proposed plan to demolish and replace the coliseum wasn't approved, the facility sought a redesign to inject new life; stylish, state-of-the-art upgrades; and local flavor into the venue.

According to Taso Sioukas with Gensler, the firm wanted the update to make a new "design statement while maintaining the 'good bones' of the existing infrastructure." The unique ceiling aesthetic earned a Gold Award in Construction Excellence from the Oak Brook, Ill.-based Ceilings and Interior Systems Construction Association in March 2018.

This project first appeared on Hunter Douglas Architectural's blog, bit.ly/2NuSGJM.

Cypress Spring High School | PBK Architects | Cypress, TX

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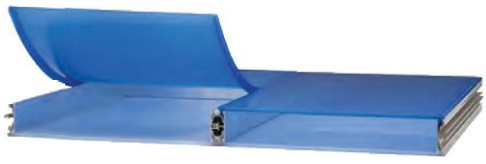
Removable Skin Technology (RST)



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FALCON BOXING GYM | Glenview, Ill.

RETROFIT TEAM

ARCHITECT: Filoramo Talsma LLC, Chicago, (312) 635-1920

GENERAL CONTRACTOR: Cordos Development, Chicago, cordos.net

MATERIALS

Three contiguous buildings were linked and wrapped with 3,600 square feet of perforated PAC-CLAD 7/8-inch Corrugated Panels to provide a visually unified, contemporary appearance. The 0.050 aluminum panels were finished in Petersen Aluminum's Cool Color Weathered Zinc.

CORRUGATED PANELS MANUFACTURER: Petersen Aluminum Corp., pac-clad.com

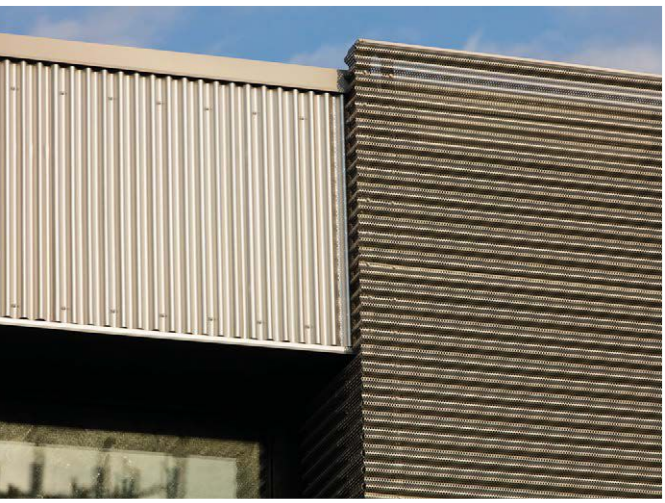
THE RETROFIT

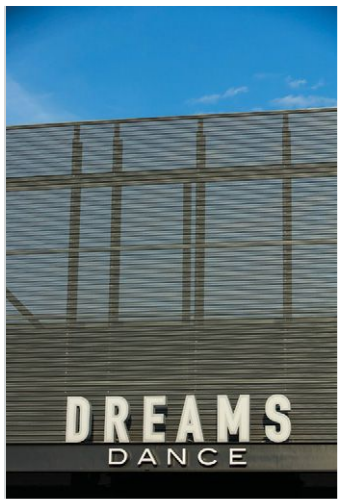
To look at the modern Falcon Boxing Gym, one would not realize it previously was an aging, multi-building, 1960s-era industrial park. The renovation combined the gut rehab of an existing 12,000-square-foot warehouse with 30,000 square feet of additions to create a premier professional boxing gym, indoor soccer training field and cardio/weight training facility.

Other amenities include a running track suspended around the soccer gym perimeter; climbing ropes; stair exercise facilities; and well-appointed locker, shower and steam rooms.

During the seven-month construction phase, Cordos Development completed campus-wide improvements, including new stormwater management, parking-lot reconstruction and landscaping. The team also hooked municipal water services to all buildings.

PHOTOS: PETERSEN ALUMINUM CORP.





FORD ICE CENTER | Nashville, Tenn.

PHOTOS: **NICHIHA**

RETROFIT TEAM

ARCHITECT: HBM Architects, Cleveland, www.hbmarchitects.com

FIBER CEMENT PANEL INSTALLER: Dixie ICF, Louisville, Ky., (502) 493-0711

MATERIALS

The original façade of what once was a mall featured a beige brick exterior, which didn't meet the aesthetic sought by the design team. "The building needed to be visually appealing to the end user," says Tim Hamilton, owner of Dixie ICF who installed the custom panels on the exterior of the building.

To create a more energetic feel, the team turned to the vibrant colors possible with Illumination Series fiber cement panels. Using Nichiha's Color Xpression system that matches any paint manufacturer's standard colors, the hockey center features blue Illumination panels with gold accents, a nod to the city's Predators National Hockey League team. The community center has blue mosaic panels, and the library features white panels with mosaic glass. A total of 32,000 square feet of panels was installed on the former mall in a six-week period.

"We used Nichiha to tie it all together. Now it has a new strong identity for all three parts," says Dan Meehan, AIA, LEED AP, principal with HBM Architects. "The scale of the building was a challenge because it was so large. We needed something to go across all three buildings. Now it gives a great feel."

FIBER CEMENT PANELS MANUFACTURER: Nichiha, www.nichiha.com

THE RETROFIT

Nashville turned a struggling mall into a community asset. The former Global Mall at the Crossings was separated into three different spaces—a hockey practice arena, library and community center—unique to themselves while complementing each other.

"I see this center becoming a hub of learning and recreation for residents in southeast Davidson County, one of the fastest growing parts of our city," said Mayor Karl Dean when the project was first announced in 2013. "Families will find it convenient to have the ice rink, community center, park and library in one location. This new public facility will benefit nearby neighborhoods and the surrounding retail and commercial area by attracting more people to the vicinity and creating a more stable business environment."

PHOTOS: ICYNENE-LAPOLLA

HOT YOGA STUDIO | Harrisonburg, Va.

RETROFIT TEAM

ARCHITECT: Gaines Group Architects, Harrisonburg, www.thegainesgroup.com
GENERAL CONTRACTOR: Herr & Co., Harrisonburg, herrinc.com
INSULATION CONTRACTOR: Elite Insulation & PolyPro LLC, Broadway, Va., www.polyprollc.net
MECHANICAL ENGINEER: Blauch Brothers Inc., Harrisonburg, blauchbrothers.com

MATERIALS

In remodels, insulation is often a secondary consideration to cosmetic and space functionality enhancements. However, during the retrofit of this 130-year-old building, which would house a hot yoga studio, insulation had to be the primary consideration.

Hot yoga is practiced in 90-minute sessions in a room heated to 108 F with 40 percent humidity. The extreme heat and moisture is intended to mimic the climate of India, the birthplace of yoga. Understandably, this heat and moisture could pose serious risk to the overarching building structure. At 2 stories and constructed of wood with mixed exterior substrates, the property also houses traditional tenants, including a law firm with offices situated right above the ground-level yoga studio. The biggest concern of the design/construction team was the prevention of moisture migration through the wall assembly, which posed risk of creating mildew, mold and poor air quality throughout the adjacent office suites. Another concern was the higher than normal temperature escaping the studio's insulation envelope to a colder building exterior, which would cause considerable condensation and possible structural damage.

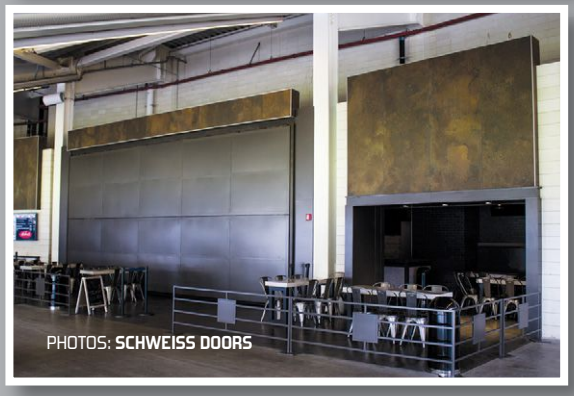
For the yoga studio owner, the prevention of mold and mildew growth inside the studio posed serious concern; a primary goal of the studio is to enhance the health of the yoga practitioners using the space, not make them sick.

The design and construction team treated the insulation much like an exterior wall SPF application (with brick ties), using some clips for drywall attachment. This enabled a virtually seamless application, limiting thermal bridging. Sheets of 4- by 8-foot, 1-inch-thick moisture-resistant rigid insulation were applied over the stud wall framing. Custom metal clips were made and attached to the wall studs. The blue board was installed on the walls with the attachment clips protruding. The ceiling features a similar application with blue board attached on the ceiling and drop drywall ceiling grid attachments protruding. All materials penetrating the walls were installed prior to the installation of the spray foam insulation so an airtight seal could be achieved.

A 2-inch layer of closed-cell spray foam was applied to the walls and ceiling of the studio. The thickness of the spray foam was gauged by how much of the drywall attachment clips were left protruding.

CLOSED-CELL SPRAY FOAM MANUFACTURER: FOAM-LOK by Icynene-Lapolla, www.icynene-lapolla.com

YANKEE STADIUM | New York



PHOTOS: SCHWEISS DOORS

RETROFIT TEAM

GENERAL CONTRACTOR: Hunter Roberts Construction Group, New York, www.hrcg.com
BIFOLD DOOR INSTALLER: AJ Garage Door & Service, Oakdale, N.Y., ajgaragedoor.com
DOOR CLADDING INSTALLER: Barrett Inc., Danbury, Conn., www.barrettroofing.com

MATERIALS

The new Yankee Stadium, which opened at the start of the 2009 season, underwent numerous enhancements during the months leading up to the 2017 season. Among the retrofit improvements are five bifold liftstrap designer doors. The largest of the custom doors measures 27-feet, 5-inches wide and 11-feet, 4-inches tall. Two more doors are 23 feet, 4 inches by 9 feet, 2 inches. The final two doors measure 21 feet, 10 inches by 9 feet, 2 inches. All five doors are fitted with electric photo-eye sensors, black liftstraps, manual latches, and alike-keyed opening and closing switches. Four doors are clad in a high-tech brushed aluminum to blend in with the façade whether the doors are open or closed.

One of the stadium doors performs at the AT&T Sports Lounge at the mezzanine level on the left-field line. The door is clad in wood and tile on the outside; when it's closed, you can't tell it's an operational door. Two additional concession/bar areas, with two doors each situated at right angles, are located in right-center field and left-center field on the Triple Zero level.

After scouting other door companies, Paul Wassenbergh, senior project manager and director of interiors preconstruction for Hunter Roberts Construction Group, decided the simplicity of design, along with the liftstraps, were reasons to specify these particular bifold doors. Bifold doors also were appropriate because the stadium didn't have room for other components, such as a hydraulic pump or counter weights.

"The bifold doors are heavy-duty, very solid and functional," Wassenbergh says. "They will be a long-lasting solid piece of equipment that I don't ever see failing. I like how easy they are to use."

BIFOLD DOOR MANUFACTURER: Schweiss Doors, www.bifold.com

PHOTOS: TREX COMMERCIAL PRODUCTS

TARGET CENTER | Minneapolis

RETROFIT TEAM

ARCHITECT: Alliance + Sink Combs Dethlefs, now Perkins + Will, Denver, perkinswill.com, and Alliiance, Minneapolis, www.alliiance.us
GENERAL CONTRACTOR: Mortenson Construction, Minneapolis, www.mortenson.com
GLAZIER: Empirehouse Inc., Mounds View, Minn., www.empirehouse.com

MATERIALS

To maintain the aesthetic of the new glass façade installed in the main entrance and lobby and to promote the passage of light throughout the interior space, approximately 600 linear feet of glass railing was installed in Target Center's $145 million renovation project.

Two types of specialty glass were used for Target Center's glass railings. Cardinal Glass Industries and Bendheim Architectural Glass provided 1/2-inch tempered glass with a special PVB interlayer, resulting in a semi-transparent, "tinted" glass. GlasPro and Standard Bent Glass provided bent 1/2-inch tempered glass, including glass with a tight radius. Trex Commercial Products' craftsmen produced stainless top rail to meet the flow and curvature of these railing designs. Custom railings, including the Dot Series railing; Track Rail; and floor, wall and glass-mounted handrail were installed.

The glass railing designs can be found alongside imaginative and artistic elements, such as the large basketball goal chandelier hanging from the atrium floor to the lobby, the coordinating metal basketball sculpture hanging above the atrium floor and the life-size statue of former Minneapolis Lakers phenom George Mikan located in the Life Time lobby.

RAILING MANUFACTURER: Trex Commercial Products, www.trexcommercial.com

THE RETROFIT

Home to the Minnesota Timberwolves and Lynx, Target Center is one of the most utilized special events venues in the U.S. At 27-years old, the building was in need of a fresh look. Particular touches and finishes of high design now grace nearly every surface of Target Center.

CAVES VALLEY GOLF CLUB | Owings Mills, Md.

MATERIALS

Sidewalls initially were added to the Caves Valley Golf Club's two covered front porches to help mitigate inclement weather so members and their guests could still enjoy the porches. The sidewalls, however, did not provide the clarity or transparency desired, and the elements were still able to come underneath the walls. After members complained about the sidewalls, the club's management decided upon a NanaWall opening glass wall system.

The bluestone patio upon which the covered porches are built has a 9-inch slope. NanaWall engineers and installers had to work around that slope to ensure the doors operate perfectly. Facilities Manager Robert Taylor says, "You can literally move this [system] using one hand; the track system is not noisy, it's very clean from the handles to the pins."

The frameless NanaWall HSW75 system also provides insulation and protection against the elements. "Once you're in this room, you really don't notice or sense anything, so I think it acts as a great insulator and wind barrier, as well," Taylor says. The system is almost invisible when closed, and the panels stack discreetly out of view when they are open, allowing for uninterrupted visual access to the valley beyond.

GLASS WALL SYSTEM MANUFACTURER: NanaWall, www.nanawall.com

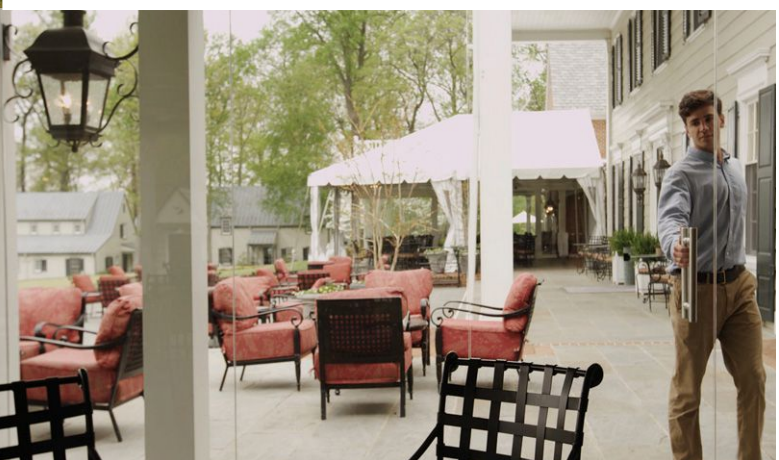
THE RETROFIT

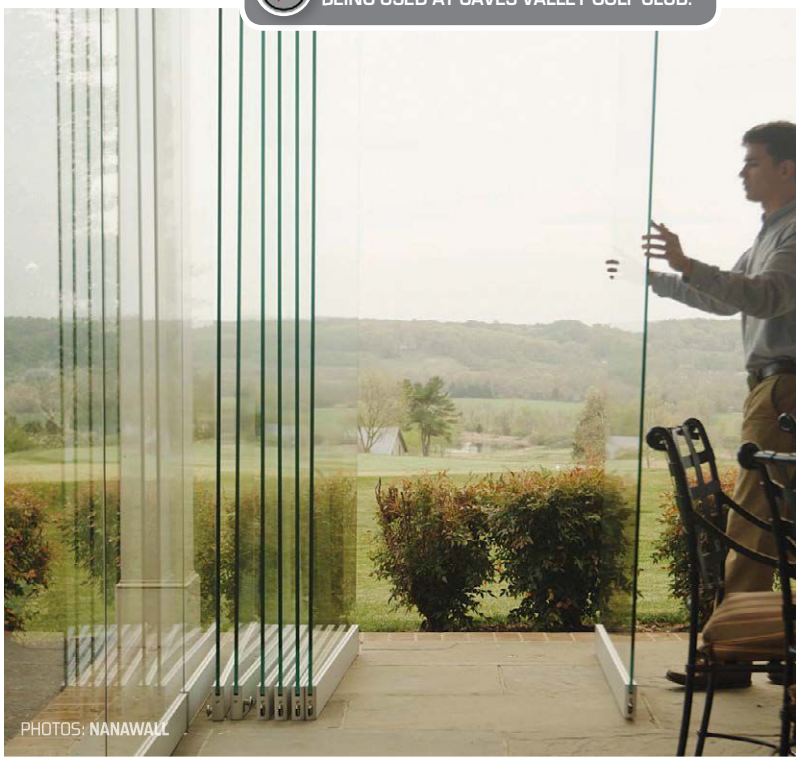
Caves Valley Golf Club is a private club situated on 962 acres of rolling hills, pastures, woods and wetlands. The clubhouse and lodge once comprised a stately 1930s home. The two covered porches were added in 2008.

General Manager Nancy Palmer explains, "We have an absolutely spectacular view from the front of the clubhouse to the valley below us, and that view is what our members are attracted to."

Because of the results of the NanaWall system, Caves Valley Golf Club's representatives have ordered another NanaWall door system for another patio.

VIEW A VIDEO OF THE NANAWALL DOORS BEING USED AT CAVES VALLEY GOLF CLUB.





PHOTOS: NANAWALL

21st CENTURY MECHANICAL SYSTEM RETROFITS

WRITTEN BY | SACHIN ANAND, P.E., LEED AP BD+C

Careful Consideration of Loads and Systems Will Ensure Modern Comfort in Buildings of the Past

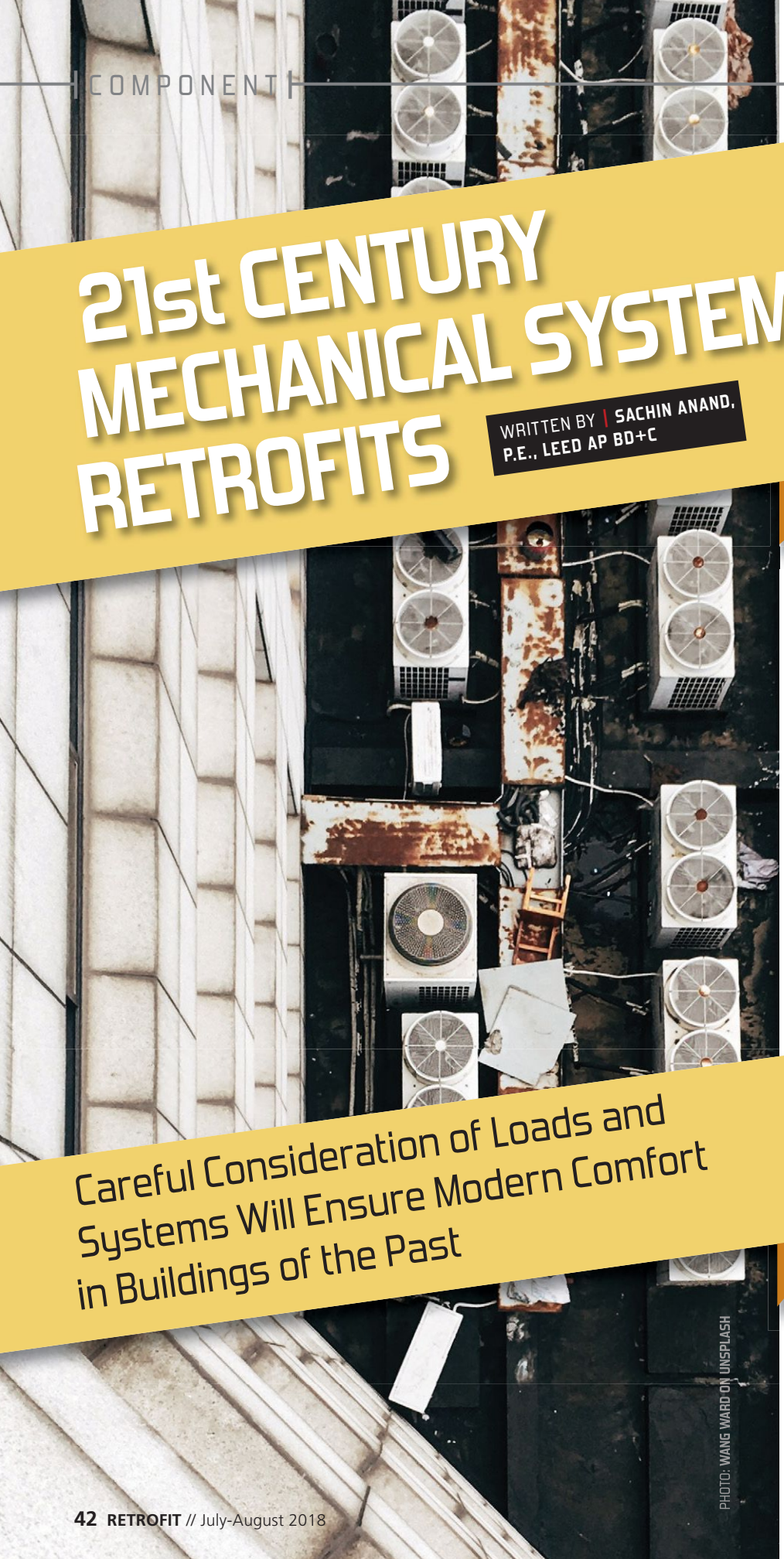


PHOTO: WANG WARD ON UNSPLASH

Heating, ventilation and air-conditioning systems have a recommended life span of 20 to 25 years. Most building owners try and squeeze an additional five to 10 years on systems to defer upgrades for financial reasons. Lack of reliable comfort conditioning and obsolete parts force most owners to retrofit and upgrade systems. However, in the last decade, other factors are starting to add to the push for upgrades. These include improved energy efficiency, thermal comfort and air quality.

Understanding options for upgrades requires comprehension of available technologies but also an understanding of the existing building envelopes, which typically outlast systems in most buildings. Building vintage often provides insight into building envelope compositions. Buildings built prior to the 1970s had little or no insulation in walls and other opaque assemblies. Major advancements in fenestration—both frames and glazing—have doubled thermal performance over the last three decades. Further, most buildings have undergone lighting upgrades to capture the low-hanging fruit for energy savings sweetened by utility company incentives. These lighting improvements have changed the dynamic of how we heat and cool buildings. For example, office buildings designed in the 1980s and 1990s used 3 watts per square foot for lighting power and often used this lighting power to keep them warm in the winter. The new standard for lighting is 0.8 to 1.0 watt per square foot.

Load Calculations

The first step in an HVAC retrofit is to re-evaluate the heating and cooling loads. The knee-jerk reaction to replace systems in-kind for capacity can not only add to costs but also reduce comfort by reducing the range over which a system can adjust under partial-load conditions. Some key aspects to consider while performing this load calculation include:

- Determining accurate values for existing wall and glazing thermal

properties. In some cases, this may require explorative demolition of wall assemblies and laboratory testing of glazing.

- Determining infiltration through the building envelope. Old rules of thumb don't always work. Modern technology now allows us to measure these in very affordable ways.
- Establishing building use with the building owner for both type and schedule. Very often these have evolved over the age of a building. This also helps determine the plug loads in the building—something very different from when the building was first occupied.
- Establishing lighting power density based on current or proposed lighting design. LED lighting has reduced these values by 200 to 300 percent!

An analysis of the loads will provide guidance on peak loads for heating and cooling. To improve efficiency and controllability, it is key that an hourly load profile for the year be reviewed. A profile with bins indicating number of hours at every 10 percent increment in load is a very helpful tool and generated by most load calculation software. A building with a peak load of 500 tons may be best served by a 200-ton and a 300-ton machine rather than two 250-ton machines.

Systems Evaluation

Once loads are finalized, system choices should be evaluated. Some key considerations for evaluating system choices include:

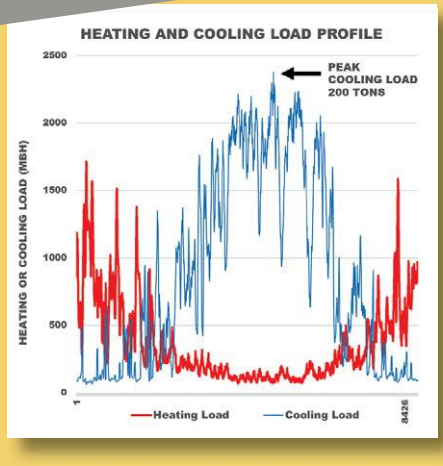
- Building location and climate.
- Building size and type.
- Space for systems and floor-to-floor heights to accommodate distribution.
- First cost and operating costs.
- Expertise of building maintenance staff.
- Life expectancy, controllability, air quality, acoustics, etc.

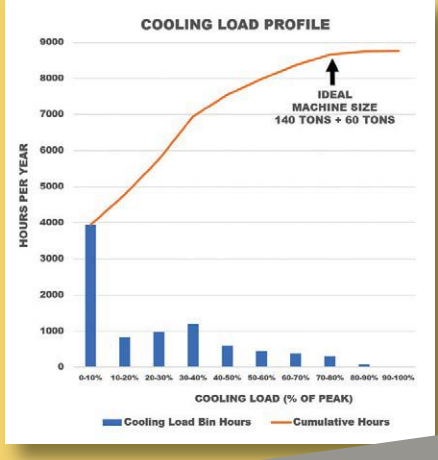
Systems can be broken down broadly into two categories—mixed-air systems and de-coupled systems. Mixed-air systems handle fresh air and thermal conditioning via the same air stream while de-coupled systems separate fresh air from thermal conditioning. Most traditional systems, like variable air volume (VAV), constant volume with reheat, etc., are mixed-air type while most modern systems, like variable refrigerant flow (VRF), radiant heating and cooling, chilled beams, etc., are de-coupled. Older buildings with no central air generally have de-coupled heating-only systems with steam or hot-water heat at the room level.

VAV systems have been the work horse of our industry for most non-residential applications greater than 50,000 square feet. Being mixed-air systems, they blend fresh air and return air in varying ratios, resulting in spaces that either have too much fresh air (not ideal for energy efficiency) or too little fresh air (not ideal for good air quality). Further, these systems use all ducted air supply to rooms, which requires the most space for equipment and duct distribution. VAV systems need ceiling spaces between 24 to 36 inches. These systems have been around for several decades and installers and operators have the most familiarity with them. They were the most efficient systems for most non-residential buildings from the 1970s to 2000.

Industry evolution and improvement to building codes along with the green-building movement have pushed the use of de-coupled systems. These systems process and deliver fresh air individually to each space ensuring that neither too much nor too little of it is being supplied. This fresh air system is commonly called a Dedicated Outside Air System (DOAS) and processes about 50 to 75 percent less air than a mixed-air system and hence requires substantially less equipment and distribution space. Ceiling space requirements vary between 12 to 24

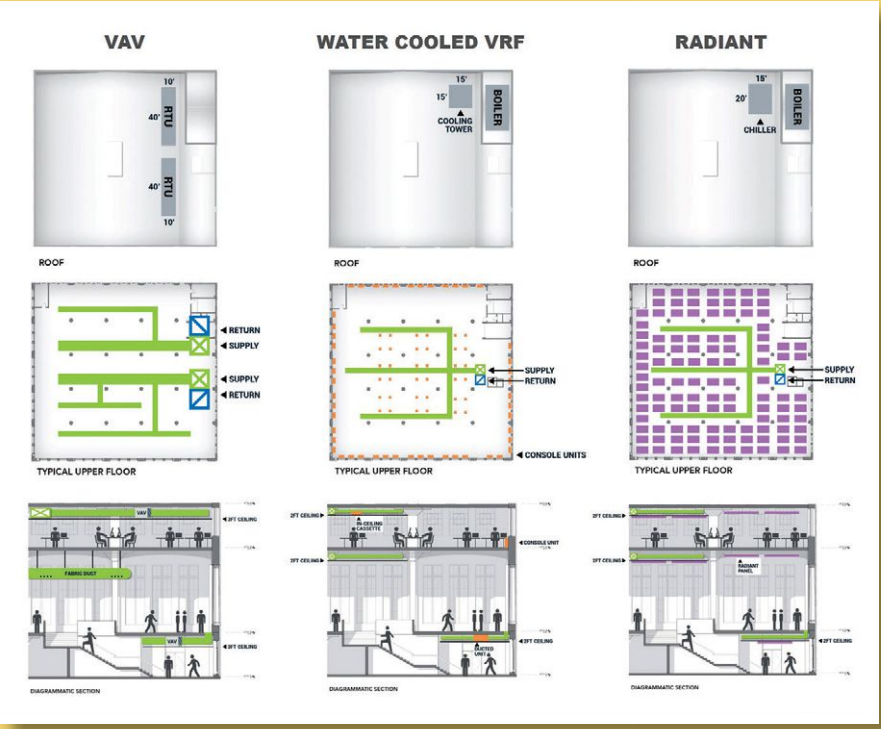
A building with a peak load of 500 tons may be best served by a 200-ton and a 300-ton machine rather than two 250-ton machines.

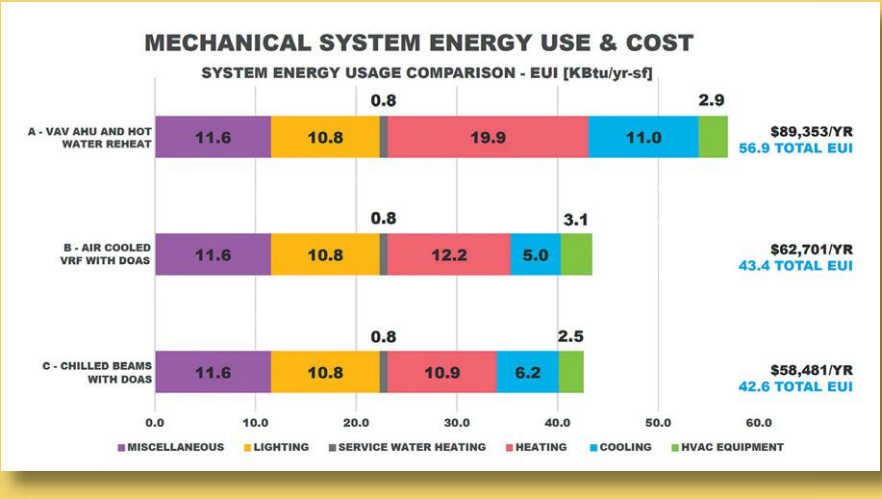




Systems can be broken down broadly into two categories—mixed-air systems and de-coupled systems.

IMAGES: DBHMS





	VAV	VRF	CHILLED BEAM	RADIANT
SPACE REQUIREMENT FOR EQUIPMENT	1	3	5	5
SPACE REQUIREMENT IN CEILING	1	3	4	5
ENERGY COST	3	4	4	5
FIRST COST	5	4	3	2
MAINTENANCE COST	3	3	4	5
LIFE EXPECTANCY	4	3	4	5
THERMAL COMFORT	3	3	3	5
ACOUSTICS	2	4	3	5
IAQ	2	5	4	5

1 = POOR 5 = EXCELLENT

inches. Heating and cooling for comfort is delivered to the space using refrigerant or hydronics (water), both of which carry significantly greater amounts of heating or cooling energy per unit volume compared to air, making de-coupled systems more efficient and needing significantly less space.

VRF systems use a series of local space-by-space fan systems, which are fed warm or cold refrigerant to make warm or cold air to condition the space. They are the most popular systems in Asia and Europe but new to the North American market. They have fans and filters at each room to check and maintain but have simpler controls and are quieter than VAV systems. They typically use air for heat rejection and injection. Their use of refrigerant limits them to smaller buildings. Scaling them to larger buildings would require a water loop for heat rejection and injection. They are an excellent choice for retrofit applications in buildings not originally designed with cooling. The small size of the fresh-air ductwork and the refrigerant piping make them very attractive for those applications.

Chilled beams, a de-coupled system, is an evolution of the old induction units from the 1970s redesigned to use lower-pressure air, be quieter and available in several mounting configurations. They were developed specifically for retrofit applications but are now used for new buildings, as well. They operate by inducing room air through a hydronic coil to warm or cool it before supplying the air back into the space. Active beams use nozzles with fresh air causing a pressure differential to induce the air. Passive beams work with natural convective currents and only provide cooling. They are an excellent fit for offices or occupancies with high space equipment loads (laboratories with electronic equipment, for example).

Radiant heating and cooling is the newest de-coupled system, specifically the cooling side. Developed in Europe in the 1990s, it has crossed the pond over the last 10 years with the number of projects in the few hundreds. It uses electromagnetic heat radiation from a warmed or cooled surface to deliver comfort to the occupants rather than the space. The surface can be a concrete slab with embedded piping for water (high mass system) or a ceiling

panel with piping attached to it (low mass system). Most retrofit applications typically utilize low mass radiant systems. It allows occupants to feel the same comfort as all air systems but at lower air temperatures in the winter and warmer air temperatures in the summer, thereby improving system efficiency. Radiant systems also have the fewest moving parts and hence the lowest maintenance costs.

Humidity control is key for the chilled beam and radiant systems because they operate at temperatures above the space dew point to prevent condensation. This limits their available capacity and helps drive capacity control by improving building envelope and lighting efficacy. The panels require the least amount of ceiling space, which is ideal for retrofit of old historic buildings. However, radiant systems come at a premium.

Smart Choices

Smart retrofit for the 21st century often requires an analysis and use of blended systems. A recent renovation of an old historic building at a university campus used a combination of chilled beams for office areas and VAV systems for classroom spaces. This was done to accommodate space constraints and balance first costs with efficiency needs.

A key barrier to the adoption of these new systems is the unfamiliarity among both the design and construction community, leading to "fear factor" pricing. On a recent retrofit application, we were able to prove out that a radiant system would have cost the same as a VAV system. This was because of the need to break down larger VAV air-handling units and reassemble them in the field compared to smaller units for the radiant system. Also, monetizing loss of rentable space to equipment should be considered as part of the system comparison.

Twenty-first century buildings demand 21st century systems, which can happen if we commit to performing comprehensive trade-off analyses.

Editor's Note: *The graphics in this article demonstrate the comprehensive analyses that should be completed before choosing an HVAC system for a specific retrofit project and are not an endorsement for any particular system type.*

OLD BONES, NEW LIFE

With a Palette of Wood and Glass, a Midcentury Modern Office Building Transforms into a Full-service Funeral Home and Chapel

WRITTEN BY | **BRIAN LIBBY**

When the Archdiocese of Portland (Oregon) decided to transform a modest 2,000-square-foot Midcentury Modern administration building for its Gethsemani Catholic Cemetery into a complete funeral home and crematorium, the intent was not simply to expand the footprint and introduce new programmatic elements. A 3,000-square-foot addition had to achieve a careful balance: providing the solemnity and contemplative spaces that would gracefully shepherd families through their most difficult hour, yet also attending to the functional needs of its office and crematorium staff.

"It really was just an office building for the cemetery side with records storage and

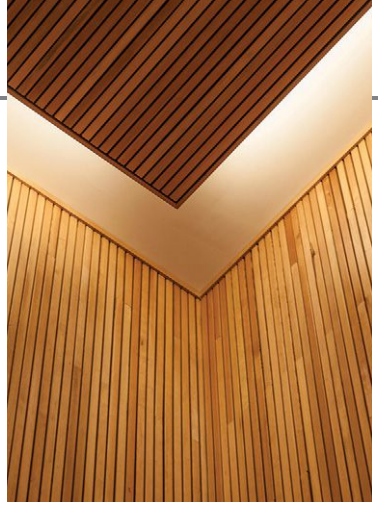
PHOTOS: PETE ECKERT

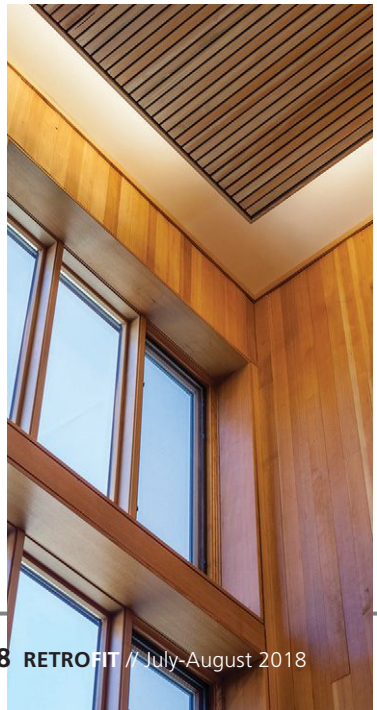
restrooms for families visiting the cemetery," explains Tim Corbett, director of cemeteries for the Archdiocese of Portland. "Many funeral homes say, 'We refrigerate at this facility; we embalm at this facility; we cremate at this facility.' We wanted to put all of those items into our building." But size was a concern: how to introduce a chapel and all the attendant funeral-home capabilities on a limited amount of available land and retain portions of the office that had been renovated as recently as 2011.

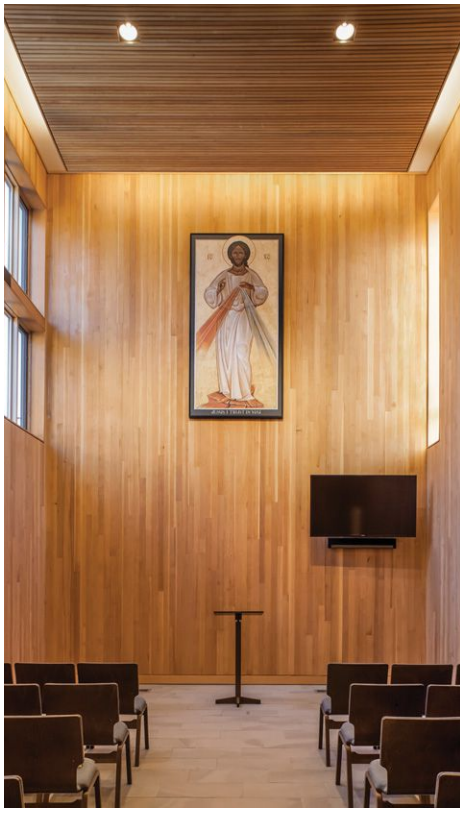
THE FIRST DECISION was to keep the chapel small at just 25 seats, which thankfully fit with the Archdiocese's bigger picture. "On occasion a small gathering will turn out to be an extremely large gathering, which can put a strain on our facilities. We've actually had groups of 75 in that space. But our philosophy was we didn't want to take the place of your church," Corbett says. "We purposely didn't have a large chapel and area to seat people because we want you to be at your parish." The Gethsemani Funeral Home's chapel is intended primarily for viewings, or rosaries, the first of a three-stage Catholic liturgical tradition before mass and then committal to the cemetery.

Despite its modest size, the 25-seat chapel feels spacious, evocative of place and engendering of contemplation. Although the lobby maintained the original building's low ceilings, which are only 8-feet high, it gives way to a 22-foot-high chapel clad in naturally stained tongue-in-groove Douglas fir, Oregon's signature evergreen hardwood. The client had initially suggested wainscoting along the bottom half of the chapel interior to save money. "But at the end of the day the architects made the right call," Corbett says. "Long after cost is forgotten, the quality will be there."

The wood-festooned wall and ceiling panels also mask layers of sound-absorbing landscape fabric, giving this solemn yet subtly beautiful space an intimate ambiance despite the high ceilings. "There's no echo. Someone could be speaking here and you don't have to talk too loudly," says Architect







Christopher LoNigro of DiLoreto Architecture, Portland. "I love that as people walk into the chapel, their voices lower just a little."

AT THE TOP OF THE CHAPEL, a clerestory window to the north (repurposed from the existing office) and a long slot window to the south bring a stream of sunlight and views of the sky into the space. On a recent spring visit, the chapel became a continuing drama of light and shadow as clouds passed across the blue sky. Here and in the lobby, where glass walls on the entry façade were chosen over solid surfaces and stained glass after some deliberation, Gethsemani Funeral Home is more open and full of light than most such funeral homes, which are traditionally among the most windowless spaces. "We wanted to maintain the feel of the original Midcentury building, which had a wonderful indoor-outdoor feel because of the natural light," says Architect Tracy Orvis of DiLoreto Architecture.

But the design direction took time. Initially, the architects considered using less glass or using stained glass out of a concern for privacy. "I was wrongly interested in the isolation of people who might be mourning," LoNigro says. Coming through the door, an artfully colorful mosaic image of Jesus Christ "would be a little surprise as you entered."

Yet particularly because the ceilings of the original midcentury-era lobby are relatively low, using transparent glass made the space feel less confining and better connected to the rolling green grass-covered landscape of the cemetery it looks out on. "Typically, a funeral home is dark and formal. Here it's much more of an open-air, bright feeling," Corbett says.

The chapel and adjacent new-construction space devoted to the crematorium also act as a structural anchor for the building, which helped make it more seismically resilient in response to increasingly stringent local codes. Although neighboring California is more famous for its earthquakes, the Pacific Northwest is overdue, seismologists say, for what's known as a Cascadia Subduction Zone earthquake of great magnitude.

ALTHOUGH the building took on new roles and added square footage, the original office remained, separated from the lobby with a maple-paneled wall that gives way to clerestory windows above to bring light from the lobby to employees' workstations. The offices also connect to a private hallway that allows

(continues on page 50)

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Retrofit Team

ARCHITECT // DiLoreto Architecture, Portland, Ore., www.diloretoarchitecture.com

GENERAL CONTRACTOR // Mark Jacobs Construction

ENGINEER // WDY Engineers, Portland, wdyi.com

Materials

EXTERIOR WOOD SIDING // Tongue-in-groove cedar, clear finish (Yakisugi 1- by 6-inch shiplap cedar)

STONE // Arizona sandstone

INTERIOR CHAPEL WOOD // Tongue-in-groove SVG Douglas fir (1- by 2-inch slats)

MAPLE // Plain sliced paneled veneer

staff to circulate throughout the building and to the crematorium on the north side of the building without coming into contact with (and thus potentially disturbing) the public gathered in the lobby and chapel during services. "There is an efficiency in that space that works extremely well," Corbett explains. "Having that ability to move from the office past the arrangement rooms into the back work-area [for cremation] worked pretty seamlessly."

Because of the existing cemetery vehicular paths and grade changes—the building borders a nearby road closely—the front façade of the building needed to provide the main public entrance and the service entrance. To differentiate between the two and make the public entrance clearly visible while camouflaging the service entrance, a canopy extends over the glass entry on the south side of the building while the service entrance on the north side of the building was clad in the same exterior tongue-in-groove cedar as this portion of the façade. Although the original office structure and the first-floor base of the building are clad in stone, to maintain and emphasize the horizontality of the original Midcentury building, a thin band of this cedar cladding runs along the entire front façade above the stone. "We needed the chapel and the chimney to feel like all the same space," LoNigro explains.

While the chapel itself rises to the building's greatest height, the north edge of the building—a chimney enclosure—rises to 19 feet to accommodate the clearance requirements of the cremation equipment below. It too is clad in vertical-grain cedar while the upper portion of the chapel is given a different cedar cladding, its surface lightly charred, similarly to the Japanese shou shugi ban technique but not blackening the material so much as adding a darker tint.

For Corbett, the Gethsemani expansion was the culmination of a 20-year vision. "This was truly a long journey to get this done," he says. "But it was helpful to have that time to really think about how it might function and how you might build it. Now people walk in and say, 'Wow, this does not feel like a funeral home to me.' I'd like to think it's a little more uplifting."

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CULTURE | SHIFT

A SMALL DESIGN INTERVENTION DELIVERS MAJOR IMPACTS AT CANADA'S NATIONAL ARTS CENTRE

WRITTEN BY | **KJ FIELDS**

Fifty years ago, attending a live performance was a special occasion: the chance to step out in one's finery, rub shoulders with high society and experience art in an exclusive setting.

Today, arts organizations relate to the public in fundamentally different ways than they did in the 1960s. They are eager to invite the public in—not only to view performances but also to participate in a range of experiences. This desire to engage the public catalyzed a $225 million rejuvenation project for the National Arts Centre in Canada's capital city, Ottawa, Ontario.

"Art centers want to create an environment that welcomes anyone and everyone," notes Jennifer Mallard, senior associate and project architect at Toronto-based Diamond Schmitt Architects (DSA). The firm initially provided a feasibility study and the subsequent design for the National Arts Centre to change its relationship with the downtown core. "Before this rejuvenation project, the National Arts Centre building had its back to the city and there was no indication of the activity inside. Now the building entry is transparent and accessible. People can see everything from opera to hip-hop to slam poetry here or gather in the new lobby for pre-performance talks, morning meditations or swing by for a cup of coffee."

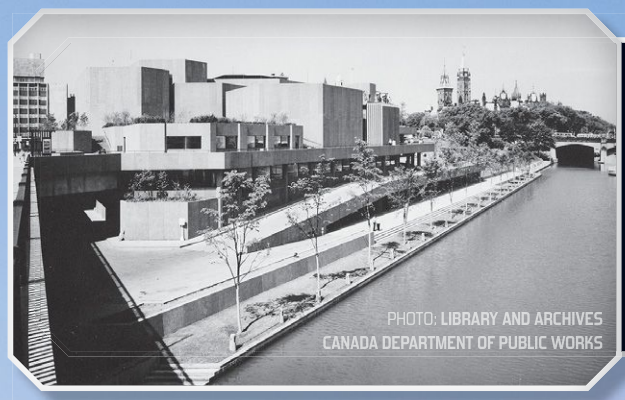


PHOTO: LIBRARY AND ARCHIVES CANADA DEPARTMENT OF PUBLIC WORKS

The Rideau Canal façade of the National Arts Center in 1968. Most of Diamond Schmitt Architects' intervention transforms the north and west sides of the 1.2-million-square-foot Brutalist building.

New Identity

The 1.2-million-square-foot Brutalist building is a geometrically intricate concrete form. Opened in 1969, a public square had been planned on the site's east side and the center was designed to face that square. The public plaza was never built, however, and Mallard says the main entrance always seemed to be on the wrong side of the building.

Creating a new front door that communicated with the city was a prime project goal. DSA saw a natural location for the entry on the northwest corner at an outdoor terrace that was rarely used in Ottawa's snowy climate. DSA enclosed the north terrace, and the addition literally emerges from the former foundation with a 3-story entry tower and connected double-height atrium.

The three new wings of public space project openness and activity. "Compared to the 1-million-square-foot concrete behemoth, the 60,000-square-feet addition is so small, but it has a huge visual and

Retrofit Team

ARCHITECT AND INTERIOR DESIGNER // Diamond Schmitt Architects, Toronto, dsai.ca

For a list of the architect's team members, view this story at www.retrofitmagazine.com/national-arts-centre.

STRUCTURAL ENGINEER // Fast + Epp, Vancouver, British Columbia, Canada, www.fastepp.com

MECHANICAL AND ELECTRICAL ENGINEER // Crossey Engineering Ltd., Toronto, www.cel.ca

LANDSCAPE ARCHITECT // CSW, Ottawa, Ontario, Canada, www.csw.ca

CONTRACTOR // PCL Constructors Canada Inc., Ottawa, www.pcl.com

CIVIL ENGINEERS // Parsons

HERITAGE CONSULTANT // ERA Architects, Toronto, www.eraarch.ca

ACOUSTICS // Threshold Acoustics, Chicago, www.thresholdacoustics.com

THEATER DESIGN // Fisher Dachs Associates, New York, www.fda-online.com

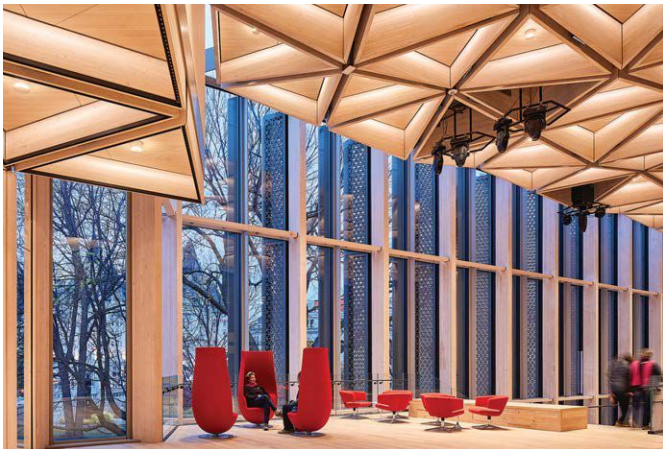
AUDIOVISUAL // Engineering Harmonics, Ottawa, engineeringharmonics.com

CODE CONSULTANT // LMDG, Vancouver, lmdg.com

LIGHTING DESIGN // Lightemotion, Toronto, www.lightemotion.ca

URBAN DESIGN CONSULTANT // Barry Padolsky Associates Inc., Ottawa, padolsky-architects.com

PHOTOS: DOUBLESPACE PHOTOGRAPHY unless otherwise noted



functional impact that completely transforms the National Arts Centre," Mallard says.

Artistic Interpretation

An essential player in energizing the addition is the hexagonal glass entry tower named the Kipnes Lantern. A transparent LED screen hung like a scrim inside the lantern glazing publicly showcases artists and the productions inside. Situated on Elgin Street (one of the capital's busiest streets), the lantern is technologically linked to a series of four, vertical, single-story LED screens called light blades that line an adjacent wall. This connection allows for active visual integration. For example, the screens can display a ballerina that dances across the light blades and onto the lantern.

Mallard says the lantern is more than a beacon for the National Arts Centre alone, however. The center's civic context is significant because, combined with the adjacent Rideau Canal, it's a UNESCO Heritage site; Parliament Hill, Confederation Square and the National War Memorial are only steps away.

"The lantern's design had to be considered carefully because events at the national war memorial are somber, and the lantern had to be respectful," Mallard explains. "The lantern serves as a community tool. It can be used on Remembrance Day to broadcast poetry or display poppies as a part of the memorial's ceremony, and it speaks to the national institution's outreach mission by displaying art exhibitions and performances that are taking place across the county."

Logic, Light and Language

With a structural grid composed of equilateral triangles, the entire building was

designed as a combination of hexagons. "The geometry of the original building was so strong and the hexagonal design was fascinating," Mallard says. "We wanted to create a refreshing look at that rigorous geometry in a way that felt contemporary, so we used wood to bring in a natural material and glass and steel as contrast to the concrete."

To bring in light, the new wings are constructed of exposed wood and framed on a custom-designed glass curtainwall system. High-performance, low-e glass units extend up to 95 inches by 228 inches to provide uninterrupted views with the added benefit of controlling solar heat gain. The addition's interior spaces gleam with white oak flooring and wall paneling. Limestone flooring hails from a local quarry. Structural columns in glulam Douglas fir—treated with a white pickled semi-transparent stain—continue the bright color palette.

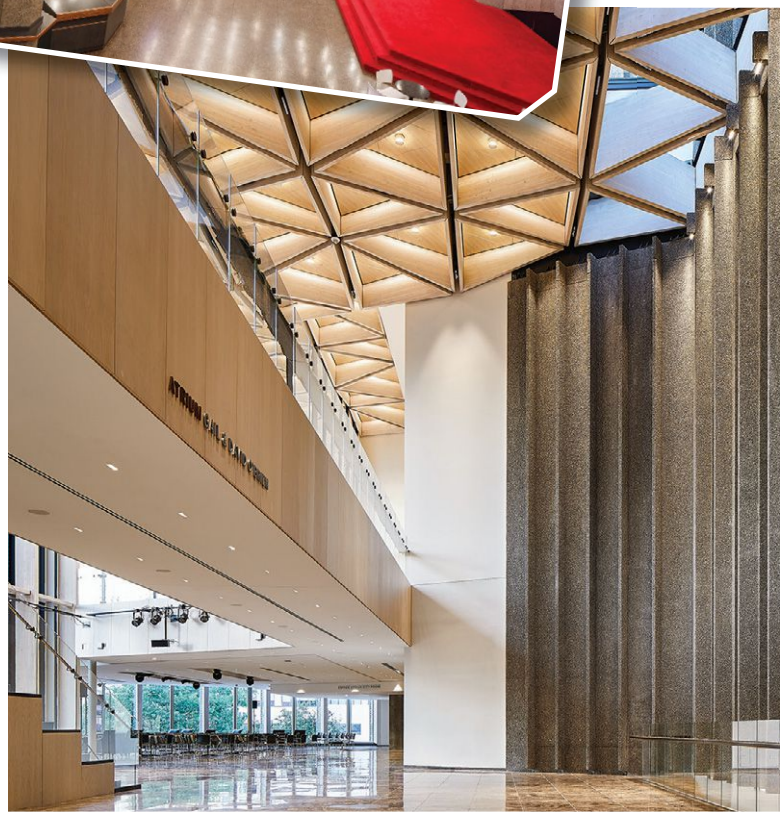
The lobby's south interior wall is the former precast concrete outside building wall, and the designers saved and exposed the original exterior walls on the inside wherever they could. Because the center is part of the UNESCO World Heritage site, DSA presented its design strategy to municipal and federal government design review panels to demonstrate the heritage rehabilitation strategy. "We worked with a heritage consultant who prepared a conservation report explaining the strategies that recognized the characteristics of the original building," Mallard notes.

The exterior's initial design language included precast concrete panels articulated with five patterns of fins in varying depths, depending on the function of the spaces within. DSA created three types of bronze-anodized aluminum fins for the new addition—some with perforations that create play of light patterns in the space—in homage to the original structure.

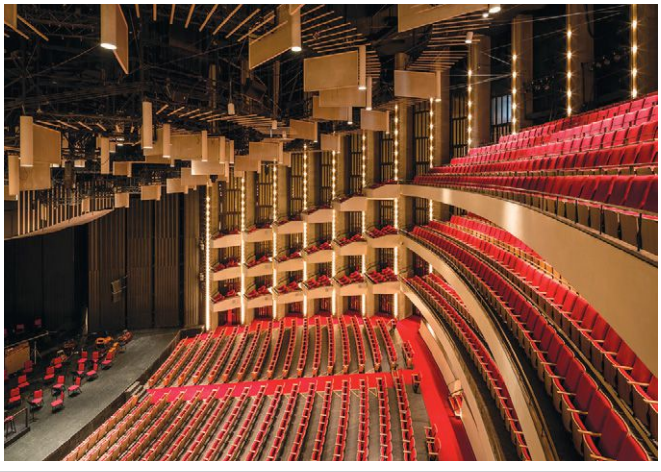
Dynamic Scene

The government announced that the rejuvenation project would open on Canada's 150th birthday, which offered only 18 months for construction. In addition to its tight urban site, the National Arts Centre was fully occupied throughout construction with crews phasing work around thousands of people coming to performances.

The building's complex hexagonal geometry also proved challenging. "Tying into the existing structure was not always straightforward," Mallard recalls. "We fully modeled the existing building in 3-D, but the original building was not plumb and true. In fact, one section was 8 inches out, which required quick changes to the structure, finishes and alignment to manage that discrepancy. We relied on strong



MORE THAN 350 WOOD TRIANGLES THAT MIMIC THE INTRICATE DESIGN OF THE BUILDING'S CONCRETE CEILINGS WERE PREFABRICATED OFFSITE AND THEN CONNECTED IN LINEAR PIECES WITH ALL INFRASTRUCTURE PRE-INSTALLED, INCLUDING SPRINKLER LINES AND LIGHTING AND WIRING FOR THEATRICAL AND AUDIO-VISUAL EQUIPMENT.



collaborations and innovative thinking throughout the project."

The ceiling coffers are one example of ingenuity to meet the intense schedule. The coffers mimic the intricate design of the building's concrete ceilings but are made of the same white pickled-coated glulam Douglas fir as the columns to continue the warmth of the new spaces.

DSA teamed with structural engineers who had experience with prefabricated long-span wood structures. More than 350 wood triangles were prefabricated offsite and then connected in linear pieces with all infrastructure pre-installed, including sprinkler lines and lighting and wiring for theatrical and audiovisual equipment.

When the coffers arrived onsite, the pieces were placed with a crane. The entire roof structure was assembled in three weeks. Moreover, because the underside of the roof pieces included the finished interior ceiling, the construction team saved valuable time in the finishing stage of the project. The solution shaved approximately six months off construction time.

Because the National Arts Centre cast a dark, imposing back to the city, Mallard says it was a building people loved to hate. "Our team scrutinized every aspect of this building, and it was so rigorously designed that we all grew to love it," she says. With the new addition's light, inviting entry and a strong communication of what occurs inside, the National Arts Centre building is now winning over new fans in Ottawa and across North America.

Materials

STONE // Owen Sound Ledgerock, www.ledgerock.com

GLAZING // Carey Glass, www.careyglass.com

GLAZING COMPONENTS // Nupress, www.nupress.com.au

CURTAINWALL // Verval, www.verval.com

GLASS COATING // SunGuard SuperNeutral 70/41 from Guardian, www.sunguardglass.com

SOLID WOOD FLOORING // Logs End, www.logsend.com

ENGINEERED WOOD FLOORING AND CERAMIC AND MOSAIC TILE // Stonetile, www.stone-tile.com

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A TRANSPARENT LED SCREEN HUNG LIKE A SCRIM INSIDE THE ENTRY TOWER'S GLAZING PUBLICLY SHOWCASES ARTISTS AND THE PRODUCTIONS INSIDE.

SIMPLE WIRELESS SOLUTIONS MAKE INTELLIGENT BUILDINGS A REALITY

Vive wireless control brings energy savings and building integration to Madison College campus

Saving Energy, Enhancing the Learning Environment

For many colleges and universities, the Lutron Vive wireless lighting control solution offers clear advantages for energy-saving, labor-reducing lighting retrofits. Because colleges often encompass multiple buildings and campuses, they have a diverse set of lighting control requirements. Recently, Lutron Vive solutions were installed at Madison College to help save energy, improve lighting performance, and enhance the learning environment.

The Challenge

The college is in the midst of an ongoing lighting upgrade in several buildings to reduce energy costs, meet codes, and enhance the flexibility and versatility of the lighting system.

Stand-alone controls, installed in many campus spaces, have delivered reliable, efficient performance, but looking forward, the Vive wireless scalable control system is reducing installation times and increasing lighting options in basic classrooms, technology labs, lecture halls, private offices, a culinary building, and conference spaces. Using **Vive wireless** also makes design quick and simple, accommodates changes easily, and helps keep the lighting retrofit within budget.

Switching — In basic classrooms, and areas that are frequently unoccupied, lighting is switched using wireless occupancy sensors and Pico wireless switches.

Dimming — Other areas demand more sophisticated, high-performance dimming control. The flexible Vive wireless solution includes dimming modules, wireless daylight sensors, occupancy sensors, and Pico remote dimmers to provide a full range of lighting control options to instructors and students in the space.

Integration — Beyond performance dimming, certain areas of campus are networked together using Vive wireless hubs. The hubs tie the lighting control system into other building management controls via BACnet, facilitating load shed and enabling HVAC systems to respond to wireless occupancy sensors, automatically reducing energy use without affecting the people in the space. Load shed is especially important to energy savings and cost reduction.

Lutron's Pico remote, a sleek, versatile wireless device, installs anywhere, on any surface, no wallbox or wiring required.

The Solution

The Lutron Vive wireless system handles all these situations with ease. The facilities team can also define exactly the right amount of control for each space and tailor the system to different light sources, while ensuring that setup is the same across the board. Wireless installation helps to eliminate a tremendous amount of pipe and wire required by a wired system — another opportunity for cost savings.

Wireless installation helps reduce time, costs, and disruption in occupied spaces.

The Vive system is simple to understand, easy to design, easy to change, and easy to manage remotely with the Vive software, creating an opportunity for the control system to have significant impact on electricity and maintenance costs. The Vive control software is another plus, making system changes quick and easy, with no additional wiring required, and no complex set up. All programming can be accomplished on any smart device with the Vive app.

Lutron service and support is also a key system benefit, providing a simple avenue for keeping software up to date.

On any project, the scalable, wireless control system allows customers to start with control in a single room, and expand as their budget and renovation plans allow. As the college enhances its ability to improve operational efficiency, system data extracted from the software simplifies analytics and improves system flexibility.

Lutron controls have been installed at Madison College for many years, but Vive opens opportunities for integration and more robust control strategies. On any project, the scalable, wireless control system allows customers to start with control in a single room, and expand as budget and renovation plans allow. Even if you start with stand-alone control, it's simple to add the Vive wireless hubs down the line.

Budget restrictions frequently drive a customer's decision to install simple, stand-alone controls rather than an integrated lighting control system, but scalable solutions ensure you don't have to choose — you can have the best of both worlds. Controls can be installed and set up in stand-alone situations, and they can be linked together via Vive wireless at any stage of the project.

Results

Using Vive wireless systems, Lutron customers can realize tremendous design and installation flexibility on their projects. Scalability is often critical to achieving operational goals, which include balancing budgets while still delivering high-quality, reliable lighting control that works for today's energy and code requirements, and will work for tomorrow's, too. Reducing energy use is good for the environment, the students, and any project's long-term success.

On any project, the scalable, wireless control system allows customers to start with control in a single room, and expand as their budget and renovation plans allow.

With simple-to-use, intuitive Vive software, the ability to save energy and improve building performance is at your fingertips.

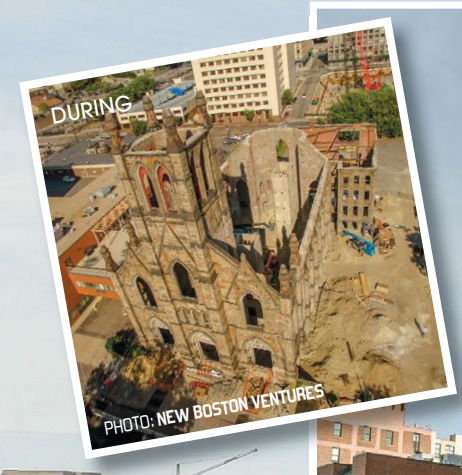
CLOSER to HEAVEN

A Former Church Is Reimagined as Condos in Boston's South End Neighborhood

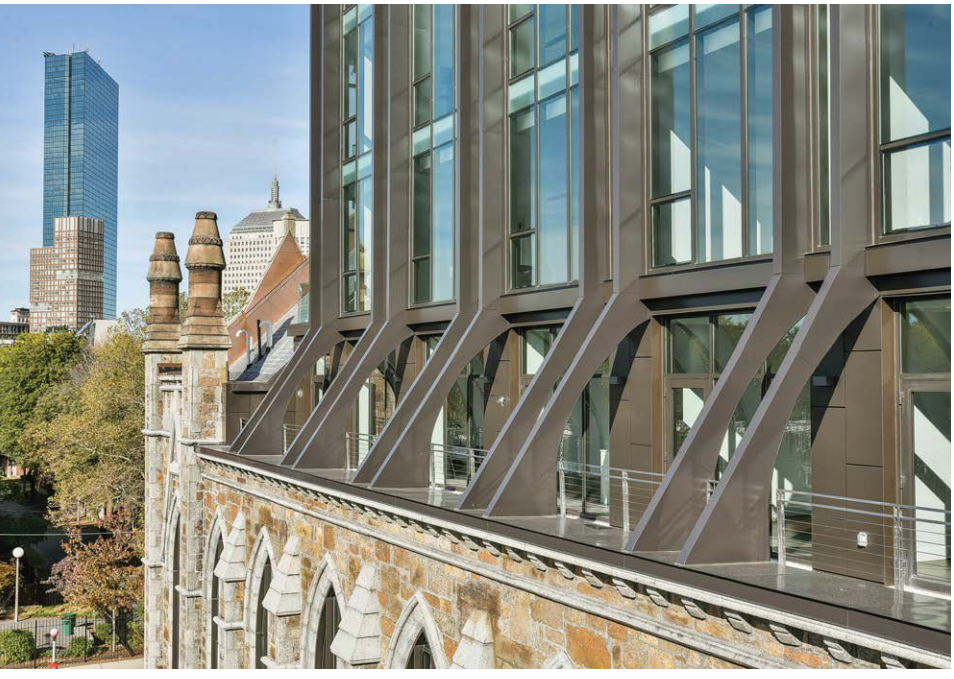
WRITTEN BY | **CHRISTINA KOCH**

One's home is an oasis from the hustle and bustle of commitments and work responsibilities. It's a safe haven from the elements and a space to nurture one's family and immerse oneself in hobbies that feed the soul. In Boston's South End neighborhood, developer New Boston Ventures LLC quite literally sought to make home a heavenly space by redeveloping the 1871 German Trinity Catholic Church into 33 high-end condominiums.

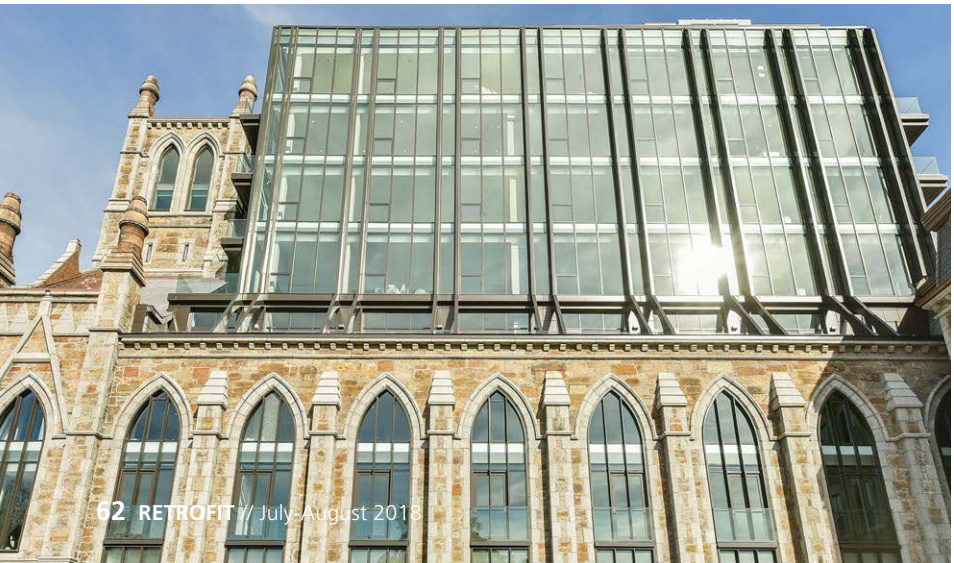
After making a promise to the seller—the Archdiocese of Boston—that the church would be saved (something New Boston Ventures intended to do anyway), the team set out to test the boundaries of modern engineering by building an 8-story vertical addition through the area in which the church's roof had been. "Modern structural engineering being what it is and the construction budget that we had really allowed us to do almost whatever we wanted, which was quite remarkable," explains Marc Savatsky, LEED AP, CSL, development project manager for New Boston Ventures.



PHOTOS: **ANFUSO IMAGING** unless otherwise noted



THE **DESIGN TEAM** PICKED UP ON THE RHYTHM OF THE CHURCH WITH THE ADDITION OF FLYING BUTTRESSES AND VERTICAL FINS, WHICH FOLLOW THE SYMMETRY OF THE ORIGINAL MASONRY PIERS BELOW.



Named for a street that no longer exists—Lucas Avenue—which ran parallel to the church when it was built, The Lucas was completed in 2017 and sold out before construction ended. This is a testament to New Boston Ventures' unique vision, which may have been executed with some divine intervention.

A Building within a Building

Boston's South End is known for the historic character of its buildings, something that drew New Boston Ventures to work in the area, rehabilitating brownstones and other historic buildings into condos, the past 25 years. Because the South End is a desirable area of Boston and land is scarce, New Boston Ventures' representatives jumped at the opportunity to buy the German Trinity Catholic Church. "We saw potential immediately in the church," Savatsky explains. "It had a great structure to it. Some features of it actually lent itself nicely to our condo vision, and we had a team of very talented architects at Finegold Alexander who helped us really start to picture what this might look like and helped us study it in terms of programming so we had the confidence to pursue it aggressively."

The church's shell primarily is comprised of Roxbury puddingstone, a local sandstone, featuring granite pebbles and quartz fragments, that has morphed into a strong material that can be used for construction. Many of Boston's historic buildings feature walls and/or foundations of Roxbury puddingstone because it often could be excavated directly from the building sites. Because of puddingstone's innate strength, the church's structure was in good condition. Savatsky notes the team only had to complete some selective repointing and wash the masonry façade, which was done in a historically sensitive manner.

Knowing volume had to be added to the space, New Boston Ventures worked with Finegold Alexander Architects, Boston, on a vertical glass addition through the existing roof—a modern interpretation of the church's original design. Boston-based McNamara Salvia Structural Engineers determined how to leave the four walls of the original building standing while essentially blowing out the roof. The team then built four levels of living space within the frame of the original church and added four levels of living space within the glass curtainwall where the roof had been. "The glass curtainwall is supported on a structural steel frame," Savatsky explains. "That frame carries down to its own foundation system that we added within the shell of the building."

(continues on page 64)

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The design team picked up on the rhythm of the church with the addition of flying buttresses and vertical fins, which follow the symmetry of the original masonry piers below.

Because the team added floors at each of the levels in the tower, they needed to make a connection between the new building and the tower rooms. "To breach the 2-foot-plus-thick Roxbury puddingstone wall, we engaged a firm called Pro Cut to do the concrete cutting for us. The machinery they used to cut through this wall was incredible," Savatsky remarks.

The construction team also came up with unique ways to provide seismic support to the existing building. For example, the large turrets on the four corners of the tower were carved out of limestone. Modern building codes require these decorative elements to be reinforced. "We, along with our structural engineers, came up with a very surgical approach to drill on the vertical, down through the top and into the structure of the building," Savatsky explains. "Then we drilled and then doweled and epoxied pretty significant threaded rods into the top of the turrets such that, in the event of an earthquake, these turrets wouldn't have any risk of toppling."

(continues on page 66)

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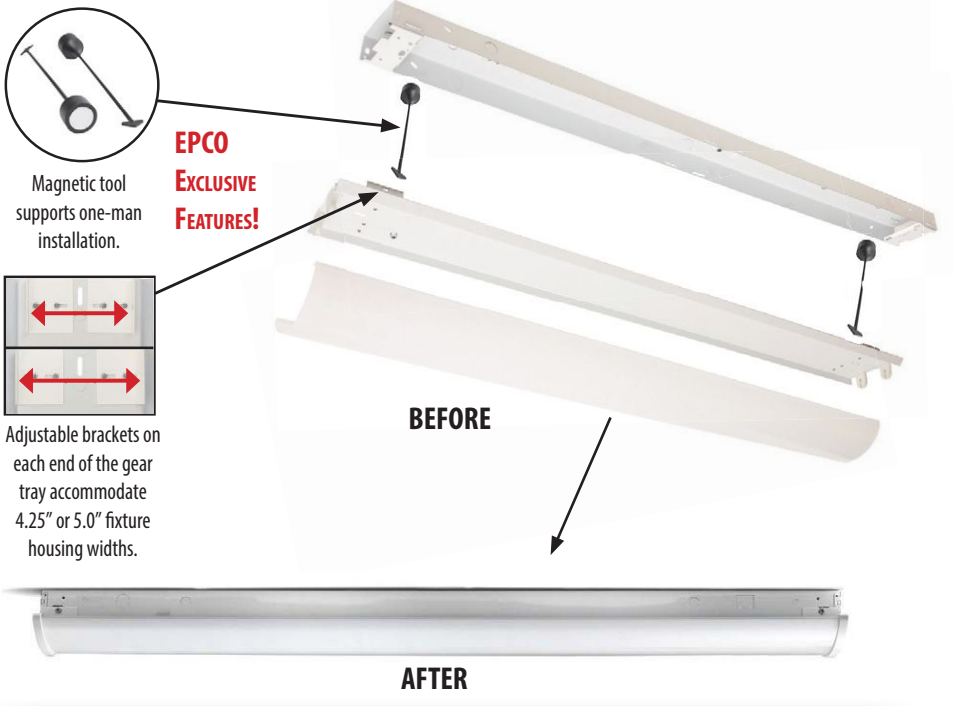

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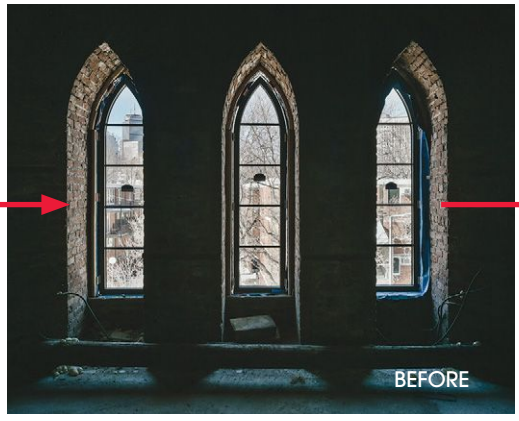

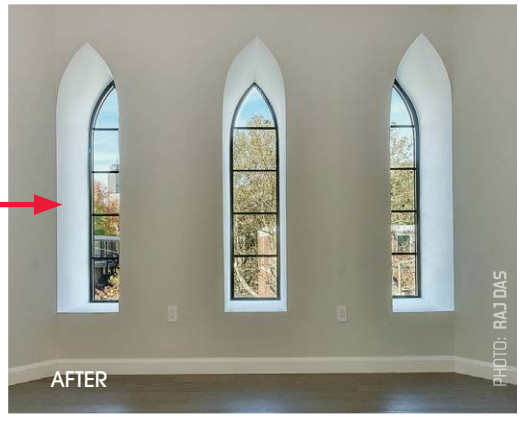

THE LUCAS FEATURES **NEW WINDOWS** THAT WERE CUSTOM FABRICATED TO FIT WITHIN THE EXISTING MASONRY OPENINGS. THE ARCHES WERE PARTICULARLY CHALLENGING TO MATCH AND HAD TO BE FIELD TEMPLATED.

RETROFIT TEAM

DEVELOPER // New Boston Ventures LLC, Boston, newbostonventures.com

ARCHITECT // Finegold Alexander Architects, Boston, faainc.com

MEP ENGINEER // WSP, Boston, www.wsp.com

STRUCTURAL ENGINEER // McNamara Salvia Structural Engineers, Boston, www.mcsal.com

INTERIOR DESIGN // Wolf In Sheep Design, Boston, www.wolfinsheepdesign.com

GENERAL CONTRACTOR // Metric Construction, Boston, metriccorp.com

LANDSCAPE ARCHITECT // Michael D'Angelo Landscape Architecture LLC, Boston, www.m-d-l-a.com

ROXBURY PUDDINGSTONE CUTTING // Pro Cut, Waltham, Mass., www.procutinc.com

HVAC INSTALLER // Back Bay Mechanical, Stoughton, Mass., www.backbaymechanical.com

Materials

GLASS CURTAINWALL // Kawneer, www.kawneer.com

SMALL-DUCT HEATING AND COOLING SYSTEM // Unico Inc., www.unicosystem.com

Modern Marvels

The city of Boston has strict requirements for energy efficiency, and New Boston Ventures seeks to meet these requisites and then some. The firm has a HERS rater on its team, who goes through its redeveloped buildings doing blower door tests, studying ductwork and ensuring the mechanical systems are efficient. In addition, New Boston Ventures has found an energy-efficient small-duct heating and cooling system it prefers to use in historic buildings, including The Lucas.

"When we're working in historic buildings, often it's the case that it's difficult to get traditional HVAC runs through your space without having to add soffits or drop ceiling heights," Savatsky notes. "We like to specify a high-velocity HVAC system that utilizes 4-inch, flexible duct runs so we can run in between joist bays. The holes that are required to run them perpendicular to structural elements are small enough that we can typically even drill out engineer joists to accommodate running the ductwork in any direction needed. This gives us great ceiling heights. We don't need to add soffits, which are undesirable. The system provides fantastic, even distribution of heating and cooling. It throws the air in such a way that makes the entire space feel comfortable."

Maintaining comfortable temperatures within the building also required tinting of the glass used in the vertical addition. "The tinting of the glass is something we studied at the outset with our mechanical engineer and during our energy modeling," Savatsky says. "I think some of the design review folks want that very clear glass, but you want to find the happy medium and I think we struck that quite well where the glass took some of the solar gain out but also it gave us that rich look we were going for."

Before the church was sold to New Boston Ventures, the archdiocese removed religious artifacts, as well as almost all the windows. The Lucas' new windows were custom fabricated to fit within the existing masonry openings. The arches were particularly challenging to match and had to be field templated.

Three prominent historic windows remain above the front doors of the original church structure. These windows feature elaborate tracery elements. "We were able to salvage those and restore them in a historically sensitive manner," Savatsky notes.

The Lucas was a complicated project and took approximately one year and seven months to complete. However, there was never a point the team lost confidence in its vision. "We had a great construction team at Metric Construction and, even though it was complicated and sometimes trying, I think that no one ever lost focus on what we were trying to achieve," Savatsky recalls.

Today, the transformation is one that makes the entire team proud—and one the homeowners love. The building offers the owners many modern amenities, including a fitness center, dog wash, club room with an outdoor kitchen and parking in the basement using vertical car stackers. Savatsky was part of the project from acquisition of the church until the day the condo owners showed up in moving trucks. He says working on The Lucas was "an incredible experience."

Savatsky adds: "Being able to execute a vision that I think may have escaped a lot of our competitors who were looking at the church at the same time was really rewarding. I think it's fun to reimagine the old and put a modern spin on it, and I think we did justice to this gorgeous late-1800s design with what we did to the building."

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THE SOUND BARRIER

WRITTEN BY | ROBERT NIEMINEN

INTERIORS ARE NOISY PLACES, BUT BUILDINGS CAN (AND SHOULD) BE RETROFITTED TO ENSURE ACOUSTIC COMFORT AND PRIVACY

There's little doubt today's commercial interiors—from corporate offices to hospitals, schools and hotels—look and function better than ever. It's no wonder either; project teams tend to focus a great deal of attention on efficiency and appearance to ensure occupant comfort and productivity, particularly in the workplace.

While factors, such as daylighting, lighting controls, indoor air quality, flexible space plans and functional furniture, certainly contribute to an improved work environment, there's more than meets the eye, however. Acoustics also play a vital role in the process of creating effectual interiors, yet it's perhaps one of the most overlooked and underfunded elements of building design.

In fact, "the acoustical environment of a workspace is typically given little or no attention during project planning and design," according to a Whole Building Design Guide article by Richard Paradis, P.E., Board Certified Noise Control Engineer, National Institute of Building Sciences, Washington, D.C. "The functionality and aesthetics of the workspace are usually the primary focus of the designer."

Paradis adds acoustics is often considered a low priority because it competes for limited project dollars with a number of other project goals, including sustainable design and development, security measures, information technology, and building automation and controls. Compounding the issue is the trend toward open office plans, which has removed physical barriers that can help mitigate noise levels in the workplace. Interestingly, the lack of effective acoustic design strategies actually exposes the symbiotic relationship between noise abatement and wellbeing.

"There's no question that these more open and densely occupied spaces have had an impact on general awareness of acoustics," says Niklas Moeller, vice president of K.R. Moeller Associates Ltd., a sound-masking developer in Burlington, Ontario, Canada. "Noise and lack of speech privacy currently top the list of distractions, dissatisfactions and discomforts in workplace surveys. I've also seen many incensed online posts and blogs on the subject in recent years."

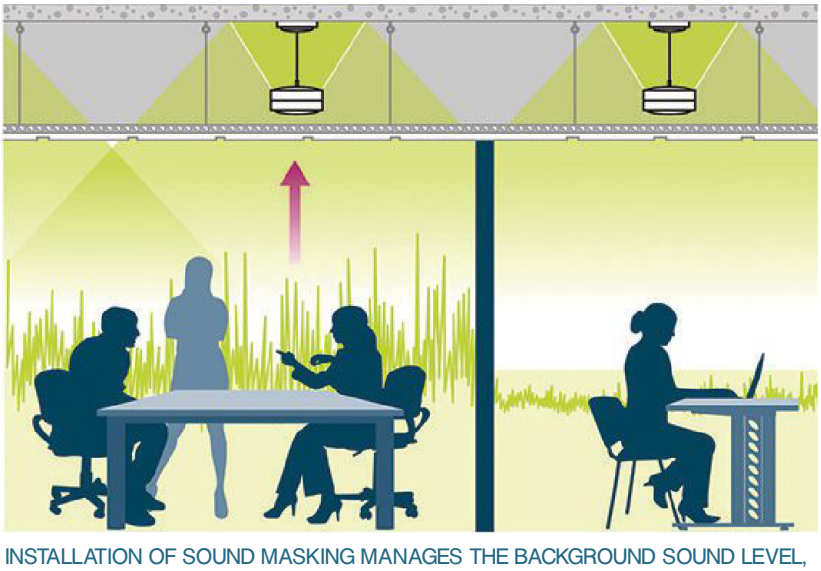


IMAGE: SCREEN SOLUTIONS UK

INSTALLATION OF SOUND MASKING MANAGES THE BACKGROUND SOUND LEVEL, INCREASING SPEECH PRIVACY WHILE LOWERING STC REQUIREMENTS AND MAINTAINING THE FLEXIBILITY OF FLOOR-TO-CEILING PARTITIONS.

The Weakest Link

If there's dissatisfaction with noise levels in the built environment, it's because acoustics is currently behind in its evolutionary development, according to Hanson Hsu, principal acoustician and founder of Delta H Design Inc. (DHDI), Marina Del Rey, Calif., a research, design and build firm providing design and consulting services for architecture and acoustics.

"As interiors have gotten better, as walls have gotten better, as architecture in general has gotten better, building materials have gotten better, electronics have gotten better,

A SOUND MASKING SYSTEM CONSISTS OF A SERIES OF ELECTRONIC COMPONENTS AND LOUDSPEAKERS THAT DISTRIBUTE A BACKGROUND SOUND MOST PEOPLE COMPARE TO THAT OF SOFTLY BLOWING AIR BUT WHICH CAN BE TUNED TO MEET A SPECTRUM SPECIFICALLY DESIGNED TO BALANCE ACOUSTIC CONTROL AND OCCUPANT COMFORT.

visuals have gotten better, acoustics is standing out now as the weak link in the chain," Hsu notes. "Meaning, when you walk into a beautiful hotel or a beautiful spa or beautiful residence or a beautiful commercial space, it will look beautiful—the paint is beautiful, the interiors are beautiful, TVs are beautiful, everything is beautiful—but then all of a sudden you can hear someone flushing a toilet half a floor away or you can hear someone talking a hundred feet away. This doesn't fit with the design of everything else; it's not part of a homogeneous design. It's evolutionary like anything else where the weak link in the chain at some point becomes the thing that needs to be addressed, and I think we're at that moment in time."

Moeller agrees and suggests the tide is turning as increased discussion takes place about focus, privacy and workplace wellness. "But more education and guidance are needed on the subject," he says. "The fact that acoustics remains a mystery to many means it doesn't always receive the necessary attention when it comes to facility design—an issue amplified by the time it's taking for various building standards and guidelines to 'catch up' to trends, as well as to improvements in acoustic products and technologies, such as sound masking."

The Price of Noise Pollution

Employers and facility executives who choose to ignore acoustics do so at their own expense. "Generally speaking, poor acoustics negatively impacts occupants' focus, speech privacy and comfort, which in turn affects the organization for which they work—by reducing attendance, productivity, confidentiality, teamwork, workplace satisfaction and even customer service," Moeller suggests.

Research supports this assertion. The Center for the Built Environment (CBE) at the University of California, Berkeley, conducted a post-occupancy evaluation of 15 buildings by 4,096 respondents in a variety of office configurations. The CBE study found more than 60 percent of occupants in cubicles think acoustics interferes with their ability to get their jobs done. Further, 99 percent of respondents cited their concentration was impaired by office noise, such as unanswered phones and background speech, resulting in a 66 percent drop in performance, according to a London-based World Green Building Council report on health, wellbeing and productivity in offices.

Interestingly, Moeller points out Gensler's "What We've Learned About Focus in the Workplace" report—based on a survey of 90,000 people from 155 companies across 10 industries—found offices designed to support individual focus work actually rate better for collaboration than those specifically designed to promote it. "Future designs need to be informed by

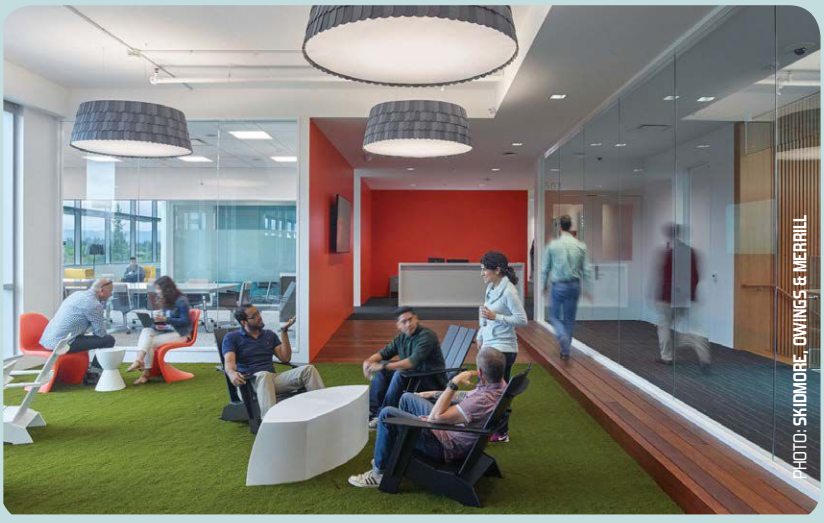
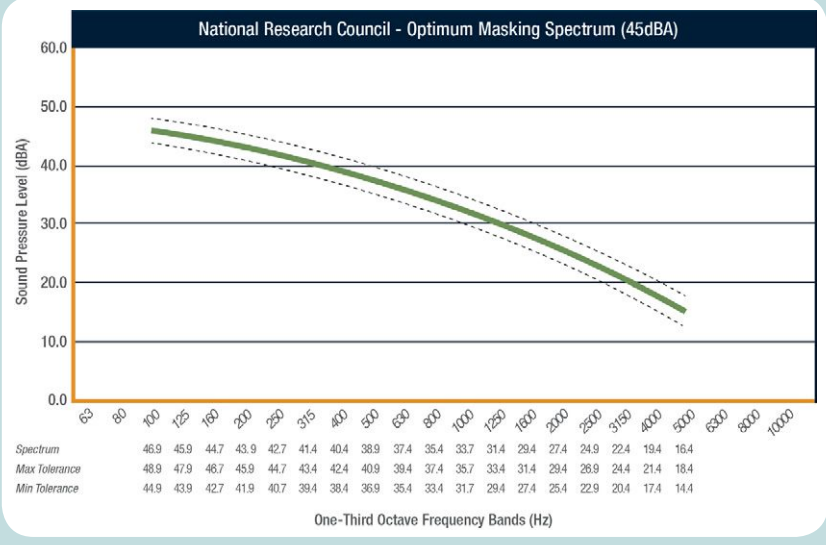


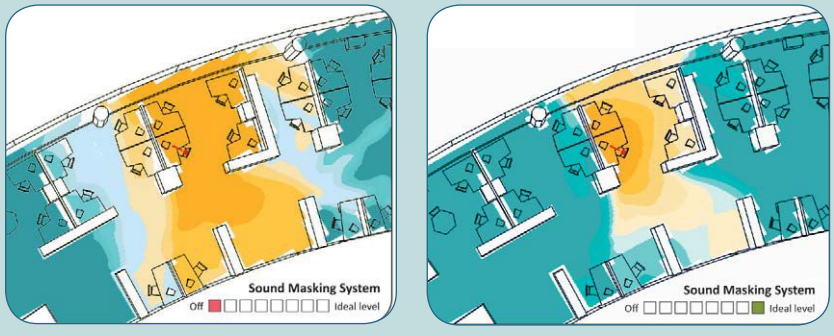
PHOTO: SKIDMORE, OWINGS & MERRILL

IN LARGE CAFÉ ZONES WHERE NOISE CAN BE AN ISSUE, RIBBED WOOD WALL PANELS AND ACOUSTICAL BATTING BEHIND ABSORB SOUND AND PROVIDE HIGHER NOISE REDUCTION COEFFICIENT.



THE NATIONAL RESEARCH COUNCIL'S OPTIMUM MASKING SPECTRUM, AS WELL AS ONE-THIRD OCTAVE BAND TOLERANCES OF ±2 DBA.

IMAGES: K.R. MOELLER ASSOCIATES LTD.



(Left) THE AREA OF INTELLIGIBILITY AROUND A SPEAKER IS NOT CIRCULAR. ITS SHAPE IS DETERMINED BY NUMEROUS FACTORS, INCLUDING THE ORIENTATION OF THE PERSON SPEAKING, AS WELL AS THE PHYSICAL BARRIERS AND ABSORPTIVE/REFLECTIVE MATERIALS USED WITHIN THE SPACE.

(Right) WHEN SOUND MASKING IS APPLIED, THE AREA OF INTELLIGIBILITY SHRINKS.

these types of studies or we risk creating workspaces that are less—rather than more—effective," he suggests.

The ABC's of Acoustics

Given how prevalent acoustical problems are in commercial buildings today, it points to the need for further education and a more holistic approach to the planning process. At its core, acoustics is the science of sound; at a deeper level, it involves an area of physics that focuses on the wave behavior of sound energy, including propagation; control; materials; and, more recently, quantum mechanical behavior, which deals with sound at a molecular level, according to Hsu.

He says acoustics essentially can be broken down into two areas: isolation and acoustic signature. In buildings, isolation refers to keeping unwanted noise outside. For example, if an airplane flying overhead produces 120 decibels of noise outdoors but inside only 80 dB is registered, then 40 dB has been effectively isolated by the building envelope, Hsu explains.

The acoustic signature of a room, on the other hand, refers to a more subjective measurement by an occupant that determines whether it is pleasing to the ear or not. Hsu notes a room with a high level of reverberation, such as a tiled bathroom where sound bounces off hard surfaces, is fatiguing in the context of an office environment but may be pleasant or even awe-inspiring if heard while sitting in a grand cathedral, for instance.

Oftentimes the problem with addressing acoustics is that the approach tends to be oversimplified. Just install a few ceiling tiles or lay down some rugs or soft seating and you're done. "Many still believe they can 'tick that box' simply by using one type of solution, but it actually requires a balanced application of three elements: sound masking, barriers and absorptive materials," Moeller explains. "Ideally, acoustics should be considered during the design phase. When planning an interior, it's helpful to refer to the formula acoustic professionals use called the 'ABC Rule,' which stands for absorb, block and cover."

According to an article by acoustical consultant Benjamin Wolf of ABD Engineering & Design, Portland, Ore., each of the ABC's are useful for resolving acoustic issues, especially in open plan environments. But effective acoustical design is never a "one-size-fits-all" approach. Although many clients assume more is better when it comes to absorption, for example, Wolf says too much absorption can make a space sound "dead," which can be unnerving.

Similar to absorption, blocking isn't about obstructing all sounds, "but rather the right amount of the right sounds in the right way," Wolf writes. Blocking sound may be accomplished with walls, carpet

and workstation panels, which can be a challenge in open plan offices where partitions heights are generally very low.

Finally, covering refers to masking sounds within an interior environment. Wolf says covering some sounds with an electronic masking system can be a great option but only if designed and deployed with precision.

Sound Solutions for Existing Buildings

Susan Orlandi, associate director and interiors practice leader at Skidmore, Owings & Merrill, San Francisco, points out there are a number of challenges when designing for acoustics in existing buildings, including high exposed ceilings, glass walls, hard surfaces and concrete floors that are in high demand in certain markets. Nevertheless, those challenges can be addressed effectively with proper strategies. "Typically, this involves reducing noise from building systems, such as HVAC and plumbing, improving sound isolation between spaces and collaborating on the interior design to achieve suitable room acoustics," Orlandi explains.

Traditional solutions to help absorb unwanted sound include treatments on the floors, walls and ceilings. Carpet or cork flooring, fabric-wrapped

ACOUSTIC RATINGS GLOSSARY

When comparing products to address acoustics, it's important to understand their ratings in terms of effectively reducing, absorbing or isolating unwanted sound. Here are the most common classifications and what they mean, according to AcoustiGuard, a Mississauga, Ontario, Canada-based supplier of soundproofing products:

- **Noise Reduction Coefficient (NRC)** determines how well something absorbs sound within a given space. It is measured using values between 0 and 1. An NRC rating of 0 indicates perfect reflection, meaning a material bounces 100 percent of the sound back into the room. An NRC rating of 1 indicates perfect absorption, meaning a material soaks up 100 percent of the sound
- **STC (Sound Transmission Class)** represents a material or product's ability to block sound from traveling through a wall, ceiling, floor or other building assembly. It is the most common sound measurement system in North America, which is why it is associated with so many soundproofing products. The higher the STC rating, the better a material's ability to block sound. STC is expressed as an integer and is calculated by taking the Transmission Loss (TL) values tested at 16 standard frequencies over the range of 125 Hz to 4000 Hz and plotted on a graph. The resulting curve is compared to a standard reference contour. Acoustical engineers fit these values to the appropriate TL Curve (or Transmission Loss Curve) to determine an STC rating.
- **IIC (Impact Isolation Class)** measures a floor assembly's ability to absorb impact sound, such as footsteps. It is represented by an integer or a whole number, where a larger number means more impact sound is being blocked. For example, bare concrete (150-millimeter thickness) has an IIC of 25; high-rated underlayment, like ISO-SEP 25HD, delivers an IIC of 62 for a single layer. Many building codes require a minimum IIC of 50.

panels, curtains, acoustic wall panels and acoustic ceiling tiles all help mitigate noise indoors to varying degrees of effectiveness. When comparing products, it's important to consider their Noise Reduction Coefficient (NRC), STC (Sound Transmission Class) or IIC (Impact Isolation Class) ratings (see "Acoustic Ratings Glossary", page 71). Additionally, Orlandi notes noise exposure modeling can assist in predicting future noise levels from a variety of sources to effectively address them. "The measurements and modeling are used to evaluate noise impacts and to develop mitigation measures to meet applicable standards and to minimize annoyance," she says.

Although most facility executives are familiar with the elements needed to absorb and block noise, fewer know how sound masking functions, what's involved with a successful implementation and how to tell if their system is doing its job, 32 to Moeller. "Once a space is complete, if the walls' real-world performance doesn't live up to their lab-tested results, you can increase the masking level to make up for that deficiency—a flexibility uniquely afforded by this technology," he says.

For example, an organization might have assumed it could rely on HVAC for a masking effect, only to discover upon move-in that this type of equipment doesn't actually provide a reliable background sound level or produce a spectrum conducive to speech privacy. If masking was omitted from the original design, it's also one of the most affordable and least disruptive remedies to retrofit in open and closed spaces. "Adding masking is far less costly and complex than upgrading the physical shell—and likely more effective," Moeller notes.

Finally, technology has evolved to the point where acoustical engineers are beginning to study sound at the molecular level to address noise in the built environment based upon applied quantum physics research, Hsu says. "Using metamaterials and quantum physics applied to air molecules, quantum acoustics controls air at the molecular level," he says. "As air is the medium on which sound travels, quantization removes the source of acoustical issues before they can exist by quantizing any air molecule before it contacts an interior surface."

In other words, air is no longer a medium through which sound can travel because the technology forces sound to behave as individual particles rather than in groups or waves. Utilizing this groundbreaking technology, DHDI's proprietary ZR Acoustics system is able to regulate all elements of sound, such as frequency response, amplitude, timbre, phase and resonance. It essentially renders walls, ceilings and hard reflective surfaces invisible—inaudible, rather.

Regardless of the products utilized to retrofit an existing space, it's important to remember the most effective method of mitigating unwanted noise is a holistic one. Project teams that address acoustics early in the design process and leverage the expertise of consultants will be better positioned to build a sound barrier that works. And the sounds of silence will be music to the ears.

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MOUNTING STANDS ALLOW HEATING UNITS TO BE PLACED ANYWHERE

View a short video demonstrating how the stands work.

Cambridge Engineering has launched a line of vertical and horizontal stands to accompany the company's heating and make-up air units. The accessories come after Cambridge's move last year to standardize the vertical versions of its two main product lines, the S-Series space heaters and the M-Series make-up air units. The mounting stands allow maximum flexibility for retrofit and new construction projects. No field cutting or rework is required, saving time and labor.

www.cambridge-eng.com // Circle No. 36

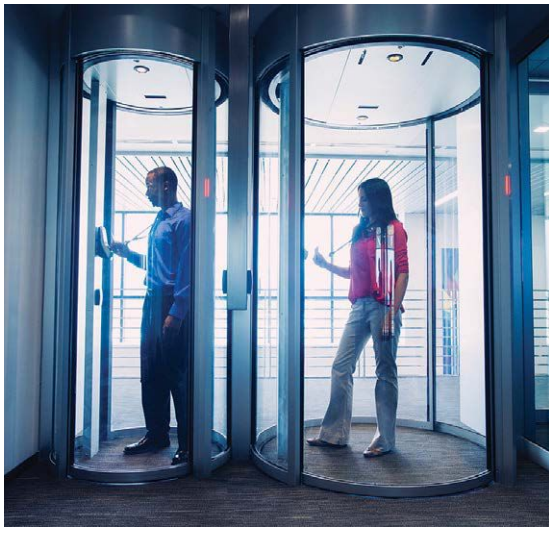
CONTROL DUST DURING REMODELING

ZipWall has added the ZipWall SideBridge wall mount, which works with the ZipWall FoamRail Span to tightly seal a barrier along a wall and keep dust under control during remodeling, restoration and repair. The ZipWall SideBridge comes in a standard size and long version designed to provide more clearance room around obstructions, like baseboard radiators and crown molding. To form a seal, the wall mount snaps onto a FoamRail Span and holds it against the ZipWall pole closest to the wall, creating a seal up to 8 feet. The reusable product takes a few seconds to set up and does not damage surfaces.

zipwall.com/sidebridge // Circle No. 34

STOP UNAUTHORIZED ENTRY THROUGH SWINGING DOORS

Boon Edam Inc. has released the Circlelock Combi mantrap portal solution that prevents unauthorized entry into high-security areas by attaching to existing fire-rated swinging doors. The retrofit option was designed to address unauthorized entrants "piggybacking" behind an authorized person through a swinging door. The cylindrical solution has a single sliding door on one end and an opening on the other end that is mounted to an existing wall and swing door. The Combi uses Boon Edam's StereoVision2 detection technology in the ceiling to scan the compartment and ensure a user is alone prior to unlocking the swing door. Security managers can choose to prevent piggybacking for inbound and outbound traffic. The Circlelock Combi can process five to six people per minute.



www.boonedam.us // Circle No. 35

CONTROL UP TO 35 LED FIXTURES WITH DIFFERENT SCENES

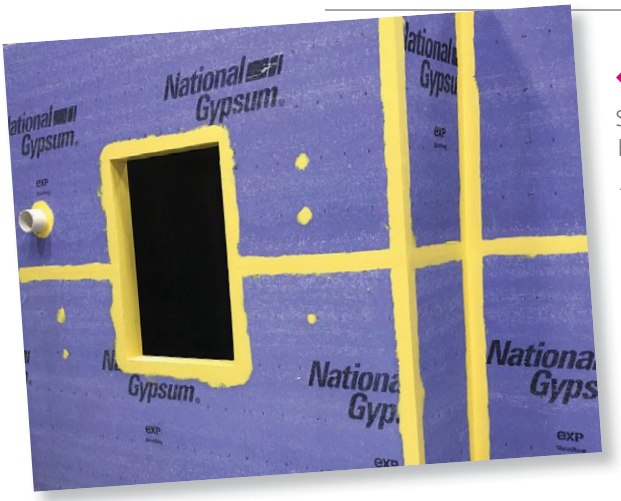
B.E.G. Controls has unveiled RATIO, an unobtrusive architectural solution for scene control. RATIO uses three components—a FLAT sensor, small power supply and matchbook-size push-button controller. Less than 1-millimeter thick, the FLAT is a completely flat occupancy sensor/photocell. The power supply can be installed on the first fixture receiving power, and the push button controller easily fits in a single gang switch box and utilizes any style of momentary switch from any manufacturer. RATIO can control as many as 35 LED fixtures, utilizing intelligent drivers with up to 16 different groups or scenes. The scenes on a RATIO solution can be programmed using Bluetooth with a free app from B.E.G. Controls.

www.begcontrols.com // Circle No. 37

LUMINAIRES ARE SUITABLE FOR PERIMETER ILLUMINATION

Hubbell Outdoor Lighting has enhanced its LitePak line of wall mount luminaires to improve performance and aesthetics. An optional prismatic refractor lens now is available for the redesigned LNC2, as well. Customers use the four housing sizes available in the LitePak family for perimeter illumination in new construction and retrofit applications. To ensure a seamless transition as customers cross over to this new generation of products, Hubbell Outdoor Lighting retained the same housing dimensions for the LNC2. At 1,500 to 4,300 available lumens and up to 130 lumens per watt, most LNC2 configurations are Dark-Sky approved and DLC qualified with several configurations achieving a DLC Premium listing.

www.hubbell.com // Circle No. 38



SEAL SEAMS AND CRACKS IN WALLS

Sto Corp. has introduced Sto RapidGuard, a single-component, multi-use air barrier and waterproofing material that seals rough openings, seams, sheathing joints, cracks, penetrations and transitions in above-grade wall construction. Sto RapidGuard adheres to damp substrates without blistering or increasing drying time. The product, which can be installed in near-freezing temperatures, bridges cracks and seams in wall construction without tearing or compromising the established air and moisture barrier. It works with Sto waterproofing air barrier membranes and is compatible with concrete, concrete masonry, brick, gypsum sheathing, wood, galvanized material and cement-based sheathings. There is no need for tape, mesh or fabric during installation, and it can be applied without special tools or applicator training.

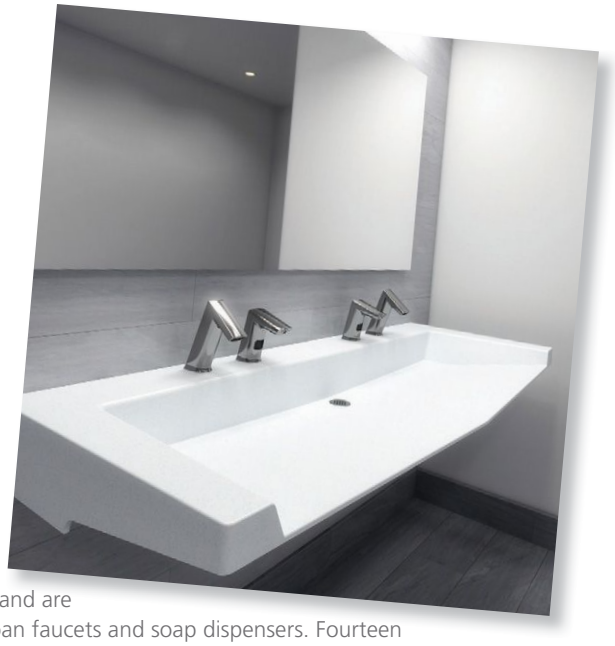
www.stocorp.com // Circle No. 39

LONG BRICK FEATURES DISTRESSED FINISH

Arriscraft has made available its Architectural Linear Series, elongated bricks for the North American architectural community. The long brick features a distressed finish that is suited for modern designs with rustic appeal. Architectural Linear Series brick is 2 3/8-inches high by 23 5/8-inches long (depth is standard at 3 3/4 inches). The brick is available in four standard colors: Charcoal, Midnight Grey, Obsidian and Opal. Arriscraft's Natural Process technology uses natural materials plus color pigments and replicates how stone is created in the Earth.

www.arriscraft.com // Circle No. 40

SOLID SURFACE SINKS AVAILABLE IN NEW MODELS



Sloan has introduced three models to its SloanStone line of molded, solid-surface sinks. Engineered for high-traffic environments, SloanStone sinks are vandal-resistant and feature a single-molded basin with non-porous surfaces for a hygienic environment that can be easily serviced. The sinks are suitable for wall-mount applications and are designed to pair with Sloan faucets and soap dispensers. Fourteen SloanStone sinks now are available, including Round Front ELRF Series for restrooms frequented by children and Arrowhead ELA Series, which features a slight point and an open front edge. The new models can be paired with any of Sloan's faucets and seven new matching sensor-activated soap dispensers for a cohesive on-deck aesthetic.

sloan.com/sloanstone // Circle No. 41

CONTROL MULTIPLE BUILDINGS ANYWHERE IN THE WORLD

Lutron Electronics has announced Enterprise Vue, a single data and management platform for multiple Lutron systems across corporate and university campuses, retail locations, or hospitality and restaurant spaces. Enterprise Vue gives facility managers real-time control of multiple buildings—whether they are all in one location or scattered around the world—by integrating data from Lutron's Quantum and Vive systems. Using a multi-building dashboard, facility managers can configure, monitor, analyze, report, and act upon the data provided across all Quantum- or Vive-enabled buildings at an enterprise level. This new offering supports Lutron's mission to simplify smart building technology and ensure that more spaces can be IoT-enabled and easily controlled.

www.lutron.com/quantum // Circle No. 42

BASEBOARD COVERS ARE EXTRUDED ALUMINUM

Slant/Fin has released Revital/Line baseboard replacement covers designed for long-lasting and cost-effective installation. The extruded aluminum cover offers an easy way to upgrade worn or damaged covers on virtually any residential standard baseboard. They are supplied in standard sizes up to 8-feet long. Replacement requires virtually no tools for most installations. The filler sleeves, end plates and other accessories allow for a finished look in less time than it would take to replace the full baseboard. The baseboard covers are lab tested to allow for maximum heat output. The powder-coat finish is durable and offered in eight decorator colors.

www.slantfin.com // Circle No. 43

BOILER LINE WITHSTANDS INTENSE ENVIRONMENTS

Lochinvar has expanded its CREST Condensing Boiler line with models tested in the elements and built for the outdoors. The CREST series now boasts six models, ranging from 750,000 to 2 million Btu per hour, designed and tested to endure strong winds, downpours and UV exposure. The option to install the unit outside adds more than 200 usable square feet to any space. The models feature a 96 percent thermal efficiency rating. The Outdoor CREST models come standard with the CON•X•US remote connectivity platform, which allows commercial facility managers and building owners to monitor and adjust equipment controls from a mobile app available on most smart devices.

www.lochinvar.com // Circle No. 44

WINDOW SHADES OFFER NEW FABRICS IN BLACKOUT RANGE

Phifer Inc. now offers new fabric options in its SheerWeave Style 7500 blackout range. Seven new colors have been added across popular neutral tones. In addition, Style 7500R now is available in response to growing demand for a lower-cost option where commercial fire certifications are not required. Style 7500 is PVC-free coated, polyester blackout fabric that maintains quality at an economical price. Suitable for roller shade and panel track systems, the window treatment fabrics are available in a neutral, 12-color palette. Style 7500 and new Style 7500R are stocked in 118-inch width. All Style 7500 fabrics are certified to GREENGUARD standards.

www.phifer.com // Circle No. 45

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Circle No. 46

CONTROL NOISE IN HOTEL ROOMS

K.R. Moeller Associates Ltd. has launched MODIO, a device specifically designed to address hotel noise. Using a sound similar to soft airflow, MODIO covers up intruding noises or reduces their disruptive impact by minimizing the amount of change between volume peaks and the guest room's baseline background sound level. In the past, guests tried unsuccessfully to use the HVAC system, white noise apps or other gadgets in this manner. A commercial-grade masking system, like MODIO, properly generates sound, adjusts it via effective volume and frequency controls, and produces it over a high-quality loudspeaker. MODIO can be attached to the back of a TV, a wall or furnishing in minutes.

www.modio.audio // Circle No. 47

BUNDLE MULTIPLE LINESETS FROM VRF/VRV SYSTEMS

Marketair has released the RD-Series and PD-Series commercial rooftop enclosure and support systems. The series are designed exclusively for multiple linesets used with variable refrigerant flow/volume (VRF/VRV) multi-split systems. Marketair's RD-Series (rectangular, metal) and PD-Series (round, PVC) complement each other and potentially save up to 35 percent in contractor labor compared to custom-fabricated lineset ducting. They are essential for preventing mechanical damage and premature insulation degradation from UV light, animals and insects. The RD-Series features a proprietary, anti-corrosive, scratch-resistant hot-dipped and chromium-free zinc, aluminum and magnesium coating. The PD-Series is designed for stand-alone use on smaller VRF projects, or it can function as a complementary transition piece between a condenser and an RD-Series run of multiple linesets.

www.marketair.com // Circle No. 48

WASTE AND RECYCLING RECEPTACLES ARE ARTSY

Peter Pepper introduces the Vilagrasa Collection to the North American marketplace. The collection includes BOX receptacles, which are designed by Jordi Blasi and are styled after corrugated boxes for a variety of individual and grouped waste and recycling needs. Ideal for lighter-scale collection, the receptacles are fabricated in durable powder-coated steel and are available in 25-, 17- and 8-gallon capacities. BOX includes integrated plastic bag retainers and optional graphics in blue, gray and yellow.

www.peterpepper.com // Circle No. 50

LIGHT DISINFECTS SURFACES

Health-care solutions company Vital Vio and lighting manufacturer Visa Lighting have introduced LED disinfection technology to a wide range of applications. Unlike other light disinfection products, Vital Vio LEDs emit a truly white light that is attractive and safe for humans. The VioSafe White Light Disinfection technology continuously protects environments from harmful bacteria. When used in combination with traditional intermittent cleaning in hospitals, homes, public spaces, and workplaces, Vital Vio's solutions safely, effectively and continuously kill harmful organisms on indoor surfaces.

www.visalighting.com // Circle No. 51

AD INDEX

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BEACON IN THE DARK

A Cemetery's Neglected Chapel Finally Serves Its Purpose

WRITTEN BY | **CHRISTINA KOCH**

PHOTOS: LASSEL ARCHITECTS PA

MATERIALS

LED CHANDELIERS // ARO by OCL Architectural Lighting, ocl.com

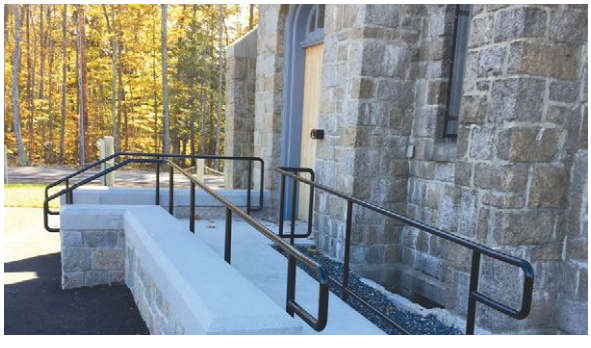
ACOUSTIC PANELS // Studio 54 Wall Panels by Acoustical Solutions, acousticalsolutions.com

In rural Berwick, Maine, a neo-Gothic-style chapel, built in 1939, stands within the confines of Evergreen Cemetery. Named Evergreen Chapel, it was built to host funeral services, but its lack of utilities made it unusable. Lassel Architects PA, South Berwick, Maine, was hired to make the building functional, including adding ADA accessibility, providing lighting and space conditioning, as well as including life-safety features.

The design team sought to maintain the chapel's charming character, including its concrete composition covered with stone veneer, stained-glass windows and slate shingle roofing. "The design intent was to pay respect to the historical character of the chapel while leaving some trace of the time in which our renovation took place," explains Michal Kaleta, CPHC, with Lassel Architects. "The new installations and fixtures selected respect the historic building without falsifying the history of the renovation."

For example, the design team ensured the new ADA-compliant ramp's granite veneer matches the existing, weathered stone elevation. While the ramp was being constructed, the stairs and landing to which it connected had to be rebuilt. All exterior veneer, granite steps and granite wall caps were reused. Millennium Granite North Berwick likely provided the chapel's original stone and also provided matching new veneer and new granite caps for the ramp.

While holding design meetings within the nave, the team realized the acoustics were poor. "The echo was quite significant," Kaleta recalls. "We could barely hear each other when there were more than eight people in the room." To ensure this would not be a problem during services (the chapel holds 50 people), 2-inch-thick acoustic panels were installed on the cathedral ceilings; fabric on the panels matches the nave's paint.



The unused basement with its 8-foot ceiling height accommodates the HVAC equipment and its runs. The chapel's previously unused chimney hosts the system's exhaust.

Most visually notable of the upgrades is the lighting. Lassel Architects' team, along with lighting consultant Apex Lighting Solutions, Freeport, Maine, relied on experience illuminating the exteriors of historic buildings in central Europe when devising the simple lighting plan. "We sought to underline the Gothic features of the building," Kaleta says. "We used LED technology to maximize the lifetime of the fixture/bulb and minimize the energy consumption."

There are no light poles and no houses in the area, but today when you drive down Cemetery Road after dark, Evergreen Chapel stands as a beacon in the dark. "Driving up the hill through that darkness, all of a sudden you'll see Evergreen Chapel flooded in a concert of lighting showing the building's beauty," Kaleta remarks.

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