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The University of Florida O'Dome Needed a Refresh

The **Stephen C. O'Connell Center**, commonly called the O'Dome, has been a vibrant part of campus life at the University of Florida (UF) since December 1980. The UF administration approved a $64.5 million renovation that would add a dramatic two-story main entrance, a reconfigured arena, high-efficiency utilities, and new amenities for students, fans, alumni, and patrons.

The Requirements? Minimum Downtime, LEED V4 Gold Certification

When you have thousands of fans anticipating the start of the basketball season you have an unmovable deadline. UF also wanted the project certified as the first Leadership in Energy and Environmental Design (LEED V4 Gold) arena in the country. General contractor **Brasfield & Gorrie** decided a temporary wall would meet these requirements and issued a request for proposals to install a 14,592 square-foot temporary wall using Georgia-Pacific DensGlass® Sheathing. "It was a unique, atypical building," says Courtney Pittman, vice president and project manager for **Davis Architects**. "It was also an aggressive schedule with just eight months to do the majority of the construction work."

Mader Southeast, a Florida-based commercial construction company, won the contract and GP Gypsum field sales manager Alan Zeedyk contacted Mader Southeast senior project manager Jeff Henderson with a suggestion for delivering an even greater efficiency. "DensGlass® Sheathing is an outstanding product," Zeedyk says. "But with this extremely tight schedule, we thought Jeff might benefit from using our new DensElement™ Barrier System."

Why Choose DensElement™ ?

The DensElement™ Barrier System offers an all-in-one weather barrier system. Its new and technically improved fiberglass mat gypsum sheathing panel has an integrated layer of edge-to-edge material that provides water and

"With this system, you put up the DensElement™ Sheathing, apply the FastFlash® liquid flashing, and you're done. Fewer steps make it faster."

– Jeff Henderson, Mader Southeast Senior Project Manager

REVITALIZING THE O'DOME

"The FastFlash® liquid flashing can also be applied even when the material is wet from rain or other condensation. These are important benefits for project owners who want to minimize delays and downtime and improve the bottom line."

– Barry Reid,
Building Envelope Technical Manager for GP Gypsum

air protection when finished with PROSOCO R-Guard® FastFlash® liquid flashing.

GP developed the DensElement™ Barrier System to meet the demand for faster construction. It allows any sub-contractor to provide installation services, even if they've never installed waterproofing products. DensElement™ installs exactly like standard fiberglass mat gypsum sheathing. No re-training is required. Barry Reid, the building envelope technical manager for GP says, "It is such a resilient product that GP will warrant the DensElement™ Barrier System against deterioration or delamination for up to 12 months of exposure to normal weather conditions.

Distinct Performance Advantages

While there was little chance the temporary wall would leak during its approximately six-month service life, the 12-month limited warranty for exposure to normal weather conditions provided the other project participants with significant peace of mind.

"Florida has harsh weather," Henderson says, "And the temporary wall was going to have a lot of exposure while the facility was still being used for activities. With the DensElement™ Barrier System, we were confident of keeping water out."

"The DensElement™ Barrier System is a great system because it goes up quickly. It suited our purposes perfectly, and we got great feedback from the installation contractor. I would certainly recommend it on future projects."

– Courtney Pittman, Vice President & Project Manager for Davis Architects

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Profiles: 7/8-in. corrugated, 7/8-in. perforated
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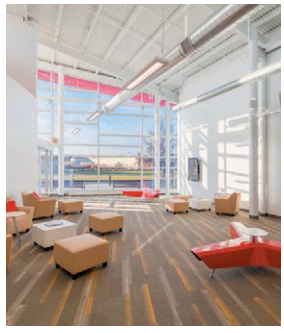

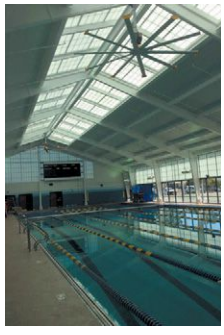

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pointofview

ARE YOU PREPARED FOR THE WORST?

We live in a crazy world. By watching the news on any given day, you easily can be convinced that the majority of humans are evil and there are few good, sane people left among us. From road rage to street violence to ambushing police officers to school and night club shootings to cyberattacks to threats to and from North Korea, it's amazing we aren't all building fallout shelters and preparing for the apocalypse.

In March of this year, ***retrofit*** experienced one of the aforementioned threats firsthand. To my colleagues and my untrained eyes, our websites—www.retrofitmagazine.com and www.retrofitTV.com—simply were running unusually slow that morning. However, our web guru, Derek Leeds, noticed a significant number of malicious requests on the server that hosted both sites. He went to work making adjustments to the network and plugins, moving retrofitTV to its own private server and adding new firewalls. His actions didn't stop the sites from being attacked, however. Leeds began blocking specific countries and specific IP addresses that were trying to access our websites' login pages. He also set up our websites to only accept specific IP addresses for login. Eventually, the crisis was averted.

Fisher Media, publisher of ***retrofit***, is a small company without a brick and mortar building. The company is not sitting on the next "Game of Thrones" script, the combination to Fort Knox's vault or any political secrets. Yet, Fisher Media was cyberattacked, and it's likely your business has been, too. Robert Nieminen, ***retrofit***'s contributing editor, writes in "Trend Alert" that "a recent Accenture security survey … found that overconfidence may be putting companies at greater risk for cyberattacks. … Of the companies surveyed, cyberattacks were carried out at a rate of three times per month during the past year alone."

Nieminen notes hackers are looking for low-hanging fruit and don't always know who or what they're attacking, thus the attack on ***retrofit***'s sites. However, they are looking to inflict damage once they get into your network. Commercial buildings, which automate so many systems in this Internet of Things era, definitely face cybersecurity risks. Nieminen outlines the common pitfalls and what you can do if you're hacked in his article, page 114.

Nameless, faceless villains behind computers aren't the only criminals we have to fear. Gun violence has become all too common, and protecting our nation's children within their schools, unfortunately, has become a critical topic of conversation. In "Component", page 78, John Woestman, director of Codes & Government Affairs for the Builders Hardware Manufacturers Association (BHMA), New York, underscores the importance of specifying classroom door locksets that meet ANSI/BHMA standards when designing and retrofitting school buildings. He notes, "Door barricade devices are currently being made available to—and installed by—some school districts despite the fact that they may violate building codes, fire codes, life-safety codes and/or accessibility laws." Ultimately, these door barricades—rather than protecting students, teachers and others—actually may compromise their safety in other terrible events, like fires. Learn more about what locksets you should be specifying in Woestman's article.

Finally, ***retrofit***'s entire team would like to thank Derek Leeds not only for remaining vigilant and protecting our websites from malicious bots, but also for protecting our country. Leeds currently is deployed with the Army National Guard in Kuwait. We thank him for his service in this time of international uncertainty.

Christina Koch

CHRISTINA KOCH
Editor in Chief

ATTEND *retrofit*'s INAUGURAL CONFERENCE

retrofit is hosting its first conference Oct. 12, 2017, at Chicago's Navy Pier. Detailed coverage about the conference, including information about speakers and presentations, begins on page 23; visit www.retrofitconference.com to register now; and follow us on social media for timely updates. We look forward to seeing you in Chicago!

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retrofit is now available on iTunes. Check it out at apple.co/1SODbx2.

THIS ISSUE IS INTERACTIVE!

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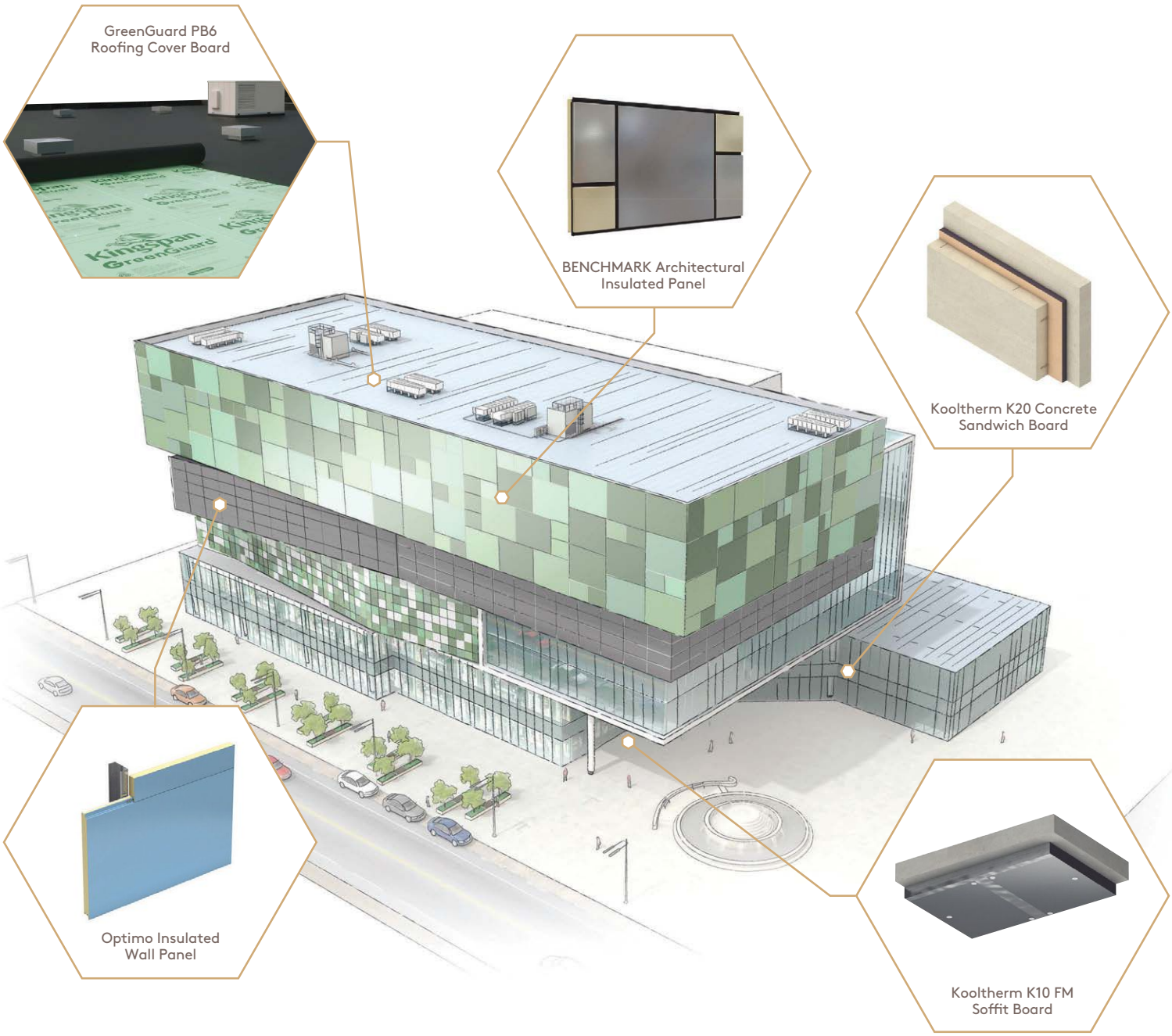

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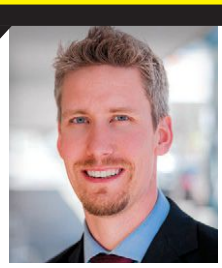
CONTRIBUTING WRITERS

In our "Cover Story", page 32, **KJ Fields**, a Portland, Ore.-based ***retrofit*** contributor, writes about Duke University's Richard H. Brodhead Center for Campus Life, Durham, N.C.: "Behind front façades steeped in time-honored tradition, a decidedly untraditional space took shape during the building's retrofit that offers students a rich culinary and social experience."



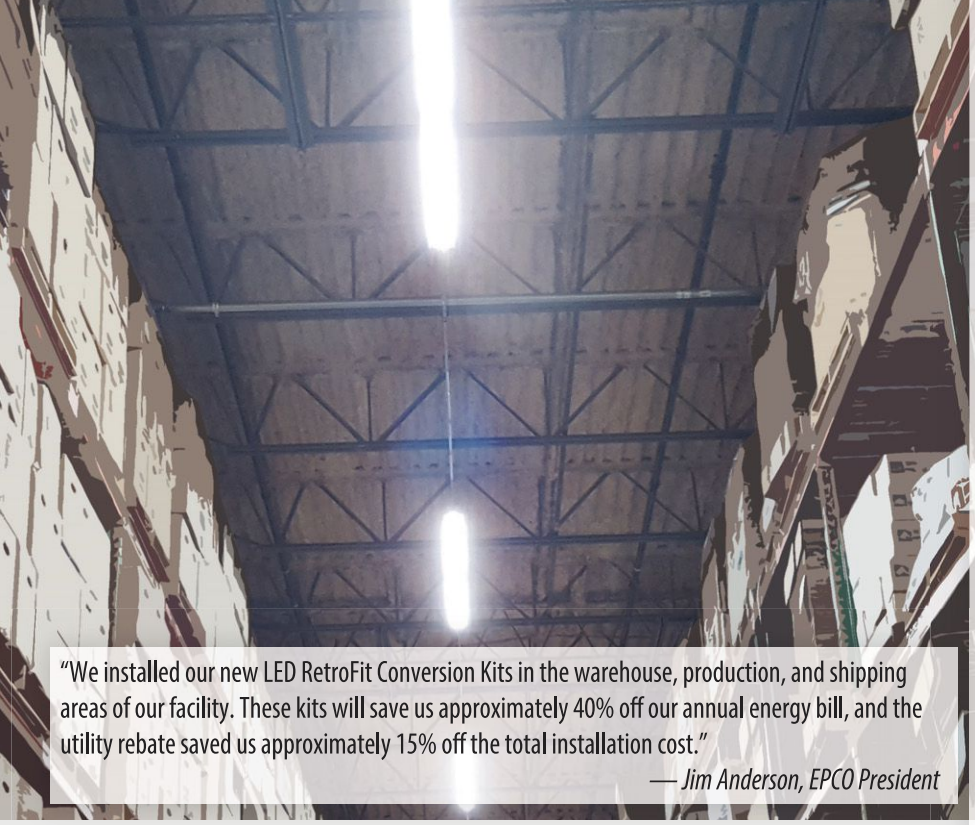
John Bixler, branch operations manager for Sebesta's Cedar Rapids, Iowa, office, has 15 years' experience working with the design and operation of HVAC systems. Having served as lead commissioning agent, lead mechanical designer and project coordinator for numerous projects, Bixler shares his knowledge about energy modeling as a tool for retrocommissioning in "Energy", page 70.

Tragic school shootings have initiated many conversations, including those about door hardware as it pertains to building codes and school safety procedures. **John Woestman**, director of Codes & Government Affairs for the Builders Hardware Manufacturers Association, New York, discusses types of locks for safe, easy egress and preventing unauthorized ingress in "Component", page 78.

Portland, Ore.-based freelance design journalist, critic and architectural photographer **Brian Libby** writes about how a Brutalist structure, Wooster Science Building at the State University of New York's New Paltz campus, was saved from demolition. Croxton Collaborative Architects, Long Island City, N.Y., wanted to improve upon the 75,000-square-foot structure's strong bones. Read the story in "Transformation", page 84.

Allen Barry, who writes about architecture and sustainability from Chicago, shares the story of Westport Presbyterian Church, Kansas City, Mo., in "Historic", page 92. The church, which was founded in 1835, was partially destroyed by fire in 2011. Kansas City-based BNIM helped restore the church to its former glory while making it an inviting space for the community.

Robert J. Verrier, FAIA, NCARB, is president and founder of The Architectural Team Inc., Chelsea, Mass. In "Multifamily", page 102, he writes about a former textile mill in Lawrence, Mass., that his firm converted into Loft Five50. The team preserved the facility's high ceilings, large windows and other unique architectural features that ultimately draw residents to historic buildings.



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— Jim Anderson, EPCO President

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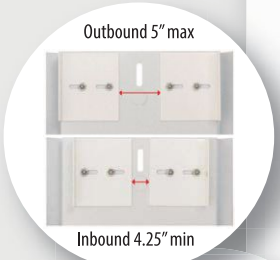

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ARTICLES ON www.retrofitmagazine.com

BRITISH COLUMBIA INTRODUCES THE AFFORDABLE HOUSING RENEWAL PILOT PROJECT

The challenge of future-proofing homes and buildings in British Columbia, Canada, during the coming decades is a formidable one, but it also represents an amazing opportunity to revitalize communities. Through the Affordable Housing Renewal pilot project, B.C. aims to demonstrate that the challenges of aging, unhealthy buildings can be addressed with a solution that is affordable, fast and scalable while reducing carbon pollution and helping the province meet its climate commitments. In the process, B.C. can create jobs in the clean economy and build a strong, prosperous future for the province's communities.

www.retrofitmagazine.com/british-columbia-affordable-housing-renewal

BLOGS ON www.retrofitmagazine.com

READ WHAT INDUSTRY EXPERTS HAVE TO SAY ABOUT RETROFITTING AND RELATED TOPICS.

Since ***retrofit*** was established, industry experts have been sharing their insight about energy efficiency, technology, codes, green-building programs, natural disasters, products and more via ***retrofit***'s blog. Click on "Online Exclusive" in our website's top navigation and select "Blog" in the drop-down menu. New blogs are posted every two weeks and shared via our e-newsletter. The latest blog topics include:

- Don't Miss ***retrofit***'s Inaugural Conference
- Six Ways to Quickly Reduce Energy Usage in Commercial Facilities
- Electrical Challenges Abound When Retrofitting Historic Buildings
- Campus Renovations Done Right

www.retrofitmagazine.com/category/blog

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Aquatherm at ISH 2017

Manufacturer Guidance

Barry Campbell, vice president of marketing for Aquatherm, explains some of the innovations Aquatherm unveiled during ISH, a water and energy trade show held in Frankfurt, Germany.

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NEWS

ASHRAE Certification Programs Meet Better Buildings Workforce Guidelines

Two Atlanta-based ASHRAE certification programs, the Building Commissioning Professional (BCxP) and Building Energy Assessment Professional (BEAP), have been recognized by the U.S. Department of Energy, Washington, D.C., as meeting the Better Buildings Workforce Guidelines (BBWG). ¶ The certifications achieved DOE recognition for aligning with Better Buildings Workforce specifications for two key commercial energy-related jobs, the building commissioning professional and energy auditor jobs, and for being ANSI-Accredited Personnel Certification Programs under ISO/IEC 17024 – Accreditation #1139. ¶ Of the six programs DOE has recognized for aligning with BBWG, two are ASHRAE certifications. ¶ "ASHRAE certification programs provide value to built-environment professionals, employers and building owners across the globe and embody our commitment to advancing human wellbeing through sustainable technology for the built environment," says ASHRAE Certification Committee Chair Cameron R. Labunski, P.E., CPMP, HBDP, HFDP. "DOE recognition of these two ASHRAE certification programs positions the employers of BCxPs and BEAPs to compete for federal, state and local government body contracts calling for the services provided by these certified professionals." ¶ Better Buildings is a national initiative in which the DOE works with partners to promote greater energy efficiency to save energy and money, create jobs and protect the environment. A key element of the Better Buildings Initiative is to ensure a trained and skilled workforce to help accelerate involvement in energy efficiency. ¶ The ASHRAE BCxP certification is for individuals who lead, plan, coordinate and manage a commissioning team to implement commissioning processes in new and existing buildings. (Learn more at bit.ly/2uCJhpV.) The ASHRAE BEAP certification is for individuals who assess building systems and site conditions, analyze and evaluate equipment and energy usage, and recommend strategies to optimize building resource utilization. (Learn more at bit.ly/2vLJYCf.) ¶ To learn more about ASHRAE certification programs, visit www.ashrae.org/education-certification/certification.

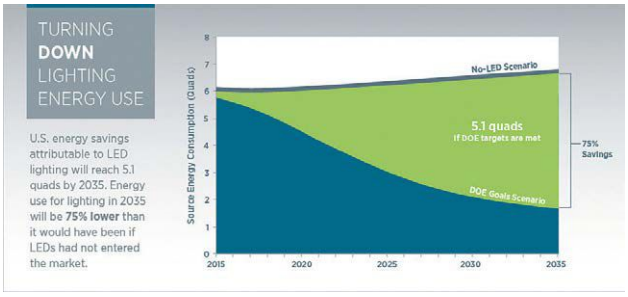
DOE REPORT: LEDs WILL HOLD MAJORITY OF LIGHTING INSTALLATIONS BY 2035

The Washington, D.C.-based U.S. Department of Energy report, "Energy Savings Forecast of Solid-State Lighting in General Illumination Applications", is the latest edition of a biannual report which models the adoption of LEDs in the U.S. general-lighting market, along with associated energy savings, based on the full potential DOE has determined to be technically feasible over time. The new report uses an updated 2016 U.S. lighting-market model that is more finely calibrated and granular than previous models and extends the forecast period to 2035 from the 2030 limit that was used in previous editions.

The new report projects that energy savings from LED lighting will top 5 quadrillion Btus (quads) annually by 2035. Among the key findings:

- By 2035, LED lamps and luminaires are anticipated to hold the majority of lighting installations for each of the niches examined, comprising 86 percent of installed stock across all categories (compared to only 6 percent in 2015).
- Annual savings from LED lighting will be 5.1 quads in 2035, nearly equivalent to the total annual energy consumed by 45 million U.S. homes today and representing a 75 percent reduction in energy consumption versus a no-LED scenario.
- Most of the 5.1 quads of projected energy savings by 2035 will be attributable to two commercial lighting applications (linear and low/high-bay), one residential application (A-type), and one that crosses both residential and commercial (directional). Connected lighting and other control technologies will be essential in achieving these savings, accounting for almost 2.3 quads of the total.
- From 2015-35, a total cumulative energy savings of 62 quads—equivalent to nearly $630 billion in avoided energy costs—is possible if the DOE SSL Program goals for LED efficacy and connected lighting are achieved.

Download the full report at bit.ly/2hH39af.



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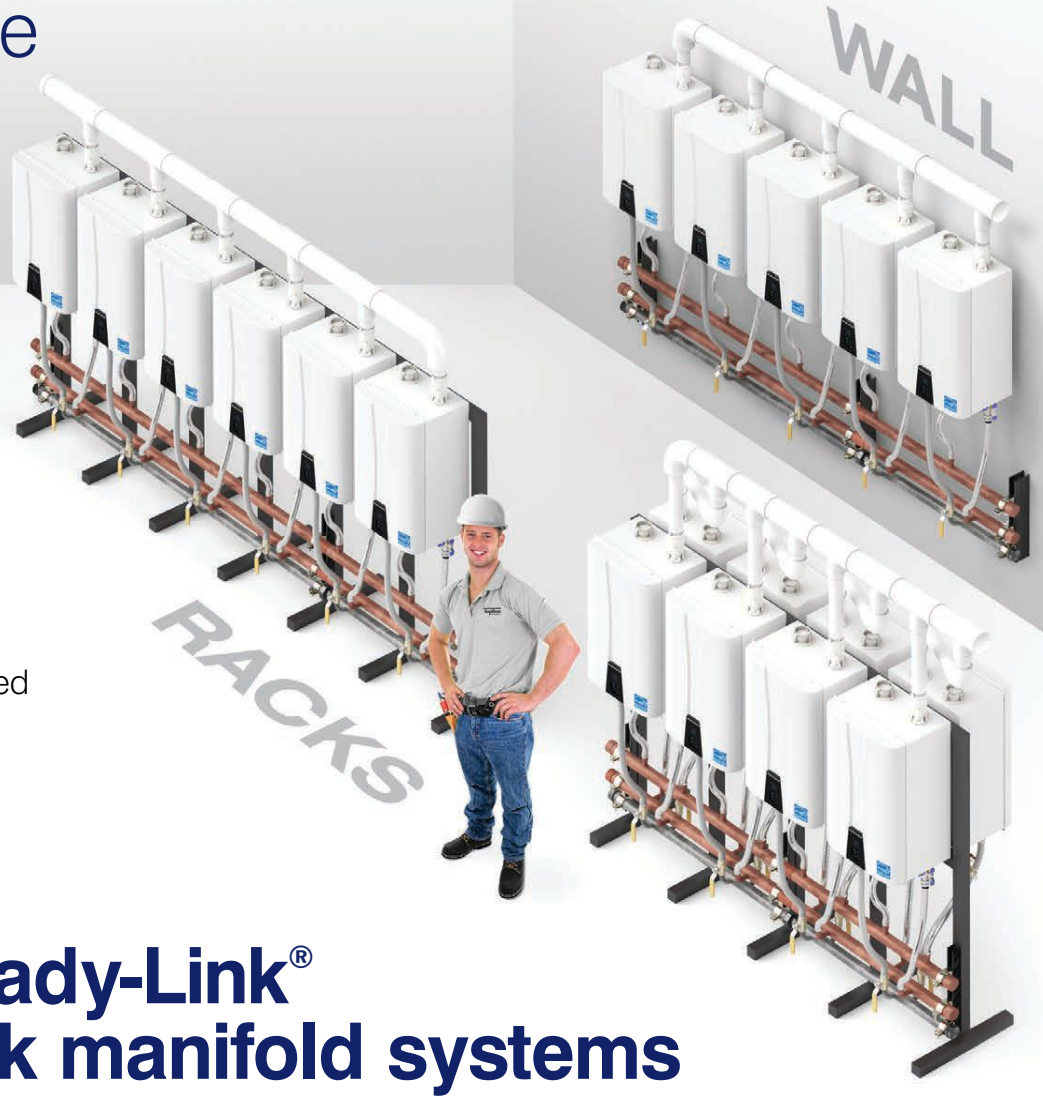

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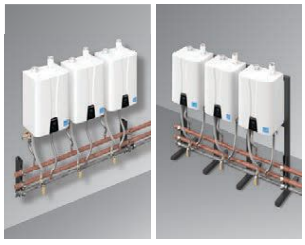

3 Pick your manifold kit

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NEWS

AAMA WATER-PENETRATION TEST METHOD CLARIFIES LAB VERSUS ONSITE TESTING

In recent years, AAMA 501.1-17 has been used in the field—an advantage if the building is occupied or if constructing a chamber at the building site is not a practical option.

The American Architectural Manufacturers Association (AAMA), Schaumburg, Ill., recently released an updated document to provide a standard water-penetration test method when it comes to using dynamic pressure. AAMA 501.1-17, the "Standard Test Method for Water Penetration of Windows, Curtain walls and Doors Using Dynamic Pressure," establishes the equipment and procedures for testing.

In it, a section on test equipment was updated to clarify what to do for laboratory testing versus onsite testing.

"The AAMA 501.1 dynamic pressure water test has been used as a laboratory test for over 50 years and is particularly useful when testing pressure-equalized fenestration systems when severe windblown rain is a concern," says Greg McKenna of Kawneer, officer of the AAMA Methods of Test Committee. "In more recent years, this test has been used in the field due to the added benefit that a separate vacuum chamber is not needed. This is an advantage if the building is occupied or if constructing a chamber at the building site is not a practical option."

Additional edits to this updated standard include the addition of two figures showing images of acceptable water leakage, plus a definition for what unacceptable water penetration means.

AAMA 501.1-17, as well as other AAMA documents, may be purchased from AAMA's online store, store, bit.ly/2wB5ZDi. More information about AAMA and its activities can be found at www.aamanet.org.

GCCA Unlocks the Benefits of Cool Roofs in Online Feature

The choice is simple and stark. Choose a hot town with more sick people, lower productivity and wasteful energy use that taxes its economic prosperity. Or choose a cool town with healthier, happier people; increased resilience; and efficient energy use that delivers millions of dollars in net benefits to its citizens.

According to the Washington, D.C.-based Global Cool Cities Alliance, in the not too distant future, unchecked heat increases will drain nearly 6 percent of urban economic output and double the cost of local climate-change impacts in the average city. The problem of heat is growing rapidly and poses serious challenges to nearly every aspect of urban life.

Cool roofs are an ancient concept that we traditionally associate with building comfort and energy efficiency. We can now understand and quantify the many other benefits cool roofs can deliver. Consequently, GCCA has launched a web feature at globalcoolcities.org/discover/unlock that explores and details the co-benefits of choosing cool roofs. Altogether, the improvements in energy use, health and safety, air quality, equity, electric grid resilience and quality of life attributable to cool roofs can return $12 for every $1 invested.

The GCCA web feature allows users to transform a city by adding cool roofs, ultimately demonstrating how cool roofs can tackle nine urban challenges.

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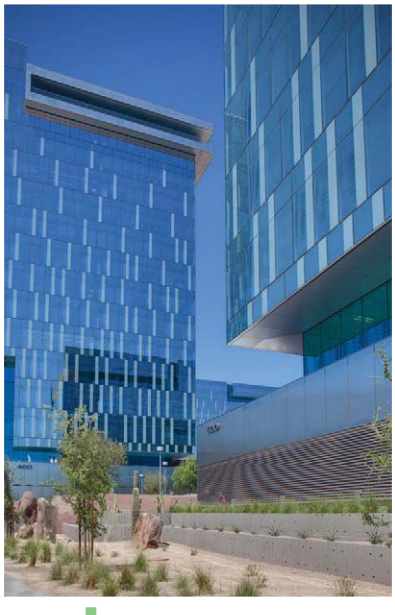

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SCHEDULE

8 A.M.	ONSITE REGISTRATION/CHECK-IN
9 A.M.	WELCOME and OPENING KEYNOTE SPEAKER: Jason Roberts, chair, Better Block Foundation
10 A.M.	NETWORKING BREAK in Tabletops Area
10:30 A.M.	EDUCATIONAL SESSION: Benchmarking
NOON	LUNCH in Tabletops Area
1 P.M.	AFTERNOON KEYNOTE: Ashok Gupta, senior energy economist, programs, NRDC
2 P.M.	EDUCATIONAL SESSION: Financing
3:15 P.M.	NETWORKING BREAK in Tabletops Area
3:30 P.M.	EDUCATIONAL SESSION: Commissioning & Building Envelope
5 P.M.	COCKTAIL RECEPTION in Tabletops Area

KEYNOTE SPEAKERS

OPENING KEYNOTE:
Jason Roberts, chair, Better Block Foundation

In 2010, Roberts organized a series of "Better Block" projects, converting blighted blocks in southern Dallas into temporary walkable districts with pop-up businesses, bike lanes, café seating and landscaping. Better Block now is an international movement.

Build a Better Block: How to Make Real Change in Your Community, Today

How can we drive change in our communities and move past unproductive committees, low community engagement and outdated regulation? In this funny, smart, energetic and breathless talk, arts activist Roberts encourages us to stop waiting around—even if that means painting in our own crosswalks, bringing in our own trees, building our own cafés and blackmailing ourselves into action.

AFTERNOON KEYNOTE:
Ashok Gupta, senior energy economist, programs, NRDC

Ashok Gupta focuses on policies relating to global warming, energy efficiency, renewables, sustainable building design, smart growth and transportation. During former New York Mayor Michael Bloomberg's administration, Gupta served as NRDC's representative to the Mayor's Sustainability Advisory Board and Energy Policy Task Force. He is the recipient of the U.S. Green Building Council's Leadership Award for Advocacy, Solar One's Environmental Steward Award, the Association of Energy Engineers' Environmental Professional of the Year Award, and the Environmental Advocates' Advocate Award for leadership in support of clean air and energy.

EDUCATIONAL SESSIONS

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Each of the three educational sessions will feature a panel of three speakers who will present for 20 minutes on the following topics. Each educational session will bring the magazine to life by providing a successful case study, further underscoring the session's focus.

SESSION 1 BENCHMARKING:

- Discover overall energy-efficiency trends in Chicago and findings from the Chicago Energy Benchmarking Ordinance data.
- Learn how to use your benchmarking results to take the next steps in energy efficiency.
- Find out how the Institute of Cultural Affairs is striving to achieve net-zero energy for its Chicago Landmark building by using what leaders learned from the benchmarking process.

SESSION 2 FINANCING:

- Learn about current financing options, as well as new options that may become available through initiatives, like the Illinois Future Energy Jobs Bill of 2016.
- Hear about Elevate Energy's recently published report, "Segmenting Chicago Multifamily Housing to Improve Energy Efficiency Programs".
- Understand Community Investment Corporation and Elevate Energy's Energy Savers program, a one-stop-shop multifamily retrofit program for affordable buildings.

SESSION 3 COMMISSIONING & BUILDING ENVELOPE:

- Find out about ComEd's retro-commissioning and monitoring-based commissioning programs.
- Understand what an enclosure consultant can bring to your retrofit project via a discussion of common envelope problems.
- Learn how to effectively insulate buildings built without insulation without negatively impacting the existing structures.

MEET OUR SPEAKERS

BENCHMARKING

BENJAMIN SKELTON, P.E., LEED AP, BEMP, CPMP, CxA, president of Cyclone Energy Group, Chicago

AMY JEWEL, Chicago city advisor with the City Energy Project

LESLEY SHOWERS, property manager at the Institute of Cultural Affairs, Chicago

MODERATOR: NATHAN M. GILLETTE, AIA, LEED AP O+M, director of Natura Architectural Consulting LLC, Grand Rapids, Mich., and a ***retrofit*** editorial advisor

FINANCING

AMY JEWEL, Chicago city advisor with the City Energy Project

KIMBERLY LOEWEN, senior manager of Technical Services, Elevate Energy, Chicago

JACK CRANE, senior vice president and director of lending, Community Investment Corporation, Chicago

MODERATOR: CHRISTINA KOCH, ***retrofit***'s editor in chief

COMMISSIONING & BUILDING ENVELOPE

RICK TONIELLI, LEED AP, senior energy efficiency program manager, ComEd, Chicago

AUBREY SWIFT, AIA, CEM, QCxP, LEED AP, director of Design Integration, dbHMS, Chicago

BRIAN STROIK, industry expert in the construction of energy-efficient, sustainable and durable buildings

MODERATOR: PAUL R. BERTRAM JR., FCSI, CDT, LEED AP BD+C, GGP, president of PRB Connect LLC, Casselberry, Fla.

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IMMIGRATION POLICY AND CONSTRUCTION LABOR

AS CONSTRUCTION CONTINUES ITS UPWARD TRAJECTORY, WILL THE TRUMP ADMINISTRATION'S IMMIGRATION POLICY WORSEN THE WIDESPREAD LABOR SHORTAGE?

COMPILED BY | **CHRISTINA KOCH**

During the Great Recession, many construction workers across the U.S. lost their jobs and, ultimately, found other employment that did not require long, laborious days under the hot sun or being laid off because of inclement winter weather. "The fact that construction labor rates have not risen commensurate with other industries is yet another detriment to those who may have considered a return to the construction industry. They will not have an incentive to return until construction wages increase," says Conrad Lazo, a shareholder with Becker & Poliakoff Legal and Business Strategists, Tampa, Fla. "The industry is plagued with manpower shortages and a lack of skilled labor."

Potentially compounding this issue is President Donald Trump's immigration policy. If the construction industry already is struggling to find workers, what will happen as construction demand continues to increase? And how might Trump's immigration policy affect construction costs? ***retrofit*** recently spoke with Lazo, who has practiced for 35 years primarily in areas of construction law, surety law and general commercial litigation, about Trump's immigration policy and its potential effects on the construction industry.

r: What's the impact of the Trump administration's immigration policy on available manpower?

Lazo: The administration's immigration policy is having a negative impact on available construction labor. The construction industry is having a difficult time finding U.S. citizens to perform the less desirable of the construction trades. For example,

(continues on page 30)

> To continue our [economic] expansion and provide a quality product within a reasonable price, there needs to be an understanding of the economics associated with slamming the door shut on immigrant labor.
> *—Conrad Lazo, shareholder, Becker & Poliakoff Legal and Business Strategists*

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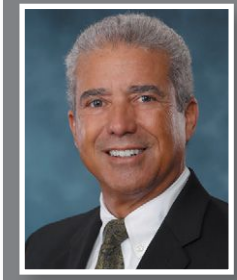
U.S. construction companies have relied on immigrant labor for performing roofing, landscaping, earthwork and road paving. With immigrant labor on the decline, U.S. construction companies will have to pay U.S. citizens higher wages to get the same performance as that obtained through immigrant labor. As higher wages are paid to U.S. citizens, the costs of construction also increase. Eventually, projects may price themselves out of the market. Ultimately, construction projects may be scrapped because of excessive costs.



CONRAD LAZO, Shareholder, Becker & Poliakoff Legal and Business Strategists

r: What are some effects of less immigration on the workforce?

Lazo: The construction industry relies on a certain amount of immigrant labor to supplement certain work trades. Compound that with a robust construction industry and the Trump administration's policies on immigration and an already tight construction labor pool will worsen.

The current administration's intent to close the borders and resist the influx of cheap labor is a double-edged sword. The construction industry is constantly dealing with increased material costs and pressure to increase labor rates. In the coming years, those companies riding the wave of the construction boom will need to reach deeper into their pockets to pay more to lure workers for vital positions on construction projects. As those labor dollars increase, so do project costs—some construction projects may become out of economic reach.

r: What is happening regarding labor in the construction industry right now?

Lazo: Recently, I began including a variety of provisions in construction contracts on behalf of the owners of prospective projects to protect against increased costs and delays associated with manpower shortages, including:

- A representation by the contractor that it has secured sufficient skilled and trained labor to construct the project in the timeframe required by the contract.
- The contractor's representation of sufficient manpower to timely construct the project was a material inducement upon the owner in agreeing to enter into the construction contract.
- A provision requiring the contractor to provide manpower projections, by trades, for the life of the construction project. This provision also requires the contractor to monitor and report manpower numbers on a daily or weekly basis and compare such numbers against the contractor's original manpower projections. If the projected manpower is not complied with, the contractor is required to provide a written explanation for the reduced workforce and provide a plan on how to recover lost time

and increase manpower. The idea is to stay ahead of the manpower problems and ensure corrections are made as soon as the size of the workforce begins falling below what was planned.

My firm also has begun increasing the sums compensable to owners for contractor delays in completing construction projects. The idea is to make the cost of delay so high that contractors will divert labor to the delayed projects first.

r: What has been the construction industry's reaction to the shrinking pool of skilled laborers.

Lazo: Larger construction companies are now establishing in-house recruiting departments and paying signing bonuses to prospective construction workers who are in the most demanded of work trades. Construction companies also are working with labor unions and trade organizations to find, recruit and train people for construction positions.

r: What can we expect during the next three-plus years of the Trump administration if the wall between Mexico and the U.S. is built, travel bans are fully instated, etc.?

Lazo: We need to find a balance between the needs of our society and the benefits gained by use of immigrant labor. It is nonsense to keep out workers who are willing to perform jobs that Americans tend to avoid, especially when manpower has not kept pace with demand.

If the economy is to expand, the number of workers currently available will not suffice. To continue our expansion and provide a quality product within a reasonable price, there needs to be an understanding of the economics associated with slamming the door shut on immigrant labor. Whether the implementation of immigration goals is through policy or mere intimidation, our neighbors to the south are a valuable part of our overall economy, especially the construction industry.

> "Recently, I began including a variety of provisions in construction contracts on behalf of the owners of prospective projects to protect against increased costs and delays associated with manpower shortages."
> —*Lazo*

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INTERIOR TERRA COTTA // NBK, nbkterracotta.com

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WRITTEN BY | **KJ FIELDS**

Duke University Serves up a New Concept in Student Dining and Socialization

The scene at Duke University's Richard H. Brodhead Center for Campus Life in Durham, N.C., is brimming with student activity paired with plentiful light, rich aromas and even flashes of flame. Behind front façades steeped in time-honored tradition, a decidedly untraditional space took shape during the building's retrofit that offers students a rich culinary and social experience.

The 3-story student union is the anchor of the Abele Quad and sits adjacent to Duke's iconic chapel. Although the prestigious West Campus was completed in 1930, the two buildings showcase ornate, Gothic-style architecture constructed with stone from a nearby quarry. "The historic façades of the student union were sacrosanct but, beyond that, Duke was very open to contemporary interpretations," says Architect David Cook, associate at New York's Grimshaw. "This was a really bold move while still being respectful to the historic context."

Situated at the nexus of student life on campus, the 112,000-gross-square-foot Brodhead Center is surrounded by structures that house athletics, performing arts and student services. The center's former interior, however, was far from welcoming. Containing a typical university cafeteria that served lackluster food and grab-and-go meals, the center also was characterized by a rabbit warren of little rooms, offices and unorganized spaces. "It really didn't function like a center for student life at all," recalls Mark Rhoads, associate at Grimshaw. "In fact, it was more like a fortress—you couldn't even pass though the building, so it essentially kept students out."

The renovation's core concepts were to offer students an appetizing 21st-century dining experience and animated space that draws students in and encourages them to stay and interact. Grimshaw's team began its work in 2012 with research of archival photographs. Team members saved the building's important historic features (the north façade, Great Hall, Cambridge Inn and main tower) and created a modern interior and expansion.

Cultural Crossroads

The project's program included a variety of restaurant venues where food is cooked in the open so students can order fresh, healthy fare and watch it being prepared. To entice students further, Duke brought in local vendors from popular Durham restaurants.

The global culinary choices range from Asian, including Indian; pizza and pasta; Southern; sushi; and vegetarian to a bistro and café with crepes and

baked goods. In the Great Hall, a wood-burning fire pit offers paella, rotisserie meats and grilled steaks. A darkened pub equipped with an audio system allows students to hang out and listen to live music and poetry readings.

A teaching demonstration kitchen for cooking and chemistry classes also serves as a venue for pop-up restaurants; catering; and guest chefs, like Mario Batali, who visited the campus last fall as part of Duke's annual Family Weekend. On the third level, students and faculty can enjoy a beautiful restaurant with a view and outdoor terrace. The space currently serves 7,000 meals per day.

With 12 kitchens, coordinating all the ductwork for mechanical equipment and grease exhausts was an enormous challenge. The project team completely removed the building's former core and added central ducts and services to the center space. To accommodate and conceal all the additional needed services, as well as the plenum for air supply and return, the team strategically thickened the courtyard wall.

Meeting Space

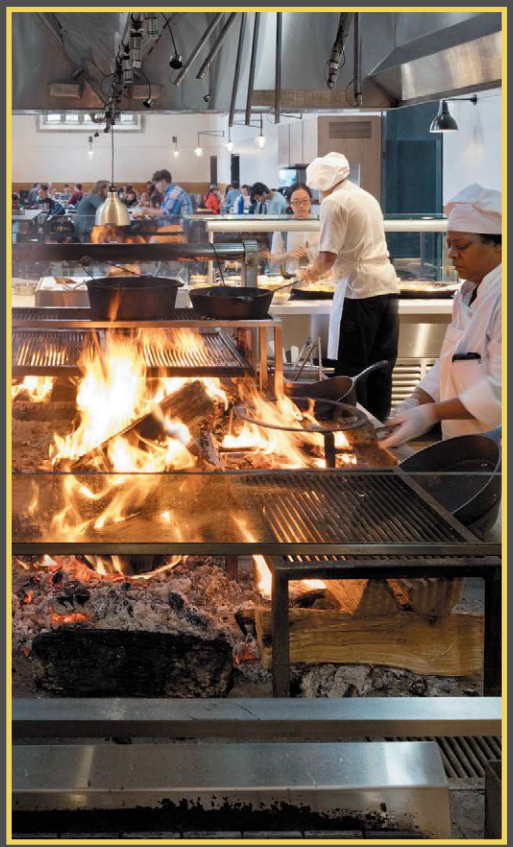
"More than just nourishment from food, the program originated with truly epicurean ideas that included social interaction," Cook explains. "We set out to provide a holistic experience that brought students together to dine, congregate and connect with each other."

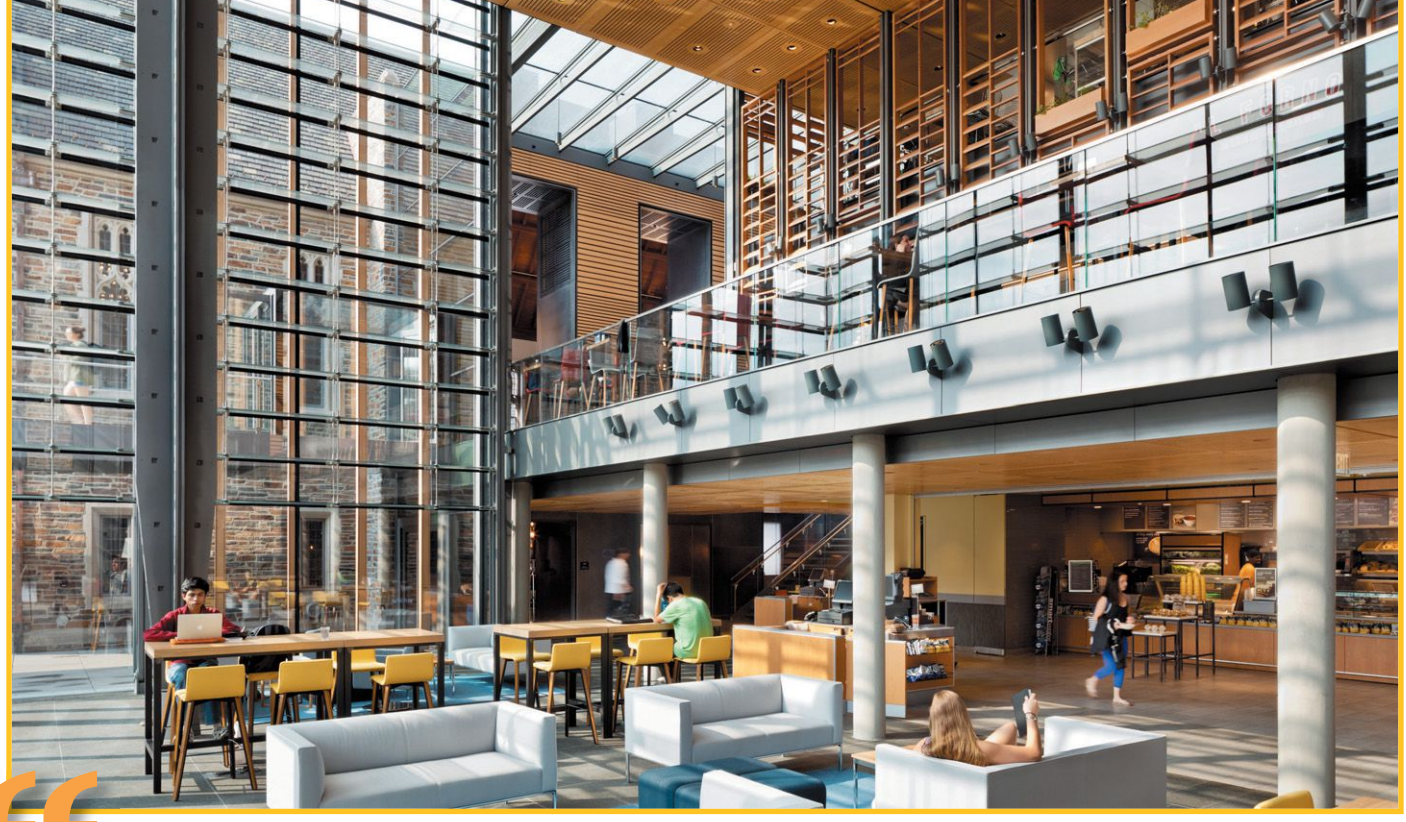
In the new core, the architects created an open social space. A promenade, or "street", lined with food vendors circles the core. Reminiscent of public market spaces on the East Coast or converted train sheds and industrial warehouse markets in Europe, the concept breathes life into the space. Tables are everywhere, giving students a break from regimented dining and the opportunity to take their meal to their favorite spot.

The floor plan incorporates a variety of spaces to suit students' needs and preferences. A lounge area feels like a living room with a restored functional fireplace and the café. Enclosed rooms with multimedia equipment serve as meeting space for student clubs and organizations.

A promenade, or "street", lined with food vendors circles the core.

The renovation's core concepts were to offer students an appetizing 21st-century dining experience and animated space that draws students in and encourages them to stay and interact.





> **Transparency was the goal.** You can see all the way across from the front of the building to the back, which fosters energy and liveliness. It provides a greater sense of connection to others and increases the chance meeting of people you might know.
>
> *—Mark Rhoads, associate, Grimshaw*

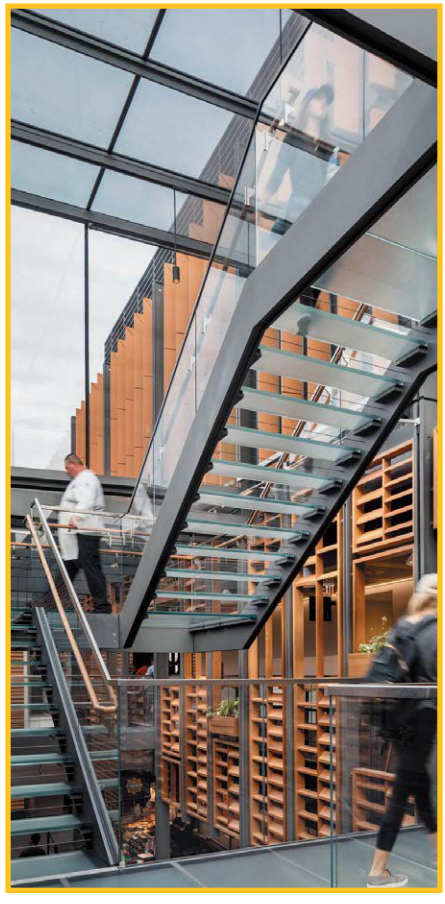
Sense of Connection

To the south, the building embraces the outside campus with a gleaming glass atrium and a new walkway that reconnects the Brodhead Center to the student services building. "The weather in Durham is lovely, so we worked closely with the landscape team to provide a beautiful outdoor space that would be used throughout the year," Cook says. "Outdoor seating and a contemplative garden space give students more places to go, and the atrium brings daylight and views to nature into the building."

Although the center provides nooks and crannies for students to nestle, most of the space is open. Skylights enhance the sense of spaciousness. On the upper levels, Grimshaw chose frosted glass for stair treads and walkways to further lighten the atmosphere.

Phenomenal viewpoints through the building greet students at every turn. One can gaze up to the activity on floors above or down a skylit corridor to the gothic windows at the north end of the building. Most importantly, students can see each other.

"Transparency was the goal," Rhoads describes. "You can see all the way across from the front of the building to the back, which fosters energy and liveliness. It provides a greater sense of connection to others and increases the chance meeting of people you might know."



New Relationships

While the contemporary design aesthetic is evident, Grimshaw found ways to respond to the historic character of the building and West Campus. The architects wrapped the core in a geometric system composed of three pieces of terra cotta triangulated around steel rods. The imperfections in the baked and formed terra-cotta clay and its warm color relate to the oxide and ochre of the original stone.

Functional contemporary detailing recalls the filigree and elegance of the Neo-Gothic building. For the atrium's glass enclosure, Grimshaw worked with a fabricator in Germany on the architecturally exposed steel members, fittings, and vertical rods and glass that create an intricate façade system. On the inside, the glass fins have a 50 percent frit to act as shading devices but they also distribute the wall's lateral load to vertical steel posts.

(continues on page 38)

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Retrofit Team

ARCHITECT // Grimshaw, New York, grimshaw.global

- MARK HUSSER, partner in charge
- DAVID BURKE, principal
- GEORGE HAUNER and ANDREW ANDERSON, associate principals
- DAVID COOK, MARK RHOADS and MANUEL SCHMIDT, associates
- AIMEE DUQUETTE, YUNHEE JEONG and MICHAEL WILSON, senior architects
- BEC WILKIE and SARAH JAZMINE FUGATE, architects
- ZACH FINE, BROOKE GASSAWAY and VIVIAN CHENG, architectural designers
- KONRAD SOBON and GREG SMITH, computational BIM specialists

LANDSAPE ARCHITECT // Reed Hilderbrand, Cambridge, Mass., www.reedhilderbrand.com

STRUCTURAL AND M/E/P/FP ENGINEER // Buro Happold, Boston, www.burohappold.com

FOOD SERVICE // Yui Design, Takoma Park, Md., www.yuidesign.com

RESTAURANT DESIGN AND BRANDING // Celano Design, New York, www.celanodesignstudio.com

CIVIL ENGINEER // Stewart, Durham, N.C., stewartinc.com

LIGHTING // Tillotson Design Associates, New York, www.tillotsondesign.com

ACOUSTICS, AUDIOVISUAL AND IT // Jaffe Holden, Norwalk, Conn., www.jaffeholden.com

SIGNAGE AND WAYFINDING // Two Twelve, New York, www.twotwelve.com

CODE AND FIRE // Jensen Hughes, Baltimore, www.jensenhughes.com

DOOR HARDWARE // Glezen Fisher Group, Campbell Hall, N.Y., (845) 497-9757

CONSTRUCTION MANAGER // Skanska, New York, www.skanska.com

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HISTORIC WINDOW RESTORATION // Raynal Studios, Natural Bridge Station, Va., www.raynalstudios.com

EXISTING WOOD CEILING RESTORATION // Alkat Restoration, Benson, N.C., alkatrestoration.com

INTERIOR TERRA-COTTA INSTALLER // Sears Contract, Raleigh, N.C., www.searscontract.com

INTERIOR TERRAZZO INSTALLER // David Allen Co., Raleigh, davidallen.com

ROOF RESTORATION // Baker Roofing Co., Raleigh, bakerroofing.com

New hanging balconies put people up in historic trusses where they can see the pediments and gargoyles up close.

"We optimized direct daylight and balanced it with strategies to control glare," Cook says. "There's a frit pattern in the skylight above, as well, and, in the center core, western red cedar panels offer shading and privacy and bring definition to the space." Planter boxes integrated into the wood panels are filled with herbs, offering plant life and a correlation to cuisine.

When the building interior was gutted, the team removed the old suspended ceiling in the East wing and found a pitched roof with steel beams that they left exposed above the new steel-truss and glass elevated walkway.

In the Great Hall and Cambridge Inn, the team restored the oak trusses to bring the legacy spaces back to their original character. New hanging balconies in these areas provide unique seating areas. "The balconies put people up in the trusses where you can see the pediments and gargoyles up close and experience this historic space in a completely different way," Rhoads remarks.

At night, the Brodhead Center's atrium is a glowing lantern that serves as a beacon for students. Unlike the prior layout, the building's update, which was completed in September 2016, is now perforated and can be entered from Duke's historic Abele Quad via the tower and north and east entrances, as well as from the Crown Commons facing the atrium to the south.

Finally claiming its place as the heart of campus, students flock to gather at the Brodhead Center over a meal, relax and mingle.

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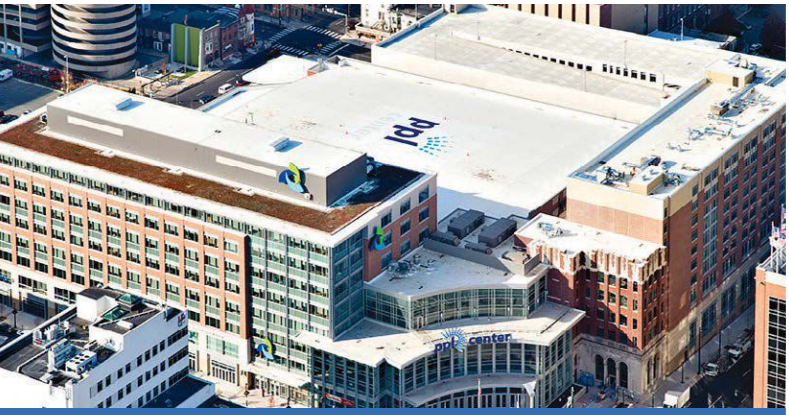

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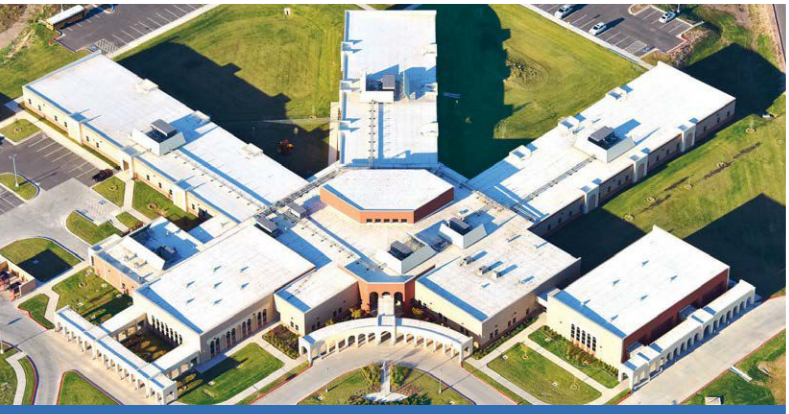

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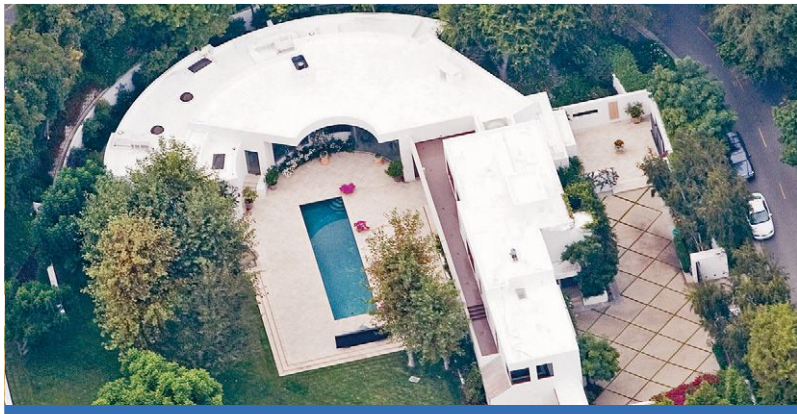

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» Retrofit Team

DESIGN ARCHITECT: Shepley Bulfinch, Boston, www.shepleybulfinch.com
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CONSTRUCTION MANAGER AT RISK: W.M. Jordan Co., Richmond, www.wmjordan.com
CIVIL ENGINEER: VHB, Richmond, www.vhb.com
M/E/P ENGINEER: Affiliated Engineers Inc., Atlanta, www.aeieng.com
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LIGHTING CONSULTANT: Collaborative Lighting LLC, Concord, Mass., www.collaborativelighting.com
COST CONSULTANT: Daedalus Projects Inc., Boston, daedalusprojects.com

» Materials

Dedicated in March 2016, Virginia Commonwealth University's (VCU's) newly expanded and renovated Cabell Library includes 156,000 square feet of new construction and improvements to existing library space, providing VCU's 31,000 students with more space to study, collaborate, discover, create and conduct research.

The new addition's glass, limestone and metal exterior envelops the original building's northern side and wraps around a portion of the eastern façade. As a counterpoint to the opaqueness of the existing library, the exterior walls at the northeast corner are entirely glass, making the activity within visible to passersby. Expanses of the new façade feature limestone panels with large windows, filling the space with daylight.

The original building's exposed precast panels were re-clad with the same limestone veneer used on the addition. The designers responded to the verticality of the original building's slot windows with a series of glass fins that provide solar shading and repeat the rhythm in a lighter, more accessible way.

The following materials highlight the project:

CURTAINWALL: EFCO Corp., efcocorp.com
METAL COMPOSITE PANELS: ALPOLIC, www.alpolic-americas.com
INSULATED CORE METAL PANELS: Kingspan, www.kingspanpanels.us
GLASS WALL PANELS: Modern Door, www.moderndoor.com
HARDWARE FOR GLASS WALL PANELS: dormakaba, dormakaba.us
WOOD PANELS: Campostella Builders & Supply, campostellabuilders.com
LED STRIPS: Finelite, www.finelite.com

» The Retrofit

VCU's Cabell Library, which is among the busiest academic libraries in Virginia, was built in 1970 and

PHOTOS: ©ROBERT BENSON PHOTOGRAPHY

expanded to its current five floors in 1975. Originally designed as a facility whose primary function was to store collections, the library faced a dire need for "people-focused" spaces to serve more than 2 million visitors annually. The $50.8 million project transformed the introverted precast concrete box of the existing Brutalist library into a civic and campus landmark that provides students and faculty with a beautiful and light-filled academic library of the future.

Designed to be as flexible and operationally efficient as it is engaging and inviting, the new library introduces a range of multi-use spaces for study and focused and collaborative work. Ninety percent of the space was designed specifically for student use, and the new library doubles existing seating capacity to nearly 3,000. Patrons are pulled vertically through the building via a series of open stairs with each new vista offering a sense of beauty and delight and higher floors providing progressively quieter areas.

Designed to achieve LEED Silver certification, the building's features include:

- New student-focused spaces featuring 25 group study rooms; two large state-of-the-art classrooms; and a third-floor "reading porch" with outdoor-style furniture, ceiling fans and windows that open.
- An area dedicated to video and audio production and editing, digitization, high-end computing and equipment loans.
- A 2-story daylight-filled lobby with expanded ground-floor café that further boosts the library's role as a gathering place.
- A new third-floor, 300-seat multi-functional event space, featuring a mosaic video wall. The entire north side of the room is a moveable glass wall that opens to a large outdoor terrace.
- A "silent space" on the fourth and highest floor—a label requested and enforced by students.
- A dedicated faculty and graduate research center in a large glassed-in fourth-floor room that offers expansive views of the Monroe Park Campus.

"With the Cabell Library project, we had the unique opportunity to create a library that embraces our robust campus community and announces VCU's prominence as a world-class research institution," explains John E. Ulmschneider, VCU librarian. "Shepley Bulfinch has designed an extraordinary new building that evolves our collective understanding of what a library can and should mean. The result is an academic library that stands unique in Virginia, and rare nationally, for its architectural beauty, functionality and immense utility to students."

The Cabell Library project received the first-place honor in *Library Journal*'s New Landmark Libraries Award competition, one of only 10 projects nationally recognized with this honor.

PHOTO: © 2011 VIRGINIA COMMONWEALTH UNIVERSITY CREATIVE SERVICES (PHOTOGRAPHER: ALLEN JONES)

PHOTO: ©SHEPLEY BULFINCH

PHOTOS: INDIANA STATE UNIVERSITY ARCHIVES

NORMAL HALL | Indiana State University, Terre Haute

» Retrofit Team

ARCHITECT: arcDESIGN, Indianapolis, arcdesign.us

ROOFING CONTRACTOR: Associated Roofing Professionals Inc., Terre Haute, (812) 466-6791

STAINED-GLASS RESTORATION: Conrad Schmitt Studios, New Berlin, Wis., www.conradschmitt.com

» Materials

For the roof replacement, Associated Roofing Professionals (ARP) installed a new modified bitumen roof system with a high-albedo coating. All existing roofing was removed to structure and Garland's StressPly EUV fiberglass-polyester reinforced SBS and SIS modified bitumen membrane was installed to provide long-term waterproofing protection.

The roof then was coated with Garland's Pyramic white, nontoxic, acrylic coating, which helps preserve asphaltic or modified bitumen surfaces and significantly reduces under-roof temperatures to create a more energy-efficient environment.

MODIFIED BITUMEN ROOF AND COATING: The Garland Co. Inc., www.garlandco.com

» The Retrofit

Completed in 1909, Normal Hall is the second-oldest surviving building on the Indiana State University campus—about one hour west of Indianapolis. Normal Hall has undergone multiple renovations, including an addition in 1957. By 2010, the grand neoclassical building was largely unoccupied and falling into disrepair.

Aside from the stately Indiana limestone, the building had to be redone from the foundation to the roof. The state of Indiana approved a $16 million renovation project and partnered with arcDESIGN to bring the building back to life. The history that makes Normal Hall special also made for unique challenges in the design and renovation process. "People will say 'they don't build them like they used to,'" says Greg Miller, project manager, arcDESIGN. He adds, in many cases, "it's a good thing they don't!"

Normal Hall was originally designed for and used as the university's central library. At that time in history, because of open flames of gas lighting and an unreliable supply of electricity, indoor lighting could have been dangerous to a library's collection. Therefore, libraries were designed to maximize natural light with plenty of windows, skylights and even glass floors. Instead of structural walls, Normal Hall's six levels of bookshelves, or "stacks", were designed structurally self-supporting, independent of the rest of the building.

Miller led the design team through the challenging process of removing the six-level stacks and replacing them with four new floors for offices and building systems. A portion of the stacks system was salvaged and reconstructed, providing the same view patrons would have had more than 100 years ago.

During construction, crews discovered unstable structural conditions on the north side of the building adjacent to the original 6-story stacks system. The entire exterior wall had to be removed and replaced while supporting the existing attic and roof nearly 60-feet above the ground floor.

To do this, crews constructed a 60-foot-high temporary structural system in and through the 6-story iron stacks system still in place to support the original attic and roof deck. The north wall was completely removed and reconstructed. Structural-steel columns supporting roof trusses were replaced while ends of deteriorated roof trusses were reconstructed in place.

"It was a monumental feat," Miller says. "It was a great example of teamwork by

PHOTOS: GREG MILLER, ARCDESIGN

PHOTOS: THE GARLAND CO. INC.

Indiana State University, design consultants and the contractor."

The largest—and brightest—rehabilitation was the stained-glass dome atop Normal Hall. The original dome had deteriorated so extensively that, by the middle of the 20th century, the remaining glass panels were completely removed and the dome was completely hidden. A suspended plaster ceiling sealed off the once grand rotunda. "Imagine just a skeleton, an empty dome with only the ribs visible," Miller describes.

The dome restoration began with historic photos, documents and forensic analysis. The glass art featured distinguished educators and philosophers. Some of the original stained-glass panels were recovered from the building while others had to be recreated. With the stained glass restored, rehab on the rotunda continued. Inside Normal Hall, the rotunda mural was restored and more than 140 surrounding light-bulb sockets were rewired to light the dome. Above the dome, a new 40-foot octagonal skylight and supplemental lighting was installed to light the dome. Below the rotunda, 20 original columns that stretch through the open hall were restored with scagliola and paint finishes.

The crew worked to save original hardware and finishes that hadn't already been lost to time. They were able to restore and replicate plaster moldings and cornices, save original wood doors and casings, as well as restore the grand marble and bronze staircase. "The general contractor did a great job preserving the historic detail with the extra time they put into restoring this building," says Seth Porter of ISU facility management.

Today, the original stately limestone structure, which is listed on the National Register of Historic Places, is accentuated by the addition, comprised predominantly of glass and Indiana limestone. The addition houses functional requirements, such as stairs, elevators, restrooms and mechanical services, maximizing use of the historic interior spaces.

Rededicated in October 2015, Normal Hall is back in action as home to the university's Center for Student Success and numerous tutors, counselors and mentors. Below the rotunda, students gather in the university Reading Room and Gallery modeled after the original hall when it opened to students in 1909.

PHOTOS: LG

Learn more about the VRF installation at Smouse Opportunity School via short video.

SMOUSE OPPORTUNITY SCHOOL | Des Moines, Iowa

Retrofit Team

VRF ENGINEER: KCL Engineering, West Des Moines, Iowa, www.kclengineering.com
CONTRACTOR: Proctor Mechanical, West Des Moines, www.proctor-mech.com
LG APPLIED REPRESENTATIVE: DPT Mechanical, Urbandale, Iowa, dptmechanical.com

Materials

When school representatives decided to improve the facilities, the school needed a versatile HVAC upgrade that balanced efficiency with the unique design needs of a historic building with several floors of varying environments. Most importantly, Smouse Opportunity School required an HVAC system that would improve the overall comfort and learning environment of the classrooms to help meet the diverse needs of the student body, as well as maintain the building's unique and historic architectural details.

Specifically, in classrooms, the system had to be quiet so it wouldn't disrupt lessons. In other rooms, such as offices and the teachers' lounge, as well as in hallways, the system needed to be minimally invasive to preserve the architecture. The system also needed to be centrally controlled to ensure the rooms were kept at a consistent temperature and could not be accidentally adjusted within the learning spaces.

After researching potential solutions, LG's Variable Refrigerant Flow (VRF) Multi V Water IV system was selected for its ability to deliver all of Smouse Opportunity School's requirements. Installed during a 10-week summer vacation, the Multi V Water IV hooked into the adjacent school's central plant that already had a cooling tower and boiler to easily incorporate the LG water-cooled condensing units in the basement. From there, the refrigerant piping was routed to the varying zones established in the school.

In the hallways where space was limited and the walls are decorated with original hand-painted tile, narrow refrigerant lines were routed through underground tunnels where hydronic piping previously existed. By reusing the existing lines, the team avoided disrupting the historic architecture and delicate tilework while saving money on the installation.

Throughout the school, a mix of ducted and duct-free indoor units were installed that worked best with the architecture and the needs of the space. In the teachers' lounge, which features elaborate hand-carved wood walls and accents, LG floor-mounted units were installed inside existing casework rendering them invisible and unobtrusive to the intricate woodwork. In the atrium, a space that wasn't previously conditioned, pre-existing openings were repurposed to disguise the ducted units—maintaining the aesthetic.

In the classrooms where minimal sound disruption was critical, indoor units were installed that operate as low as 36 dB(A)—a noise level equivalent to a quiet library.

"The LG Multi V system is inherently very, very quiet," says Dave Chongo, principal, senior mechanical engineer, KCL Engineering. "That played a very important part in this building. Some of the kids are sensitive to vibration, sensitive to noise, sensitive to light, and the LG VRF systems are so quiet you can't even tell that they're there."

LG's remote temperature sensors were installed in each classroom to monitor the individual environments. These remote sensors report into a central control unit, allowing administrators to monitor and ensure each classroom's temperature was kept consistent. The whole school system was then connected, via an ACP BACnet, to the Des Moines school system so representatives could oversee operation at a district level.

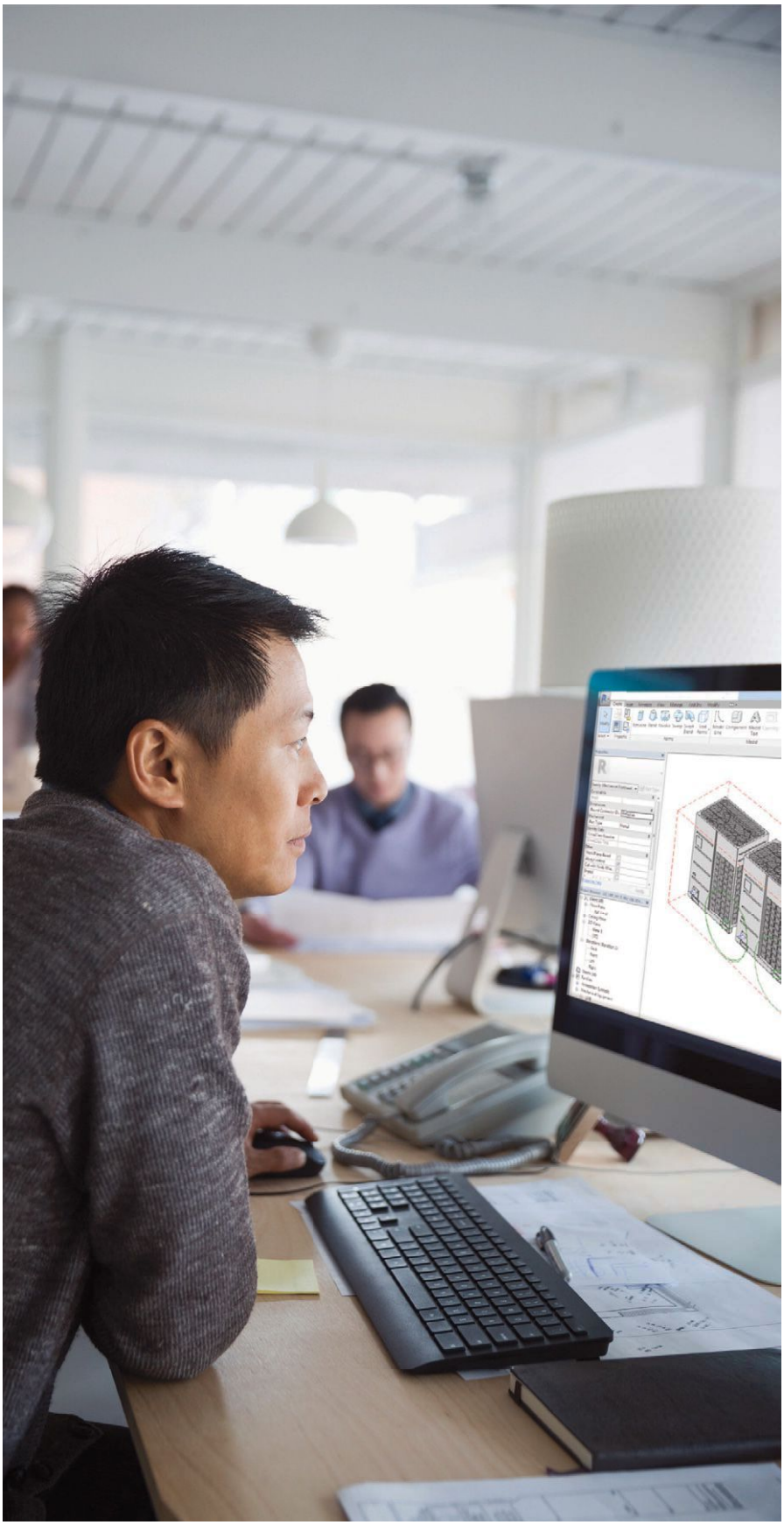
"It's definitely way more efficient than we used to be," says Jamie Wilkerson, facility services director, Des Moines Public Schools. "We've seen a significant reduction in utility costs and operational costs in the building since installing LG's VRF Multi V Water IV system."

VRF: LG, www.lg-vrf.com

The Retrofit

Originally commissioned in 1931 and designed for students with special needs, Smouse Opportunity School was one of the first schools in Iowa to create a conducive learning environment for those students unable to attend a traditional public school because of physical or mental disabilities. Designed to accommodate the unique requirements of its students, Smouse Opportunity School is equipped with resources, such as a hydrotherapy tank, temperature-controlled classrooms, rooms designed to carry vibrations for hearing-impaired students, tilted blackboards to prevent glare for the visually impaired, a resting room and swimming pool.

In addition to the school's personalized learning environment, the facility also features beautiful architectural elements from the building's original structure, such as ornate wood carvings and hallways adorned with hand-painted ceramic tiles. Because of its turn-of-the-century design and long-standing contribution to the Des Moines community, Smouse Opportunity School has been listed on the National Register of Historic Places since 2002.



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Circle No. 24

SHARPSBURG COMMUNITY LIBRARY | Sharpsburg, Pa.

» Retrofit Team

ARCHITECT: Front Studio Architects, Pittsburgh, frontstudio.com
METAL PANEL INSTALLER: Franjo Construction Corp., Homestead, Pa., www.franjoconstruction.com
METAL PANEL DISTRIBUTOR: Brock Associates LLC, Pittsburgh, brock-assoc.com

» Materials

Approximately 2,600 square feet of PAC-CLAD 7/8-inch Corrugated Panels in five different colors was installed. The 0.032-inch aluminum panels were finished in Award Blue, Cardinal Red, Copper Penny, Patina Green and Silver.

The decision to use metal as the primary exterior façade material was made fairly early in the design process. "As soon as we knew we wanted the building to be colorful, metal became the obvious choice for the exterior," explains Front Studio Architects Principal Art Lubetz. "We had an extremely minimal budget for the project. PAC-CLAD corrugated metal would be the most economical, long-lasting material we could use. We got involved with Petersen because we like their colors. The contractor bid it out and the price was right."

Durability and low maintenance were key factors, too. "The longevity of the product was important," Lubetz adds. "This is a little tiny library with little tiny budgets. We knew the PAC-CLAD corrugated wouldn't require much attention in terms of maintenance. That's another strong reason we used it."

Skip Stein, project manager with Franjo Construction, likes the look of the new building: "It certainly sets itself apart from the other construction in the area. It's almost an amusement-park appearance that the kids really like. The architect really did a nice job of mixing and matching the colors."

Corrugated metal continues to be a popular architectural material, Stein notes. "We see corrugated popping up all over the place. This job was relatively straightforward, though the building was irregular and didn't have many 90-degree corners. That made installation of some of the outside corners a little challenging. But the corrugated really turned out great."

Lubetz agrees: "I couldn't be happier with the way the project turned out. And the use of the PAC-CLAD had a lot to do with it."

METAL PANELS: Petersen Aluminum Corp., pac-clad.com

» The Retrofit

The multi-colored facility is making a splash in this small town a few miles north of Pittsburgh. The 1-story concrete block building library patrons previously frequented has been surrounded by vividly colored geometric shapes. Front Studio Architects initially was hired to design an addition on the back of the existing library building. "But it was such an unattractive structure that we just couldn't do it," Lubetz explains. "We came up with the idea of literally surrounding the building with simple, elemental blocks that would be individually colored so that we would have this pulsating, dynamic structure."

"It would be hard to miss the building's new design," notes Kathy Amrhein, library director.

PHOTOS: PETERSEN ALUMINUM CORP.

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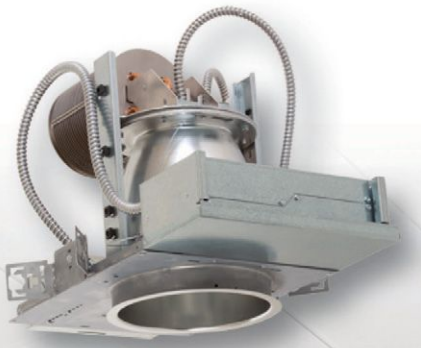

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Circle No. 25

HAROLD D. JOLLEY HALL

Washington University, St. Louis

» Retrofit Team

ARCHITECT OF RECORD: REMIGER DESIGN, St. Louis, www.remigerdesign.com

INTERIOR DESIGN: Directions in Design, St. Louis, www.directionsindesign.com, and REMIGER DESIGN

ENGINEER: William Tao & Associates Consulting Engineers, St. Louis, www.wmtao.com

CONSTRUCTION MANAGER: S.M. Wilson & Co., St. Louis, smwilson.com

» Materials

In its pre-renovation state, Jolley Hall lacked vertical connectivity between floors; it solely relied on one existing stairwell located toward the far east end of the building and one existing elevator. As such, the REMIGER DESIGN team proposed the design of a new 5-story monumental stair to be located in the existing atrium and lobby area that is the entry node of the building. The stair provides much-needed connectivity from floor to floor and provides a sense of cohesion to the department.

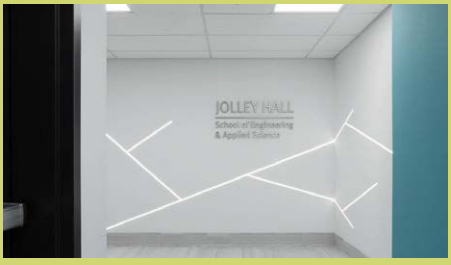
Other unique elements to the project include a demountable partition system that is full glass with an applied frosted film for visual privacy. The frosted film pattern is in the form of binary code that actually spells out the name of the department when deciphered. This feature helps give the department its own identity in a subtle, yet effective way. Another element worthy of noting is the use of a continuous 1/2-inch LED light fixture that traverses diagonally up and down the 5-story wall immediately adjacent to the stair. The layout reflects the vertical movement that occurs as students utilize the stairs from floor to floor.

DEMOUNTABLE PARTITION SYSTEM: Enclose by Haworth, www.haworth.com

» The Retrofit

The building, which underwent an approximately 30,000-square-foot renovation, serves as the home of the Department of Computer Science and Engineering and the Department of Mechanical Engineering & Materials Science and includes research laboratories, undergraduate teaching laboratories and offices.

"It's a privilege to work with my alma mater, Washington University," says Vern Remiger, president of REMIGER DESIGN. "The design that we helped to create for this space is meant to encourage students to learn and succeed in an environment that reflects current work trends. We're very proud of the work we've done on this project and our ongoing collaboration with the university."



PHOTOS: **REMIGER DESIGN**

FORT LEE ELEMENTARY SCHOOL | Fort Lee, N.J.

» Retrofit Team

FLOORING INSTALLER: The Gillespie Group, Dayton, N.J., www.thegillespiegroup.com

» Materials

The project timeline was dictated according to the length of the holiday recess at the end of the calendar year. The Gillespie Group created a plan according to the timeline and removed and replaced the water-damaged flooring as soon as school let out for the holiday.

The company installed Forbo MCT tiles for a variety of important reasons. The previous flooring required considerably more maintenance and had to be stripped and waxed several times per year. In contrast, the 13- by 13-inch squares of linoleum are made of recycled material and require no waxing or buffing, so maintenance is virtually eliminated. The flooring also meets all environmental regulations stipulated by the state of New Jersey. Eco-friendly and highly durable, the 2-millimeter natural linoleum tiles are constructed of USDA Certified 100 percent bio-based content and feature a Topshield 2 occupancy-ready factory finish. The floor also has a 30-year system service life.

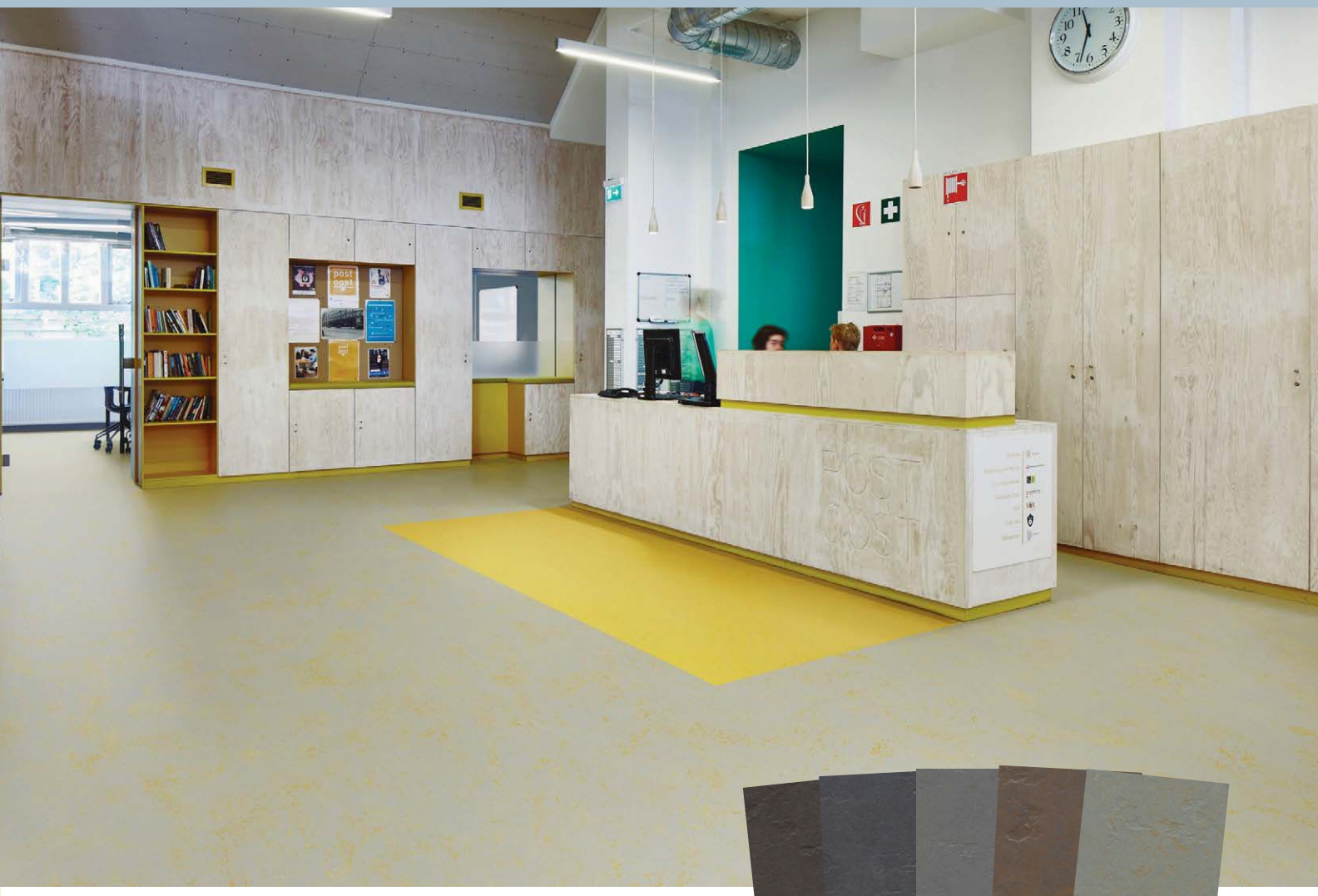
In addition to its sustainable qualities, Forbo MCT was a wise choice for its self-sanitizing capabilities, which inhibits the growth of bacteria that may create conditions favorable to the development of staph infections or the transmission of communicable diseases. John Gillespie, vice president of Operations for The Gillespie Group, states, "While the initial price of the new tile may have been slightly more than the flooring it replaced, the lower maintenance costs, durability and the significant health advantages it offers make it a smart choice and far more cost efficient over the life of the product."

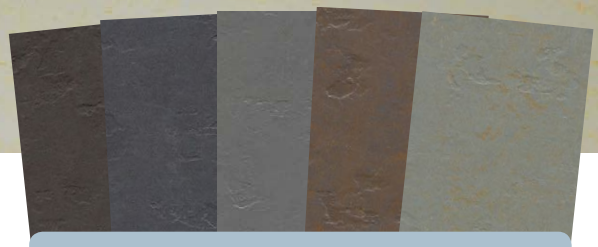
LINOLEUM: Forbo, www.forbo.com

The Retrofit

Water damage to the flooring of several classrooms at the Fort Lee Elementary School had left education officials with a number of critical issues to address before students could return to classes. First, the removal and replacement of the flooring had to be accomplished with little to no disruption to class schedules. Second, the project had to comply with New Jersey sustainability mandates. Finally, the flooring installation needed to provide students with a learning environment that was as durable as it was healthy.

PHOTOS: THE GILLESPIE GROUP





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THE POINT AT OTTERBEIN UNIVERSITY, STEAM INNOVATION CENTER | Westerville, Ohio

Retrofit Team

ARCHITECT: Moody Nolan, Columbus, Ohio, moodynolan.com

GENERAL CONTRACTOR: Corna Kokosing Construction Co., Westerville, www.corna.com

Materials

In a world where factory jobs are being replaced with smart technology and globalization has made the manufacturing industry increasingly competitive, Otterbein University saw an opportunity to transform a mundane, uninviting warehouse into a welcoming and innovative learning center. Partnering with leading organizations from the private and public sectors in central Ohio, Otterbein developed a hands-on curriculum focused on cutting-edge skills in science, technology, engineering, arts and math (STEAM), as well as a state-of-the-art facility for STEAM to thrive.

Envisioning a space to facilitate this important perspective and collaboration, Moody Nolan's architectural design included a multi-paneled, geometric façade to deliver daylighting with minimized solar-heat gain and glare. To diffuse daylight with visual clarity in key locations, the curtainwall system needed to incorporate metal, polycarbonate and glass.

Accomplishing all of the project's objectives, a LIGHTWALL 3000 series curtainwall system, which accommodates polycarbonate and glass infill, was customized for the facility. EXTECH engineered the system with deep glazing pockets and low-friction gaskets to allow for thermal movement while providing water- and air-infiltration performance.

To create Moody Nolan's distinctive geometric design, EXTECH fabricated a new horizontal mullion that allowed for the inclusion of non-continuous vertical framing members. The new mullion "flushed out" the interior surface of the system and allowed it to span up to 8 feet between vertical mullions, doubling the typical span lengths of 4 to 5 feet. The curtainwall system also allowed for the application of point loads from vertical framing members without additional structural reinforcing—horizontals typically deliver their loads to verticals.

PHOTOS: ANDY SPESSARD PHOTOGRAPHY

The curtainwall's polycarbonate inserts diffuse daylight to minimize glare on computer screens and other monitors. The high-performance glazing also reduces solar heat gain for a more comfortable learning environment and lessens dependence on electric lighting, which contributes to a more energy-efficient building.

Fabricated as a unitized system, the curtainwall arrived onsite in pre-assembled sections that installed quickly and accurately. In addition, the lightweight polycarbonate portions are easy and quick to set in place.

CURTAINWALL SYSTEMS: Exterior Technologies (EXTECH) Inc., extechinc.com

The Retrofit

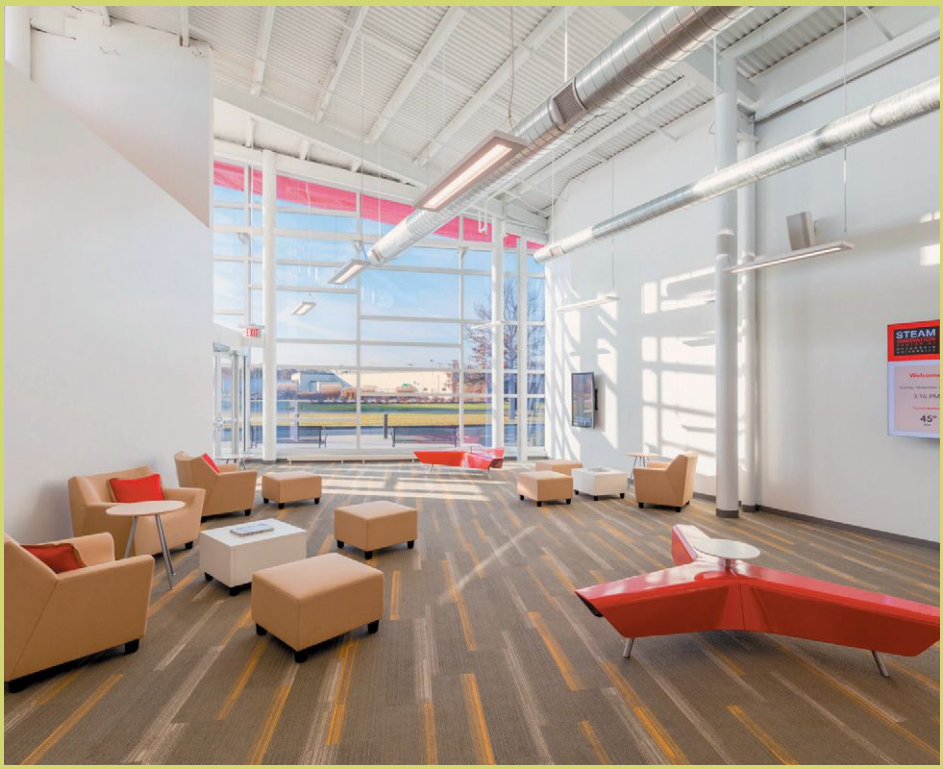
The $10.8 million endeavor proved impressive in mission and its resulting 61,000-square-foot structure. The facility houses two resident companies and Otterbein academic departments with laboratory space available to businesses and the broader community. Students work alongside resident professionals and complete onsite internships.

"We thought of how this space is also a starting point, a launching point and a point of innovation," describes Executive Director Erin Bender. "We thought of the design of this space and the peak that points the way to the entrance to this space while also suggesting a convergence of numerous elements meeting to form a point."

Otterbein President Kathy Krendl adds: "This building is a purposeful intersection of the best principles and strengths that education, industry, business, research and government each bring to the mix. The work that happens here will offer students, corporations and community partners alike new points of view about how things can and should work."

Completed on time for Otterbein University's 2016-17 academic year, the grand opening was celebrated in October 2016 with a "wire-cutting," a technological pun on "ribbon-cutting." At the ceremony, President Krendl praised the team effort saying, "We are opening the doors to this place within one year of its approval. A feat like that is only possible when you have the right partners, in the right position at the right time."

By 2021, conservative estimates show the direct impact of the project will result in the creation of 200 jobs, totaling $16 million in payroll.



DINING FACILITIES | Pensacola Christian College, Pensacola, Fla.

» Materials

There are three dining options, but most of Pensacola Christian College's (PCC's) 4,900 students eat in one of two dining facilities—Four Winds or Varsity. The two dining halls serve about 10,000 meals per day, two-thirds of which are served at the Four Winds facility. Meals are served three times a day, seven days a week. Because students are busy, they're hungry, and they want to get in and out, meal times can be a real feeding frenzy. For PCC, the challenge was bringing students into the dining halls to ensure they have proper ID and count them (to better manage meal projections and food costs).

PCC had turnstiles installed in both dining halls that were 20 years old and were at the end of their usable life. For a number of months, PCC staff researched various companies offering turnstile entrances and found the visual appearance of each of the products to be quite similar. "We needed someone to work with us to customize our entrances," explains Amy Glenn, the college's chief communication officer. "What brought us to Boon Edam was their willingness to sit down with us and modify their products to fit our needs." The college wanted recessed scanners in each cabinet and a durable, plexiglass covering for protection. Cost was also factor. "The fact that the turnstiles are made in America cut our shipping costs and that made a big difference for us," Glenn adds.

The request for cabinet customization was presented to Boon Edam's engineering team for feasibility assessment and design. Details, such as the dimensions of the card reader, were used to ensure enough space was available inside the cabinet and to develop special brackets to hold the device in place. A custom cut-out was designed for the cabinet's top and for the placement of the plexiglass. Drawings of these customizations were approved by PCC, then the extra materials were ordered and made as specified in the factory.

At Four Winds, the turnstiles were installed in January 2016. There are eight turnstiles at two separate entrances, but four units alone can handle 1,000 students in 15 minutes. "We don't want our students waiting in lines," Glenn explains. "We could have designed a huge lobby but our entrance size with this kind of high throughput is ideal."

A tap scanner is used by the student to gain entrance with his/her PCC Smart Card. The system identifies the card itself has not expired, that the student is eligible to attend the meal, and that he or she has not scanned for the same meal at another venue on campus. If the student has forgotten his or her card, there is a keyboard and monitor connected to one of the turnstiles at each location for the student to use his or her campus login to gain access and open the turnstile. An attendant on duty oversees the entrance and assists students (and guests) as needed.

At the 1,600-capacity Four Winds, eight turnstiles are used for entering; lobby attendants monitor the exit, so no turnstiles are needed. At the 900-capacity Varsity, four entrance turnstiles were installed in August 2017. Similar to Four Winds, attendants monitor the exit and no turnstiles are installed.

Another challenge PCC addressed was fine-tuning the amount of time the turnstiles remain unlocked, which can be adjusted at the site. If a turnstile is set to relock too quickly, distracted students may be slow to enter the

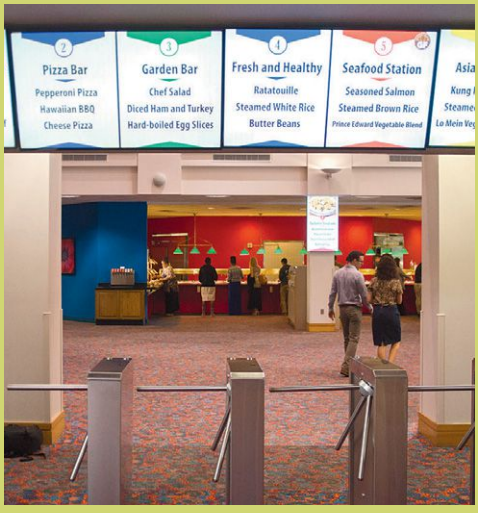
turnstile after their authorization and bang against a relocked arm. Aside from the wear and tear this presents, the student would have to badge in again to gain entry (inflating the meal count) or request assistance from the attendant and slow down the line. Users, like PCC, can spend a few days observing line behaviors to adjust the settings to an optimal time interval.

"It's been night and day right from the beginning, compared to our old entrances," Glenn concludes. "Plus, we know we can get parts quickly, and mechanically the turnstiles have performed super well. Our team has been quite pleased, I've heard no complaints at all, and our students consistently are able to get to their meals with little or no waiting."

TURNSTILES: Boon Edam, www.boonedam.us

» The Retrofit

PCC is located just off the warm emerald waters of Florida's Gulf Coast. The school became a reality in 1974 when 100 students arrived at the college's one building. Forty-two years later, students now represent every state and more than 50 foreign countries.



PHOTOS: **BOON EDAM**

ROBERT D. CAMPBELL JUNIOR HIGH SCHOOL | Winchester, Ky.

» Retrofit Team

INTEGRATED DESIGN AND DELIVERY ENGINEERING CONTRACTOR: Performance Services Inc., Lexington, Ky., www.performanceservices.com
SHEET METAL AND PIPING CONTRACTOR: Donahue Mechanical, Morehead, Ky., www.donahuemechanical.com

» Materials

School representatives agreed to replace circa-1970s unit ventilators with chilled beams and dedicated outdoor air systems (DOAS)—but with a new twist. The 43-year-old junior high is the world's first known building to use smart, plug-and-play controllable chilled-beam pump modules (CCBPM). The CCBPMs combine chilled-beam pinpoint indoor air comfort temperature and humidity control with energy efficiency.

Performance Services Inc.'s (PSI's) CCBPM specification enabled the reuse of 100 percent of the existing two-pipe loop's piping, pumps, and the relatively new replacement chiller and boiler installed in the 1990s and 2003, respectively. Another advantage is that CCBPMs eliminate the need for heat exchangers.

A CCBPM, which includes a powered integrated direct digital controller, chilled- and hot-water connections, valves, variable-speed electronically commutated motor pumps and smart sensors, is superior in temperature and humidity control to the original unit ventilator design, especially during season changes. The plug-and-play CCBPMs eliminate the guesswork associated with chilled-beam system specification, installation, balancing and commissioning. As with most two-pipe designs, the many wildly fluctuating temperatures of spring and fall days previously resulted in uncomfortable indoor temperatures because of the extensively long periods required to switch from heating to cooling modes.

Conversely, Robert D. Campbell Junior High School's design provides pinpoint tempered conditions within a 1-degree tolerance, regardless of the season, because its control is based on outdoor dew point, not temperature. If the OA dew point is less than or equal to 45 F, the space latent load is satisfied by DOAS ventilation air, which is distributed through each chilled beam and controlled via its respective CCBPM. When the dew point surpasses 45 F, the chiller is needed to maintain space conditions.

Donahue Mechanical executed PSI's design of reusing all hydronic trunk lines and the former unit ventilator taps for the first floor but needed to extend the second floor unit ventilator taps to the ceiling for CCBPM and chilled-beam connection. Most CCBPMs are mounted above each level's classroom zone's 18-inch-high T-bar drop ceilings and typically control four ceiling flush-mounted chilled beams ranging from 2- by 2- to 2- by 8-foot sizes. Each CCBPM was centrally positioned in each zone to limit chilled-beam piping circuitry and allow its front panel to swing down through a removed 2- by 2-foot ceiling tile for easy access.

"Our project is best described as a three-loop system—the original pipe loop from the central plant, the take-off loop to and from each CCBPM, and the loop that connects a series of four to eight chilled beams to its respective CCBPM," explains Gary Sprague, PSI's energy management specialist.

The third loop is a "game-changer," according to Sprague because the CCBPM blends and recirculates its return water within its zone to convert typical 42 F (cooling) and 140 F (heating) primary loop supply water temperatures to optimal 58 F (cooling) or 100 F (heating) chilled-beam discharge temperatures, respectively. This prevents cooling-mode condensation and heating-season heat stratification.

A building management system monitors the CCBPM via Ethernet with the BACnet protocol and sends outdoor temperature/humidity information. Sprague receives alarms and periodically reviews real-time and historical data from the BMS to spotlight trends and calibrate energy-efficiency improvements.

The project also reused the building's two 125-ton air-cooled RTAA-Series chillers manufactured by Trane (www.trane.com) and three 3-million BTU/h modulating boilers by Thermal Solutions (www.thermalsolutionsmfg.com).

46 NEUTON CCBPMS, 212 IQHC ACTIVE CHILLED BEAMS AND THE PINNACLE 5,000-CFM DOAS UNITS: SEMCO LLC, www.semcohvac.com

BUILDING MANAGEMENT SYSTEM: Delta Controls Inc., www.deltacontrols.com

BMS FRONT-END SOFTWARE: Tridium, www.tridium.com

» The Retrofit

Clark County School District Superintendent Paul Christy likes the decibel reduction of chilled-beam induction versus the disruptive operational noise of unit ventilator fans for classroom environments. "The two-pipe conventional unit ventilators that preceded the retrofit were noticeably loud and distracting, whereas now I walk into classrooms with the chilled beams and I can't hear any sound from the HVAC system," Christy says.

Using CCBPMs in the school's two-phase HVAC retrofit saved the district $147,000 in labor installation costs versus another system that was considered. The chilled beam/DOAS combination also saves $33,000 annually versus the school's former unit ventilator system. The energy savings will lower capital dollars spent on the project by $500,000, which is guaranteed by a performance contract with PSI.

PHOTOS: SEMCO LLC

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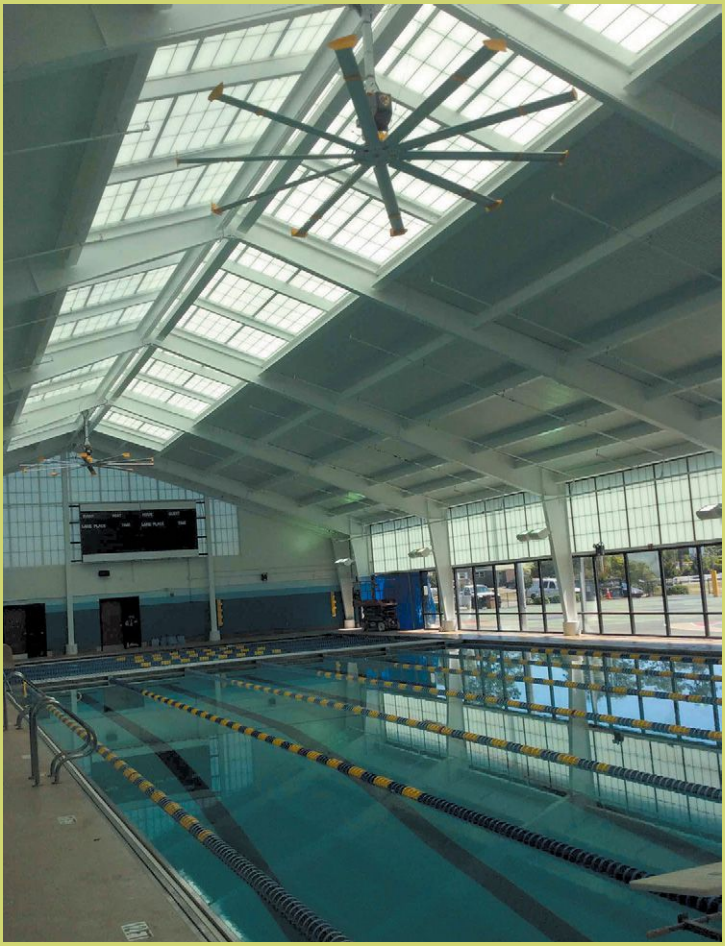

PHOTOS: METL-SPAN

PEPPER GEDDINGS RECREATION CENTER | Myrtle Beach, S.C.

» Retrofit Team

ARCHITECT: Tych & Walker, Murrells Inlet, S.C., www.tych-walkerarchitects.com

ROOFING CONTRACTOR: Spann Roofing & Sheet Metal, Conway, S.C., www.spannroofing.com

» Materials

The city of Myrtle Beach was looking for an efficient method for dealing with some moisture and insulation issues in the indoor pool of the Pepper Geddings Recreation Center. Metl-Span's Mesa insulated metal panel was chosen to solve the problems quickly and cost-effectively.

The original roofing system, with batt insulation and a liner inside the natatorium, was sagging. Mold and mildew had become an issue and condensation had caused some rust to the structure.

"The insulated metal panel system is a complete system. It has all three things going on in every panel—the interior panel, the 6 inches of insulation to get the R-value we wanted and the standing-seam metal roofing," says Michael Walker, AIA, LEED AP, at Tych & Walker. "The interior panel was coated with a product that is resistant to chlorine. It made all the difference in the world."

Spann Roofing & Sheet Metal installed more than 9,000 square feet of Metl-Span's Mesa panel, which features a 6-inch urethane core. The outer face is 22-gauge Galvalume, custom color SR Pre-weathered Galvalume. The outer panel features a flurothane coastal finish to better stand up to the salty sea air; the facility is about 1 mile from the Atlantic Ocean. Panels were 30-inches wide with a 22-gauge Galvalume interior face, coated SR Igloo White. Panels vary in length up to 45 feet.

"This was the first time we've ever installed an insulated metal roof panel," says Jimbo Spann, project manager and estimator for Spann Roofing & Sheet Metal. "We just don't see a lot of applications like this around here. It was pretty straight-forward and Metl-Span did a good job of taking us through the shop drawings."

Spann says the job was under a deadline to get the pool open in time for summer vacation. His crews were onsite for about four weeks and wrapped up in April 2015. "It was a tight schedule and it was challenging working above a pool, just logistical things you don't have on other jobs," Spann says. "Plus, before we could install roofing, the general contractor had to add some steel to the existing structure."

Spann Roofing also installed 180 feet of gutters, coated to match the insulated metal roof panels.

INSULATED METAL ROOF PANELS: Metl-Span, www.metlspan.com

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PHOTOS: **ALEX UPTON**

FEATHERSTONE HIGH SCHOOL | Southall, London

» Retrofit Team

ARCHITECT: DSP Architecture, London, www.dsparchitecture.co.uk

» Materials

This 1958 concrete-framed building was failing because of decay and ingress of water and needed structural stabilization. DSP Architecture was appointed to repair and encapsulate the frame, resulting in a modern teaching block befitting its outstanding Ofsted (Office for Standards in Education, Children's Services and Skills) rating.

The renovation required the removal of the old concrete spandrel panels and repairs to the concrete structure. Kalwall panels were installed and supported on a new steel frame, which was added to extend the floor space.

The new façades allow floor to ceiling diffused and healthy daylight to flood the interior while providing privacy for students and removing any distractions. An integrated row of clerestory windows provides ventilation and limited views to the outside.

Kalwall eliminates all shadows and glare, as well as the stark contrasts of light and shade, which not only reduces eye fatigue, but also enhances concentration.

The system also allows for simplicity by doing away with the needs for blinds, curtains and solar control. Even on cloudy days, Kalwall allows for ample daylighting, which means less artificial lighting. In addition, because Kalwall is highly insulating, energy costs are reduced.

The build was completed in two phases during the course of a year while the school continued to operate. Time and money was saved by using Kalwall Unitized Curtain Walls, which are assembled and glazed at the factory. Once delivered to the site, these large units can be installed rapidly, allowing the building to be enclosed quickly and interior work to commence earlier. The ability to keep the school functioning while the work was completed meant minimum disruption to staff and students.

Geraldine Walder, project architect at DSP, comments: "The client specifically requested Kalwall for this project after seeing how well it worked on our previous project for the adjoining sixth form building. The advantage of it being fabricated offsite meant disruption and time onsite were minimized while the combination of high insulation, natural daylight and ventilation means reduced energy costs."

UNITIZED CURTAIN WALL: Kalwall, www.kalwall.com

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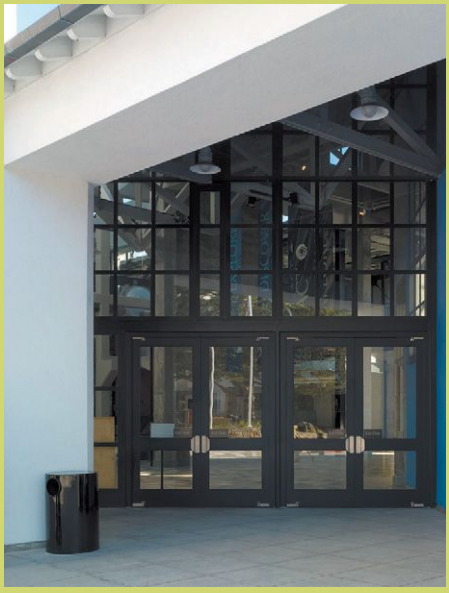
PHOTO: © MONTEREY BAY AQUARIUM



PHOTOS: ELLISON BRONZE

MONTEREY BAY AQUARIUM | Monterey, Calif.

» Materials

In 2002, the aquarium installed two pairs of Ellison Bronze custom-balanced doors made of extruded aluminum painted black with stainless-steel tie-rod construction and panic exit devices. In 2004, nine more of the same doors were installed. The aquarium first purchased Ellison Bronze doors to replace previous doors with swing components made of aluminum and steel—materials that at the aquarium would wear out after only three to four months.

"The original four Ellison doors are still in place and working, in good condition but with some ongoing maintenance," says Master Crafts Worker Jurek Zawadzki of Monterey Bay Aquarium. Given the corrosive effects of salt water and the heavy traffic at this site, preventative maintenance is to be expected.

The four Ellison doors installed in 2002 are large size: 48-inches wide by 129-inches high each. These doors have durable balanced hardware with most of the door components made of solid bronze to withstand the corrosive surroundings of an oceanfront location. The additional nine installed in 2004 were slightly smaller, measuring 44-inches wide by 107-inches high each.

Unlike conventional entry doors, an Ellison Bronze aluminum door is constructed from heavy wall extrusions that are made solely for Ellison and specifically designed to work in conjunction with the company's balanced hardware system. The door leaf's horizontal top and bottom rails are attached to the vertical stiles, using welded and bolted connections with additional stainless-steel tie rods at horizontal rails, yielding a durable and long-lasting entrance.

DOORS: Ellison Bronze, www.ellisonbronze.com

» The Retrofit

The Monterey Bay Aquarium received the 2016 Twenty-five Year Award from the Washington, D.C.-based American Institute of Architects. The award is given each year to a precedent-setting "project that has stood the test of time for 25-35 years and continues to set standards of excellence for its architectural design and significance."

Opened in 1984, the aquarium was built over the bay itself, literally participating in the natural ecosystem it showcases—pumping in unfiltered seawater that fills some of its exhibit tanks, as one example. The aquarium receives about 2 million visitors per year.

New Orleans East Hospital | New Orleans, LA | Manning Architects Eskew+Dumez+Ripple

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IOWA CULINARY INSTITUTE

Des Moines Area Community College, Ankeny

Retrofit Team

ARCHITECT: Shive-Hattery, West Des Moines, Iowa, www.shive-hattery.com
METAL PANEL INSTALLER: SGH Inc., Urbandale, Iowa, www.sghinc.com

Materials

Inspiration for the renovation and expansion came to Shive-Hattery from a building to the west of the institute classroom that has a terra-cotta tile exterior. The design team wanted to match that look with something that installed easily, was cost effective and has low maintenance. The solution was 0.080-inch aluminum Shadow Series and Aluvium panels.

The Aluvium finish is a 70 percent PVDF resin package that uses a special technique to impart a sand-like texture during the finishing process. Beyond the unique tactile expression, the texture gives the panels a distinctive visual element from a close proximity or far away.

The project required 5,038 square feet of Shadow Series panels in Pewter and Regatta Mica (blue), as well as 2,753 square feet of Terra Cotta Armagnac, Terra Cotta Mountain and Terra Cotta True Penny. "The color selection of the metal was chosen to coordinate with an adjacent building that used orange terra cotta along with DMACC's blue, which is used in the school logo," says Paul Rathjen, an architectural designer with Shive-Hattery.

"The architect wanted the look to be completely random, similar to terra cotta," says Jeff Alkema, director of construction operations with SGH. "To do that, you have to create a pattern to essentially make a very organized pattern look random."

The Shadow Series panels also add dimension because they can be extended at varying depths to create texture or a dynamic variation in patterns while keeping the substrate and weather barrier in the same plane. The exterior installation carries into the interior, through the curtainwall, requiring SGH to technically prepare for two separate installs on the same building.

Alkema notes the job remained challenge-free because it was a Guaranteed Dimension project from Dri-Design. In fact, the panels were ready and waiting at the job site well before SGH could install them. The Guaranteed Dimension program allows for the general contractor, architect, installer and Dri-Design team to collaborate to establish dimensions that all other trades will build to, which ensures the Dri-Design panels fit perfectly on a building. Guaranteed Dimension eliminates the need for field dimensions.

WALL PANEL MANUFACTURER: Dri-Design, www.dri-design.com

The Retrofit

DMACC was looking to update and expand its classroom building to continue to attract students and ensure the space matches real-world culinary expectations. The expansion brought a new entryway, lobby and pre-banquet area, as well as upgraded existing spaces.

PHOTOS: DRI-DESIGN

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DMACC Culinary Institute
Shive-Hattery Architecture

Circle No. 34

PHOTOS: SOUND SEAL

NEW YORK STATE POLICE ACADEMY | Albany

» Materials

The project incorporates 5,696 square feet combining WoodTrends wood-veneered acoustical Topline wall and ceiling panels and Sound Quality fabric-wrapped acoustical wall panels.

The wall and ceiling materials included reflective and absorptive types of WoodTrends wood-veneer panels and Sound Quality fabric-wrapped panels. The thickness of the elements varied from 3/4 to 4 inches; however, the vertical plane on the face of the walls remains unchanged because the concealed blocking varies in depth. Sound Quality S-2100 High Impact Fabric-wrapped fiberglass insulation boards were used to be absorbent where necessary but also S-3000 Reflective Fabric-wrapped sheets of solid medium density fiberboard were used to act as a reflective surface, allowing a seamless transition between the two variations on the same surface.

Cherry-wood-veneer Topline panels and planks, in addition to solid cherry millwork trims, were used throughout the project to create a timeless look. The absorptive Topline panels have a perforation spacing of 14/2 (14-millimeter wood and 2-millimeter groove space) with 2 inches of fiberglass insulation mounted behind, thus achieving an NRC rating of 0.75. The design pattern of a 3/4-inch black reveal between the wood-veneer panels required the panels to be fabricated with a variety of recessed edge profiles to meet several types of wall conditions.

Four large and reflective wood-veneer ceiling clouds were designed to hang above the center stage. These clouds were constructed at 8-feet wide by 16-feet long. The clouds' convex and concave curves required complex and custom fabrication

The early stages of the project required the space to be "gutted", which revealed the 22-foot-high masonry block sidewalls were not adequately braced to meet current code requirements. The design team was able to incorporate steel columns for the wall bracing to be hidden inside the new wood-veneer pilasters on the two sidewalls.

The four, large wood-veneer ceiling clouds had to be made and delivered in four individual sections versus pre-assembled offsite. This was necessary to access the inside of the building for final assembly.

WALL AND CEILING PANELS: Sound Seal, soundseal.com

» The Retrofit

The New York State Police Academy was originally constructed in 1967 with minimal concern around acoustic performance. The primary goal of this renovation was to use the full knowledge of acoustical design, materials and technology to create a space that users could enjoy for many years into the future.

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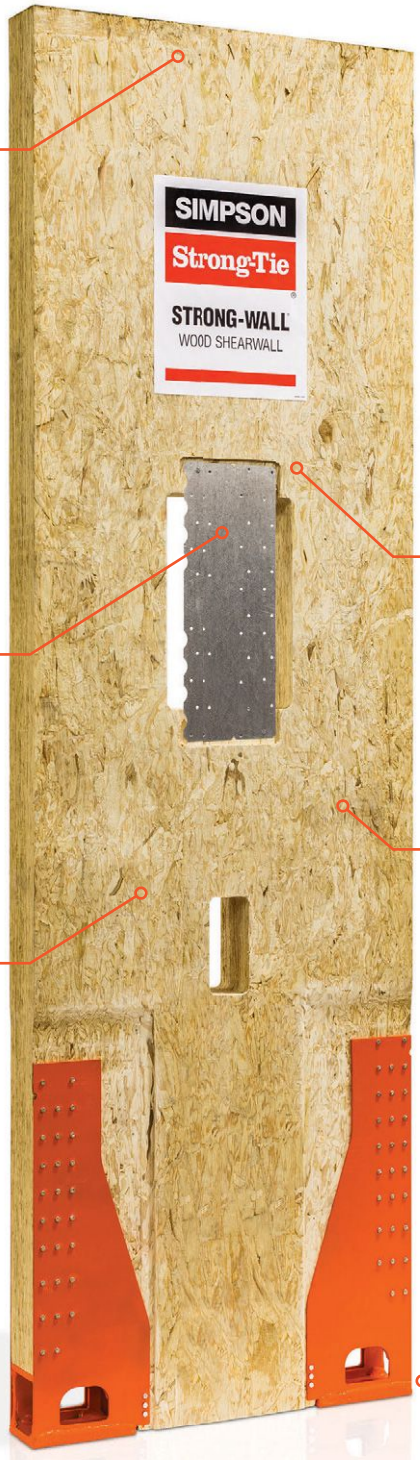

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CENTRAL DINING FACILITY

Emerson College, Boston

» Retrofit Team

HOT-WATER SYSTEM DESIGNER: Vanderweil Engineers, Boston, vanderweil.com

PLUMBING INSTALLER: Commonwealth Plumbing Corp., Rockland, Mass., www.commonwealthplumbing.com

» Materials

The central dining facility at Emerson College was built around 115-years ago. With a historic structure of that age, installing completely new plumbing systems would come at a premium—and space wasn't the only concern. With the all-new renovation came metered faucets on timers, which are wonderful innovations, but in an installation like the dining hall, they added a level of complication.

"Most of the faucets are on timers, which limit the amount of water that can flow out," says Rich Dean, senior plumbing designer for Vanderweil Engineers. "When you have the limited amount of time, you don't purge the line. Viega's double-drop elbow gets water to the faucet from the source quicker, and that improves user experience."

Dean designed the hot-water plumbing systems for two bathrooms in the dining facility. One bathroom provided the space necessary to install regular tees, but the other bathroom was too small. Peter Hannon, vice president of Commonwealth Plumbing, explains: "It's a very old building and just has the issues that come with renovations to a very old building. We had to drop individually to each sink as opposed to having the space to run it horizontally down right to the fixture. Due to space within the wall, we didn't have that luxury. The tight quarters made the double-drop elbows the best choice."

An average user will take 30 seconds or less to wash his or her hands. Most of the time that means the water he or she uses will have been sitting in the pipe line for a while. It won't be freshly heated water until the line is purged. "That dead-leg water is in those faucets," Dean says. "It will purge itself over time, but not usually fast enough."

By using double-drop elbow fittings in the bathroom installation, the team was able to eliminate the dead leg in the line completely. "Installing the double-drop elbows allows us to get the piping much closer to the fixtures to minimize the dead legs," Dean notes. "Having warm water at the faucet is a better experience for the user, so they'll think the best of the facility."

Although Dean has used Viega products before, Emerson College marks the first time Vanderweil Engineers has installed Viega's double-drop elbows in a commercial project.

"They're very good about marketing the product and educating the engineers," Dean says, noting he attended Viega's water-quality seminars, which were held across the country in various locations. "The water-quality seminar was excellent. Extremely informative and to the point. Very detailed. It's been helpful in our day-to-day design duties."

DOUBLE-DROP ELBOWS: Viega, www.viega.us

» The Retrofit

For the Emerson College project, the main focus was providing hot water to users in spite of the low-flow faucets. In a series design installation, like the sinks in a bathroom, when water is turned on at the end of the line, the water circulates through the whole system, purging the line and providing hot water to the active fixture almost immediately.

"We've done a loop system before similar to this," Hannon says. "This was the first time we'd used these particular fittings, the double-drop elbows. We met our installation goals, especially where there was a lot of wood in the building; pressing saved us from having to solder."

PHOTOS: VIEGA

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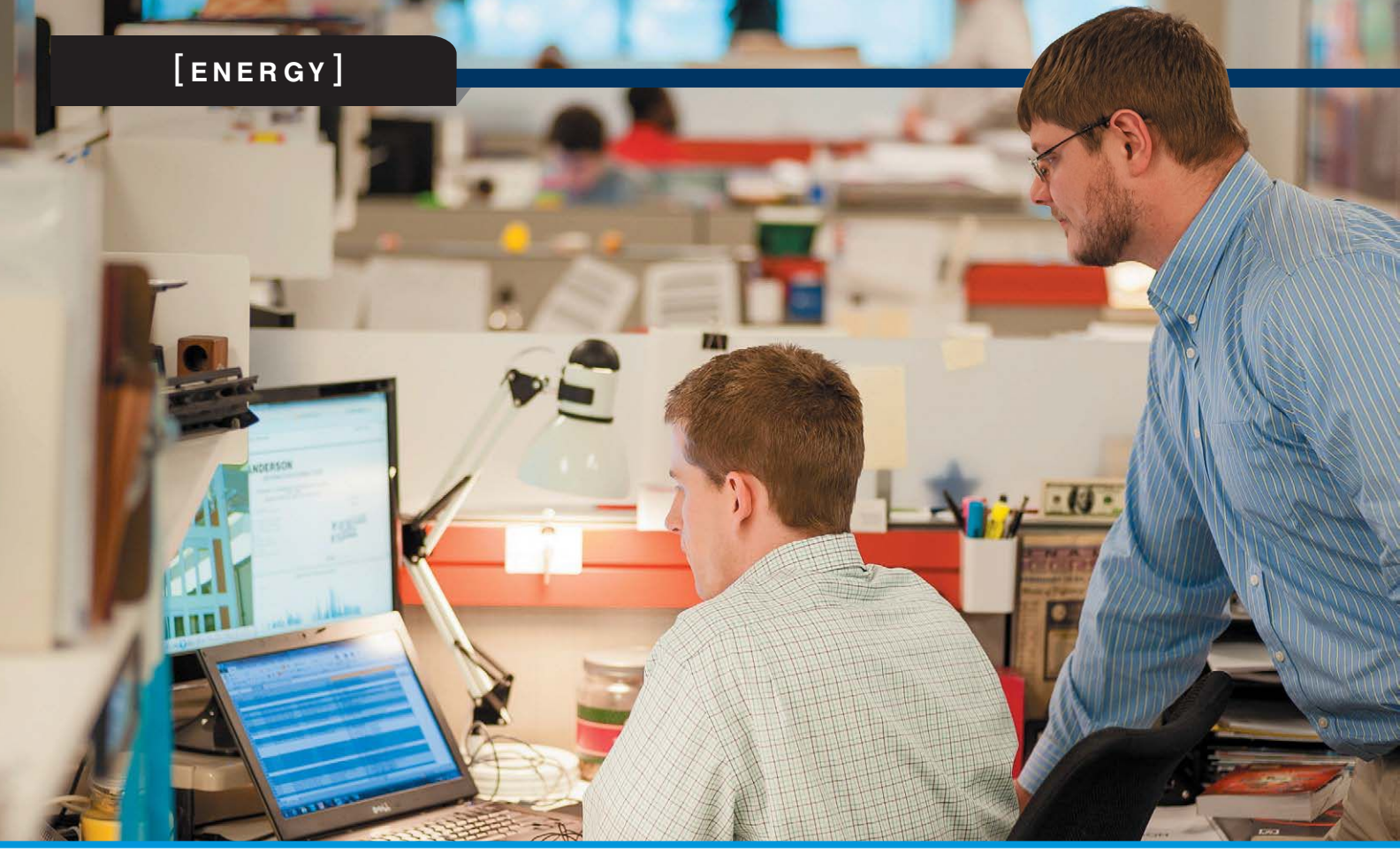

RETROCOMMISSIONING WITH ENERGY MODELING

DON'T OVERLOOK THIS TOOL TO BETTER UNDERSTAND THE INTERTWINING NATURE OF BUILDING OPERATIONS

Retrocommissioning (RCx) has become a very ambiguous word with so many different uses that it no longer really means anything. At the heart of a RCx project, a building's performance is analyzed, and measures to improve the current performance are suggested.

The team of people performing a RCx project have a number of different tools

WRITTEN BY | **JOHN BIXLER**

from which to draw. These may include review of existing drawings and energy bills, interviews with building operators, data-logging devices, as well as trends and other information from the building automation system. Another effective tool, often overlooked for this purpose, is an energy model.

Energy modeling is a more well-defined term than RCx: Energy modeling is a physics-based software simulation of building energy use. The original intent of energy models was to provide a way to make apples-to-apples comparisons of different characteristics of a building during design. This allows the design team members to be well informed regarding the energy impact their decisions would have.

(continues on page 72)

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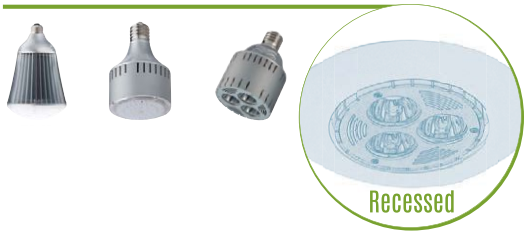

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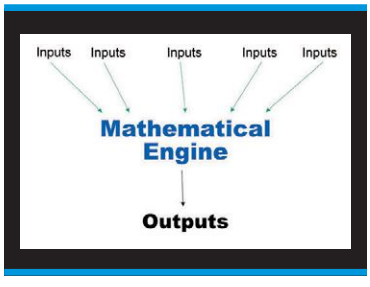
THE INFORMATION FLOW BETWEEN THE RCx PROJECT AND THE ENERGY MODEL—IN THE HANDS OF CREATIVE PROBLEM-SOLVERS—CAN PROVIDE SIGNIFICANTLY MORE INFORMATION TO PROJECT TEAMS AND OWNERS.

The energy model is capable of providing information in the context of a RCx project, as well. To understand how, it is necessary to first understand the basics of energy modeling.

Primer on Energy Modeling

Energy models manage to be simple and complicated at the same time. All energy models are basically a set of inputs that are run through a mathematical engine that calculates a number of outputs. Most commonly used energy-modeling programs, such as eQuest or Trane Trace 700, act primarily as a graphical front end, displaying the inputs in an easier to understand format and reporting the outputs in a convenient manner.



The mathematical engine used by most energy-modeling programs is produced by the U.S. Department of Energy, Washington, D.C. The code is revised regularly and helps to provide some degree of consistency between different software.

The complication for energy models usually lies in the sheer quantity of inputs required by the software. Every room requires detailed schedules and information about the envelope, lighting, occupant activity, airflows, adjacent shading, mechanical equipment, etc. The quality—and accuracy—of the inputs absolutely determines the quality of the outputs.

Energy models provide very detailed and quite valuable information, including equipment capacities, utility use, system load information and room by room airflows.

Bi-directional Flow of Information

Energy modeling as a tool in a RCx project is very effective because the energy model supplies information to the RCx project, and the RCx project feeds information into the energy model. This perpetual flow of information leads to snowballing insight. Cause and effects become more clear, and the intertwining nature of building operations becomes evident—and better understood.

RCx Information Flowing to the Energy Model

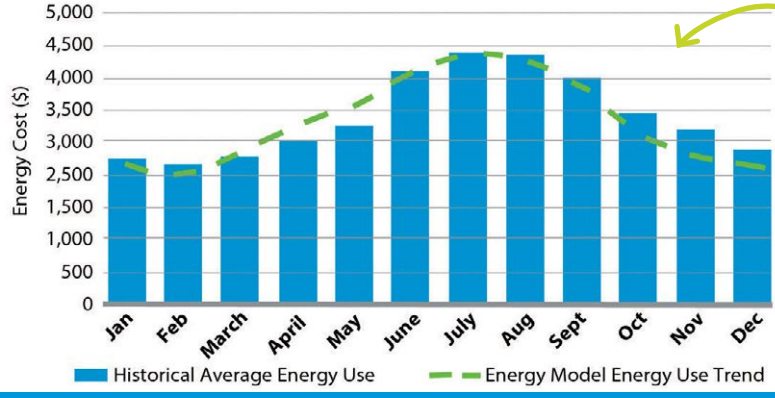
The process of developing the energy model inputs can be much less intimidating in a RCx project. Questions about the building envelope, equipment capacity, motor sizes, room-usage patterns, lighting and other things are easily answered: Simply go look at the building!

However, the less obvious observations from the RCx process are key components of information that can enhance the energy model. Results from functional testing can be added directly to the energy model. Find a VAV (variable air volume) damper that's stuck wide open? Is there an air handler that never reaches its static pressure setpoint? Discover lights are left on overnight? These observations can all be directly input into the model; information flows from the RCx project to the energy model.

The utility usage data reviewed in an RCx project also flows into the energy model. Actual usage can be compared to the model's usage. This can then be used to guide tweaks to the model, and the model's energy use can be calibrated to that of the actual building.

It is important to note that reflecting actual energy use was never the intent of an energy model. The process is often difficult and time consuming. The payoff is a high degree of confidence in the model (and any savings calculations evaluated by the model) and,

ELECTRICAL UTILITY COSTS



(continues on page 74)

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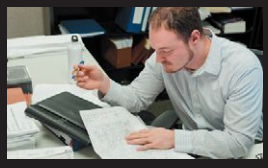

ENERGY MODELING AS A TOOL IN A RCx PROJECT IS VERY EFFECTIVE BECAUSE THE ENERGY MODEL SUPPLIES INFORMATION TO THE RCx PROJECT, AND THE RCx PROJECT FEEDS INFORMATION INTO THE ENERGY MODEL.

oftentimes, additional insight into the building's performance (information flowing from the energy model to the RCx project).

Energy Model Information Flowing into the RCx Project

The value of a RCx project is that the results will help to guide decisions made by the owner. The energy model can play a role in supplementing other RCx observations to further assist the owner with his or her decision-making.

The energy model calculates energy savings while accounting for all interactions between systems. An example that illustrates this is the evaluation of a lighting replacement project. If the RCx observations note a building has legacy fluorescent lighting and a recommendation is to replace the lighting with LED lights, the energy model will calculate the electrical savings at the lights, as well as the effect it has on the HVAC system. This means you can also quantify—with a high degree of confidence—the change in heating and cooling loads this change would have. Information, such as peak-load reductions and even cooling-tower water temperature bins, can be provided as part of the RCx report, thanks to the energy model. System interactions become clear and quantifiable with help from the energy model.

The load information provided by the energy model can also be used to evaluate sizing of equipment as part of the RCx project. It's possible to go beyond rules of thumb and experience and confirm sizing issues with hard data.

The owner then can make more well-guided decisions with this additional information.

Real-world Examples

The following are examples of how RCx observations provided information to the energy model and how the energy-modeling results then contributed to the RCx project:

Stuck VAV Damper

One of the most straightforward examples is the classic case of inoperable VAV dampers. In this case, the RCx team observed a VAV damper stuck in the open position.

The "Minimum Flow Ratio" was set to 1 in the energy model. The model was able to quantify additional energy use from the electric, chilled water and hot-water systems in the building.

VAV DAMPER

ACTION	REQUIRED REACTION	Y ☑	N ☑	COMMENTS	R ☑	C ☑
Adjust thermostat set-point to equal current space temperature.	Damper goes to minimum position.	☐	☑	VAV is wide open	☐	☐
	Heating valve closed.	☑	☐	1343 cfm (total of outlets)	☐	☐
	Record CFM.	☑	☐		☐	☐
	CFM is at minimum per TAB set-point.	☐	☑		☐	☐
	Intial discharge temp.	☐	☐		☐	☐
	Final discharge temp.	☐	☐		☐	☐
	Final upstream temp.	☑	☐	78°F	☐	☐

Record issues: VAV does not go to minimum.

Issue Log Item: Initial | Date

Integrated Diffusers/Lights

The RCx team on this project noted the air-distribution method in the building was old-style diffusers that were integrated with the fluorescent lights. The air blew directly over the lights as it entered the zone, picking up the heat generated by the lights. The heat gained by the airstream was quantified by measurement and averaged about 5 F.

This observation transferred into the energy model in the "duct losses" area, where a duct delta T (heat gain from the air-handling unit discharge to the entrance of the air into the zone) can be entered. This allowed accurate calculations of the energy effects of this observation to be performed. Additionally, the effect on the equipment capacity, as well as zone temperatures, was quantified.

(continues on page 76)

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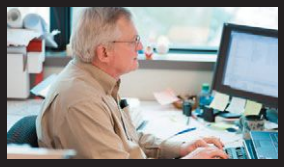

THE INSIGHT PROVIDED BY THE MODEL OFTEN IS THE KEY TO UNDERSTANDING A COMPLICATED BUILDING DYSFUNCTION.

Information flowed from the RCx project into the energy model, and the energy model provided information to the RCx project to help guide the owner's decision.

Infiltration

A building built in the 1920s had a very loose building envelope, and many of the original windows were nearly 100-years old. Part of the motivation for a RCx study of this building was it was experiencing persistent pressurization issues between floors. The RCx team was able to determine that many of the exterior zones of the building were negatively pressurized.

An energy model was developed for this building, and the calibration process of the model to the utility data proved very difficult. It seemed the heating energy in the model just couldn't get anywhere near the historic heat consumption of the building.

When this fact was combined with the observations regarding the loose envelope and the negative pressurization, it became apparent infiltration was driving the utility cost of the building. The question, of course, was: "How much infiltration does the building have?" The industry has not yet developed a reliable method to quantify infiltration rates.

The approach that was taken was to incrementally raise the infiltration rates in the energy model until results that were consistent with utility data were reached. This approach eventually did reach results very consistent with utility data.

In this case, information from the RCx project flowed into the energy model. Once it was calibrated, the energy model then provided information back to the RCx project, which helped guide decisions made by the owner. The owner decided to replace the windows as the first step, then address the HVAC system and building pressurization after the loose envelope was addressed.

Although energy modeling may not be appropriate for every RCx project, it can be a valuable tool available to RCx providers. The insight provided by the model often is the key to understanding a complicated building dysfunction. The information flow between the RCx project and the energy model—in the hands of creative problem-solvers—can provide significantly more information to project teams and owners.

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in & OUT

NFPA 101—LIFE SAFETY CODE, THE INTERNATIONAL BUILDING CODE AND INTERNATIONAL FIRE CODE REQUIRE DOORS IN A MEANS OF EGRESS TO UNLATCH WITH ONE RELEASING OPERATION. APPLICATIONS LIKE THIS **ARE NOT COMPLIANT** WITH THE CURRENT MODEL CODES.

Ensure You Have Rapid Egress and Effective Ingress Control in Schools and Educational Businesses

WRITTEN BY | JOHN WOESTMAN

Columbine. Virginia Tech. Sandy Hook. These and other tragic events in our schools and educational institutions have entered the national mindset and contributed to an atmosphere of anxiety and concern in our K-12 schools and colleges.

School shootings have polarized political opinions pertaining to gun control and mental-health treatment. Such tragic events have also incited discussions relating to door hardware as it pertains to building codes and school safety procedures. The terms "school shooter", "active shooter", and "lockdown" have become part of our common vocabulary and are of constant concern to parents, teachers and school administrators.

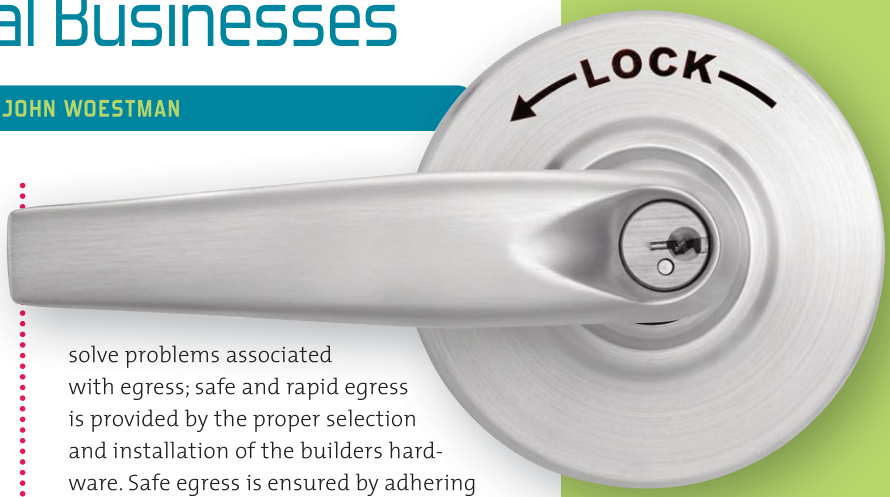
These issues also are of special concern to designers and specifiers who may be involved in the updating, renovating, and retrofitting of schools and educational facilities. When bringing an old school building up to current standards or retrofitting a building to deliver educational services, it is essential to understand the building itself, as well as fire and life-safety codes and their purposes. In some cases, these codes may not support the requests of today's school administrators—however, current building and fire codes were carefully and deliberately developed over many decades of experience to resolve important safety issues and should not be neglected in favor of drastic solutions.

Prior to the increased concerns about school shootings, the focus of building, fire and life-safety codes has been on safe egress in the event of a fire. Door hardware, door locksets and codes have gradually evolved to solve problems associated with egress; safe and rapid egress is provided by the proper selection and installation of the builders hardware. Safe egress is ensured by adhering to building, fire and life safety codes.

One consequence of tragic school shootings, including Sandy Hook Elementary in 2012, is the need to prevent unauthorized ingress through a classroom door to protect students and teachers in the classroom.

Thus, there are two priorities regarding the functionality of classroom doors: the first being rapid egress and the other being lockdown. In the event of an active shooter, it may be necessary to make a quick decision as to which response provides the highest level of safety for students.

Fortunately, these two needs—safe, easy egress and preventing unauthorized ingress—are not contradictory and are readily solved through the proper use of classroom door locksets, especially when specified using ANSI/BHMA standards. In fact, the Sandy Hook Advisory Commission Final Report (published March 6, 2015) recommends "requiring classroom and other safe-haven areas to have doors that can be locked from the inside." The report also states, "The Commission cannot emphasize enough the importance of this recommendation. The testimony and other evidence presented to the Commission reveals that there has never been an event in which an active shooter



THIS IS A CYLINDRICAL CLASSROOM SECURITY FUNCTION LOCK.

View the Door Security & Safety Foundation's video that highlights the dangers of door barricade devices and provides a better understanding of safe and secure classroom door openings.

PHOTOS: ALLEGION

THIS CLASSROOM SECURITY LOCK FEATURES AN INDICATOR, NOTING WHETHER THE HARDWARE IS LOCKED OR UNLOCKED.

breached a locked classroom door."

Intruder Locks and Entrance Locks

Specialized locks have been designed for traditional use in schools for classroom doors. The common denominator for classroom door locks is that a key is required to lock or unlock the door from outside the classroom. The keys are usually held by the teachers, administrators and custodians. Since these traditional types of locks can't be locked from inside the classroom and can be unlocked from outside the room, it is difficult for mischievous students to lock the teacher—or other authorities—out of the classroom from the inside.

There are two types of locksets that can be employed for lockdowns that make it easy to lock the classroom door from the inside (without needing to go into the corridor): the classroom intruder lock and the entrance lock.

- The classroom intruder lock allows a teacher to lock the classroom door with a key from the outside or the inside of a classroom. This type of lock allows the teacher to use a key from inside the classroom to lock the outside lever (with the door closed). This lock can prevent unauthorized ingress through the classroom door—a functionality that can be important in the event of an emergency. It is quick and effective, provided that a person with the key is available in the room when the lockdown is announced.
- Another option is the entrance lock. Because the number of shootings has increased over the past two decades, some schools have decided to use entrance locks for classroom doors. Entrance locks allow any occupant—not just the teacher—to lock the door from inside the classroom using a button or thumb turn. Like the classroom intruder lock, these locks can be unlocked from the outside using a key or credential.
  - A drawback of the entrance lock is that it allows any person within the classroom to lock the door at any time. When using an entrance lock, there is a greater risk of them being misused—by a troublesome student perhaps—to potentially lock out authorized personnel.

Safe, easy egress and preventing unauthorized ingress are not contradictory and are readily solved through the proper use of classroom door locksets, especially when specified using ANSI/BHMA standards.

In addition to typical mechanical classroom and intruder locks, electrical door locking hardware is available. These electrical locks can be controlled remotely by teachers, administrators or other authorized personnel to secure classrooms in the event of a lockdown.

Barricade Devices as Unusual Solutions

Parents, teachers and school personnel have struggled to figure out the best way to protect students and staff in the event of an active shooter. In some cases, these parties feel that classroom intruder locks and entrance locks aren't adequate when it comes to keeping their students safe. As a result, devices, such as door barricades, have emerged during the last few years.

Another description for these devices is "ad hoc door barricade devices". Ad hoc door barricade devices are typically designed to be deployed on classroom doors (in addition to the existing locking hardware) in the event of a lockdown or active shooter situation.

Door barricade devices are currently being made available to—and installed by—some school districts despite the fact that they may violate building codes, fire codes, life-safety codes and/or accessibility laws.

Consequently, building-code and fire-code officials across the country are being challenged with the task of determining an appropriate compromise between life safety and security when it comes to schools.

Commercial locksets, such as classroom intruder and entrance locks, are designed to meet building, fire and life-safety code requirements for free egress. They always allow occupants to exit a room without impediment. These commercial locksets also meet accessibility requirements set forth by the Americans with Disabilities Act (ADA).

Building codes, fire codes, life-safety codes and the ADA ensure safe egress and easy access for all by requiring door hardware in public and commercial buildings to have single-operation release for easy egress. These codes also require that locks must not require any keys, tools, special knowledge or effort to unlock.

Door hardware also must not require tight grasping, pinching or twisting of the wrist to open the door. Door barricade devices often violate these codes and regulations, life-safety codes and the ADA because they tend to require multiple steps and/or "special knowledge" for operation, delaying egress.

These inconsistencies may also compromise fire safety and have the potential to create an environment where disabled employees and students are discriminated against because of their inability to operate or remove the barricade device.

Disadvantages of Ad Hoc Door Barricade Devices

Door barricade devices may seem to provide better security by preventing or delaying ingress to classrooms but, unfortunately, the availability of door barricade devices in classrooms facilitates unauthorized use that can do more harm than good. If a door barricade device is used by someone intending to harm others, these devices can especially be hazardous to life safety. Many ad hoc door barricade devices are difficult for authorized personnel outside of the room to remove or disengage and may require significant physical force to breach the door.

As mentioned, door barricade devices can also make it harder for people to leave a room in life-threatening situations when installed, should there be a fire or an intruder already in the classroom, for example. These devices are also more difficult for smaller children, the elderly or those with disabilities to operate than conventional locksets.

Ad hoc door barricade devices may help people feel safer by allowing them to

Building-code and fire-code officials across the country are being challenged with the task of determining an appropriate compromise between life safety and security when it comes to schools.

barricade themselves inside a classroom during an emergency but, in reality—unless they comply with building, fire and life-safety codes, as well as with accessibility requirements—these devices introduce unintended risks that far outweigh their intended benefit.

Staying with the Codes

To help address these life-safety issues, the New York-based Builders Hardware Manufacturers Association (BHMA) is working with other stakeholders to provide information about the risks of some ad hoc door barricade devices in schools and to review and revise building codes, fire codes and life-safety codes.

Thanks, in part, to the efforts put forth by BHMA, new language has been approved to be added to the 2018 International Building Code (IBC) when it comes to educational buildings. The IBC classifies these facilities as Group E, which pertains to daycare centers and schools up to the 12th grade, or Group B, which includes universities, community colleges and other centers of learning. The 2018 IBC language will read as follows:

1010.1.4.4—Locking arrangements in educational occupancies. In Group E and Group B educational occupancies, egress doors from classrooms, offices and other occupied rooms shall be permitted to be provided with locking arrangements designed to keep intruders from entering the room where all of the following conditions are met:

- The door shall be capable of being unlocked from outside the room with a key or other approved means.
- The door shall be openable from within the room in accordance with Section 1010.1.9.
- Modifications shall not be made to listed panic hardware, fire-door hardware or door closers.

1010.1.4.4.1—Remote operation of locks. Remote operation of locks complying with Section 1010.1.4.4 shall be permitted.

This language will apply to all K-12, college and university classrooms, as well as offices and other occupied rooms. The codes will now clearly state that if these types of rooms are lockable, they must be able to be unlocked from outside the room and must comply with all the existing requirements of the IBC.

Similar language also received final approval last year for the 2018 International Fire Code (IFC):

1031.2.2—Locking arrangements in educational occupancies. In Group E occupancies, Group B educational occupancies and Group I-4 child daycare occupancies, egress doors from classrooms, offices and other occupied rooms shall be permitted to be provided with locking arrangements designed to keep intruders from entering the room where all of the following conditions are met:

- The door shall be capable of being unlocked from outside the room with a key or other approved means.
- The door shall be openable from within the room in accordance with Section 1010.1.9.
- Modifications shall not be made to existing listed panic hardware, fire-door hardware or door closers.
- Modifications to fire-door assemblies shall be in accordance with NFPA 80.

Additionally, new language for the 2017 edition of NFPA 101: Life Safety Code is expected to be approved by the end of summer 2017.

Other organizations, such as the Chantilly, Va.-based Door Security & Safety Foundation (DSSF), have also taken initiative against door barricades. Earlier this year, DSSF launched a short educational video that highlights the dangers of these types of devices and provides a better understanding of safe and secure classroom door openings. The video was developed as part of the foundation's "Opening the Door to School Safety" campaign, which was designed to educate school administrators about the importance of safely securing classroom doors with code-compliant methods. More information about the campaign can be found at www.LockDontBlock.org.

Ensure Safety while Complying with Codes

When it comes to school security—and security in general—it is always recommended to use locking systems that comply with building codes, fire codes, life-safety codes and accessibility laws. Locking hardware intended for classroom applications—and that has been certified by BHMA—offers a safe and reliable solution compared to ad hoc devices because they comply with all codes and follow the requirements set forth by the ADA.

Ultimately, codes do not specify which hardware should be used within schools; instead, it is up to local decision-makers to decide on a case-by-case basis. Why? Because the kind of lock function desired can vary by school type (elementary school, middle school, high school or college) and room type (classroom, office, library, etc.), in addition to other considerations. As such, it is imperative that decision-makers know the benefits of BHMA-certified classroom locking hardware and the dangers posed by door barricade devices.

Examine a list of Builders Hardware Manufacturers Association–certified products at bit.ly/2tJy8rR.

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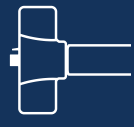

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NORTH VIEW – BEFORE

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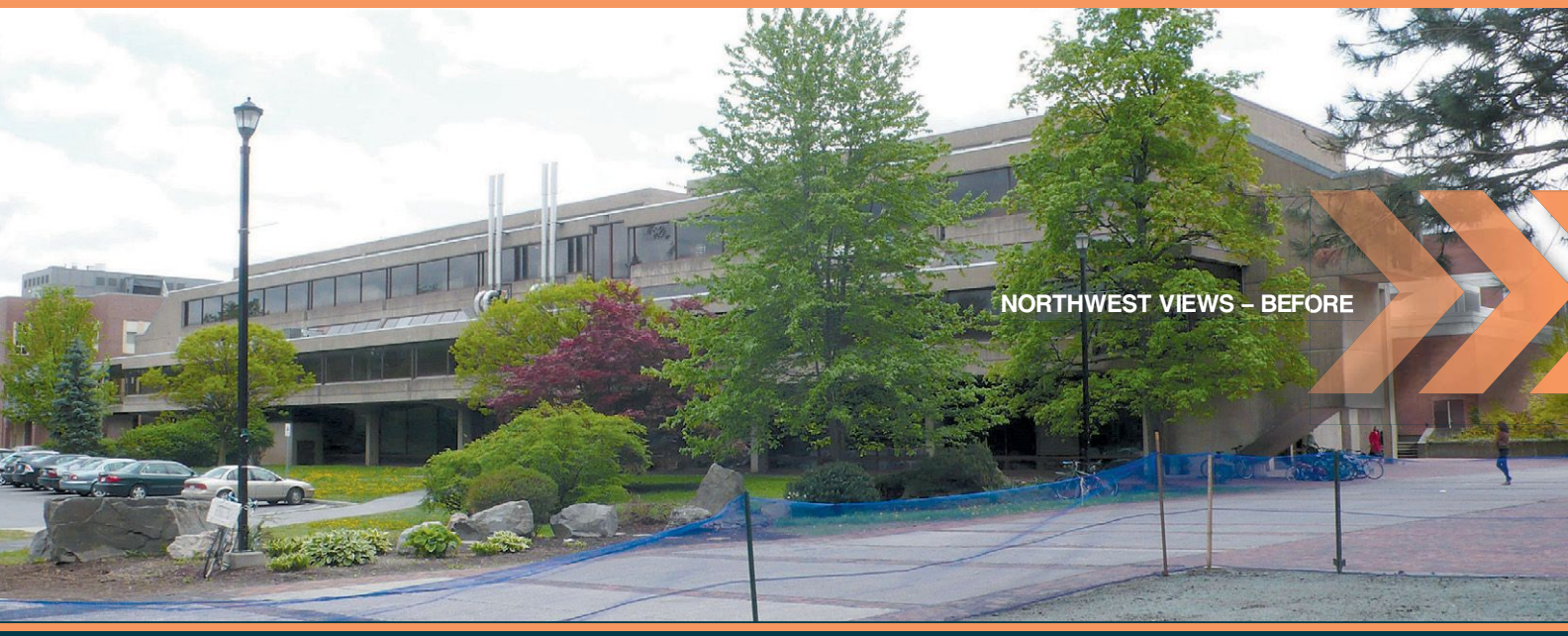


NORTHWEST VIEWS – BEFORE

SUNY New Paltz's Wooster Hall Undergoes a Transformative Renovation

WRITTEN BY | **BRIAN LIBBY**

PHOTOS: **TIM HURSLEY**

NORTH VIEW – AFTER

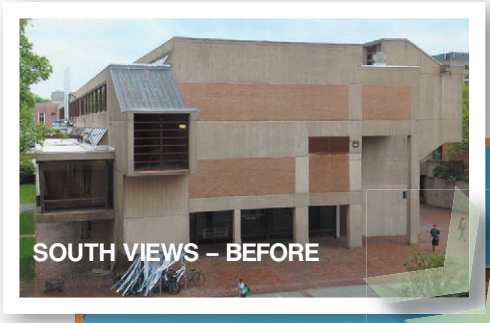
HUMANISM

NORTHWEST VIEWS – AFTER

When the Wooster Science Building first opened at the State University of New York's New Paltz campus in 1967, the building was at the forefront of a new architectural movement sweeping the U.S.: Brutalism.

With raw concrete façades and bulky, block-like shapes, Brutalist buildings expressed a kind of unadorned monumentality: ambitious yet pragmatic. For that reason, Brutalist landmarks, such as Boston City Hall and Montreal's Habitat '67, have endured, and the genre, now reaching the 50-year threshold for historic status, has in recent years gained new appreciation. Yet Brutalism also reflected the limitations of the time. Multi-pane or coated glass had not yet become prevalent; energy still was cheap, so most Brutalist buildings minimized windows and natural light and had little insulation.

In the case of Wooster Science Building, by the time SUNY New Paltz leaders began considering a renovation or possible replacement, the 75,000-square-foot building did not have many fans. "All the bad architectural features that you could have we had," recalls John Shupe, the school's assistant vice president for facilities management. "It was dark inside with no air conditioning. There was no wayfinding in the building, so you didn't know where you were. There was no real lobby. And the roof leaked."


SOUTH VIEWS – BEFORE


SOUTH VIEWS – AFTER

Demo vs. Reno

Even so, Long Island City, N.Y.-based Croxton Collaborative Architects P.C. argued against demolishing the structure in favor of a transformative renovation that also would provide for collaborative learning via the relocation of two other science departments and four engineering labs under one roof.

"We struck a middle road," explains Randy Croxton, FAIA, LEED AP, president of Croxton Collaborative Architects. "We resisted the notion that this building would be demolished because, in terms of urban design and sustainability and resourcefulness, it just seemed crazy to throw away the massive amount of structure and bones of the building, which are very handsome and striking. We felt we could literally strip every molecule of the building away but leave the bones and rebuild a new facility on that structural scaffold."

At first, the client took convincing. "There was some deliberation," Shupe says. "Even our president at the time wanted to raze the building. But we felt that given the proper amount of time and money we could transform the building into a real gem." Indeed, now that the renamed Wooster Hall has been fully restored as a light-filled, LEED Gold-rated sustainable project teeming with life, that former president has come back to visit, "and he just can't believe how beautiful it came out," Shupe adds.

Although the renovation retained about 96 percent of the original structure, you'd never know it; inside and out, the building—besides retaining the same basic exterior form—is almost unrecognizable. That started with making the building much more transparent and full of light.

Let the Light In

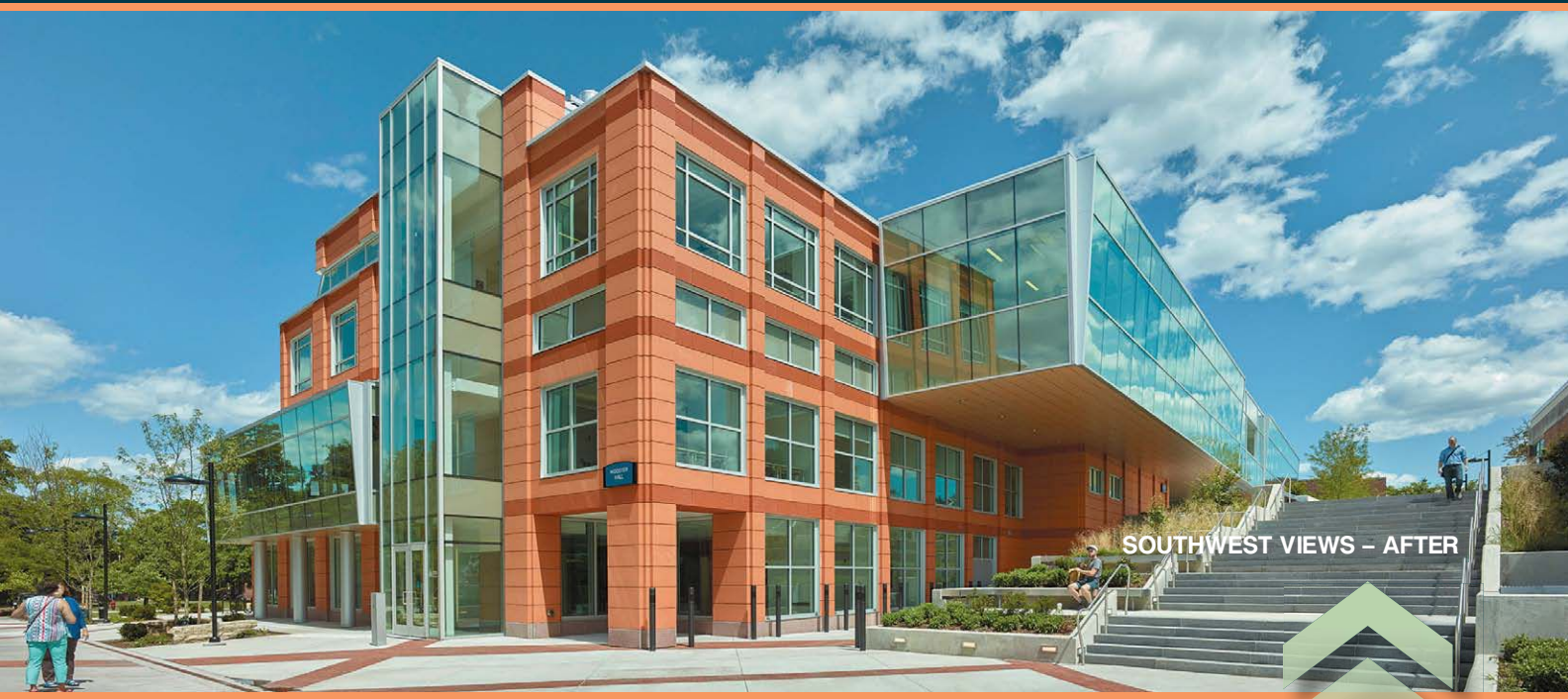
"It was moving from brutalism to humanism," Croxton says. "Our premise was we were going to daylight every square foot of the building. We see the building as being connected to the natural sequence of sunrise, sunset, clouds. It introduces a dynamic quality to the space. You can dim electric lighting in the presence of natural light, so you're saving energy and creating a day in the building that's like a day in nature. Your circadian rhythm is an extremely important aspect of your wellbeing."

Although most of the renovation retained the original building's basic form, a cantilevered extension was added to the third floor that extends the full length of the south elevation, creating space for new faculty offices, as well as a summer-shaded, winter-warmed solar exposure at ground level.

The architects also added a massive new skylight that traverses the east-west spine of the building, at times extending down all three floors as a kind of light-well. The skylight pairs with and bathes in natural light a new internal stairway that serves as what Croxton calls "the move, the connector," between the old quad immediately north of the building and a science quad to the south. The stairway is placed at a slight angle within the building but faces directly north-south, allowing it to become a kind of daily and seasonal sundial. At each summer solstice at noon, the sun shines directly on the top stair; on spring and summer solstices, it spotlights the bottom stair. Students and faculty even gather there on the summer solstice to celebrate.

Circulation and Connection

The interior stairway also is intended as a circulation path that connects the



SOUTHWEST VIEWS – AFTER

Retrofit Team ››

OWNER // State University of New York at New Paltz, www.newpaltz.edu

ARCHITECT // Croxton Collaborative Architects P.C., Long Island City, N.Y., croxtoncollaborative.com

ASSOCIATED ARCHITECT // Nadaskay Kopelson Architects, Morristown, N.J., www.nkarchitects.com

CIVIL, STRUCTURAL AND ENVIRONMENTAL ENGINEER // Larsen Engineers, Rochester, N.Y., www.larsenengineers.com

LANDSCAPE ARCHITECT // Mathews Nielsen (MNLA), New York, www.mnlandscape.com

GENERAL CONTRACTOR // APS Contracting Inc., Paterson, N.J., (973) 754-1980

CONSTRUCTION MANAGER AND HAZMAT ABATEMENT // Jacobs, Rochester, www.fisherassoc.com

M/E/P/LIFE-SAFETY ENGINEER // Kallen & Lemelson Consulting Engineers LLC, New York, www.klengineers.com

AUDIOVISUAL/ACOUSTIC/TELECOM ENGINEER // Harvey Marshall Berling Associates, New York, www.hmb-a.com

LIGHTING DESIGN // SBLD Studio, New York, www.sbldstudio.com

FOOD SERVICES DESIGN // Raymond/Raymond Associates, Goshen, N.Y., rradesigns.com

COST ESTIMATING // VJ & Associates, New York, www.vjassociates.com

SOUTHWEST VIEWS – DURING

SOUTHWEST VIEWS – BEFORE

HALLWAY– BEFORE

HALLWAY – AFTER

Materials »

METAL CLADDING // Alucobond, www.alucobondusa.com

ALUMINUM STOREFRONT AND CURTAINWAL // Kawneer, www.kawneer.com

ELEVATOR // Otis Gen2, www.otis.com

LIGHTING, DIMMING SYSTEM AND LIGHTING CONTROLS // Lutron, www.lutron.com

WINDOW GLASS // PPG Solarban 70XL Glass, www.ppgideascapes.com

STRUCTURAL GLASS // ISG (Innovative Structural Glass Inc.), www.structuralglass.com

DEMOUNTABLE PARTITIONS // DIRTT, www.dirtt.net

ETCHED GLASS // Skyline Design, www.skydesign.com

COUNTERTOPS // Solid Surface Silestone by Cosentino, www.silestoneusa.com

PAINTS AND STAINS // Liberty Paint Corp., libertyonthehudson.com

FLOOR AND WALL TILE // Lea Ceramiche, www.ceramichelea.it, and Ann Sacks, www.annsacks.com

MARBLE // Dale Culleton, bluecloudmarble.com

WOOD FLOOR FINISH // Bona, us.bona.com

BRICK PAVER // Hanover Architectural Products, www.hanoverpavers.com

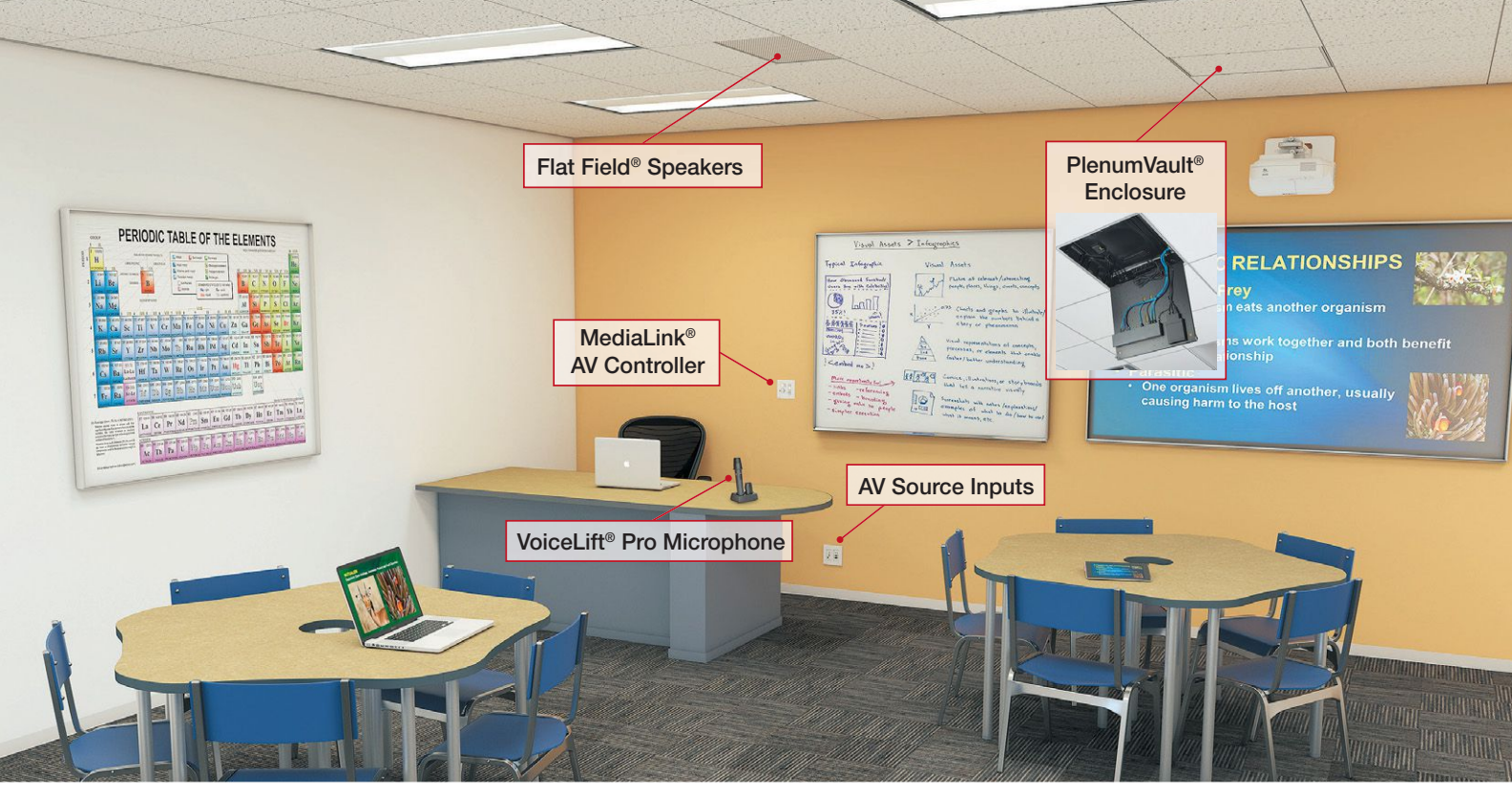
RETAINING WALL // Versa-Lok, www.versa-lok.com

two quads. "We actually want people to cut through the building," Shupe says. Wooster Hall also is connected to another academic building by a bridge on the second floor, which makes the 3-story stairway area a kind of "Grand Central Station" for the campus. The architects created a kind of freestanding front porch at the main entrance that gives the building the clear sense of entry it always lacked.

The renovation improves the exterior stairway just outside the building, making it safer and more of a gathering place. "That stair had a blind landing. You were blocked from seeing if there was anybody on the other side," Croxton says of the original stairway. "It's something we now know should be avoided." In its place came a wider, grander staircase with an adjacent stepped landscape fed by rooftop rainwater and accompanying seating. "It becomes a place where people can stop and talk outside of the flow of traffic," Croxton adds.

The building's programming is also intended to foster connections and interactions between students and faculty. That starts with a new dining hall and student services offices on the ground floor and a student lounge on the second floor, which

(continues on page 90)



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gives way to the psychology, anthropology and engineering departments on the upper two levels. "There was no dining in that area of campus," Shupe explains. "You had to walk across campus to get a meal. We knew it would be great to put a café in, and now it's packed all the time. It couldn't be more convenient for students, because right across the concourse is our largest classroom building and next to it are the science building and the library. You're right in the heart of the academic core."

Adding a dining hall and student services to the mix of classrooms and offices at Wooster was not just about convenience, though. "It's really about the students and faculty interacting," Croxton says. "That was a big objective: to get as much faculty office space in conjunction with classroom and dining space—to encourage interaction."

The Envelope, Please

Standing outside the building today, the most recognizable change is that the Brutalist raw concrete exterior is gone. It now is covered with a terra-cotta tile cladding with a rainscreen between the new façade and the concrete, which in turn helps keep the building a stable temperature thanks to its thermal mass. "It was the worst exterior wall in terms of comfort and moisture intrusion and deterioration of the masonry," Croxton says of the existing façade. "We thermally isolated the concrete that was creating the pathway for the loss of heating and cooling inward, so that became a thermal stabilizer of the interior temperature."

With its more robust building envelope and radiant heating, Wooster Hall is projected to use 36 percent less energy than a building designed to meet ASHRAE code stipulation, even though the project created 3,500 square feet of additional usable space. Shupe says the building actually uses slightly more energy than before renovation because of the fact that it previously had no air conditioning. More importantly, he adds, maintenance calls are only about 10 percent of what they were before the renovation. "It's a much better building to be in," Shupe says.

What's more, in a time of increasing natural disasters, such as Hurricane Sandy, which brought the New York area (just south of New Paltz) to a standstill in 2012, Wooster Hall was designed to be resilient. "If you have a power failure, the building will retain the comfort condition for an extended period of time," Croxton explains. "And the building in an emergency can be converted to natural ventilation without AC at minimal effort. The fire-safety system already has fans to pull air through the building. And every square foot gets daylight, so you wouldn't need electric lighting to see."

Since its completion last year, the project has been transformational—not just architecturally but socially and ecologically, as well: a new center of campus. "The Wooster Hall renovation completely transformed the 1960s-era Brutalist building into a bright, airy, modern space with centralized student services and enhanced spaces for academic programs," says SUNY New Paltz President Donald Christian. "By repurposing this half-century-old building with great bones, the college was able to take advantage of its basic architecture and create a 21st century building that supports and reinforces our sustainability values."

> BY REPURPOSING THIS HALF-CENTURY-OLD BUILDING WITH GREAT BONES, THE COLLEGE WAS ABLE TO ... CREATE A 21st CENTURY BUILDING THAT SUPPORTS AND REINFORCES OUR SUSTAINABILITY VALUES. —*Donald Christian, SUNY New Paltz president*

The vision:
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Folwell Hall, University of Minnesota | Minneapolis, MN

Built in 1907, Folwell Hall at the University of Minnesota is a fixture on the National Register of Historic Places. Two of the main goals for Folwell's restoration were to protect its historic significance and to improve its energy efficiency – the more than 12,000 students that met in its 30 classrooms were at the mercy of fluctuating temperatures as a result of outdated, inefficient windows. Kolbe's Sterling double hungs met the both the aesthetic and performance specification, with custom interior and exterior options to create a near-perfect match of the building's original, historic style.

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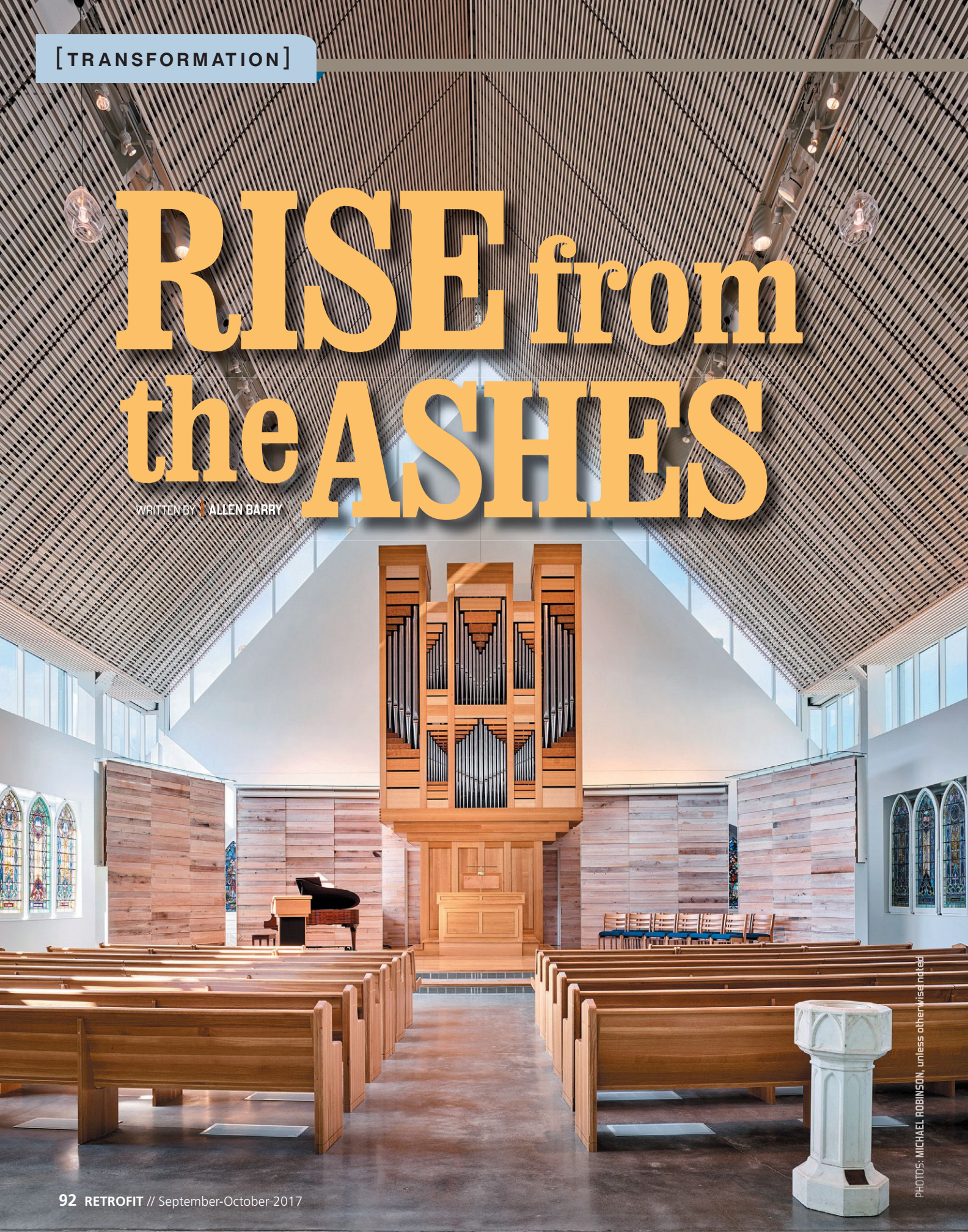
RISE from the ASHES

WRITTEN BY | ALLEN BARRY



PHOTOS: MICHAEL ROBINSON, unless otherwise noted

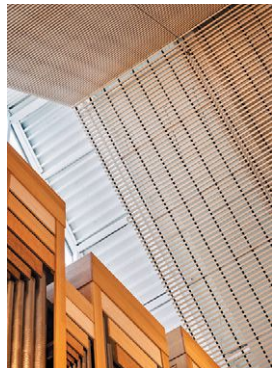
A HISTORIC KANSAS CITY CHURCH IS RESTORED & EXPANDS ITS ROLE IN THE COMMUNITY


PHOTO: BRAD POGATETZ

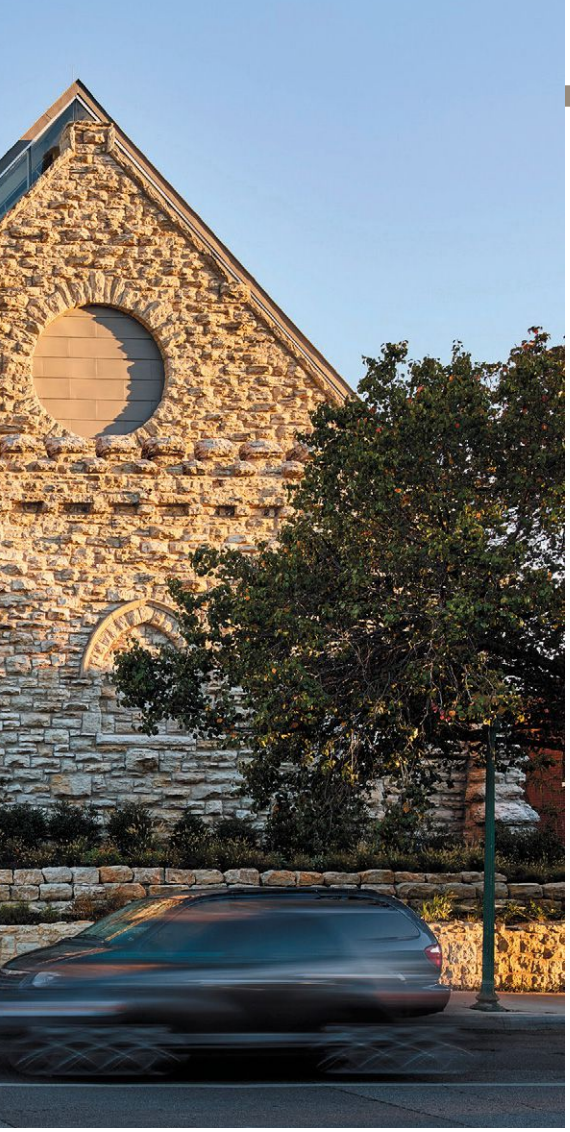
In the early- to mid-1800s, two cities competed to be the major urban area west of St. Louis: the city of Kansas, which was a port on the Missouri River, and the city of Westport, which was where the wagon trains left. Westport was the departure point for the California, Santa Fe and Oregon Trails. Ultimately, the city of Kansas became what we today know as Kansas City, and Westport was absorbed into it. Today, Westport is a hip, eclectic neighborhood with a mixture of homes, entertainment, restaurants and bars.

For the better part of two centuries, one of the pillars of the neighborhood has been the Westport Presbyterian Church. Originally founded in 1835, the church has grown and changed with the neighborhood and city around it. A stone church sanctuary building was dedicated in 1904 and an educational building was added in 1916. The congregation grew and evolved throughout the 20th century and remains an important part of Kansas City's fabric.

In 2011, a terrible fire destroyed most of the church sanctuary building, leaving only stone walls and ruin. Determined to rise again, church representatives turned to Kansas City-based BNIM, an architectural firm very familiar with bringing new life to what once was lost. BNIM was heavily involved with the reconstruction of the tornado-ravaged towns of Greensburg, Kan., and Joplin, Mo., as well as post-Katrina New Orleans. The firm was called on



IN 2011, a terrible fire destroyed most of the church sanctuary building, leaving only stone walls and ruin. Determined to rise again, church representatives turned to Kansas City-based BNIM.



to help restore the Westport Presbyterian Church to its former glory.

DESIGNING FORWARD

There was never any question of moving the church to a new site, but there was a thorough conversation about how to best create a facility that could at once serve the needs of the congregation and the community while paying due respect to the history and legacy of the church.

For a congregation that had been around as long as Westport Presbyterian, it was natural to take the long view. Although the fire was a terrible tragedy, it also was an opportunity to rethink the church, its siting and its relationship to the community. The original construction and layout of the site had plenty of issues.

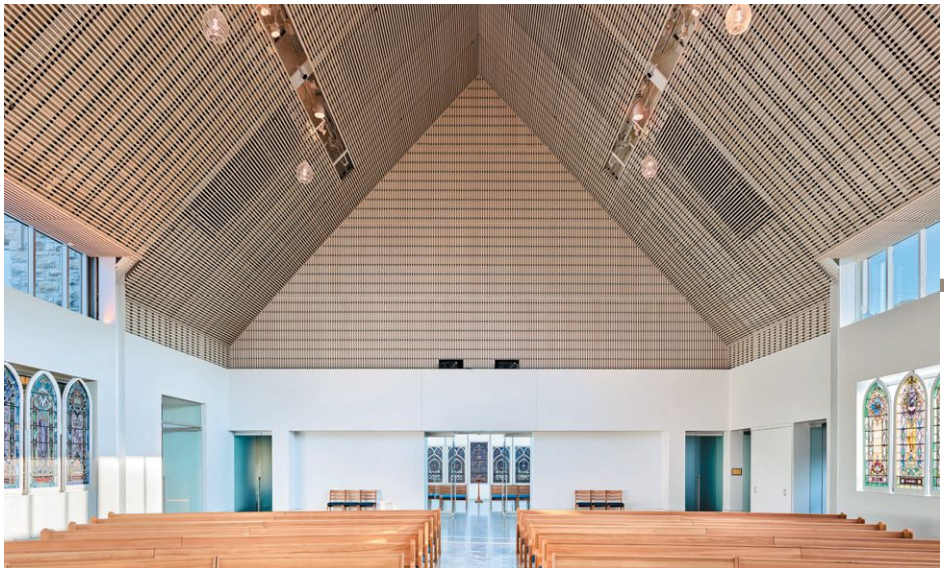
Architect Erik Heitman, formerly an associate principal with BNIM and project architect on the Westport Presbyterian project, explains: "The 1904 sanctuary building had a tower and main entrance. In 1916, the fellowship wing of the building was built at an angle to the sanctuary, following the church's property line. It was built very close to a retaining wall with a graded area stepping down to a basement entrance, which was not properly drained, so throughout the history of the church there were significant problems with how that building had been sited. The relationship between the sanctuary and the fellowship wing severely limited the exterior space of the church. There really was not sufficient space for outdoor services or meditative gardens. We wanted to save the most sacred part of the church, reorient the fellowship wing and allow the church to have meaningful outdoor space to extend their ministry outside."

The church and the design team at BNIM came together and drew inspiration from each other. They wanted to not just restore the church, but to give it a future as bright as its past. For this project, owner and architect were a perfect match.

"Disaster recovery is ingrained in what BNIM does," Heitman says. "We really thrive on the experience of working with communities and helping to create a vision for their future. In the case of the Westport Presbyterian Church, they had started on a process of creating their own vision before the fire."

Like many urban churches, Westport Presbyterian had seen its congregation dwindle because of the migration of its

ALTHOUGH THE FIRE WAS A TERRIBLE TRAGEDY, it also was an opportunity to rethink the church, its siting and its relationship to the community.



members to the suburbs. In the 1950s, Westport Presbyterian was one of the biggest churches in Kansas City, but by the time of the fire, its numbers had decreased to about 100 members. The group that remained was small but tight knit and dedicated to its community.

"Before the fire, the congregation had already started to think and talk about who they were and what they wanted to be and how they would remain relevant in Westport," Heitman says. "So when disaster struck, they were really ready to answer that question. BNIM stepped into a visioning process that had really started a year before."

BLENDING OLD AND NEW

A structural assessment was done on the remains of the original church and it determined that only the stone could remain as a structural component.

"We looked at some alternatives where the church would be demolished in its entirety. We also looked at the possibility of reconstructing the church as it was," Heitman recalls. "Ultimately, we settled on a hybrid solution that saved the most sacred part of the church and deconstructed other elements in such a way that enabled us to use some of the salvaged wood for furniture and finishes."

There were several important goals that were front of mind in the design of the new space for the church. One was to be respectful and honor the original church building as much as possible. The congregation also has a focus on sustainability and concern for the environment, so it was important the new building be efficient in its operation and the team repurpose as much of the original structure as possible.

The remaining stone walls from the entrance of the original church live on in the interior of the new church, in a central

(continues on page 98)

THE DESIGN TEAM saved the original part of the church and deconstructed other elements so some of the salvaged wood could be reused for furniture and finishes.

Retrofit Team

ARCHITECT AND LANDSCAPE ARCHITECT // BNIM, Kansas City, Mo., www.bnim.com

- EVIN NORDMEYER, principal, design advisor
- BOB BERKEBILE, principal
- ERIK HEITMAN, project manager, project architect
- SAM DEJONG, project architect
- CARLY PUMPHREY, programming, interior architect
- BRIAN MCKINNEY, technical advisor
- AARON ROSS, landscape architect
- ELISE HUBBARD, landscape architect
- ADAM WIECHMAN, landscape architect

ARCHITECTURAL ACOUSTICS AND AUDIOVISUAL DESIGN // Jaffe Holden, Norwalk, Conn., www.jaffeholden.com

M/E/P ENGINEERS // Henderson Engineers Inc., Lenexa, Kan., www.henderson engineers.com

STRUCTURAL ENGINEERS // Bob D. Campbell & Co., Kansas City, www.bdc-engrs.com

CIVIL ENGINEERS // Kaw Valley Engineering Inc., Kansas City, www.kveng.com

CODE CONSULTANT // F.S.C. Inc., Overland Park, Kan., fsc-inc.com

GENERAL CONTRACTOR // A.L. Huber General Contractor, Overland Park, www.alhuber.com

hallway called Heritage Hall. Nearly 40,000 board feet of lumber was salvaged to use for interior finishes, and recovered stone was reused as part of the construction of the site retaining walls.

STEWARDS OF THE EARTH

Although partially built with old materials, the new church was designed with a very modern approach to sustainability and energy efficiency.

"This was a congregation that wanted a high-performance building that was conscious of the environment, so we worked with mechanical/plumbing engineers Henderson Engineers to design a high-performance building that would tread lightly on the planet and the Westport neighborhood," Heitman says.

A commitment to sustainability is evident throughout the church, inside and out. "We have a lighting system in the church that is almost entirely LED," Heitman explains. "In addition, we used a VRF [variable refrigerant flow] system in the mechanical design, which gives the church the ability

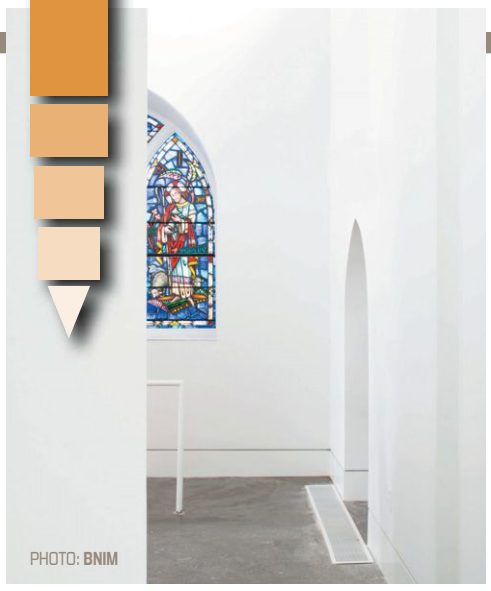


PHOTO: BNIM

Materials

ZINC FLAT-LOCK WALL PANELS AND ROOFING // VM Zinc, www.vmzinc.com

KANSAS LIMESTONE, COTTONWOOD, HONED (FELLOWSHIP WING) // U.S. Stone Industries, usstoneindustries.com

GREEN ROOF SYSTEM // Henry Co., us.henry.com

DASH BENCH AND BEVEL BENCH // Forms + Surfaces, www.forms-surfaces.com

PERMEABLE PAVERS // Hanover Architectural Products, www.hanoverpavers.com

LUXRAIL LED HANDRAIL // Cooper Industries, www.cooperindustries.com

WALL LUMINAIRES (EXTERIOR) // BEGA, www.bega-us.com

21-STOP PIPE ORGAN // Pasi Organ Builders Inc., www.pasiorgans.com

WOOD PANEL GRILLE CEILING AND WALL SYSTEMS (SANCTUARY) // Rulon International, rulonco.com

SALVAGED WOOD WALL PANELING AND STAIR TREADS (SANCTUARY AND CHAPEL) // Elmwood Reclaimed Timber, www.elmwoodreclaimedtimber.com

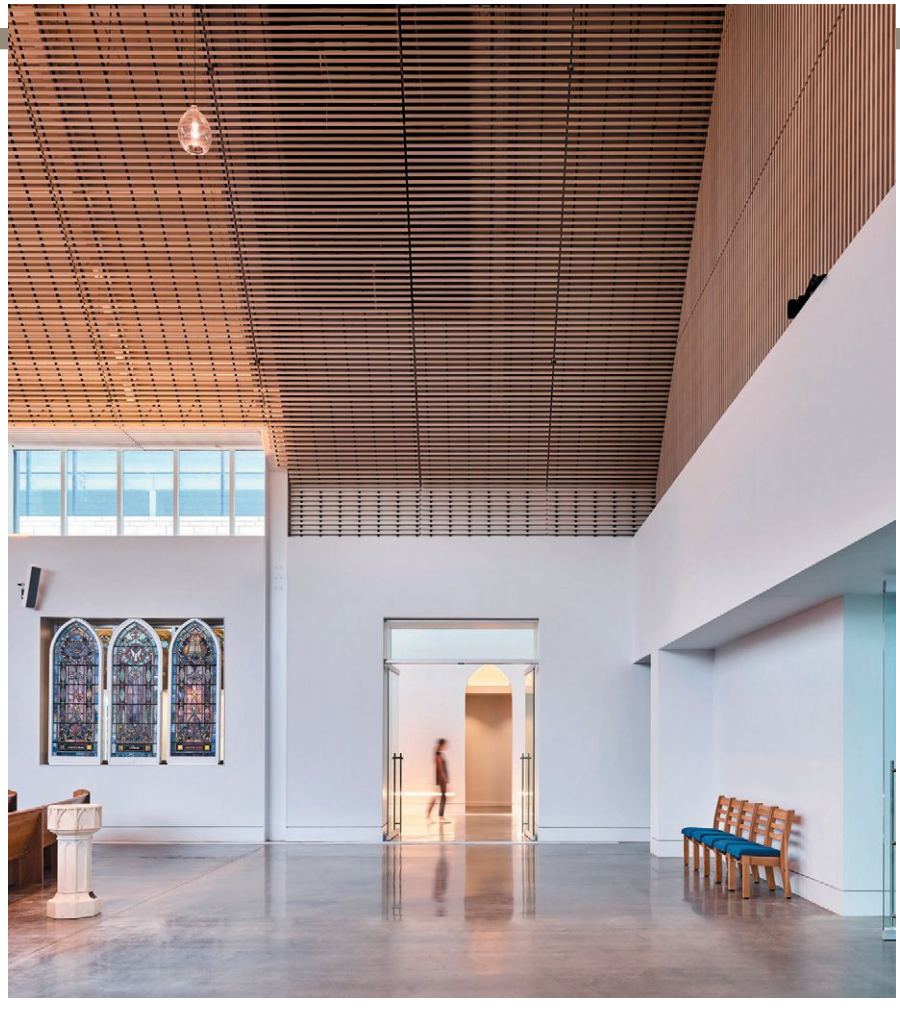
WHITE OAK RADIUS PEWS AND CHAIRS (SANCTUARY AND CHAPEL) // Ratigan-Schottler Manufacturing, ratiganschottler.com

WHITE OAK FLOORING (SANCTUARY AND CHAPEL) // ACME Floor Co., www.acmefloorco.com

LED PENDANT LIGHTING (SANCTUARY AND CHAPEL) // TECH Lighting, www.techlighting.com

CLARO ACOUSTICAL CEILING SYSTEM (FELLOWSHIP ROOM) // Decoustics, www.decoustics.com

VARIABLE REFRIGERANT FLOW (VRF) SYSTEM // Daikin, www.northamerica-daikin.com



to precisely regulate the temperature and humidity in multiple zones throughout the building. This allows the church to reduce energy consumption by only using the system where it is needed."

The exterior landscape is another important part of the church's sustainability strategy. "The church is in the oldest part of Kansas City, so it has a very antiquated combined stormwater and sewage system," Heitman says. "In the Westport area, the city has been encouraging developers to employ sustainable stormwater-management strategies, so we also needed the landscape to be part of the working design of the building. We created rain gardens that are not only beautiful spaces for the church, but also a working part of the stormwater-management system."

Indoor environmental quality, particularly acoustics, was another extremely important part of the equation in the design of the new church. "The music ministry is very important to the identity of the Westport Presbyterian Church," Heitman explains. "They hired an organ builder before they hired an architect. We worked with some of the best acousticians in the business to define the acoustic design criteria of the space. The sanctuary space is really designed for the organ in terms of the size and volume and reverberation that would be required in the space. It shaped the room in so many ways."

FELLOWSHIP WING

Beyond its spiritual mission, Westport Presbyterian has also been a major patron of the arts for decades. "The church has been very active in the promotion of the arts in Westport for about the past 35 years. Members of the church founded an arts non-profit called the Westport Center of the Arts," Heitman says. "So the church also wanted space where they could exhibit art and be a comfortable, inviting place for the community."

The Fellowship Wing was designed to fulfill this role. The new construction storefront was built to complement the

restored sanctuary building. It is open to the community every day of the week and also helped in overall site design.

"One of the challenges was that we wanted to preserve this beautiful church, but it sat almost ominously on a hill, 10-feet above the sidewalk elevation," Heitman says. "We wanted to make the building welcoming and inviting, but it also had to address the natural topography and that 10-foot change in elevation from the first floor to the sidewalk. The Storefront, a 1,000-square-foot community room located on the sidewalk level, was part of that solution. The Storefront is connected to the main building and allows the church to extend its ministry to the street; however, it can also function autonomously as a community meeting room or gallery space. We used the existing topography of the sidewalk as the start of an accessible ramp that loops around the Storefront. On top of the Storefront, a green roof helps to create a pleasant, accessible entrance that is part of the landscape and part of the architecture."

Completed in April 2016, the restored Westport Presbyterian Church recently celebrated its one-year anniversary. The congregation is thriving and the new church is a very active part of the vibrant community it inhabits. "The church is positioned to be an important community center," Heitman says. "They host fantastic concerts, like jazz and organ performances. The acoustics are amazing. They've also hosted readings of plays and have had an artist exhibiting his work in the space. And it's a flexible worship space. It's an eclectic mix of things happening."

There's an old saying, often attributed to Winston Churchill, "never let a good crisis go to waste." Of course, the fire that destroyed the original Westport Presbyterian Church was tragic, but a determined, forward-looking congregation was able to seize the moment and forge something even better for the future.

"I don't know that an architect gets to work on many projects in their career that take on such meaning," Heitman says. "It was fantastic to work with this congregation. They did their homework and had an idea of what they wanted to be. They just needed an architect to help turn their vision into a building."

PRIDE OF PLACE

In a Massachusetts City, a Reimagined Mill Complex Provides Elegant and Affordable Housing

WRITTEN BY | ROBERT J. VERRIER, FAIA, NCARB

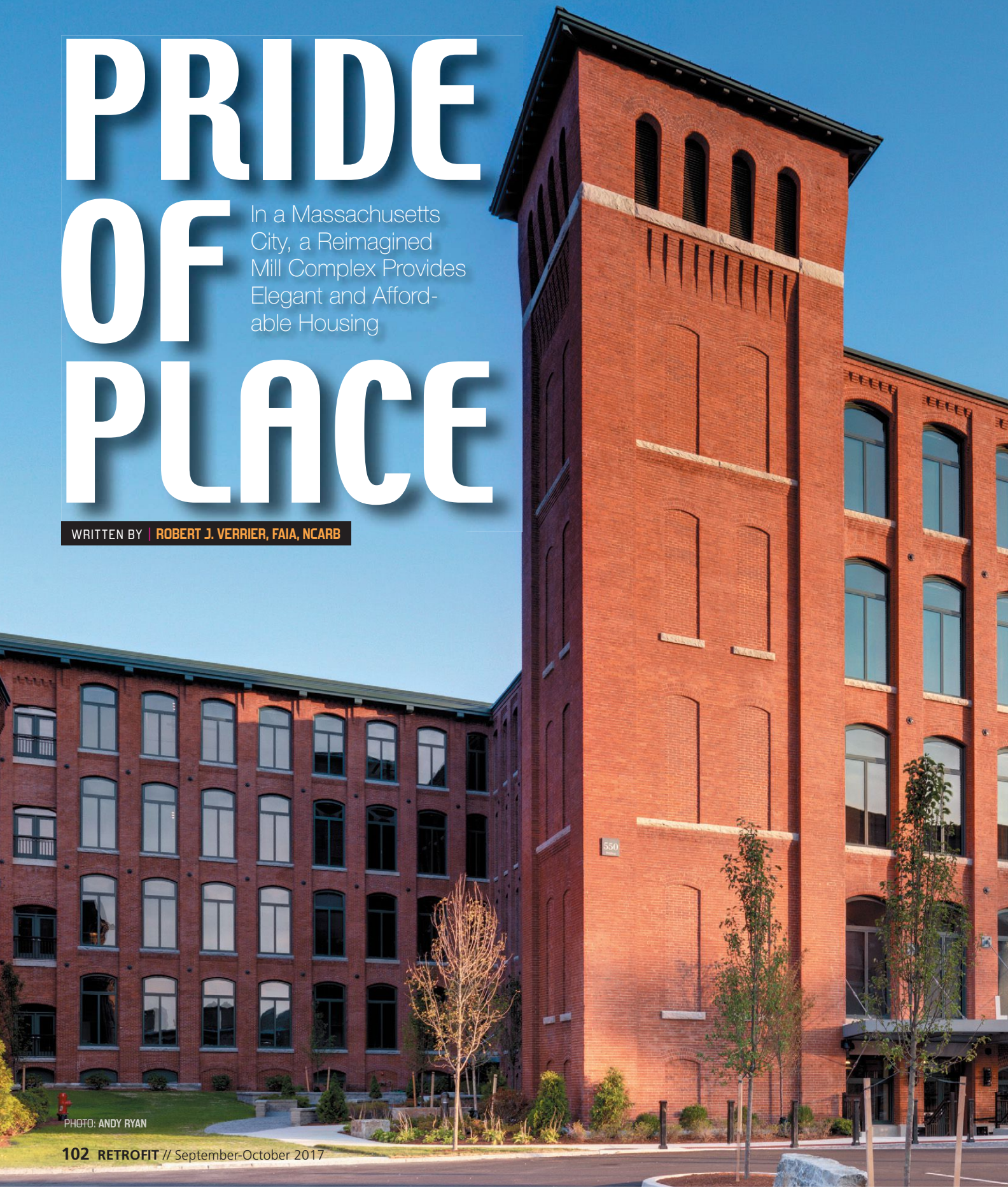


PHOTO: ANDY RYAN

If you were an American in the 20th century, chances are you owned something made at Malden Mills. Located in Lawrence, Mass., Malden Mills' imposing brick buildings with their copper-roofed clock tower were at the center of the nation's textile industry—first as one of the largest producers of worsted wool and later as the home of Polartec Fleece. Even as the city itself struggled, Malden Mills filled a crucial role as a major employer and a symbol of local pride.

In late 1995, that legacy went up in flames. The largest fire Massachusetts had seen in more than 100 years tore through Malden Mills, gutting the complex. Although the owner continued to pay displaced employees and built a modern facility (becoming a national figure in the process), many of the original mill buildings closed, sitting empty as a reminder of a more prosperous past.

For more than a decade, the unused Malden Mills embodied the challenges facing Lawrence—familiar to many of the Northeast's former industrial cities—including high unemployment, poverty and urban decay. But a recent transformation has revitalized the previously forlorn structures. Now considered central to Lawrence's upward trajectory, the rebirth of Malden Mills as Loft Five50 shows the value of public and private stakeholders coming together for thoughtful redevelopment and reuse.

A Challenging Rehab

When Boston-based WinnDevelopment purchased the property in 2011, the company set its sights on reimagining the main Malden Mills structure as an affordable multifamily residential community. With a record of successful conversions throughout the Northeast, WinnDevelopment based this latest purchase on three factors: an understanding of the community's crucial need for affordable housing; a related desire for a source of renewed local pride; and a longstanding relationship with a number of dedicated partners, including design and master planning firm The Architectural Team Inc. (TAT), which is based in Chelsea, Mass., and is nationally recognized in adaptive reuse and historic preservation.

Named for its address at 550 Broadway, Loft Five50 has great bones with high ceilings and numerous, large windows necessary for industrial use lending themselves well to residential conversion. In addition, the structure offers the kind of unique architectural features that draw people to historic buildings. The iconic clock

PHOTO: ANDY RYAN

THE PROJECT TEAM RECEIVED SPECIAL PERMISSION FROM THE NATIONAL PARK SERVICE TO ADD LED LIGHT STRIPS INTO THE GRANITE BELOW THE CLOCK FACE, PROVIDING NIGHTTIME ILLUMINATION WITHOUT VISIBLY CHANGING THE TOWER'S APPEARANCE.

tower and the stairway tower that bookend the building, for example, made it clear to the project team that Loft Five50 could present a unique, compelling story to a new generation of people who call Lawrence home. However, because it originally was constructed in the 1860s and had sat dormant for so long, the building's adaptation was far from simple.

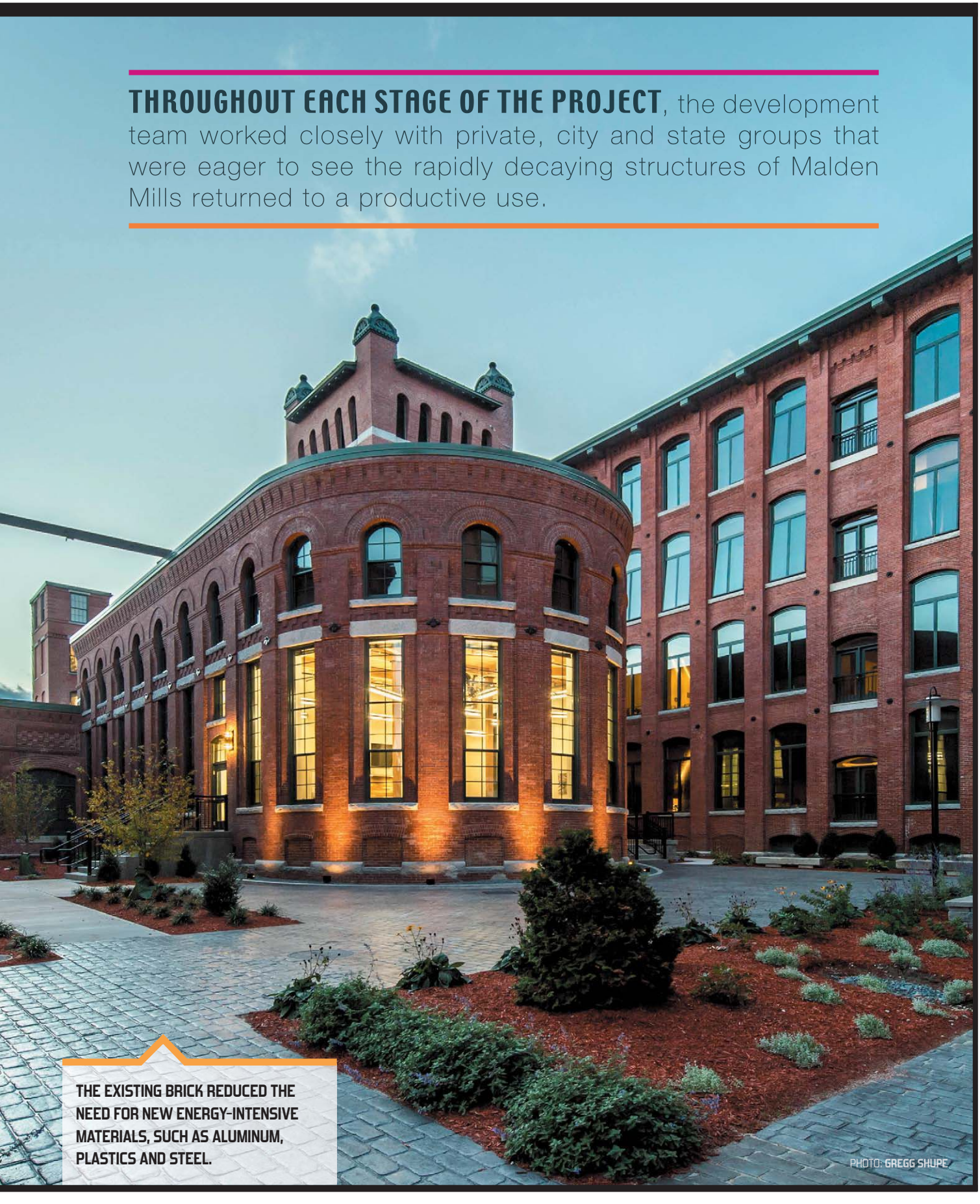
The age and condition of the former Malden Mills meant a comprehensive rehabilitation was necessary. However, because the building is listed on the National Register of Historic Places, the conversion also had to meet specific Washington, D.C.-based National Park Service and Massachusetts Historic Commission standards for historic preservation. A complex-enough process to navigate on its own, in this case, the design team led by TAT project manager Nick Kane had to restore and preserve the landmark elements, yet also decrease the carbon footprint.

Balancing Act

From the start, WinnDevelopment set a goal of reaching LEED-certifiable status. The paths of LEED certification and National Park Service standards rarely intersect; in fact, the most direct ways of achieving the former often run counter to the tenets of historic preservation. But as the development team has learned during decades of historic preservation and adaptive reuse, much of the joy in these projects comes from finding ways to be creative within a set of strict parameters. It helps to cultivate strong relationships with agencies that oversee historic designations, and Loft Five50 was no different. On the painstakingly restored (and now-functioning) clock tower, for example, the project team received special permission from the National Park Service to add LED light strips into the granite below the clock face, providing nighttime illumination without visibly changing the tower's appearance.

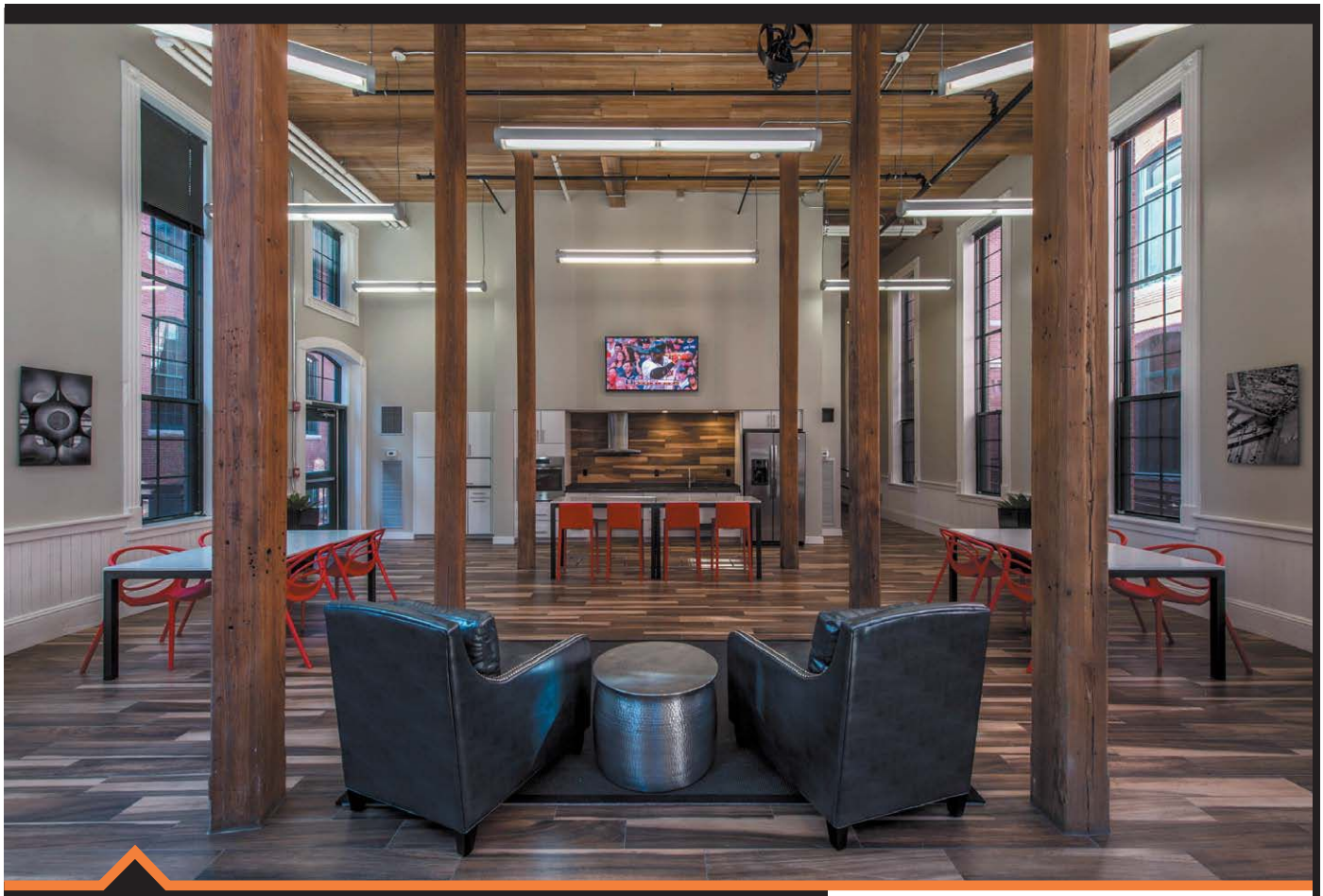
Throughout the building, new, low-E glazed, triple-light windows replicate the look of the original awning-style ones. This modern solution supports the project's energy efficiency and sustainability goals, as well as its historic-preservation requirements. The new window assemblies deliver saturating daylight while reducing solar heat gain and UV penetration and minimizing thermal bridging. They also reduce air infiltration substantially better than the originals. Combined with newly insulated exterior brick walls, the windows were instrumental in reaching LEED for Homes-certifiable status. The

THROUGHOUT EACH STAGE OF THE PROJECT, the development team worked closely with private, city and state groups that were eager to see the rapidly decaying structures of Malden Mills returned to a productive use.

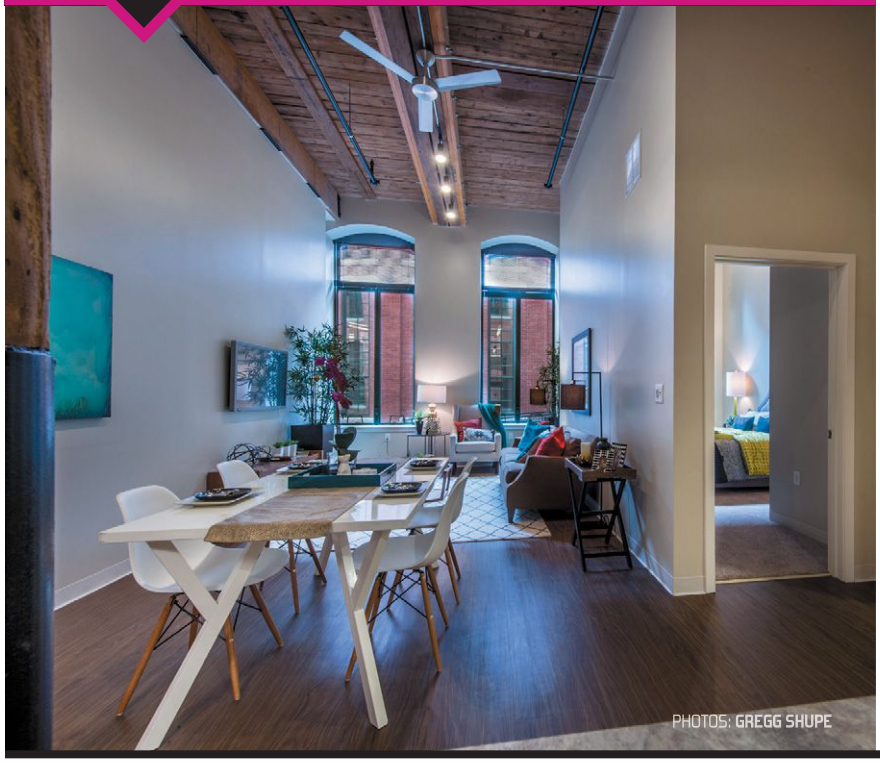


THE EXISTING BRICK REDUCED THE NEED FOR NEW ENERGY-INTENSIVE MATERIALS, SUCH AS ALUMINUM, PLASTICS AND STEEL.

PHOTO: GREGG SHUPE



HISTORIC FEATURES WERE RESTORED AND PRESERVED, SUCH AS THE 20-FOOT-HIGH CLERESTORY CEILINGS, WOOD BEAMS AND COLUMNS.



PHOTOS: GREGG SHUPE

existing brick, of course, reduced the need for new energy-intensive materials, such as aluminum, plastics and steel.

Other historic features were restored and preserved, such as the 20-foot-high clerestory ceilings, wood beams and columns. The project team also exposed impactful elements, like interior brick walls and select original staircases. Years of neglect and tacked-on ancillary features had to be addressed, too, which meant removing non-historic bridges, oil-tank sheds and loading docks. To tell the story of Loft Five50's past as Malden Mills, the project team also repurposed the metal-clad fire doors and decorated the common areas of the 75 units with pulley and flywheel assemblies and original photography depicting the previous state of the mill. The idea was to strike a balance between old and new, reimagining the architectural fabric for new use while preserving its industrial heritage.

Another benefit of converting an old mill building like this one into homes is that the units are large—the average square footage of a Loft Five50 home is twice the size of an

(continues on page 108)

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THE AVERAGE SQUARE FOOTAGE OF A LOFT FIVE50 HOME IS TWICE THE SIZE OF AN AVERAGE MODERN HOUSING UNIT, AND 65 PERCENT OF THE BUILDING'S HOMES HAVE TWO OR MORE BEDROOMS.

PHOTOS: NORA LIGHTING

average modern housing unit, and 65 percent of the building's homes have two or more bedrooms. The remainder of Loft Five50's homes are studio or one-bedroom units. Across all unit sizes and layouts, the project offers efficient, well-thought-out housing.

Community Connection

This concept of growing and sustaining a community was top of mind not only for WinnDevelopment and TAT, but also for the city of Lawrence and the various other entities involved in this adaptive-reuse process. Throughout each stage of the project, the development team worked closely with private, city and state groups that were eager to see the rapidly decaying structures of Malden Mills returned to a productive use. This support was particularly important for Loft Five50's success because numerous local renovation projects had failed during the prior decade because of a lack of financing that could carry construction overruns and approval delays. Close collaboration with the Massachusetts Historic Commission and the National Park Service, for instance, ensured the project team was able to use State and Federal Historic Tax Credits. These incentive programs were critical in completing development funding to deliver one of Lawrence's most significant community assets in decades.

Opened in the fall of 2013, Loft Five50 was an immediate success with all 75 units occupied within months. Its enthusiastic reception led the project team to redevelop four additional Malden Mills structures into Loft Five50 Phase Two, a 130,000-square-foot, 62-unit affordable apartment complex with a mix of one-, two-, three- and four-bedroom layouts intended for families. The 137 units of the full Loft Five50 complex are now zoned to adhere to mixed-income needs based upon Area Median Income (AMI). With poverty rates in Lawrence at three times the state average, WinnDevelopment reserved 15 units for those with incomes at or below 30 percent of AMI and 119 units for residents at or below 60 percent of the AMI. Not surprisingly, Phase Two

(continues on page 110)

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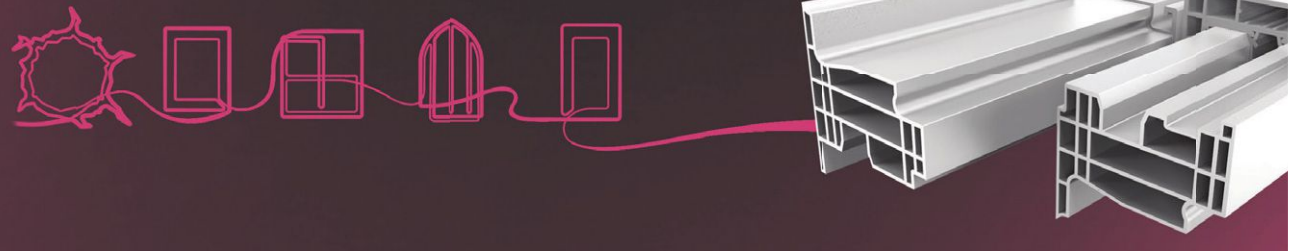

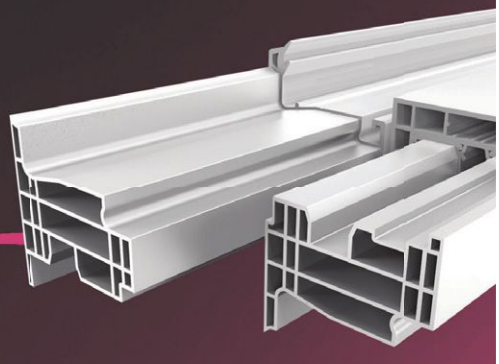

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PHOTO: NORA LIGHTING

RESIDENTS SHARE AMENITIES, LIKE A 1,500-SQUARE-FOOT COMMUNITY ROOM WITH KITCHEN AND ENTERTAINMENT, BUSINESS CENTER, FITNESS SUITE, THEATER ROOM, LOUNGE AND INDOOR PLAYROOM.

reached 100 percent occupancy only four months after opening.

Indistinguishable from the outside, phases one and two are connected via a firewall, and residents share amenities like a 1,500-square-foot community room with kitchen and entertainment, business center, fitness suite, theater room, lounge and indoor playroom. All of these spaces take creative advantage of underutilized square footage within the old mill buildings; the large community room, for instance, originally housed part of the power plant for the mill facility.

Just as important, Loft Five50 is not an isolated complex. It's an integral part of the Lawrence community. The grounds provide a connection to the surrounding city and constitute an important element of the design, too. Outside, residents can enjoy a landscaped and newly expanded courtyard and central patio. Adjacent to the Spicket River, Loft Five50 also offers easy pedestrian access to local amenities via the river walkway. In fact, the Spicket River Greenway stretches nearly 4 miles to schools, stores, parks and commuter hubs. Like Loft Five50 itself, the Greenway has the potential to contribute meaningfully to Lawrence's revitalization as a desirable place to live. As part of the mills' redevelopment, the project team also contributed to the planning of this important community asset. Within Loft Five50, the amenity spaces are also used to provide crucial local services. For example, residents can take courses on retirement preparation, safe driving practices and identity theft protection, as well as attend seminars for first-time homebuyers.

Loft Five50 is a significant show of faith in the future of Lawrence, and the project is expected to encourage further investment in the city. According to Chrystal Kornegay, Massachusetts undersecretary of Housing and Community Development, "Projects, such as Loft Five50, that offer affordable and stable housing are important for neighborhood revitalization, creating strong communities and empowering working families."

(continues on page 112)

Retrofit Team

DEVELOPER // WinnDevelopment, Boston, www.winncompanies.com/winndevelopment

ARCHITECT // The Architectural Team Inc. (TAT), Chelsea, Mass., www.architecturalteam.com

HISTORIC CONSULTANT // Epsilon Associates, Maynard, Mass., www.epsilonassociates.com

INTERIORS // Ideal Design, Bradford, Mass., www.idealdesignstudio.com

GENERAL CONTRACTOR // Keith Construction, Stoughton, Mass., www.keithconstruction.net

STRUCTURAL ENGINEER // Odeh Engineers Inc., North Providence, R.I., www.odehengineers.com

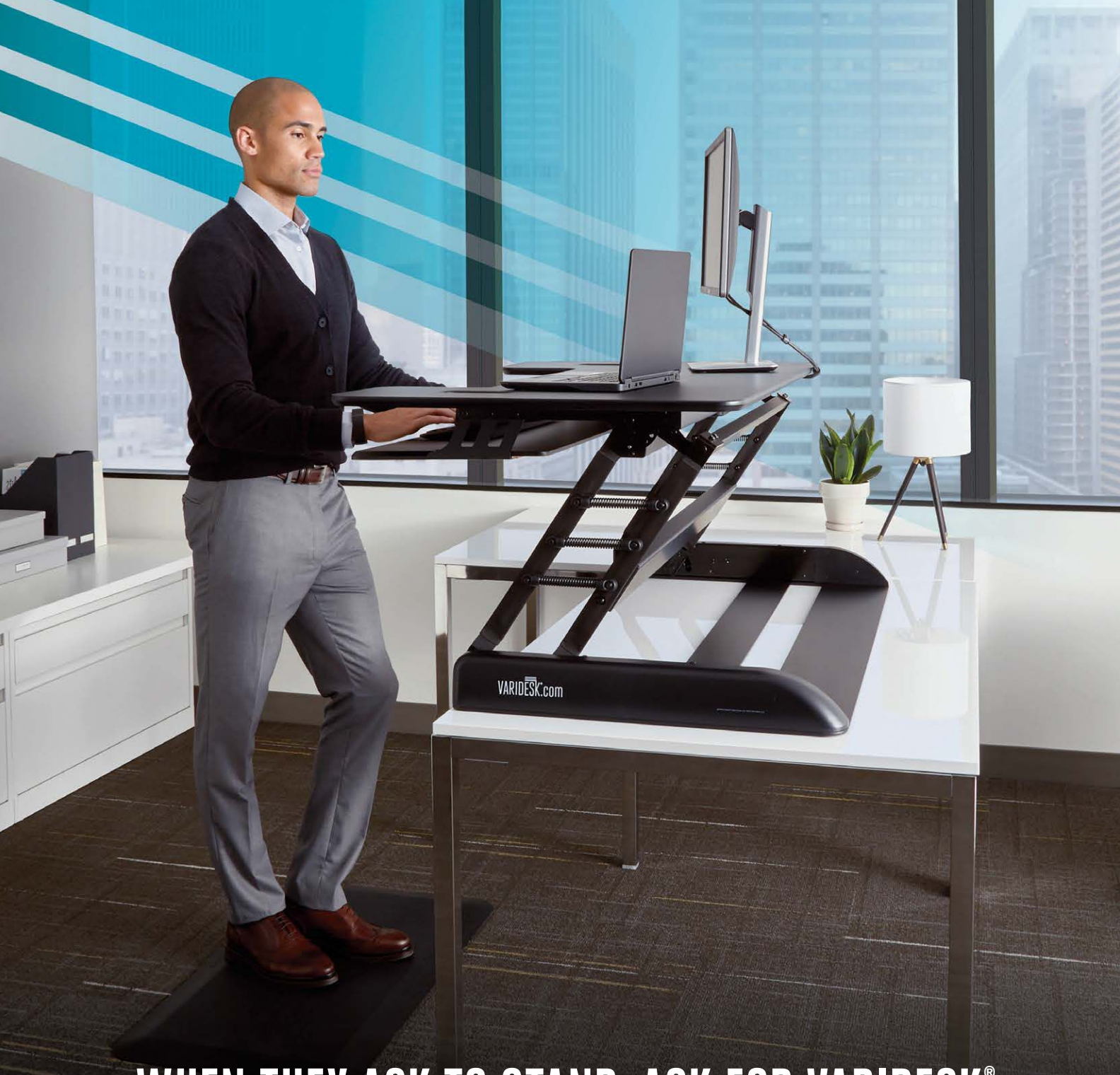
CIVIL ENGINEER // VHB, Watertown, Mass., www.vhb.com

M/E/P AND FEP ENGINEER // Petersen Engineering Inc., Portsmouth, N.H., www.petersenengineering.com

ENVIRONMENTAL ENGINEER // Loureiro Engineering Assoc. Inc., Merrimack, N.H., www.loureiro.com

LIGHTING INSTALLATION // Wayne J. Griffin Electric Inc., Holliston, Mass., www.waynejgriffinelectric.com

LIGHTING DISTRIBUTOR // Yale Electric, Dorchester, Mass., www.yaleappliance.com



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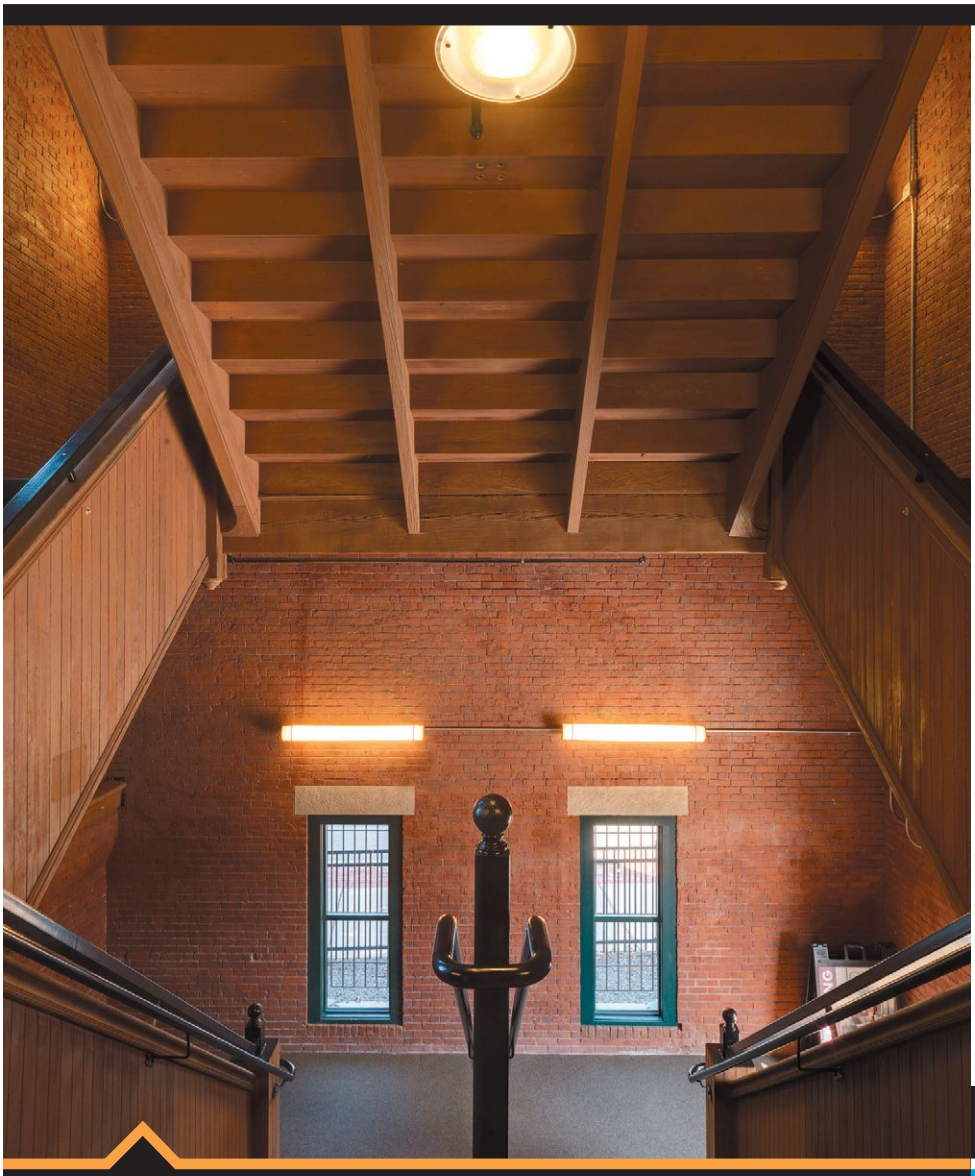
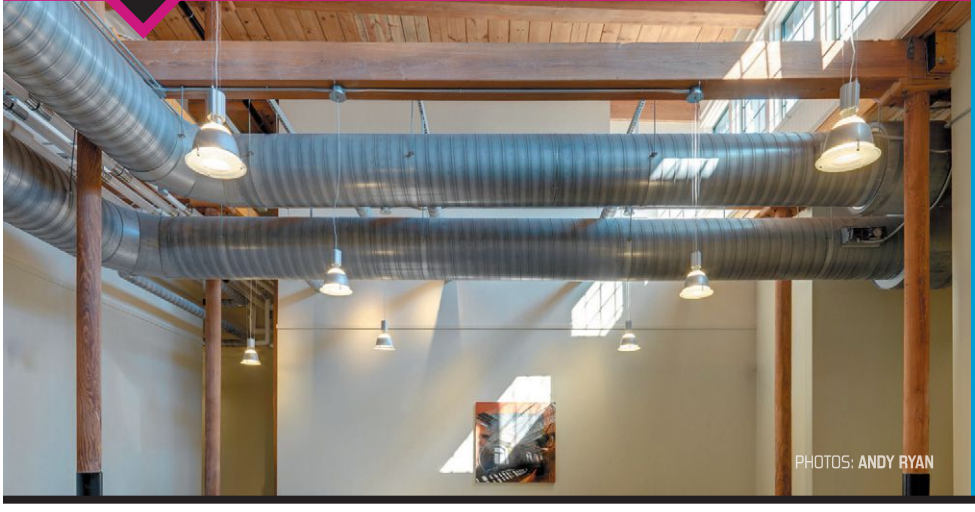


THE PROJECT TEAM EXPOSED IMPACTFUL ELEMENTS, LIKE INTERIOR BRICK WALLS AND SELECT ORIGINAL STAIRCASES. THE IDEA WAS TO REIMAGINE THE ARCHITECTURAL FABRIC FOR NEW USE WHILE PRESERVING ITS INDUSTRIAL HERITAGE.



PHOTOS: ANDY RYAN

Director of Business & Economic Development for the city of Lawrence Abel Vargas noted at the opening of Loft Five50 Phase Two that the project "adds vitality of new residents and businesses to the city and enhances our competitive position for additional investment over the long term."

Indeed, local neighborhoods are now improving. Spurred by Loft Five50, smaller developments are sprouting up nearby, reversing years of misguided revitalization efforts in Lawrence. The central business district has become a place for entrepreneurship with a recent increase in small businesses opened by members of the Spanish-speaking immigrant population. Just as promising, land within the downtown area recently was sold to Northern Essex Community College.

Residents of cities like Lawrence deserve the chance to feel pride of place, and reimagining local landmarks is one of the most powerful and tangible ways to anchor that feeling. Loft Five50 is proof positive that creative thinking, strong partnerships and dedicated stewardship can turn our cities' historic resources into assets for the present and future. Why should we settle for anything less?

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COMMUNITY ROOM PENDANT LIGHTING // Metalumen Round R6A, www.metalumen.com
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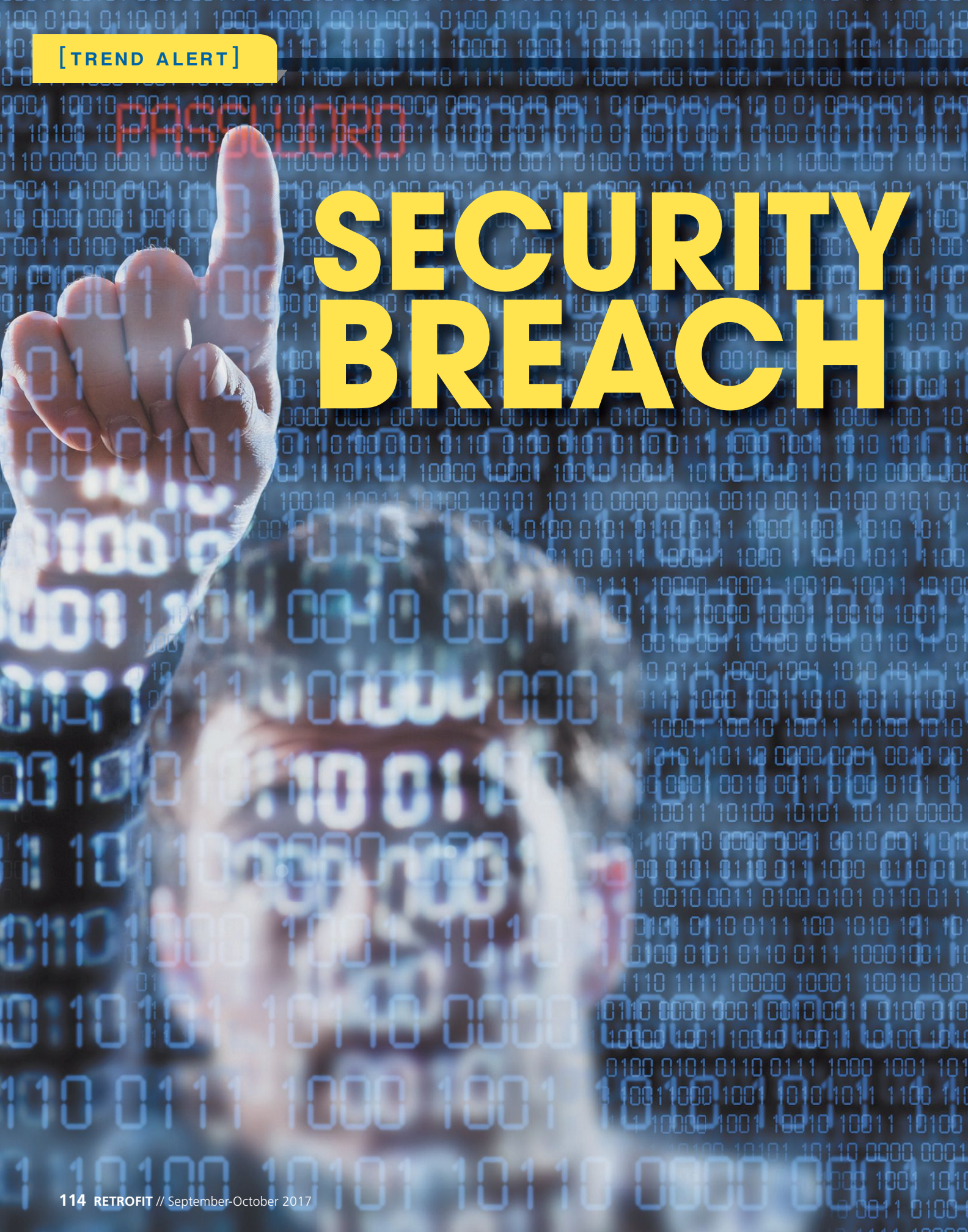


WRITTEN BY | **ROBERT NIEMINEN**

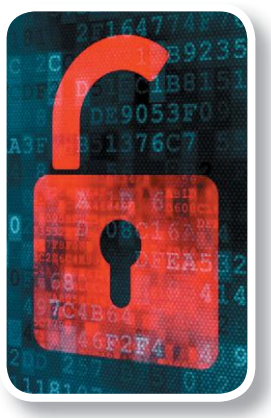
CYBERATTACKS WITHIN COMMERCIAL BUILDINGS ARE OCCURRING AT ALARMING RATES. ARE YOU PREPARED TO DEAL WITH THE IMMINENT THREAT?

Your building automation system (BAS) has been compromised and a hacker is threatening to shut down the HVAC in your facility in exchange for a large ransom in untraceable Bitcoin currency. What do you do?

If this scenario seems far-fetched or unlikely, you may need to pull your head out of the proverbial sand and consider what follows very seriously. Denying or downplaying the existence and prevalence of cyber-related security threats is a common miscalculation—and that's exactly what hackers are banking on.

In fact, a recent Accenture security survey, "Building Confidence: Facing the Cybersecurity Conundrum", found that overconfidence may be putting companies at greater risk for cyberattacks. Two-thirds of respondents to the survey indicated their organizations are capable of protecting their assets from such threats, yet actual data suggests otherwise. Of the companies surveyed, cyberattacks were carried out at a rate of three times per month during the past year alone.

Thanks in part to the increased connectivity of building control systems and mobile devices afforded by the Internet of Things (IoT), which was covered in ***retrofit***'s January-February 2017 issue, "Trend Alert", page 76 or bit.ly/2iQF5xt, shared networks often create gaps that allow easier access for cyberattacks and privacy invasion, which hackers are persistently trying to identify and exploit.



The Threat Is Real

If you still think this is child's play, consider the fact that Hollywood Presbyterian Medical Center in Hollywood, Calif., paid $17,000 (approximately 40 Bitcoin) to ransomware hackers last year after a cyberattack locked doctors and nurses out of their computer system for days, according to the *Los Angeles Times*. For the uninitiated, ransomware is a type of malicious software (or malware) that encrypts a user's data, then demands payment in exchange for unlocking it. This sort of invasive activity happens more often than many realize.

"If you consider a non-organized exploit—in other words, just a simple query where IP addresses and networks have been identified and then simple open ports are looked at and queried—this happens every hour of every day with virtually every system that is connected. This is going on constantly," explains Steve Surfaro, industry liaison for Phoenix-based security solutions provider Axis Communications and chairman of the Security Applied Sciences Council for ASIS International, Alexandria, Va.

Jim Kelton, managing principal at Altius Information Technologies Inc., a security audit company in Costa Mesa, Calif., agrees cyberattacks are on the rise and notes commercial buildings are a relatively easy target.

"We've seen an increase across the board in the [frequency of] cybersecurity attacks," he says. "Attackers can't always distinguish one organization from another, so commercial buildings

> There has to be some **segmentation** so people can't just get wherever they want. If you do get breached, there's got to be a moat in front of the castle so (hackers) don't just come marching right in once the drawbridge comes down.
>
> *—Dave Tyson, CEO, CISO Insights*

may be at the same risk as even, let's say a high-tech firm; hackers are looking for low-hanging fruit, the path of least resistance, to try and see where they may be able to exploit a vulnerability."

This seemingly innocuous intrusion into building networks is essentially a game for "black hat hackers," or individuals with extensive computer knowledge whose purpose is to breach or bypass internet security measures. ("White hat hackers," on the other hand, are ethical security specialists who perform the same function to expose weaknesses before malicious hackers can detect and exploit them.)

"[Black-hat hackers] are essentially doing this almost as frequently as gamers play, and they are looking to intrude, and they're looking for vulnerabilities—and not in a good way," Surfaro says. "Once they find those vulnerabilities, then they either do it for their own hobby or they do it for profit."

The motives behind cyberattacks is where things get worrisome. These can range from financial, self-promoting, pathological to political, "which is usually incredibly organized and very, very dangerous," Surfaro warns. "These are the folks who are going after entire companies they're disagreeing with."

Surfaro explains that systematized factions throughout the world are seeking hackers who will identify and catalogue weaknesses within organizations. But these cyberterrorists don't want hackers to act on their own; rather, they want to launch massive, coordinated attacks to inflict the most damage.

For example, Dave Tyson, CEO of security consultancy firm CISO Insights, Racine, Wis., notes earlier this summer a ransomware attack dubbed "Petya" (and later, "NotPeta") was launched in the Ukraine and linked to a state-sponsored organization that wiped out a significant portion of the country's business financial services and industrial control systems. While this incident was deemed an attack between nation states, companies can also become targets based on their political affiliations.

"Let's just say your organization supports a government bill or a political position or something else that is contrary to [a hacker's] view of the universe," Tyson explains. "They might deface your website. They might lock it up with some ransomware to cost you money, or they may just make it so that you can't use it with a denial of service attack. We see all of these."

Unfortunately, Surfaro says these types of organized exploits for political or social purposes—also known as "hactivism"—are rising exponentially. "It's well-measured in exponents, increasing to the point where many of my associates that are in the ASIS Applied Sciences Council who are cyber architects believe that major exploits will get to the point where they will be every week, whereas we're seeing it every month now."

Among the reasons Kelton believes the frequency of such invasions are increasing is because of the lack of cybersecurity professionals to fill open positions. "With a 0 percent unemployment rate, it's compounding the risks that everyone faces across the board," he says.

Areas of Vulnerability

In terms of identifying weaknesses in the commercial building sector, the bad news is almost any form of connected device can be hijacked and misused by hackers. "When you look at the buildings themselves, they are automating a lot of different areas: the HVAC, the lighting, communication systems, parking,

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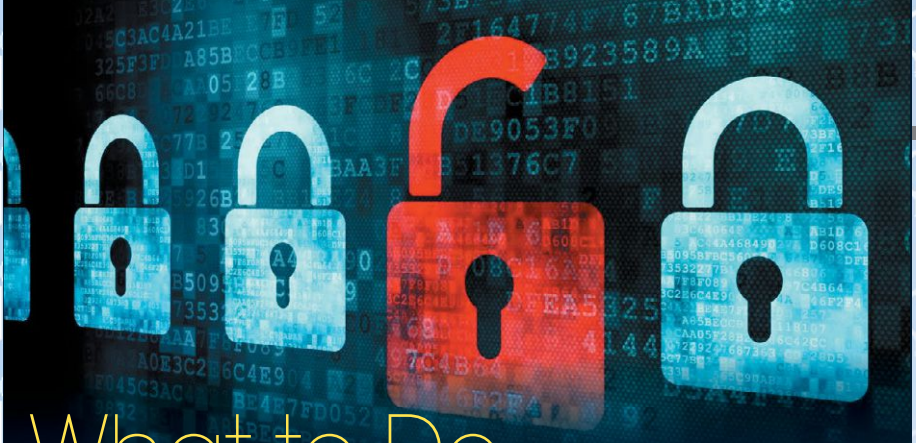

What to Do If You've Been Hacked

The time to decide what to do in the event of a cyberattack isn't after it's already taken place. Establishing a plan of action in advance is absolutely essential to protecting your organization and its assets.

"What you want to do is prepare an incident response plan when you have a clear head, and you want to identify various scenarios," says Jim Kelton, managing principal at Altius Information Technologies Inc., a security audit company in Costa Mesa, Calif. "So if there is an incident you quickly go back to your plan, pull out this scenario and say, 'These are the steps we're going to follow. These are the people we're going to communicate with: the authorities, executive management, the press, our suppliers, our staff and our customers.' It really needs to be thought out very well in advance, not when you're having an incident and then saying, 'What do we do now?'"

However, assuming a cyberattack has already taken place, building owners and facility managers should focus on life safety, protecting property and preserving data, according to Steve Surfaro, industry liaison for Phoenix-based security solutions provider Axis Communications and chairman of the Security Applied Sciences Council for ASIS International, Alexandria, Va.

When mobile devices are near a wireless access point, a user's location can be identified easily without intrusion, which Surfaro says is an excellent tool for evacuating people from a building. "If the Pulse Nightclub (in Orlando where a mass shooting took place in 2016) used this simple software, more lives would have been saved; they would have been able to find out where people were," he says.

Secondly, protecting expensive mechanical equipment, such as power distribution, HVAC, and data servers from fire or explosives is important and relatively cost-effective. For example, visible-light sensors attached to video surveillance cameras now can detect radiation while "sniffers" installed in the HVAC can identify harmful chemicals or explosives within the system.

Equally important is to protect data. "Everybody knows what data recovery means, but not everybody understands how it works," Surfaro says. The most effective, yet often overlooked method of preserving data—including operating systems, license keys and intellectual property—is to have at least two off-site copies or mirrors in two different geographic locations. "I would say not too many people do that. It's amazing," Surfaro says.

Lastly, ensuring your organization has the expertise to deal with cyberattacks is key to a solid defense, according to Dave Tyson, CEO of security consultancy firm CISO Insights, Racine, Wis.: "If you just have some well-meaning IT folks even with a healthy sense of paranoia, that's probably not what's going to get you by. This requires sophisticated expertise."

energy management, water management, landscaping," Kelton observes. "The more you automate, obviously, you're going to face risks in that certain area, in this case cybersecurity risks."

For example, Tyson points to last year's Mirai botnet—a piece of malware that turns networked devices running Linux into remotely controlled "bots" to launch large-scale network attacks—which infected millions of IoT-connected CCTV cameras, DVRs and routers worldwide, as well as successfully shut down much of the internet on the East Coast of the U.S. and portions of Europe.

According to Surfaro, HVAC, power and lighting systems are the most desirable targets but the most common point of entry is internet connectivity. He says hackers use connected devices, such as surveillance cameras and network video recorders that are often installed and operated with default passwords and no protection—an oversight that essentially turns them into distributed denial of service attack (DDoS) servers, which flood an organization's network with hundreds of HTTP requests per second, rendering it useless. Once hackers control part of the network, Surfaro says they can seek out vulnerabilities in the lighting or HVAC systems to gain control of the building's electromechanical equipment.

While mobile devices have made life easier for facility managers in terms of providing remote access to their BAS, they also leave the door wide open for hackers if not protected properly.

"So many facility managers love their mobile devices, but what happens is the vulnerability to their HVAC system or their power system may be through a mobile device, and they haven't taken care to establish multifactor authentication, which now you're seeing even at the lowest level, even with social media," Surfaro points out. "Incredibly, these building automation systems are lagging behind what is a norm for our financial systems and our current social media systems."

Common Pitfalls

"In general terms, I think people don't take it seriously enough," Tyson says. As noted

Denying or downplaying the existence and prevalence of cyber-related security threats is a common miscalculation—and that's exactly what hackers are banking on.

earlier, overconfidence is putting organizations at greater risk for cyberattacks and, according to Tyson, 98 to 99 percent of all breaches are preventable because solutions are available. However, in spite of the risks and available protections on the market, the building industry is slow to upgrade systems and establish proper security protocols.

According to Tyson, some physical access control systems sold new on the market today are still running on databases designed in the 1990s. "I've seen access control systems in commercial buildings that literally were 25- and 30-year-old designs that are still being used. They have almost no security on them whatsoever," he says, adding that in other cases, facility professionals simply fail to properly maintain existing systems that are in place, making them susceptible to attacks.

Echoing Tyson's observations, Kelton agrees that obsolescence is a huge problem in the commercial buildings market because people don't consider the risk serious enough to invest in security.

"Many buildings just aren't allocating sufficient funding because they don't see it as a risk," he says. "It's not a television set that you put up and you don't ever have to worry about; it's more like a computer system that needs to be constantly and professionally managed."

Another common mistake building owners and facility executives tend to make with cybersecurity is neglecting to establish separate networks for building controls and end-users. "There has to be some segmentation so people can't just get wherever they want," Tyson urges. "If you do get breached, there's got to be a moat in front of the castle so [hackers] don't just come marching right in once the drawbridge comes down."

But perhaps the biggest pitfall when it comes to protecting against cyberattacks is

In spite of the risks and available protections on the market, the building industry is slow to upgrade systems and establish proper security protocols.

failing to account for the behavior of end-users, who are the single biggest source of security compromises, Tyson says.

"You may have heard the term 'phishing' or 'spear phishing,' where you attack very specific people—get them to click on a link in an email; get them to go to a website. This is really the No. 1 method to get into organizations," he points out.

Additionally, failure to implement proper identity management within an organization is a huge error. Granting everyone in the organization access to the network with a single user ID and password is a recipe for disaster, especially when an employee is fired or resigns on bad terms and the login information isn't changed. "I worked with an organization that literally had not changed the password on its gas control system in 20 years," Tyson recalls.

Similarly, Surfaro suggests allowing employees access to the network with mobile devices that are loaded down with apps is a blunder, as well. "You're allowing people to log into the BAS system who essentially could have keyloggers installed in their mobile apps, so their keystrokes are being sent to other locations periodically—that's one pitfall," he says.

Fortunately, Tyson says educating end-users about the dangers of downloading unvetted apps and clicking on links from people they don't know is the easiest and most cost-effective way to deal with cybersecurity breaches on the front end.

"There are tremendous amounts of things you can do to protect [your building's assets] upfront, and you can really reduce the amount of risk by good hygiene of your environment, good security practices and then educating your users at the end of the day not to click on things. Security awareness is probably the No. 1 thing you can do," he concludes.

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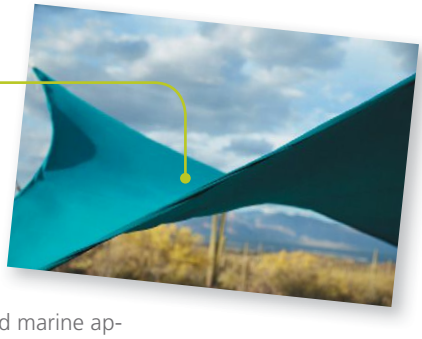

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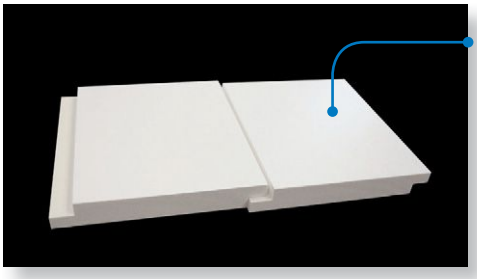

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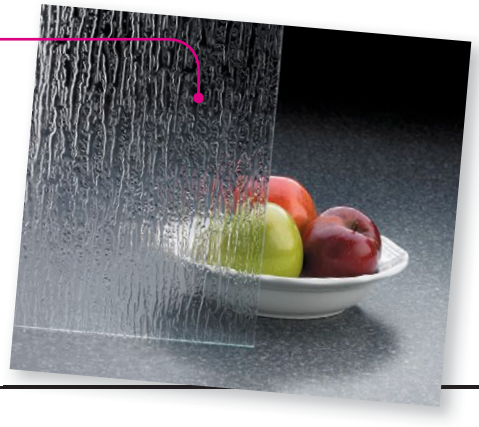
strongtie.com // Circle No. 61

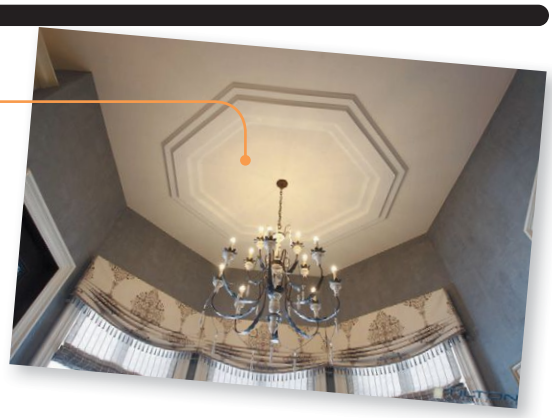
GLASS PATTERN MIMICS RAIN ON SMOOTH GLASS

MI Windows and Doors has added a new pattern in its Obscure Glass product line—Rain Glass—that mimics the look of rain running down a smooth piece of glass. Allowing natural light into a space while maintaining privacy, Rain Glass is available as 1/8-inch double-strength with annealed and tempered options. The pattern, which is pressed into the glass during the glassmaking process, masks finger prints and is stain-resistant. Rain Glass is available in a maximum size of 72-inches wide by 140-inches tall and thicknesses of 2, 3, 4 and 5 millimeters.

www.miwindows.com // Circle No. 62



COFFERED CEILINGS CREATE 'WOW' FACTOR



Tilton Coffered Ceilings offers hundreds of Box Beam and Shallow Beam ceiling treatment design options to create the "wow" factor for any room. Typically installed in one or two days, the coffered ceiling systems and kits are often constructed using versatile polyurethane, supplied by Nu-Wood. Lightweight polyurethane pieces offer a reduction in the quantity of seams in the finished product because they can be molded to look like the buildup of many pieces. In addition to polyurethane, ceiling treatments include cherry, mahogany, maple, MDF, pine, poplar, PVC, red oak and walnut.

www.tiltoncofferedceilings.com // Circle No. 63

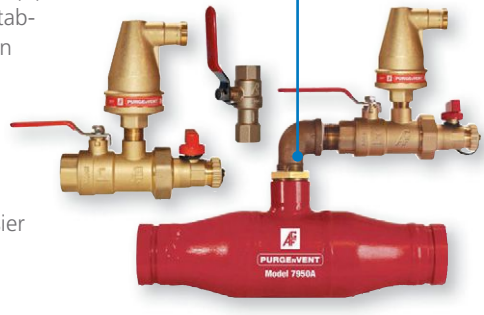
CONTROLLER ACTIVATES DE-ICING CABLES

Danfoss has released its RX1200 controller for electric de-icing applications. Designed to complement Danfoss RX de-icing cables for roof and gutter applications, the controller helps to extend the life of an outdoor electric heating system and prevent damage and leaks. By sensing moisture and temperature conditions, the RX1200 can activate or deactivate the cables as needed, reducing energy consumption by up to 75 percent compared to a controller that measures temperature alone. Rated at a maximum of 10.2 amps/120 volts (maximum 1,225 watts), the fully-automatic RX1200 comes pre-assembled and ready to install.

www.heating.danfoss.us // Circle No. 64

REMOVE EXCESS AIR FROM SPRINKLER PIPES

AGF Manufacturing Inc. has launched its PURGENVENT Air Venting Valves, which are designed to remove excess air from sprinkler pipes to meet and/or exceed the new venting requirements established in NFPA 13 (2016). Designed to work alone or in tandem, the valves remove the oxygen trapped in the system to reduce corrosion activity. The line includes manual and automatic models: Model 7910MAV (manual air venting valve), Model 7900AAV (automatic air venting valve) and Model 7950ILV (inline air venting valve). The valves' compact size allows for easier installation and greater flexibility in placement.



www.purgenvent.com // Circle No. 65

PARTITION IS COMPOSED OF PLANT LIFE

Sagegreenlife has partnered with Gensler to create a double-sided green partition known as Verdanta. Research shows keeping plant life in an office can increase productivity by 15 percent. A Verdanta panel boasts 240 plants, each meticulously selected, placed and grown by Sagegreenlife's horticultural design experts prior to installation in a client's space. At nearly 6-feet tall and 4-feet wide, the panel provides a sight and sound barrier that allows for private meetings or focused individual work. Sagegreenlife's patented hydroponic system, the Biotile, features a layered basalt rock fiber that evenly and continuously distributes water, oxygen and nutrients, resulting in strong, healthy and long-lasting plants that use less water.

www.sagegreenlife.com // Circle No. 66

INSULATION BOARD IS DESIGNED FOR HIGH LOAD-BEARING APPLICATIONS

Kingspan Insulation has expanded its commercial product offering by introducing GreenGuard Type VII XPS Insulation Board for high load-bearing engineered applications requiring insulation with a minimum compressive strength of 60 PSI. Type VII XPS is primarily used in commercial roofing applications, such as protected membrane and pedestal paver systems. The insulation board offers an R-value of 5.0 per inch of thickness and meets ASTM C578 Type VII requirements. The product retains its insulating properties over time, has high water resistance and is HCFC-free. In addition to commercial roofing applications, it also is suitable for low-temperature freezer floors, cold-storage facility floors, ice rinks and parking decks.

www.kingspaninsulation.us // Circle No. 67

WINDOWS AND DOORS NOW ARE COMPATIBLE WITH MAJOR SECURITY SYSTEMS

Resolution Products, a provider of security technology, and Pella Corp. have collaborated to incorporate Resolution's Universal Translator with Pella's Insynctive Technology, enabling Pella windows and doors to be compatible with most major security systems. Pella's built-in security sensors provide open and close status for Pella's Designer Series windows and an additional benefit of locked/unlocked status for Designer Series patio doors, plus Architect Series and Pella-branded entry doors. The technology is installed during manufacture, which maintains window and door warranties.

pella.com // Circle No. 68

FABRIC LINES INCREASE OPENNESS SELECTIONS

Mermet USA has enhanced two of its existing fabric lines, Natte and Vienne, with updated, matching colors and increased openness selections for residential and commercial customers. For consistency across product lines, all colors offered in Natte and Vienne have been color-matched to Mermet's interior fabric lines. New colors include Charcoal/Cocoa, Cocoa/Cocoa, Cocoa/Grey and Cocoa/Straw. Updates to existing colors include Charcoal/Charcoal, White/Linen, White/Pearl and White/White. Natte and Vienne are offered in two openness options: 5 and 10 percent. All styles and colors will be offered in 98-inch width. Additionally, Charcoal/Charcoal and Charcoal/Cocoa colors for both styles are available in 122-inch width.

www.mermetusa.com // Circle No. 69

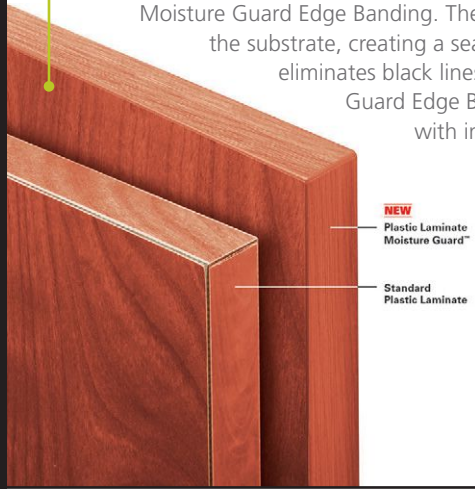
SUSTAINABLE CEILING PORTFOLIO FEATURES 850 PRODUCTS

Armstrong Ceiling Solutions has expanded its portfolio of Sustain high-performance sustainable ceilings to include more than 850 products. New additions to the Sustain portfolio include Ultima and Cirrus ceiling panels, expanding the offering of sustainable ceiling products with Total Acoustics performance. Total Acoustics ceiling panels provide a combination of high sound absorption and sound blocking in a single panel. The Sustain portfolio also includes other products that offer noise absorption, including Lyra PB (plant-based binder) and Optima PB ceiling panels. With the addition of MetalWorks Blades–Classics, there are five metal ceiling products in the portfolio. Prelude XL Max has been added to the list of suspension systems, and Axiom Trims and Transitions and Short Span and Quick Stix drywall grid systems round out the portfolio.

www.armstrongceilings.com/sustain // Circle No. 70

PLASTIC LAMINATE PARTITIONS RESIST MOISTURE

ASI Global Partitions has introduced its Plastic Laminate Partitions with Moisture Guard Edge Banding. The edge banding fuses with the substrate, creating a seamless beveled profile that eliminates black lines. ASTM tests on Moisture Guard Edge Banding confirm durability with increased resistance to moisture and humidity. Available in 45 colors/patterns, the partitions can be installed quickly with Easy Stall Shoe for floor anchored/overhead braced partitions. The partitions come with a five-year warranty.



www.asi-globalpartitions.com // Circle No. 71

CONVERT FLUORESCENT STRIPLIGHTS TO LED

The Linear Strip Retrofit Kit (LSRK) from Columbia Lighting is a labor-saving LED retrofit kit for striplights. It is available in 4- and 8-foot lengths and has two width options that fit most 4- to 4 1/4-inch and 5- to 5 1/4-inch fluorescent channels. An optional frosted acrylic lens and endcaps can be factory- or field-installed. Occupancy/daylight sensors are available. The LSRK is available with multiple CCT, lumen output and dimming options.

www.columbialighting.com/products/lsrk // Circle No. 72

View how the LSRK is installed via short video.

CHARGE DEVICES OUTDOORS WITH SOLAR

ConnecTables are outdoor tables that include a solar-panel canopy. They allow those who are outdoors to work, access the internet, recharge phones and computers, and socialize. The tables, which are made of structural steel, are suitable for highly trafficked areas without access to electrical outlets. The self-ballast-mounted solar-table charging stations feature USB and 120-volt charging capabilities and require little to no maintenance. They are resistant to vandalism and feature a 90-mph wind rating. The high-capacity battery, charged by the solar modules, reliably performs overnight and through multiple overcast and inclement weather days.

theconnectable.com // Circle No. 73

ELASTOMERIC COATING LINE REFLECTS THE SUN'S RAYS

Duro-Last has introduced its Duro-Shield Coatings and Materials available in Duro-Shield 20, Duro-Shield 10 and Duro-Shield 5. Duro-Shield Roof Coatings are 100 percent elastomeric acrylic with a white finish that reflects the sun's rays, which can lower heat buildup and reduce costs. Duro-Shield 20 offers 35 mils of coverage when dry and a 20-year limited warranty. Duro-Shield 10 features 24 mils of coverage when dry and a 10-year limited warranty. Duro-Shield 5 offers 20 mils of coverage when dry and a five-year limited warranty. Additional products in the Duro-Shield line include Duro-Shield Primer, Duro-Shield Brush Grade Mastic and Polyester Reinforcement Fabric.

www.duro-last.com/duroshield // Circle No. 76

SOAP, WATER AND DRYER IN ONE FIXTURE

Bradley Corp. has combined its touchless handwashing feature with its line of OmniDecks. The WashBar, originally launched with Bradley's Verge wash basins, is comprised of a single piece of chrome-plated stainless steel that combines soap, water and dryer in one fixture. LED lighting and easy-to-identify icons on the WashBar help to visually orient the user through the handwashing process. The WashBar's streamlined design eliminates the cluttered look of three separate components, complementing the OmniDeck's aesthetic and elevating its washroom flexibility. WashBar technology also saves on maintenance costs with fewer soap refills, the elimination of paper towels, less wet floor cleanup and less time emptying waste bins.

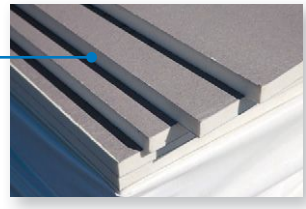
www.bradleycorp.com // Circle No. 74

DIRECT-WIRE RETROFIT SOLUTION SAVES MORE ENERGY PER LAMP

EarthTronics now offers a high-performance T8 double-end direct-wire LED Type B, 15-watt EarthBulb that provides greater than 60 percent energy savings. By removing the ballast from the equation, direct-wire T8 lamps save up to 5 additional watts of energy per lamp. When replacing 32W fluorescent T8 lamps, this new direct-wire solution saves 18 to 22 watts per lamp, resulting in 60 to 70 percent savings, depending on the type of ballast removed from the circuit. The double-end design provides a quick, UL-listed way to retrofit existing fixtures inexpensively.

www.earthtronics.com // Circle No. 75

POLYISO OFFERS HIGH PERFORMANCE IN LOW TEMPERATURES



Firestone Building Products Co. has released a new polyiso formulation, which is equipped with high R-value performance in low temperatures. It also won't soften or melt when exposed to extreme weather conditions. The new formulation requires less embodied energy to manufacture and is easy to install. The new formulation includes ISO 95+ GL Insulation, RESISTA Insulation and ISOGARD HD Cover Board.

www.firestonebpco.com // Circle No. 77

LARGER SHINGLE FORMAT SAVES TIME AND MONEY

Atlas Roofing has introduced its HP42" shingle format, which is the new standard for the Atlas StormMaster Shake and Pinnacle Pristine shingle lines. The shingle, which is 42-inches wide and 14-inches high, features an enhanced 1 1/2-inch nailing area. The shingle offset provides up to 5 percent material savings. HP42" offers a 130-mph wind limited warranty with a four-nail install. Based on an average 40-square job, the new format requires 320 fewer shingles to be installed and up to 6,000 fewer nails and penetrations. The format also can save two to four hours of labor time on the roof.

atlasroofing.com // Circle No. 78

See what roofing contractors are saying about the HP42" shingle format in a short video.

[PRODUCTS]

WINDOW FEATURES IMPROVED AIRTIGHTNESS

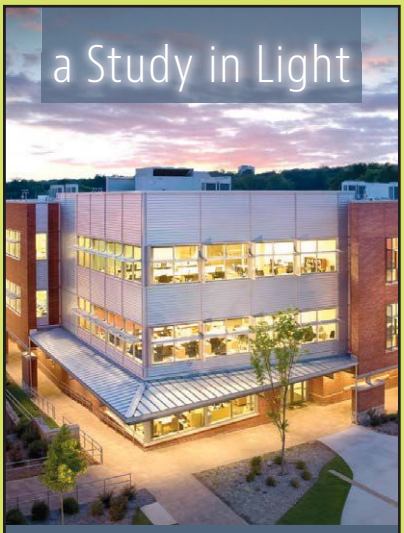
Zola Windows now offers its PanoramicView Lift & Slide with a completely frameless fixed glass portion. The operable sliding sash now has a sash width of only 3 1/2 inches but can carry an 8-foot-high by 10-foot-wide panel of glass. The product has a visible light transmittance of 71 percent. For improved energy performance, U=0.07 glazing is available. R-11 triple glazing is standard; dual glazing (Classic Clad, R-5) and quad glazing (R-15) are available. Airtightness also has been upgraded by incorporating a quadruple compression seal along the sides and head of the sliding sash, offering Passive House-level air sealing and gasket design. The hardware and track system is fully concealed, and the flush threshold is ADA compatible while being air, snow and watertight.

www.zolawindows.com // Circle No. 79

GLASS PARTITION REDUCES SOUND TRANSMISSION

C.R. Laurence has introduced its Fallbrook XL Series Office Partition System. The acoustically rated partition features 1-inch insulating glass units to offer customers reduced sound transmission. It features an ultra-thin aluminum door frame and low-profile channels on adjacent sidelites. Fallbrook XL is a front-load, dry-glazed system that allows for easy glass installation and replacement. It has no exposed fasteners, which adds to its streamlined appearance.

www.crlaurence.com // Circle No. 80



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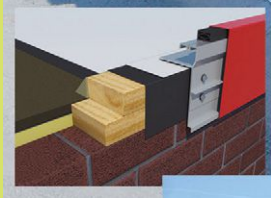

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ANDREW FRANZ ARCHITECT DONATES DESIGN SERVICES TO HARLEM SCHOOL

PHOTOS: **ANDREW FRANZ ARCHITECT**

For non-profit groups working for the greater good, design allies can be a valuable asset.

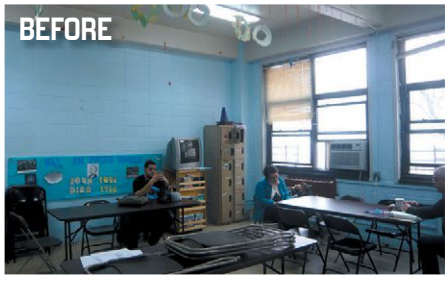
That's why New York-based Andrew Franz Architect and Union Settlement Association, a non-profit resource for residents of New York's East Harlem neighborhood, were paired by a charity-focused matchmaker recently.

The goal of the pro-bono project was mission-critical: Transforming multipurpose classrooms for adults and after-school kids' facilities to be more uplifting, usable and comfortable. More challenging, the work had to be inexpensive and lasting for the non-profit client's carefully monitored budget, too.

"Our work was to reimagine the classrooms creating an inspiring, adaptable and healthy place for learning," says Andrew Franz. "So we directed the improvements to things that had the most impact—not just visually, but also in terms of supporting effective education."

The best value for groups like Union Settlement Association often start with fresh painting; lighting controls, such as dimmers; and window treatments. Andrew Franz Architect also recommended new furniture; acoustical control; and educational additions, such as whiteboards, pin-up boards and cubbies—all in support of the group's central mission.

"Best of all, through a team fundraising effort, most of the construction services and materials were donated," Franz recalls. "This year students and teachers are enjoying brighter, fresher, and more functional and fun spaces for growth and learning."



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