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* Sense of Style:

Two Historic Buildings Set the
Tone for a Redevelopment in
Westport, Conn. + More Retail and
Mixed-use Projects

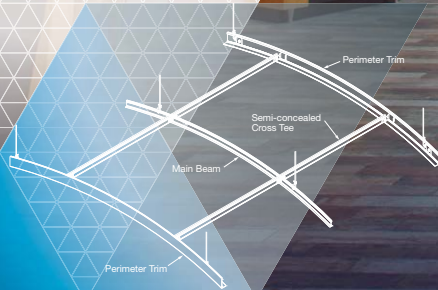
* TREND ALERT:
safety on
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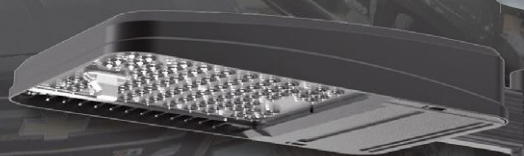
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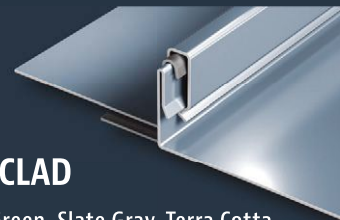
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- Jersey Shore State Bank, Williamsport, Pa.
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- Central Maine Toyota, Waterville, Maine
- 31 East 74th Street, New York
- Karl Chevrolet, Ankeny, Iowa
- Rockler Woodworking and Hardware, 34 Locations
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← cover

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NATHANIEL RILEY PHOTOGRAPHY

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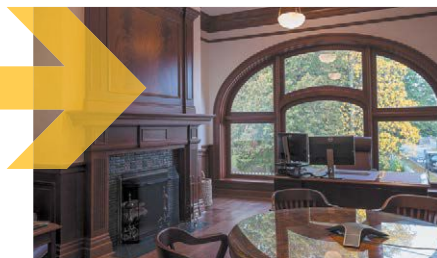
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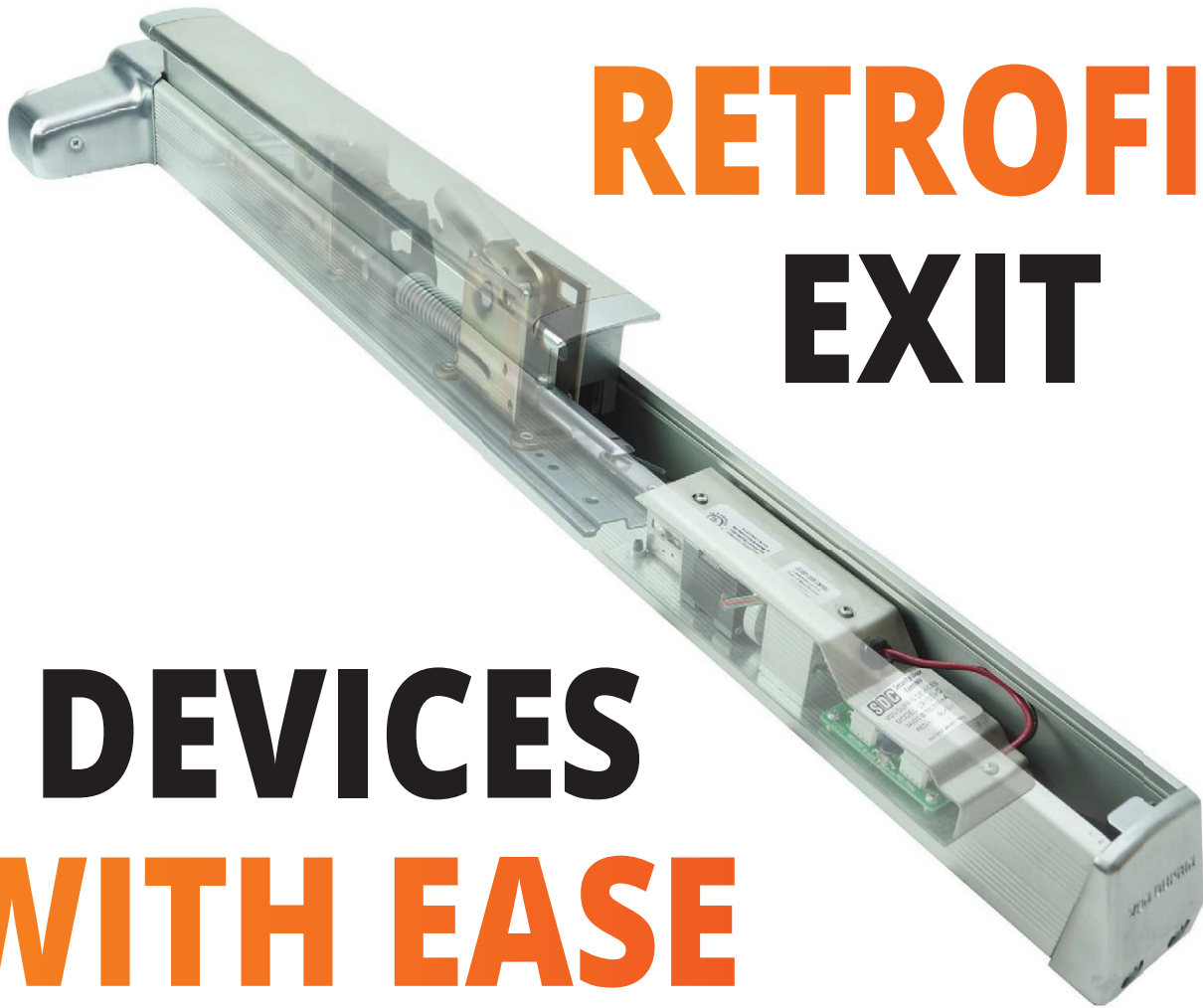
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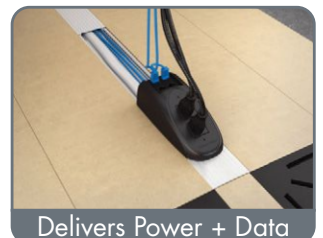


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RETAIL THERAPY



My husband and I have been finishing our basement for the past two years. It's almost complete (hopefully done by the time this issue hits the streets), and I'm so over it. Creating living spaces in a raw, concrete block basement was stressful (and drawn out); I've definitely had enough of home-improvement projects for a while.

This probably sounds like the opposite of what someone who makes her living championing the great work of the design and construction industry should be saying. Therefore, I should point out some of my angst over the remodeling process came from the retail options available to me. I live in a rural part of Iowa and, consequently, do most of my shopping online. However, there were times during our basement remodel when I needed to touch items and compare colors, and my computer screen just wasn't cutting it.

To solve this problem, I made a list of all the items I wanted to experience in person—wallpaper, for example—and planned a trip to the largest city near our house (an hour and a half away). I stopped at three brick and mortar stores in the city and none of them carried the items I wanted to consider. If they did have the item, there were only a couple options from which to choose or, in the case of the wallpaper, sample books to flip through, but I couldn't buy rolls immediately and bring them home. All the sales associates said the same thing, "You'll have to order that online."

I was disappointed to say the least and a bit surprised, considering brick and mortar stores are struggling against online shopping behemoths, like Amazon. One of the brick and mortar stores that forced me online actually lost my business—not because I found the item I wanted cheaper online but because I already had ordered from and had an account with another online retailer who had the same item. The ease of not setting up a new account was enough to pull me away from the brick and mortar store's site.

To lure shoppers back into their buildings, this issue of **retrofit** illustrates how stores are updating, evolving and creating experiences for patrons. One way to do that is to adapt historic buildings for retail, as in our "Cover Story", page 22, written by regular **retrofit** contributor KJ Fields. Centerbrook Architects and Planners, Centerbrook, Conn., created a 110,000-square-foot mixed-use development of retail, entertainment and residential units in the affluent community of Westport, Conn. New buildings were built around and inspired by two existing buildings in the development. These existing buildings' Tudor style not only was restored, but also extended to the additions, transforming downtown Westport into a beautiful live-work-play area. According to Jefferson B. Riley, principal at Centerbrook Architects and Planners, the redevelopment meets his team's goal of restoring "the lost art of living closely together" within suburban-oriented Westport.

For retailers, hoteliers, hospital administrators and other commercial and institutional facilities' managers who want to manage their buildings' energy use via a continuous-improvement process model, 50001 Ready is the program. It recognizes facilities in the U.S. that self-attest to conformance to the ISO 50001 Energy Management System standard. In "Energy", page 42, Pete Langlois, an engineer and program manager with the Washington, D.C.-based U.S. Department of Energy's Advanced Manufacturing Office, explains 50001 Ready and how it can help manage energy like other "key expenditures".

Now that retailers are luring customers back to brick and mortar stores by creating unique customer experiences, as well as striving to be more energy efficient, let's hope they also figure out the perfect balance of what to carry in stock and what to force their customers to buy online. Then maybe the brick and mortar stores could give Amazon a run for its money.

Christina Koch

CHRISTINA KOCH
Editor in Chief

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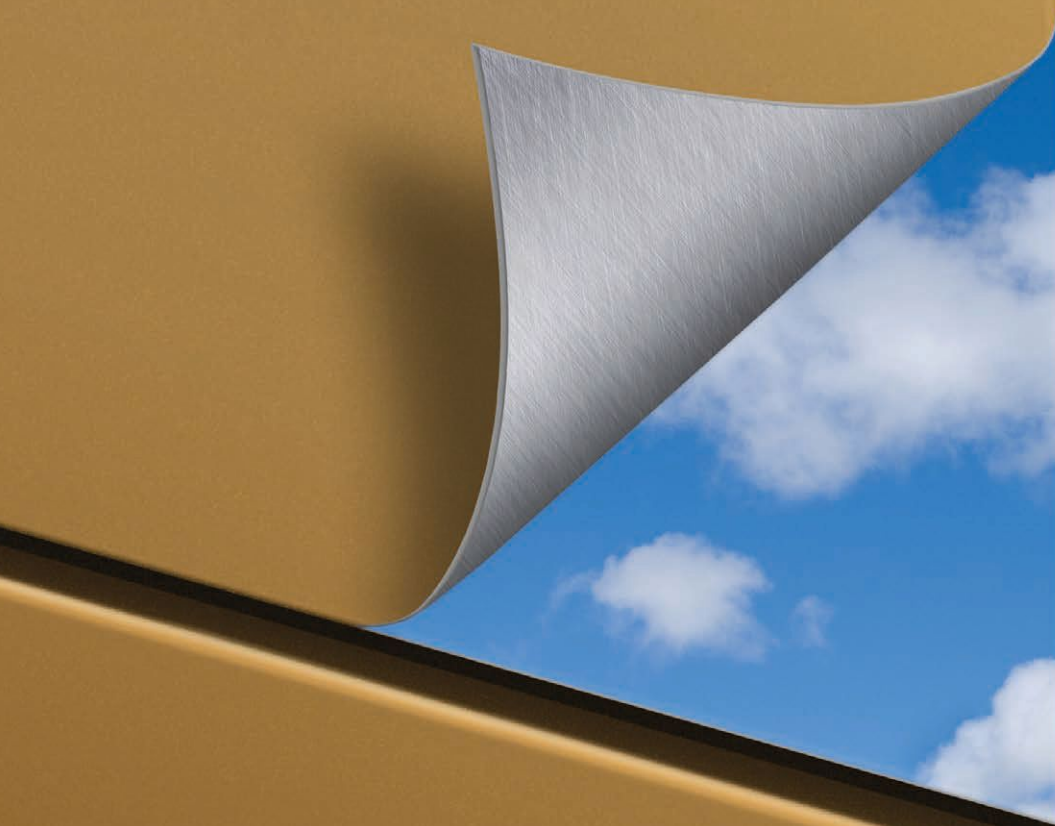


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CONTRIBUTING WRITERS



In the "Cover Story", page 22, **KJ Fields**, a Portland, Ore.-based **retrofit** contributor, writes about a project in Westport, Conn., an affluent community on the Long Island Sound. Two existing Tudor-style buildings—a former YMCA and firehouse—inspired and became part of a dense redevelopment of retail, entertainment and residential facilities.



The Washington, D.C.-based U.S. Department of Energy is helping organizations create sustainable energy savings via its 50001 Ready program. **Pete Langlois**, an engineer and program manager with DOE's Advanced Manufacturing Office, writes about the program in "Energy", page 42. Jay Wrobel with DOE; Christine Wu with Lawrence Berkeley National Laboratory, Berkeley, Calif.; and Michael Stowe with Advanced Energy, Raleigh, N.C., contributed to the article.



The Schaumburg, Ill.-based American Architectural Manufacturers Association Certification Manager **Jason Seals** directs the association's certification-related activities from his home office in Texas. Based on his expertise, Seals discusses in "Component", page 46, the AAMA Field Testing Agency Accreditation Program, which validates fenestration products are field tested according to accepted test methods.



Aaron Benker, remediation resource manager, is a principal at Minneapolis-based Wenck, a consultancy of engineers, scientists, hazardous materials specialists and more. In "Transformation", page 52, Benker underscores that brown-field redevelopers must consider risks from and know how to mitigate vapor intrusion.



Lisa Gelfand, FAIA, LEED AP, is managing principal of Gelfand Partners Architects, San Francisco, where she has designed or supervised the design of more than 40 education projects and 6,000 units of affordable housing. As such, she writes in "Multifamily", page 62, about Kelly Cullen Community, a historic YMCA building that today houses the formerly homeless and provides medical services in San Francisco.



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CLEAR UP CONFUSION ABOUT CURTAINS AND FIRE CODES

Although smoke and fire protective curtain assemblies have been used extensively in Europe since the 1980s, they are still relatively new to North America. Recently, test standards and codes have been developed so additional compliant applications are available for North American markets. However, evolving standards and codes have left some designers and code officials confused and uncertain as to which standards and codes apply to fire- and smoke-protective curtains. This article seeks to clear up that confusion.

www.retrofitmagazine.com/confusion-curtains-fire-codes

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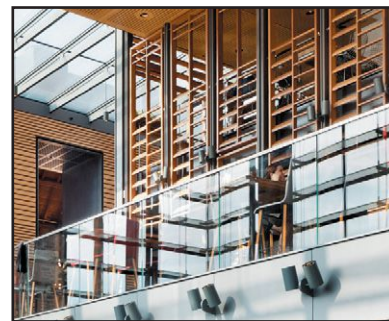
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IWBI Opens Registration for WELL Community Standard Pilot

The New York-based International WELL Building Institute (IWBI) has opened registration for the WELL Community Standard pilot, a companion to the pioneering WELL Building Standard. Grounded in evidence-based research and developed through consultation with leading physicians, scientists and public health professionals, as well as city planners, engineers and architects, the WELL Community Standard is a district-scale rating system centered exclusively on human health and wellness. ¶ The WELL Community Standard builds on the principles of the WELL Building Standard, a performance-based system for measuring, certifying and monitoring features of buildings that impact the human experience. It aims to set a new precedent for planning, building and development by providing a thorough understanding of how communities can employ actionable strategies and interventions to support the health and wellbeing of their residents across all aspects of community life. ¶ “The WELL Community Standard is an important next step in what I like to call the ‘second wave of sustainability’, whereby the environments we construct actively promote human health and wellness,” says IWBI Chairman and CEO Rick Fedrizzi. “We are excited to unveil this program and believe that with its tremendous reach, the WELL Community Standard has a revolutionary capacity to truly enhance people’s health and quality of life on the widest scale to date.” ¶ Building off existing WELL programs and incorporating features specific to urban scale developments, the WELL Community Standard focuses on 10 concepts that impact human health and wellness: ■ Air ■ Community ■ Fitness ■ Light ■ Materials ■ Mind ■ Nourishment ■ Sound ■ Temperature ■ Water ¶ The standard benefitted from expertise provided by several notable community-level projects,

including Water Street Tampa, Tampa, Fla., which inspired the creation of the standard in September 2015 when Tampa-based Strategic Property Partners LLC, the developer of Water Street Tampa, joined President Bill Clinton at the Clinton Global Initiative, New York. Water Street Tampa was the first adopter of WELL’s approach for a community founded on health and wellness as part of its core development principles. Located in the heart of downtown Tampa, Water Street Tampa intends to revitalize the surrounding area and create an urban, mixed-use waterfront district consisting of more than 9 million square feet of new commercial, residential, hospitality, cultural, entertainment, education and retail uses, totaling approximately \$3 billion in private investment. ¶ Other working group member projects include the Tropicana Field Conceptual Master Plan Project in St. Petersburg, Fla., which is a proposal for redeveloping the current 86-acre Tropicana Field site into a mixed-use destination district that will feature housing, office buildings, retail spaces, public parks and plazas, and even a research and tech campus, as well as a new baseball stadium in the northeast corner of the site. ¶ In addition to the significant contributions by these and other projects, IWBI collaborated with a robust team of other working group members and contributors to develop the pilot program. The members, who were instrumental in refining program operations and providing expert content recommendations for community elements and features, include several of the building and health fields’ most highly esteemed organizations, professionals and subject matter experts. ¶ To learn more, visit www.wellcertified.com.

GLOBAL REAL-ESTATE SECTOR IMPROVES ENVIRONMENTAL, SOCIAL AND GOVERNANCE PERFORMANCE

Amsterdam-based GRESB, the Global ESG Benchmark for real assets, has released the results of its annual 2017 GRESB Real Estate Assessment for the North American real-estate sector.

Globally, a record 850 property companies and real-estate funds completed the assessment, representing 77,000 assets and more than \$3.7 trillion in value. The average GRESB score increased to 63 points, up 3 from 2016. Listed property companies continue to outperform private entities, and entities focused on offices outperform other property types.

The new GRESB data shows tangible improvements in environmental, social and governance (ESG) performance. Globally in 2017, the sector:

- Reduced like-for-like energy consumption by 1.1 percent, equivalent to 79,827 U.S. homes.
- Reduced like-for-like carbon emissions by 2.2 percent, equivalent to 113,000 passenger cars.
- Reduced like-for-like water consumption by 0.5 percent, equivalent to 999 Olympic swimming pools.
- Diverted 52.9 percent of landfill waste, equivalent to 399,008 truck loads.

The results show the energy improvements made in recent years by the global real-estate sector are in line with the energy reductions targets set out in the United Nations-supported Sustainable Development Goals.

Sander Paul van Tongeren, co-founder and managing director at GRESB, says: “We are delighted to see an increase in the number of participants and assets across all regions for eight consecutive years. It’s encouraging that, once again, GRESB participants were able to lower energy, water and carbon emissions. We hope that the commitment and meaningful actions taken by the 850 GRESB participants serve as an example to others and help to drive improved sustainability performance more broadly across the market.”

Two-hundred-four companies and funds in North America representing \$2.3 trillion in assets under management reported on their ESG performance in 2017. This represents a 15 percent increase in participants from 2016. The average GRESB Score for the region increased to 64 from 59. This not only represents a higher rate of increase than other regions, but also places the North American sector ahead of the global average.

North American property companies and funds achieved a 2.5 percent reduction in energy consumption, 2.9 percent reduction in carbon emissions and 1.3 percent reduction in water consumption.

More than 59 companies and funds in North America completed the voluntary Health & Well-being Module, a sign that the region is embracing this important industry theme.

For more information about the 2017 GRESB data and Regional Sector Leaders, visit the GRESB real estate results page at gresb.com/2017-real-estate-results.



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THE MILL AT DOVER-FOXCROFT

LG's VRF System Delivers Total Tenant Comfort in Mixed-Use Mill Complex and Integrates Seamlessly with Water-Source Geothermal System for High Energy Efficiency



CHALLENGE

Located on the picturesque Piscataquis River in Maine, The Mill at Dover-Foxcroft is 60,000 square foot complex comprised of nine structures built between 1841 and 1944. After sitting vacant for nearly a decade, Arnold Development Group embarked on a full renovation of the complex to develop a mixed-use building complete with residences, office space, a cafe and a boutique inn.

On the National Register of Historic Places, the renovation of The Mill required an update to modern amenities with limited modifications of the building's envelope. In addition to the preservation of the structure, the developer also desired to make the building a net-zero facility in the future with plans to restore the turbine of the pre-existing hydro-electric dam.

CRITERIA

Located 100 miles from the Canadian border where during the winter months the temperature can frequently sustain below freezing temperatures, the new HVAC system needed to provide year-round comfort. On top of functioning in the extreme conditions, in order to achieve the desired net-zero impact, the HVAC system needed to be energy efficient while still delivering on the specific comfort requirements of the varying businesses operating throughout the complex. All of this had to be achieved with minimal modification to the structure in order to preserve its historic nature.

SOLUTION

After evaluating the needs of the project, Ranor Mechanical, recommended LG's Water Source VRF system to The Mill at Dover-Foxcroft. The robust solution featured 180 tons of LG Multi V™ Water IV Heat Recovery Units that tied into the geothermal well system and included a variety of indoor units, such as ceiling cassettes, wall mounts, high static ducted and floor standing indoor units. By implementing a predominantly duct-free solution, the small refrigerant piping was minimally invasive to the building's envelope. The design flexibility of the LG VRF solution allowed for the appropriate mix of indoor units to be used to meet the comfort and aesthetic requirements of each space.

In addition to the space savings from eliminating the need for bulky ductwork, the condensing units themselves are substantially smaller than a conventional system. With a small and compact footprint, the LG Multi V Water IV units were

installed in the mechanical room under the building. This placement not only serves to make the units unobtrusive, but allows for easier control of the temperature from the source water loop which enables the system to effectively heat in the extreme temperatures.

One of the key requirements of the new system was energy efficiency. With future goals of creating a net-zero building, The Mill chose to maximize efficiencies by implementing LG water source, heat recovery units that tied into nine, 1000 ft geothermal wells. The Multi V Water IV units were easily incorporated to the geothermal well system and used water control valves to regulate the operating pressure to the VRF units for improved efficiency. Heat recovery units were selected for the mixed-use complex due to the varying temperature demands across the spaces. By choosing a heat recovery system, The Mill is able deliver simultaneous heating and cooling while balancing the comfort demands of each occupant across the building. This not only allows for superior comfort and maximizes the energy efficiency, but it also lowers the operating costs and eliminates the need to have a secondary system to supply heat.

RESULTS

By only using small piping rather than traditional, large ductwork, the Multi V Water IV system seamlessly blends into the building's interiors without disrupting the exterior. The architectural integrity of the historic mill complex and compliance with the guidelines set forth by the National Register of Historic Places were both met with no issue. In recognition of this accomplishment, the architect was awarded Maine's Historic Preservation Honor Award for Stewardship in 2015.

"The energy-efficient LG Multi V VRF system met all criteria with flawless performance, and it tied in perfectly with the geothermal wells to generate big cost savings and improve energy efficiency," said developer Jonathan Arden. "The Mill has retained its architectural integrity and was honored to remain on the Historic Register and receive a prestigious Stewardship award. All of our various tenants and customers, whether living at The Mill, working in the office space or enjoying coffee at a café located on-site, are comfortable and happy, even in the coldest winter months in Maine."

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retrofit's Inaugural Conference Is a Success

retrofit hosted its first conference on Oct. 12 at Chicago's Navy Pier. The conference included a lineup of fantastic speakers who are experts in Chicagoland building retrofits, as well as two highly motivational keynotes to inspire attendees. The conference also offered CEUs from the Washington, D.C.-based American Institute of Architects and Green Business Certification Institute.

The day kicked off with a keynote from Jason Roberts, chair of the Better Block Foundation. Roberts recalled how, in 2010, he 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.

The afternoon keynote from Ashok Gupta, senior energy economist, programs, at the New York-based Natural Resources Defense Council, focused on policies relating to global warming, energy efficiency, renewables, sustainable building design, smart growth and transportation.

The conference's three educational sessions—Benchmarking, Financing and Commissioning & Building Envelope—featured a panel of three speakers per session who presented for 20 minutes each. Thank you to our speakers for sharing thought-provoking presentations:

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

FINANCING

- Amy Jewel, Chicago city advisor with the City Energy Project
- Kimberly Loewen, associate director, Technical Services and Building Technology, Elevate Energy, Chicago
- Jack Crane, senior vice president and director of lending, Community Investment Corporation, Chicago

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



“The **retrofit** conference is the only conference I know of where industrial and commercial facility owners and managers can hear information specific to retrofitting their facility. This focus provided an in-depth opportunity that isn't available at conferences that blend retrofit topics with new construction or O&M topics. — Doug Hargrave, GGA, CEM, Iconergy”




“ I thoroughly enjoyed the **retrofit** conference! It had a good mix of industry professionals—from designers, specifiers, owners, research and sustainability specialists, media and legislative experts—with very engaging and thought-provoking presentations on a myriad of topics. —Kelly Adighije, CEng, IMechE, LEED AP BD+C, BCxP, BEAP, GGP, senior mechanical engineer, Baumann Consulting ”

A special thank you to our industry advisors who helped make introductions and garner speakers and support for the conference:

- Nathan M. Gillette, AIA, LEED AP O+M, director of Natura Architectural Consulting LLC, Grand Rapids, Mich., and a **retrofit** editorial advisor
- Paul R. Bertram Jr., FCSI, CDT, LEED AP BD+C, GGP, president of PRB Connect LLC, Casselberry, Fla.

There was opportunity to network and socialize throughout the day in our Tabletops Area. Here attendees talked with our generous sponsors—without whom the conference would not have been possible—about materials and systems for effective building retrofits.

Finally, we ended the day with a cocktail reception to celebrate a successful conference. 



Bookmark www.retrofitconference.com and follow **retrofit** on social media for updates about the 2018 retrofit conference.



THANK YOU TO OUR SPONSORS!



FROM INSPIRATION



An hour's drive from New York City, Westport, Conn., is an affluent community on the Long Island Sound marked by a quaint downtown and suburban living. When the YMCA's representatives decided to move, the former complex's prime location at the edge of the downtown historic district attracted the Bedford Square Associates' developers, who are based in Westport.

They purchased adjacent land to create a 1.5-acre site and commissioned Centerbrook Architects and Planners, Centerbrook, Conn., to design a 110,000-square-foot redevelopment.

"We created a very dense mixed use of retail, entertainment and residential units, which was unusual for Westport," describes Jefferson B. Riley, principal at Centerbrook Architects and Planners. "Our

goal was to restore the lost art of living closely together within this suburban-oriented town. The historic Bedford Building's charm, scale and integrity served as the perfect inspiration for the rest of the project."

Built in 1923, the Bedford Building was a gift to the YMCA. A Firehouse of the same era was erected next to the Bedford Building and, over time, the YMCA took

TO TRANSFORMATION

Two Historic Buildings Set the Tone for a Redevelopment in Westport, Conn.

WRITTEN BY | KJ FIELDS



Watch Bedford Square's key players talk about goals for the project.

ownership of the Firehouse. Although not characteristic of Westport's architecture, the Bedford Building and the Firehouse were constructed in the Tudor style, featuring brick, half-timber and stucco. The YMCA kept the original Bedford Building and Firehouse intact, but a 1977 expansion left the complex with an awkward set of non-historically sensitive additions.

Playful Details

Poised at the corner of Main Street and Boston Post Road, the Bedford Building's hand-carved gargoyles and rake boards support its slate-shingled steep-slope roofs. Exterior walls of battens on stucco have ornate wood trim around windows and doors. "The building's playfulness lent humanism to the project's overall design,"

Riley says. "We steered away from glass and steel modernism, but we infused contemporary design elements into the redevelopment to meet modern needs."

To comply with historic district requirements, Centerbook Architects and Planners had to preserve the public street façades of the Bedford Building and Firehouse. Removal of the 1977 structures cleared the site for new residential



Retrofit Team

ARCHITECT // Centerbrook Architects and Planners, Centerbrook, Conn., www.centerbrook.com

- Jefferson B. Riley, principal in charge
- Mark Herter, associate principal and project manager
- Peter Cornell, project architect
- Jennifer Shea, project architect

STRUCTURAL AND MEP/FP CONSULTANT // BVH Integrated Services, Bloomfield, Conn., www.bvhis.com

CIVIL/SURVEY AND LANDSCAPE CONSULTANT // Langan Engineering & Environmental Services, New Haven, Conn., www.langan.com

CODE CONSULTANT // Philip R. Sherman, Elkins, N.H.

ACOUSTICAL CONSULTANT // Acentech, Cambridge, Mass., www.acentech.com

ELEVATOR CONSULTANT // VDA—Van Duesen & Associates, Boston, www.vdassoc.com

CONSTRUCTION MANAGER // Turner Construction, Shelton, Conn., www.turnerconstruction.com

OWNER // Bedford Square Associates, Westport, Conn., www.bedfordsquare.com

OWNER'S REPRESENTATIVE // Chrusciel Group, East Longmeadow, Mass., www.chruscielgroup.com

units, community gathering spaces, public courtyards, pedestrian alleyways, tree-lined sidewalks and underground parking. Careful and selective demolition of the back side of the historic structures prepared the buildings to house stylish retail environments.

Under Pressure

The team dug down approximately 20-feet behind the buildings to create an underground garage and add new lower levels for the Bedford Building and Firehouse. The Saugatuck River flows one-block away from the site, and it had been commonplace for the YMCA and portions of Main Street to flood.

"The water table is 2 1/2-feet above our parking-garage ceiling," notes Mark Herter, associate principal at Centerbrook Architects



ABOVE: THE HISTORIC BRICKWORK HAS DEEP RAKED JOINTS THAT CREATE A HARD SHADOW LINE, WHICH MAKES THE BRICKS VISUALLY STAND OUT. IN THE NEW BRICK PORTIONS (BELOW), A SLIGHT BEVEL AT THE BOTTOM OF THE JOINT GIVES A HARD SHADOW LINE AT THE TOP TO COMPLEMENT THE HISTORIC WORK.



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AS PART OF THE YMCA, THE BEDFORD BUILDING HAD TWO STACKED GYMNASIUMS ON THE NORTHEAST SIDE, WHICH OFFERED OPEN FLOOR PLATES. BY REMOVING THE GYMNASIUMS' 4-STORY SOUTH MASONRY BEARING WALL, A MONUMENTAL STAIR AND SKYLIGHT CONNECTS ALL FLOORS AND FILLS WHIMSICAL RETAILER ANTHROPOLOGIE WITH DAYLIGHT.

and Planners. "We had to design the basements as bathtubs to deal with the ground water and resist hydrostatic pressure to an elevation 12-feet above sea level in order to meet the new FEMA flood elevations. We could have designed a massive slab, but installing 37 rock anchors was a far more efficient approach."

On the back side and beneath the two historic buildings, the team drilled 6-inch-diameter caissons into solid bedrock, which varied at elevations below the site at depths of 30 to 60 feet. Team members inserted cables into the caissons and epoxied them to the rock. Then, the cables were pre-tensioned and secured with a steel plate before the team filled the caissons

with concrete. The cap of the rock anchor sits at the center of the slab within the reinforcing bars. Thanks to the rock anchors, the concrete slab can withstand a design flood pressure of 1,000 pounds per square foot. The new slab is 2-feet, 6-inches thick, compared to the 7-foot-thick slab that the YMCA had in its former pool.

The exterior masonry bearing walls are triple-wythe bricks, but they lacked the needed lateral structural integrity. Inside the basement of each building, the team built 12-inch-thick concrete walls to resist the hydrostatic pressure. Then, team members tied the rebar in the walls into the rebar in the slab to reinforce the system as a whole.

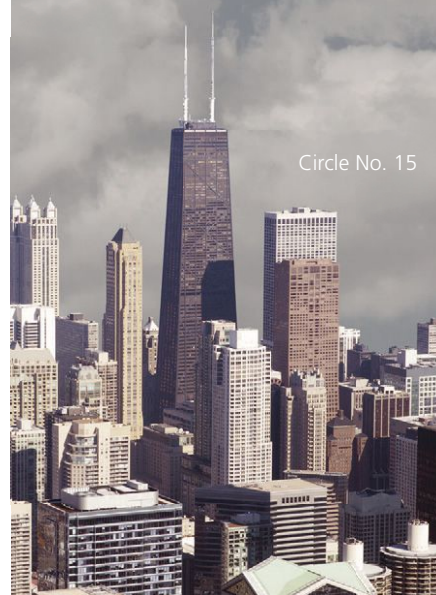


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LEVERAGE MY
POTENTIAL

Circle No. 15





We made significant changes to repurpose the buildings for contemporary uses, and it was critical that we took the time to understand the buildings well and maintain their craft, integrity and history.—Mark Herter, associate principal, Centerbrook Architects and Planners



Water Barrier

As originally built, the Bedford Building basement is a half-flight down and the first floor is a half-flight up. With the street elevation down at 6 feet, 9 inches, if the river were to flood, the basement would be 6-feet underwater. Centerbrook Architects and Planners added two sunken courtyards on the outside of the building with doors and larger windows to offer appealing retail display areas, enhanced daylight and better access. The openings required the team to devise a system that would protect the buildings from floodwaters.

The solution was aluminum sandwich panel flood gates. The panels have

a neoprene gasket around the perimeter. When the user inserts an allen wrench in a socket, it expands the gaskets, creating a watertight barrier. Very large stainless-steel plates bolted to the concrete wall are anchors for the flood gates. The team prepared an Emergency Flood Plan with instructions for a flood event, including where the gates are stored and how to install them. Once the building is evacuated, the gates can be secured in place within hours.

“Some of the flood gates get installed on the front side fully visible from the street, so we had to design concealed attachment details to remain true to the historic character of the buildings,” Herter explains. “We made significant changes to

repurpose the buildings for contemporary uses, and it was critical that we took the time to understand the buildings well and maintain their craft, integrity and history.”

Floor Space

Masonry bearing walls in the center of the Bedford Building had to be removed to provide open retail floor plates. Because the walls supported timber framing at the roof and floors, the team had to shore up the structure with a series of steel frames and columns before removing the bearing walls.

As part of the YMCA, the Bedford Building had two stacked gymnasiums on the northeast side, which already offered open floor plates. The south masonry bearing



Materials

CLAD WOOD WINDOWS // Marvin Windows and Doors, www.marvin.com

EXISTING BRICK // Cleaned and repaired

NEW BRICK TO MATCH EXISTING // Glen-Gery, www.glengery.com

NEW BRICK AT ADDITION // Redland, www.redlandbrick.com

BRICK PAVERS // Whitacre Greer, wgpaver.com

EXISTING SLATE // Repaired and reflashed

NEW SLATE AT ADDITION // EcoStar LLC (Majestic Slate), www.ecostarllc.com

EXISTING WOOD TRIM // Repaired or replaced with mahogany profiles to match, repainted

NEW EXTERIOR TRIM AT ADDITION // Boral, www.boralamerica.com

NEW EXTERIOR CLADDING AT ADDITION // James Hardie, www.jameshardie.com

NEW CURTAINWALL AND SKYLIGHTS AT ADDITION // Oldcastle BuildingEnvelope, www.obe.com

DISPLAY WINDOWS AT COURTYARD // Custom steel

MEMBRANE ROOF AT ADDITION // Firestone Building Products Co., www.firestonebpco.com

BELOW-GRADE WATERPROOFING // W.R. Grace & Co., www.grace.com

GREEN ROOF // American Hydrotech Inc., www.hydrotechusa.com

wall of the gymnasiums was 4-stories tall. Once removed, it created a spectacular location for a monumental stair and skylight, connecting all floors and filling the space with daylight.

In all, the design extracted five bearing walls in the Bedford Building and one in the Firehouse. A clear plan of action was essential; all of the interior bearing wall removal had to be precisely coordinated with the shoring, rock-anchors and slab work.


Striking Resemblance

Without an ample budget, the YMCA had let the historic windows fall into disrepair. The windows had steel sashes and were single-glazed with lead coming, but replacing them with new energy-efficient steel windows that resembled the originals was cost prohibitive. Energy-efficient windows that matched the profile of the historic window were outfitted with lead coming on the exterior to imitate the Tudor facades. Some of the original windows went to people involved with the YMCA. Others were repurposed and salvaged.

"The impact those two buildings have on the street is stunning," Herter says. "In addition to the windows and detailing,

the brickwork is spectacular." The historic brickwork has deep raked joints that create a hard shadow line, which makes the bricks visually stand out. This masonry process is no longer used because of water-infiltration problems. When the team's masons repaired small sections of existing brick they used salvaged brick and carefully recreated the same original rake joints. Thanks to the original brick type, the kiln-firing process of the time and the mortar mix used, the original masonry withstood the test of time. In spite of the deep raked joints, there has been almost no brick spalling or mortar joint failures on the existing building.

In the new brick portions, a slight bevel at the bottom of the joint allows water to run off yet still gives a hard shadow line at the top to complement the historic work.

"It's rare that a building is restored back to its original condition both inside and out," Riley says. "Here, we conscientiously restored the exterior but gutted the entire interior while taking care to extend the genetic code of the Bedford Building and Firehouse to the additions through details that connect the whole. It's a transformative project for downtown Westport." 



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Circle No. 15

HARBISON COURT |

Columbia, S.C.

» Retrofit Team

PANELS DISTRIBUTOR AND INSTALLER: Abrams Architectural Products, Austell, Ga., abramssales.com

» Materials

As part of the shopping center's 2015 makeover, 25,000 square feet of Omega-Lite ACM panels in Slate Grey were installed as cladding using the manufacturer's proprietary Clip & Caulk installation system.

Omega-Lite ACM panels offer a decorative and durable surface finish for exterior wall surfaces. Composed of a polypropylene, lightweight corrugated core between two finished aluminum sheets, these panels are non-absorbent, water-resistant and easy to maintain. The Clip & Caulk installation system provides a rout and return look without prefabricating the panels, reducing the total installed cost and project timeline. It provides a flat look without visible fasteners. Panels can be cut onsite with few peripheral accessories needed for installation.

Omega-Lite installed with the Clip & Caulk system guarantees Harbison Court a Class A fire rating, as well as meets NFPA 285, Miami-Dade County Product Control and Florida Product Approval requirements.

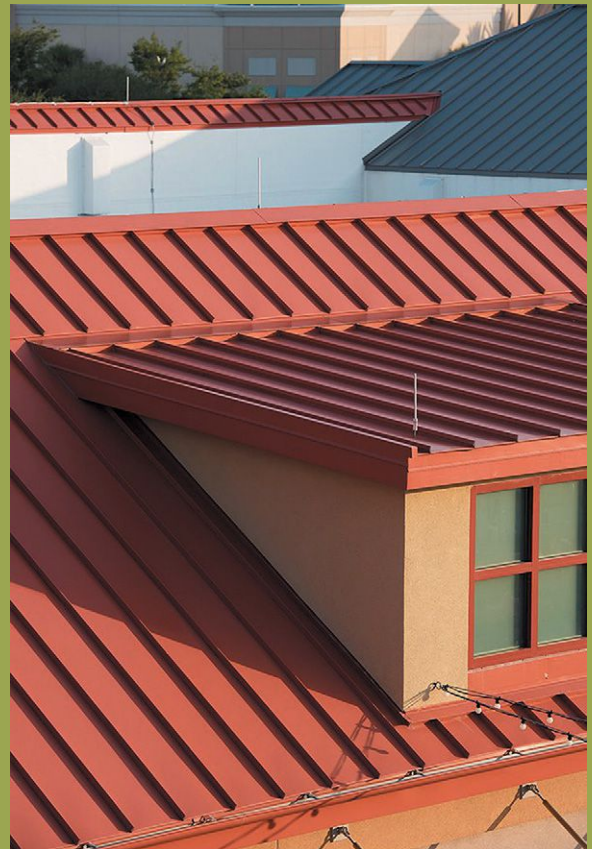
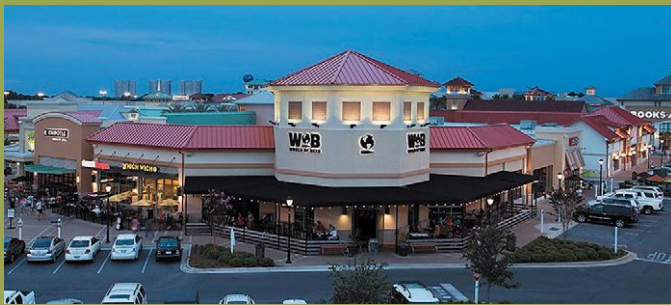
ACM PANELS MANUFACTURER: Laminators Inc., www.laminatorsinc.com

» The Retrofit

Strategically located near I-26 and in the primary retail corridor of a growing residential area, Harbison Court has more than 301,000 square feet of retail property. Originally opened in 1991, the shopping center was re-developed in 2006 before receiving its facelift in 2015. Some of its major tenants include Babies "R" Us, Marshalls, Nordstrom Rack, Olive Garden, Ross Dress for Less and Starbucks.



PHOTOS: LAMINATORS INC.



PHOTOS: PETERSEN ALUMINUM CORP.

DESTIN COMMONS | Destin, Fla.

» Retrofit Team

ARCHITECT: JPRA Architects, Farmington Hills, Mich., jp.ra.com
 ROOFING INSTALLER: Infinity Metal Systems, Lake City, Ga., (404) 361-0029
 ROOFING DISTRIBUTOR: Commercial Roofing Specialties, College Park, Ga., www.crrsupply.com

» Materials

PAC-CLAD roofing panels were specified on the original Destin Commons development in 2003 and continue to be the roofing material of choice for the high-end development. The Phase II expansion is clad with more than 30,000 square feet of Petersen Aluminum Corp.'s Snap-Clad 24-gauge, 16-inch-wide panels finished in three complementary colors—Arcadia Green, Slate Gray and Terra Cotta—all of which

are PAC-CLAD Cool Colors. The panels were fabricated at Petersen's Acworth, Ga., plant.

Although Destin Commons is located less than 1/2 mile from the Gulf of Mexico in a corrosive saltwater environment, steel was selected for the project versus aluminum because of budget constraints. Valspar, Petersen Aluminum's partner since 1972, wrote a finish warranty on the steel application.

"It was a good job for us—probably one of the best we've done as far as workmanship," says Ken Murray, owner of Infinity Metal Systems. "There were multiple buildings involved with various applications and complexities. We're proud of it. There weren't any issues or difficulties to overcome." Infinity Metal Systems is a regular user of Petersen metal systems.

ROOF PANELS MANUFACTURER:

Petersen Aluminum Corp., pac-clad.com

ROOFING FINISH MANUFACTURER:

Valspar, valspar.com

» The Retrofit

The major expansion of Destin Commons further establishes its reputation as the premier open-air lifestyle center offering the best in shopping, dining and entertainment on Florida's Emerald Coast. The Phase II expansion adds 100,000 square feet to the 500,000-square-foot family-oriented shopping environment. The complex looks more like a European village with its corner turrets, old-fashioned clock towers and fountain plazas. Destin Commons also includes 70,000 square feet of Class A office suites.

JERSEY SHORE STATE BANK | Williamsport, Pa.

» Retrofit Team

SHADING INSTALLERS: Master Contractors, Williamsport, mastercontractorsinc.com

» Materials

This contemporary bank was built in the early 1980s and features a large sloping 3-story façade terminating in a single-story “skylight canopy”. The retail portion on the first floor featured a live tree, growing up through an opening in the second floor. The tree recently was removed because it had outgrown the space, and the opening in the second floor was closed to provide a location for a new corporate boardroom. Unfortunately, the space was subject to severe heat gain because the unshaded west-facing glass façade was exposed to direct sun.

The solution is the Skyliter Shading System, which includes 54 rotating fabric light-

shelves, each 30-inches deep and around 65-inches wide. The lightshelves, which are connected and motorized in banks of six, consist of Alkenz 3000HT (3 percent) fabric mounted in a custom powder-coated aluminum frame. External motorized tubes above each bank of lightshelves control the system through a series of stainless-steel wires. Each of the nine tubes contains a Sonesse 50 RTS motor hardwired and commissioned to operate as three individual “stories” of 18 lightshelves.

LIGHTSHELVES MANUFACTURER: Indoor Sky LLC, www.indoor-sky.com

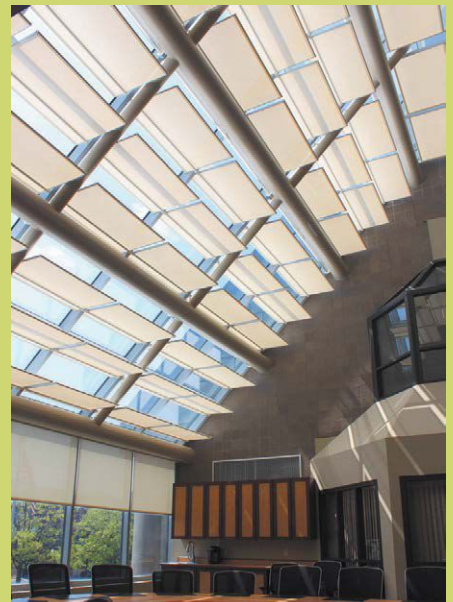
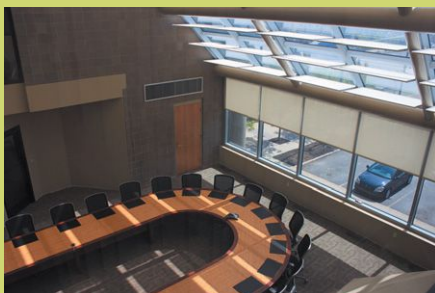
FABRIC MANUFACTURER: Rollease Acmeda, www.rolleaseacmeda.com

MOTOR MANUFACTURER: Somfy, www.somfysystems.com

» The Retrofit

The Skyliter Shading System is designed to block direct solar heat gain while allowing glare-free, diffused daylight to bounce between the fabric lightshelves and deep into the space. For late afternoon sunlight penetrating at low angles, the lightshelves may be rotated closed to fully protect the space; in winter, they might be left open to allow warmth from the sun to contribute to heating the building. Occupants may elect to close just the lower band of lightshelves or any combination.

The shading system was flexible enough to overcome the fact that the large structural tube framework supporting the glazing was 2 1/2 inches off center. The fixed “canopy” portion of the system capped off the installation from an aesthetic viewpoint and a functional shading viewpoint.



View a video of the bank's president/CEO discussing the new shading system.

PHOTOS: INDOOR SKY LLC

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Circle No. 16



ROYAL HAWAIIAN CENTER | Honolulu

» Retrofit Team

ARCHITECT: AHL, Honolulu, www.ahldesign.com
 GENERAL CONTRACTOR, BUILDING A: Swinerton Builders, Honolulu, www.swinerton.com
 GENERAL CONTRACTOR, BUILDING C: JW Inc., Honolulu, (808) 841-5888
 SKYLIGHT INSTALLER, BUILDING C: Alii Glass & Metal Inc., Kapolei, Hawaii, www.aliiglassandmetal.com

» Materials

The center's refreshed exterior seamlessly blends with its lush surroundings, including an added green gathering space for entertainment and cultural programming. On buildings A and C, skylight systems showcase natural light and views. The skylight system on Building A features an electrochromic architectural glass that intelligently transitions through multiple tint states to control the sun's energy for optimum natural light and thermal comfort. The skylight's aluminum framing from Linetec is a Dove Gray color for resiliency under the Hawaiian sun. Linetec's in-house blending laboratory custom-matched and formulated a Charlie Brown color for the 20- by 20-foot pyramid canopy glazing system on Building C.

To mitigate corrosion's destructive results, Linetec supports projects with proper selection, specification, application and maintenance tips for finishes in coastal conditions. When high-performance 70 percent PVDF resin-based coatings are selected, Linetec applies these finishes to meet the Schaumburg, Ill.-based American Architectural Manufacturers Association's stringent industry standards of AAMA 2605-13. In addition to resisting corrosion, these finishes are tested for proven resistance to water, salt spray, humidity, impact, chemicals, detergents, scratches and fading caused by ultraviolet light. Finished aluminum also is fire retardant and does not swell, rot, warp or attract insects.

Supporting environmentally sound practices, Linetec's painted coatings are applied in a controlled facility that safely captures and destroys the VOCs present in liquid solvent-based paints before the finished products' arrival on the building site. The aluminum used to produce these products may utilize recycled content and may be recycled after its useful lifespan.

SKYLIGHT SYSTEMS MANUFACTURER, BUILDINGS A AND C: Super Sky Products

Enterprises LLC, www.supersky.com
 GLASS MANUFACTURER, BUILDING A: View Inc., viewglass.com
 GLASS MANUFACTURER, BUILDING C: Oldcastle BuildingEnvelope, www.obe.com
 ALUMINUM FRAMING FINISHER, BUILDING A AND C: Linetec, linetec.com

» The Retrofit

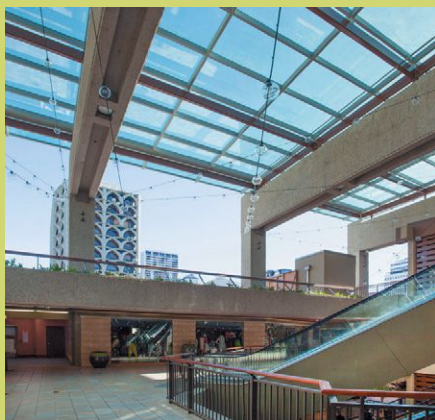
Owned by RHC Property Holdings LLC, the Royal Hawaiian Center opened in 1979 and stands upon a parcel of land known as Heleluma, once home to Hawaiian royalty. Designed in the Brutalist modern style of the time, heavy concrete exterior walls defined the structure with little embellishment or connection to the environment or the community.

After years of increasing vacancy and declining visitors, the first phase of the \$115 million renovation and expansion began in 2005. Callison Companies (now Callison RTKL, a design consultancy of Arcadis) is credited for this initial step in transforming what was once a dark, outdated shopping center into a vibrant, lifestyle-oriented retail and entertainment community. The heavy walls were replaced by open, modern façades and native landscaping.

Concluding its multi-year, multi-building renovation, the center revitalizes and reestablishes itself as a premier shopping and entertainment destination. With more than 110 shops and restaurants in three 4-story buildings, the 310,000-square-foot center is one of Hawaii's largest shopping malls. The 6-acre retail campus connects to the Sheraton Waikiki and Royal Hawaiian Hotel, just minutes from Waikiki Beach.

Recognizing the property's successful transformation, the Royal Hawaiian Center has earned several accolades, including the American Institute of Architects' Honolulu Chapter's Award of Merit, General Contractors Association's Build Hawaii Honorable Mention, Superior Achievement in Design and Imaging Award for Renovated or Expanded Community/Power Center, and Hoowehiwehi Lihi Award from the Waikiki Improvement Association.

Hawaiian culture is celebrated every day at the center with a variety of complimentary cultural-arts activities, such as hula instruction, lauhala weaving, lei-making, ukulele classes, and live entertainment featuring Hawaiian music and hula performances.



PHOTOS: WILLIAM LEMKE, COURTESY OF SUPER SKY PRODUCTS ENTERPRISES LLC



BEFORE

CENTRAL MAINE TOYOTA | Waterville, Maine

» Retrofit Team

ARCHITECT: George Parker Architect,
Damariscotta, Maine,
gparkerarchitect.com

METAL BUILDING CONTRACTOR: Peachey
Builders, Augusta, Maine,
peacheybuilders.com

» Materials

A 1,920-square-foot showroom addition was added to an existing 15,000-square-foot metal building. The existing building and showroom addition include new siding that displays the latest Toyota aesthetic.

The building is a deck frame with metal-stud curtainwalls. The walls are metal studs with DensGlass Sheathing and alu-

minum composite material (ACM) panels. The building is a mixture of pre-engineered systems and conventional elements.

METAL BUILDING MANUFACTURER:
VP, vp.com

SHEATHING MANUFACTURER:
Georgia-Pacific, www.buildgp.com

» The Retrofit

Work occurred during the winter months, so protection from the elements was an ongoing effort. Disruption to the Toyota dealership's operations had to be minimized. Constant coordination and communication helped maintain awareness of operations and construction activities.

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31 EAST 74th STREET | New York

» Retrofit Team

ARCHITECT: Beyer Blinder Belle, New York, www.beyerblinderbelle.com

GENERAL CONTRACTOR: New Line Structures Inc., New York, www.newlinestructures.com

SHEET-METAL CONTRACTOR: B&B Sheet Metal Inc., Long Island City, N.Y., www.bbsheetmetal.com

» Materials

In 2010, Entrepreneur Daniel E. Straus turned his hand to development, remaking six historic brownstones, including 31 East 74th Street, and two townhouses on the Upper East Side into boutique mixed-use property. Because five of the six brownstones date back to the 1890s,

their redevelopment had to be approved by the Landmarks Preservation Commission. The main goal was to maintain the historic details on the façades.

The cornice, baluster and ornamental pieces on Madison Avenue had to match the preceding color but, throughout the years, many layers of paint and rust had accumulated and made it difficult to decipher the original material. The new storefront cornices and balusters are made in 20-ounce copper and cover 30 linear feet, so they had to be made in three segments to facilitate transportation and installation.

The architect wanted to incorporate structural pipes to reinforce the baluster system.

The spacing of the rods and balusters had to be homogeneous to avoid any setback in the scheduling. The entrance pediment hood's design at Madison Avenue followed a curvilinear shape, which had to be made very accurately. Exact dimensions of the eyebrows shape were constantly being ascertained for B&B Sheet Metal to make it in one piece and slide it in place.

Multiple mock-ups were made for the arches and, as a solution, smaller segmented pieces were fastened together to provide the overall arch shape. All the ornamental moldings featured on the cornice were meticulously selected to portray the preceding ones. Although

the building's ground level encompasses 15,000 square feet of new retail space, the completed project retains the vintage façades.

COPPER SUPPLIER: Aurubis Buffalo Inc., www.aurubis.com

» The Retrofit

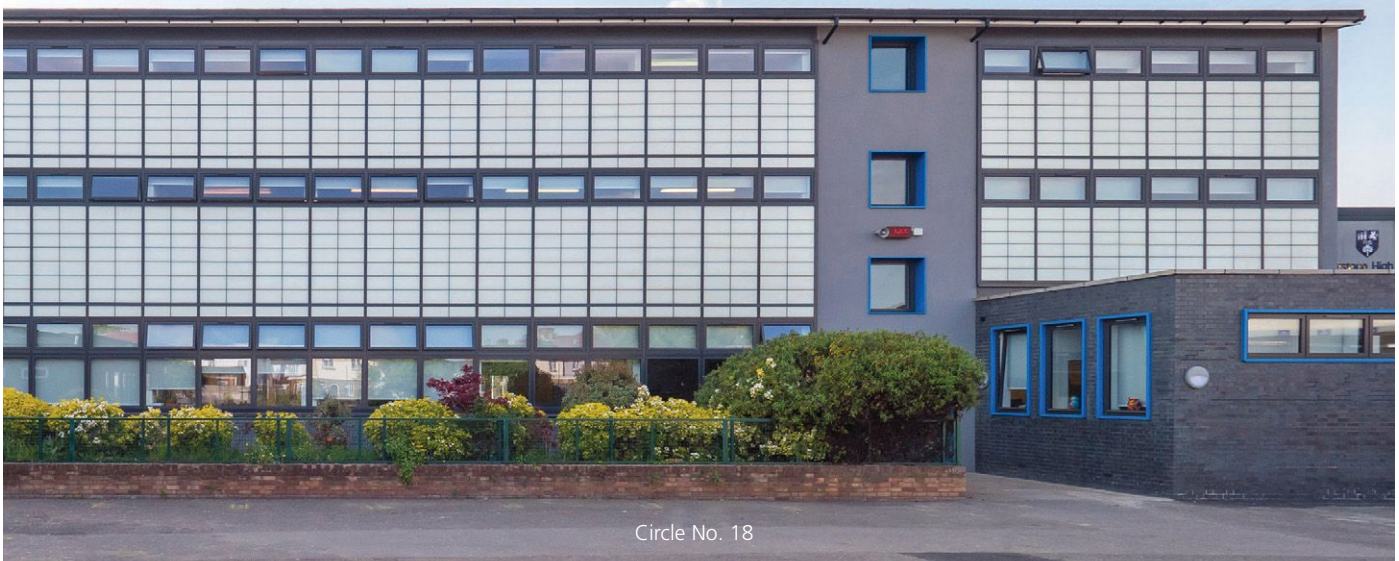
The progression of construction on East 74th Street typifies the development pattern on much of the Upper East Side. Beginning in the early 1870s, at the end of the Civil War, an explosion of speculative brownstone row houses began to surface. Most of the façades of these brownstone houses were replaced in the early years of the 20th century; by then, Fifth Avenue was filling with lavish

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mansions and the side streets followed the trend.

The restoration of this project wasn't an uncomplicated process but bringing this façade back to life pays homage to the original design. In a city where new skyscrapers are rapidly getting erected, preserving the old is becoming rare. Exposing the work of builders whose designs took many hours to create helps this generation improve its skills by building and learning from the legacy left for us. In fact, the project earned a 2017 North American Copper in Architecture Award bestowed by the New York-based Copper Development Association Inc.



PHOTOS: B&B SHEET METAL INC.



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KARL CHEVROLET | Ankeny, Iowa

» Retrofit Team

ELECTRICAL CONTRACTOR: Tesdell Electric, Ankeny, tesdell.com

ELECTRICAL DISTRIBUTOR: 3E, Des Moines, Iowa, www.3e-co.com

LIGHTING DISTRIBUTOR: Lighting Solutions of Iowa, Ankeny, lsiowa.com

» Materials

Since its founding in the 1970s, Karl Chevrolet has had a progressive outlook on new technology. Management knew it wanted to replace the legacy 1,000-watt metal halide fixtures but needed a proven one-to-one replacement and a controls solution that was affordable and compliant with the local utility's program requirements to qualify for a custom rebate. In addition, Karl Chevrolet is located close to one of the busiest stretches of interstate in the Midwest and the solution had to be dependable and work 100 percent as planned.

3E and Lighting Solutions of Iowa developed a lighting solution that included Spaulding Lighting's Arceos ARA3 and Hubbell Control Solutions' wiSCAPE platform. The Arceos ARA3 was designed for mounting heights of up to 50 feet, features the latest LED technology, precision optics, thermal management and controls while providing uniformity for large area/

site applications. The ARA3 is a 1,000-watt HID replacement, offering more than 50 percent energy savings, three lumen options for design flexibility and backlight control to reduce light trespass. By selecting the Arceos ARA3 Type 1A distribution fixture in the front-row applications, the team was able to reduce luminaire count by 60 heads where two existing 1,000-watt metal halide at 1,100 watts each with ballast load could be replaced with one 580-watt fixture. This solution decreases the amount of light spilling onto the streets at night without losing the visual impact of product on the front row.

To further increase energy savings, the lighting team elected to use wiSCAPE to create and control the lighting scenes. The wireless control system is non-invasive and non-disruptive, allowing engineers to avoid a lengthy wiring process and installing relay panels. The wiSCAPE module is supported by wiSCAPE View, a graphical system management software platform that can configure, control, monitor and meter the facility's lighting systems. The wiSCAPE View software empowers facility managers with real-time monitoring, instant alarm notifications from faulty lighting equipment, and increased network efficiency and maintenance operations—all from a smartphone or tablet.

Karl Chevrolet now can dim all fixtures for closed business hours, rather than turning off roughly 50 percent of the poles, resulting in better uniformity after hours. The front row is dimmed to 30 percent and the interior poles dimmed to 20 percent. The dimming also fades to dim to make the change less noticeable. The fixtures have been strategically staggered when turning on to help eliminate inrush.

Because of the higher light levels observed after installation, the team decided to apply a 10 percent high-end trim to max light levels. This will result in even higher energy savings than originally estimated.

A surprising byproduct of the success of the new installation included the elimination of dark spots on the lot. The uniformity of the light was instantly better because of advantages associated with LED technology. The security team at Karl Chevrolet notes the clarity of night-time security footage is 10 times better than it was before. It is now easier to see plate numbers and follow automobiles through the lot.

LIGHTING MANUFACTURER: Spaulding Lighting, www.hubbelloutdoor.com

LIGHTING CONTROLS MANUFACTURER: Hubbell Control Solutions, www.hubbell-automation.com



View a short video
about this project.



Karl Chevrolet's new lighting (left) versus its neighbor's lighting.



» The Retrofit

At 30 acres, Karl Chevrolet is one of the largest single-line Chevrolet dealerships in the U.S. Lighting this site at high light-level requirements is no easy task. Providing performance in a cost-effective manner makes it even more challenging.

In the first full month of operation, the team saw a \$12,500 reduction in energy costs—before wiSCAPE was operating. The annual energy savings is expected to be \$143,465 and the total reduction in energy use will be 74 percent. Added to this figure is an annual maintenance savings of \$11,988. The combination of energy savings and controls enables Karl Chevrolet to qualify for a \$262,000 rebate from MidAmerican Energy, the Des Moines, Iowa-based electric utility. In addition, the payback period is 3.4 years and the internal rate of return is 33 percent.

"If the initial results are indicative of what's to come, the return on this investment in luminaires and controls will be much better than initially predicted," says Shaun Rydl, Karl Chevrolet's facilities manager. "We feel great about our decision to upgrade to LED technology and new lighting controls, especially when we see that waiting would have cost us almost \$2 million in savings over the next 10 years. Finances and energy savings aside, the appearance of our entire property is simply outstanding at night."



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ROCKLER WOODWORKING & HARDWARE

34 Locations



PHOTO: 75F

» Retrofit Team

ENERGY MANAGEMENT: 75F, Burnsville, Minn., www.75f.io

» Materials

Rockler Woodworking is a nationwide network of retail stores that faced a common problem: lost time, energy and money from inconsistent thermostat control. Rockler Woodworking used a variety of manual thermostats across its stores, some of which weren't programmable. Without remote monitoring and scheduling, these thermostats were set to different temperatures according to local store managers. Because of this, Rockler Woodworking found its energy intensity was inconsistent. Some stores were using far more energy than others, and facility managers thought an energy management system would be a solution.

In addition to varying energy bills, Rockler Woodworking store representatives were seeking opportunities to save energy on lighting. Rockler Woodworking relies on lighting plug loads to illuminate display cases and, because these display cases are plugged into hard-to-access outlets, the standard operating procedure was to leave lights on overnight.

Installing Outside Air Optimization (OAO) across stores provided Rockler Woodworking with more efficient rooftop units and the ability to remotely manage all its thermostats simultaneously through one platform. This also gave facility managers the ability to set schedules according to occupied hours. Equipped with cloud computing data storage and processing power, OAO is much more efficient than the standard economizer controller found in existing units. Predictive analytics improve comfort and economy.

75F installed a single circuit lighting solution, too, which put store lighting circuits on a set schedule. This meant lights were automatically turned off overnight and came back on when stores opened in the morning.

OAO AND SINGLE-CIRCUIT LIGHTING SOLUTIONS: 75F, www.75f.io

» The Retrofit

A study at the Rockler Woodworking store in Maplewood, Minn., showed 32 percent energy savings after the 75F solutions were installed. Utility bills validated and confirmed test results. Thanks to the circuit lighting solution, Rockler Woodworking was able to reduce its display case lighting by 12 hours per day, saving energy and bulb longevity. Rockler Woodworking's ROI was only one year.

Rockler Woodworking also was able to standardize the guest experience. Facilities directors now enjoy remote-control access and diagnostic abilities, allowing them to monitor stores without calling the store manager. Store managers, in turn, are able to be more productive; they no longer have to worry about thermostat control. The benefits of cost savings, remote control on a mass store level, ease of use and the value of data insight led to a national rollout of the 75F solution to all 34 stores.

PATTEN CAT | Five Locations



PHOTO: CAMBRIDGE ENGINEERING INC.

» Retrofit Team

HVAC INSTALLER: Patten CAT Facilities Team
HVAC MANUFACTURER'S REP: Air Products Equipment, Elk Grove Village, Ill., airproductsequip.com

» Materials

For more than 80 years, Patten CAT, a Caterpillar equipment dealer, has focused on its mission of "providing quality products and unparalleled services" to customers. These high standards include bringing customers cost-effective and efficient solutions, so it's no surprise that Patten CAT facilities managers have a similar mindset when it comes to heating and ventilating their numerous high-bay buildings.

With a focus on saving energy and reducing utility costs, Patten CAT in 2005 launched what has become a successful heating retrofit program. It began when the firm replaced older, less efficient heating units in its Oglesby, Ill., facility with high temperature heating and ventilation (HTHV) equipment from Cambridge Engineering Inc. Company representatives soon realized significant energy savings, not to mention better comfort for employees during frigid Chicagoland winters.

Since that first project, Patten CAT has retrofitted four additional facilities with Cambridge S-Series units, with the latest project qualifying for an energy-efficiency rebate from Nicor Gas, the local utility, which is based in Clinton, Iowa.

Terry Flick, facility manager for Patten CAT, says the Cambridge units are "long lasting and economical. Whenever I have to update something I keep going back to Cambridge."

Flick is also pleased with the fact that the Cambridge units are a 100 percent outside air heating technology, providing positive pressurization for the buildings, which helps keep cold air out and improves the indoor air quality for employees during winter heating months. "Even on a 0-degree day, the units still provide a 160-F discharge temperature, which keeps our facilities nice and warm," Flick says. He adds the previous heating units struggled to achieve a 60-degree discharge air temperature when the outside temperature dropped down to 0 F.

HEATING UNITS MANUFACTURER: Cambridge Engineering Inc., www.cambridge-eng.com



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50001READY



**RANDY GROFF LEADS
FOUR SEASONS PRODUCE'S
ENERGY-IMPROVEMENT
EFFORTS.**

Randy Groff, the director of Facilities and Energy at Four Seasons Produce, Ephrata, Pa., had a problem—a common problem but an acute one. The electricity needed to keep Four Seasons Produce's refrigerated warehouse cool was growing to be a major expense for the private company with tight margins, and Groff needed to find a way to reduce energy costs—and keep them down.

When Four Seasons Produce consolidated its operations in 2004 from six nearby buildings to one larger location, the new facility came with an unexpectedly high electric bill because of the type of refrigeration system put in place. For the next few years, Groff and

his team tackled several one-off energy-improvement projects with the gains and management buy-in accelerating when utility rebates were available. Savings were notable, but Groff wanted to implement a culture of energy efficiency that wasn't dependent on the availability of capital and wasn't limited to him and his immediate team.

Then he heard about 50001 Ready.

In June 2017, Four Seasons Produce became the first facility recognized as "50001 Ready" by the U.S. Department of Energy (DOE), Washington, D.C. The 50001 Ready program recognizes facilities in the U.S. that self-attest to conformance to the ISO 50001

DOE HELPS ORGANIZATIONS CREATE SUSTAINABLE ENERGY SAVINGS

WRITTEN BY | PETE LANGLOIS



PHOTOS: U.S. DEPARTMENT OF ENERGY

1. FOUR SEASONS PRODUCE REDUCED ITS ENERGY INTENSITY IN 2016 EVEN AS OPERATIONS INCREASED SUBSTANTIALLY.

2. CHARTER STEEL'S SAUKVILLE, WIS., PLANT IS THE FIRST INDUSTRIAL SITE RECOGNIZED BY THE DOE AS BEING 50001 READY.

3. MANAGING ENERGY COSTS IS A KEY SUCCESS FACTOR FOR CHARTER STEEL.

Energy Management System standard.

An international standard that supports organizations in developing an energy-management system, ISO 50001 outlines a Plan-Do-Check-Act continuous-improvement process model for energy management, similar to ISO 9001 for Quality Management and ISO 14001 for Environmental Management. 50001 Ready is an expansion of the DOE's efforts to support ISO 50001 adoption in the U.S. since the standard came into effect in 2011, building on DOE's existing Superior Energy Performance (SEP) certification program. Whereas SEP adds an external data validation component for organizations that are

already ISO 50001 certified, 50001 Ready is a free program targeting those organizations in the pre-certification stage by providing instructions, project-management tools and recognition, such as that achieved by Four Seasons Produce.

Like many operators of energy-intensive facilities, Groff has always been proactive in searching for support to reduce costs. In 2012, Four Seasons Produce participated in a continuous energy-improvement program with its local utility, which set the foundation for a culture of energy management by establishing an energy policy, energy team and energy-reporting model. Fast forward to 2017 when Groff

saw the 50001 Ready program as a way to reinvigorate those energy-management processes put in place five years earlier but not always top of mind.

"Sustainability is something our top leadership cares a lot about," Groff explains. "We want our customers and our associates to know what we are doing, and the 50001 Ready recognition helps us do that."

At the center of the 50001 Ready program is the DOE's newest software application—the 50001 Ready Navigator. Available free of charge at energy.gov/50001ready, the Navigator divides the

The 50001 READY program now provides recognition, tools and resources freely available to any organization interested in implementing an energy-management system, whether the organization decides to ultimately pursue certification or not.

required elements of ISO 50001 into 25 tasks, organized into four themes:

- Planning
- Energy Review
- Continual Improvement
- System Management

Resources to assist organizations in completing each task include summary checklists, extensive guidance highlighting best practices, worksheets and templates for download, and a video overview emphasizing the key points of the task. All of these resources are available on the website at any time. Users who sign up for a free account in the Navigator can also create implementation projects and track their team's progress on the task dashboard, assign tasks to other team members, leave notes or links to shared files for the team, access help-desk resources and apply for DOE recognition when the project has been completed.

Four Seasons Produce anticipates ongoing engagement with the 50001 Ready Navigator will help the company identify additional no- and low-cost operational opportunities to reduce energy costs and keep improving its energy performance. Initial results have shown Four Seasons Produce reduced its energy intensity by nearly 2 percent in a year (2016) when its operations grew substantially. Groff found the Continual Improvement tasks to be especially impactful in ensuring that practices and lessons learned since the utility improvement program are continuing to be properly implemented and producing results.

Tari Emerson, division energy manager of steelmaker Charter Steel, Saukville, Wis., also had an energy-management problem but in a very different type of operation than grocery distribution. Fortunately, the 50001 Ready framework is applicable to just about any type of organization.

When Emerson was hired in 2015, she was tasked to develop an energy-management program. First, she linked up Charter Steel with the DOE's Better Plants program, a community of nearly 200 companies setting long-term strategic energy-reduction goals, and worked with a Better Plants technical account manager to establish a regression-based energy baseline and an energy-man-

agement plan. Under Better Plants' guidance, Charter Steel started conducting energy "treasure hunts" across its three facilities in Wisconsin and Ohio in 2016, which laid the foundation for a culture of energy management to take shape. However, the path forward remained uncertain. Building on the organization's prior experience with ISO 9001 and 14001, putting an energy-management system in place using the ISO 50001 structure was a logical next step.

"A key to our success is the great relationships among our energy team members and strong support from upper management," Emerson notes. "The Navigator tool was really easy to use, and we had lots of support from the DOE Better Plants program team, as well."

Charter Steel is planning on certifying its three facilities to ISO 50001 between now and 2019. Its Saukville plant achieved the 50001 Ready recognition in August 2017 as an additional motivator and to establish a repeatable methodology for the other facilities in preparation for the certification process. The Saukville facility has calculated its energy performance with 2016 as its baseline year, and Charter Steel expects the energy-management systems it develops at its plants to drive savings that will help it meet its corporate-wide Better Plants goal as quickly and cost effectively as possible. Overall, Better Plants partners have seen their energy intensity improve at a rate of 3 percent annually.

"There is a big step between reading the ISO 50001 standard and being able to implement it," Emerson adds. "The 50001 Ready Navigator does a great job of translating the standard into actionable items."

Charter Steel was the first industrial facility to receive the 50001 Ready recognition, but the DOE has a long track record with industrial buildings that have achieved the more strenuous SEP certification—for which ISO 50001 is required. DOE-measured results of dozens of those facilities demonstrate they can attain as much as 30 percent improvement in energy performance over three years, typically with short payback periods because of identifying and implementing many no- and low-cost changes. The long-term energy and cost savings produced through such a holistic energy framework are greater and

Learn more about 50001 Ready and/or get started on your own energy-management journey at energy.gov/50001ready.


more consistent than those associated with project-by-project energy improvements.

The broader result from using 50001 Ready is having a comprehensive, standardized, systematic way to achieve energy savings and keep saving into the future. The benefits go beyond solely energy and cost savings, however. Investing in this comprehensive energy-management strategy promotes energy efficiency throughout the entire organization. It leads to increased employee awareness, stewardship, and a stronger understanding of energy use and consumption. Organizations are better able to identify and integrate future projects into their new framework, fostering continual improvement.

For facilities implementing energy-management systems but not interested in pursuing ISO 50001 certification, there had been no DOE recognition available until recently. The 50001 Ready program now provides recognition, tools and resources freely available to any organization interested in implementing an energy-management

system, whether the organization decides to ultimately pursue certification or not.

With 50001 Ready, the emphasis is on a “do it yourself” method for instituting an energy-management system that will encourage more facilities to realize savings through an increased culture of energy management. Another goal of expanding the DOE 50001 support program is to involve more commercial and institutional facilities, including hotels, hospitals, colleges, big-box retailers and more, in energy management.

Four Seasons Produce and Charter Steel are demonstrating 50001 Ready is a comprehensive way organizations can manage energy like other key expenditures and inputs. It enables higher ENERGY STAR scores from the Washington-based U.S. Environmental Protection Agency and helps meet any organizational energy and sustainability goals. From steelmaking to refrigerating produce to hundreds of other types of operations, an organizational culture of energy management can be a competitive edge. Could your facility be 50001 Ready next? 

The broader result from using 50001 READY is having a comprehensive, standardized, systematic way to achieve energy savings and keep saving into the future.

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Fenestration & Water Penetration

WRITTEN BY | JASON SEALS

Water penetration through the building envelope is a serious concern. Issues range from what constitutes reasonable performance during extreme conditions, such as hurricanes, to resolving liability for interior water damage and moisture-induced mold. Fenestration is a prime candidate for being perceived as the weakest link in the weather-resistive barrier and, thus, typically receives the greatest scrutiny.

Faulty fenestration is not likely to be the cause of such leakage, especially when the design is certified to the code-mandated AAMA/WDMA/CSA 101/I.S.2/A440, "North American Fenestration Standard/Specification for Windows, Doors, and Skylights (NAFS)", which includes stringent water-penetration-resistance laboratory testing. This testing of factory-made window and door products does not account for leakage caused by improper flashing or poor installation practices—more likely culprits when

leaks occur. In addition, water penetration at or near a fenestration product opening may actually originate from the surrounding construction.

How can you tell for sure before problems arise post-occupancy? When properly applied, field testing can be a powerful quality-control mechanism to verify the actual installed

(continues on page 48)

Field Testing
Accreditation Ensures
Reliable Results

PHOTO: MELISSA BALDWIN

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Starrett-Lehigh Building, New York City

Circle No. 24

A water application, using the AAMA 501-2 diagnostic water leakage field check procedure on a curtainwall.



An AAMA 502/ASTM E1105 water-penetration test with an exterior chamber. Depending on the building design, sometimes the chamber must be fabricated on the outside of the building. Most of the time, it is on the inside.

PHOTOS: AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION

performance of fenestration products during construction and retrofitting and prior to occupancy of a building. The key is to apply the appropriate test method to the specific installation.

Performing tests as soon as practical after installation of the fenestration product is crucial in determining if manufacturing, installation and/or perimeter-sealing problems are present before a substantial portion of the project is completed. This ensures issues are found at a time when responsibility for the problems can be assigned and remedial action can be relatively simple and inexpensive. Optimally, testing is performed prior to the installation of drywall, interior finishes and wall/roof materials to provide visual access to hidden parts of the fenestration product and the perimeter joint. In some retrofit applications, this is not possible. In these cases, small portions of interior finishes

can be removed to provide visual access. The testing agency may also employ specialized equipment, such as borescopes or thermal-imaging equipment, to minimize disturbance to the interior finish materials.

Industry Consensus Test Methods

To properly test installed fenestration, the Schaumburg, Ill.-based American Architectural Manufacturers Association (AAMA) has developed three field-testing methods:

- AAMA 501.2-15, "Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing System", is a simple, economical water-spray quality assurance and diagnostic method for finding leaks in fully installed, permanently closed (non-operable) glazing. It includes gaskets, sealant, perimeter caulking, splices and frame intersections. It is not appro-

priate for testing operable windows and doors and does not simulate the effects of wind-driven rain.

- AAMA 502-12, "Voluntary Specification for Field Testing of Newly Installed Fenestration Products", is the proper test method for verifying field air leakage and water-penetration resistance of newly installed operable windows and doors and is used for new and existing buildings. Based on ASTM E783, "Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors", and ASTM E1105, "Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference", AAMA 502-12 requires the use of a sealed test chamber, typically applied to the interior side of the window or door. The entire installed

fenestration product is tested, including the frame; corners; panning; subframe/receptor system; and the adjacent substrate, including the perimeter seals.

- AAMA 503-14, "Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems", is similar to AAMA 502 but applicable to storefronts, curtainwalls and sloped glazing systems installed into new and existing buildings. Like AAMA 502, AAMA 503 bases its testing protocols on ASTM E1105 and E783. Also, both AAMA 502 and 503 require the testing be performed during construction and retrofitting and prior to occupancy of a building but in no case later than six months after installation.

But who is going to perform such tests in an objective and professional manner?

In Search of Competent Testers

Manufacturers, architects, general contractors and building owners should beware of any self-proclaimed window tester or one who may have an axe to grind in establishing product liability and/or is in search of deeper pockets. Anecdotal evidence exists indicating that unofficial "garden hose" tests have been loosely applied by unscrupulous activists in window-leakage and mold-litigation cases.

In some cases, even the more capable investigators have used inappropriate field-testing adaptations to AAMA 502 and AAMA 503 to investigate reported water penetration. A common mistake while testing for water penetration involves testing at a differential pressure that exceeds

the product's rating originally generated during prototype testing in the laboratory. Field testing at higher pressures may actually create leaks and lead to the false conclusion that the fenestration product is the cause. Conversely, field testing at elevated pressures may also conceal defects that would have produced leakage at lower pressures. In the hands of the misinformed or ill-willed, field testing can be misused to apply a false mantle of scientific propriety to tenuous claims of alleged poor product performance.

It is concern for such problems as these that prompted the development of an accreditation program for field-testing organizations. Using an AAMA-accredited laboratory or agency assures the specifier that the field test agency has the staff, training, experience, and calibrated

WHEN PROPERLY APPLIED, FIELD TESTING CAN BE A POWERFUL QUALITY-CONTROL MECHANISM TO VERIFY THE ACTUAL INSTALLED PERFORMANCE OF FENESTRATION PRODUCTS DURING CONSTRUCTION AND RETROFITTING AND PRIOR TO OCCUPANCY OF A BUILDING.



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Great designs demand the best

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Manufacturers, architects, general contractors and building owners should beware of any self-proclaimed window tester . . .

instruments and equipment to properly perform field testing.

The FTA Accreditation Program

The AAMA Field Testing Agency (FTA) Accreditation Program validates that FTAs are capable of testing installed fenestration products to the AAMA 502 and 503 field-test specifications, as well as the ASTM test methods referenced therein.

Requirements are detailed in the program's Procedural Guide, *AAMA LAP-3*,

Laboratory Accreditation Program Operations Manual - Laboratories and Test Agencies Performing Onsite Testing of Fenestration Products.

An FTA is defined as a business entity providing fenestration-testing services in a non-laboratory environment that can be held legally responsible to carry out its testing and calibration activities in full compliance with ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Note that


"brick and mortar" testing laboratories carrying other accreditations can become approved as FTAs, as well.

Acceptance into the program requires that AAMA's independent validator, Associated Laboratories Inc., Dallas, confirms the applicant has demonstrated independence from the manufacturers or suppliers of the products being tested or the components thereof. This is done through an initial inspection, conducted at the prospective FTA's facilities or at a mutually agreed upon site. The prospective FTA also must demonstrate its ability to perform (at a

minimum) the methods of field testing outlined in ASTM E783, E1105 and AAMA 502. This must be done using the actual equipment used for testing products in the field, as well as adherence to the required calibration of test instruments and documentation standards as set forth in ISO/IEC 17025 and AAMA LAP-3. The prospective FTA also must provide evidence of a comprehensive training program for all personnel performing the tests.

Each FTA must have a documented Quality Management System (QMS). The QMS documentation (quality manual, operations manual, etc.) is submitted to AAMA and the validator with the application for accreditation and will be audited for compliance with ISO/IEC 17025, as well as AAMA requirements.

Whether it's during a service call or in the courtroom, window manufacturers should be ready with the facts when their products are tested to the wrong specification, tested incorrectly or by inexperienced personnel, or held to inappropriate or unreasonable expectations of installed performance (compared to laboratory test data).

Competent field testing can provide the backup needed to deal with such situations. Just make sure the results are meaningful and defensible by using an AAMA-accredited FTA. 



A water application, using the AAMA 501-2 diagnostic water leakage field check procedure. Each 5 linear feet of frame must be sprayed for five minutes before moving on to the next section.

PHOTOS: ARCHITECTURAL TESTING



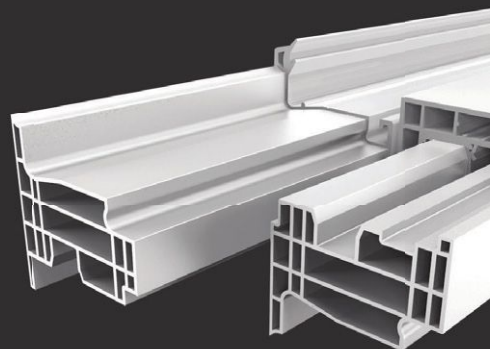
This commercial project example shows an interior chamber used for air leakage and water penetration testing per AAMA 503, which is intended for curtainwalls and storefronts.



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VAPOR INTRUSION

WRITTEN BY | AARON BENKER

Brownfield Redevelopers Must Consider this Risk and Know How to Mitigate It

Across the country, former industrial facilities are finding new life as they are repurposed for use as nonindustrial commercial spaces, such as retail, churches and even schools. Often these buildings are brownfield properties, in which past industrial use complicates redevelopment because of contaminated soil and water at the site.

Historically, lenders and buyers have been comfortable financing and purchasing properties where soil and groundwater contamination exists because a building positioned over existing contamination often can be used without disturbing contaminants in the dirt or groundwater. This type of buyer is what was known in the industry as an “innocent landowner”, meaning the buyer wasn’t the one who caused the release and, as long as the buyer’s use of the building wasn’t impeded, he or she wasn’t responsible for cleaning up the site.

Vapor intrusion has changed that landscape somewhat for brownfield redevelopers. Now, just by buying a property and putting occupants or tenants into the building, the innocent landowner takes on liability for his or her tenants’ potential exposure to harmful vapors caused by contaminants.

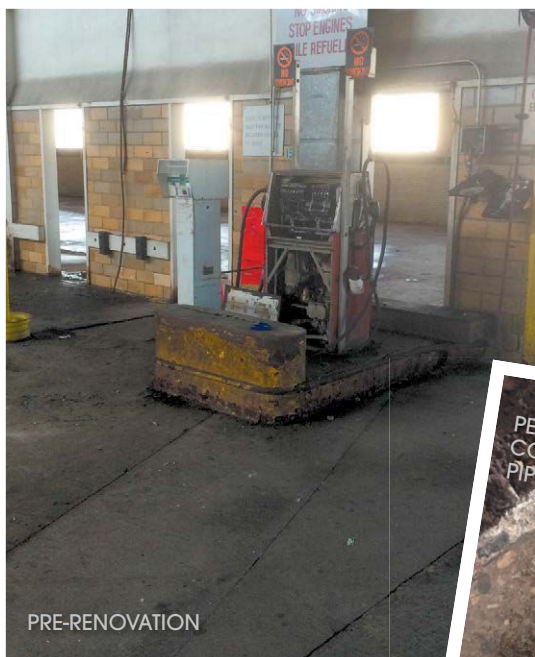
Our firm, Minneapolis-based Wenck, an environmental engineering, construction and response firm, is seeing two major real-estate categories that are getting hit hard with the vapor issue. The most obvious one is former industrial manufacturing facilities because the harsh chemicals and processes historically used at these sites leaves residual contamination in soil and groundwater. The other building type, which often surprises people, is the run-of-the-mill strip mall built across the country from the 1960s to 1970s. Along with retail spaces, these mixed-use buildings often had dry cleaners, which have contributed substantially to the footprint of trichloroethylene (TCE) and perchloroethylene (PCE) contamination. These solvents are very volatile and they persist for quite a distance in the soil. As these buildings are redeveloped to include not only retail spaces but restaurants, groceries and even daycare spaces, the need to mitigate intruding chemical vapors is obvious.

As brownfield redevelopers find new and more creative uses for properties, the size of the vapor intrusion problem will only continue to expand. For example, just in the past year, our company has worked on vapor-mitigation proj-

ects for five different charter schools that have set up shop in redeveloped brownfield properties. The innocent landowner theory goes by the wayside when it comes to ensuring a property suitable to provide a comfortable and safe learning environment for kids. Vapor mitigation and post-mitigation certification is the only way to ensure everything is working the way it should and the building is safe.

From Brownfield to Classroom

The U.S. Department of Health & Human Services and the U.S. Environmental Protection Agency, Washington, D.C., have been studying vapor intrusion for decades, from which they’ve ascertained very conservative health threshold values, called Vapor Intrusion Screening Levels (VISLs) for the intrusion of chemical vapors into breathing spaces. (To learn more about VISLs, visit www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls.) Contamination in the air can quickly become widespread. Because indoor-air contaminants can be prevented, the regulatory agencies often take an aggressive approach to enforcement of efforts to minimize or eliminate the pathway.



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FLOOR. NOTE VAPOR
MONITORING POINT.

Our firm recently completed work on a 30,000-square-foot industrial building in south Minneapolis that had previously been used for industrial manufacturing operations that resulted in PCE releases. The building was slated to change over to a charter school with an emphasis on teaching wood-working trade skills to students. The Minnesota Pollution Control Agency (MPCA) was conducting an area-wide vapor intrusion assessment, and its assessment turned up a vapor problem less than 45 days before the school was set to open its doors. Consequently, MPCA was pressuring the landowner to make sure the building was suitable for its intended use. Failure to sufficiently mitigate vapor would not have allowed the school to open. Occupying the building without mitigation could have opened the door to liability and enforcement action from the state. Our team worked with the landowner to evaluate vapors at the site and set an expedited response to mitigate the vapors.

Steps to Mitigation

The first step of any mitigation effort is building diagnosis, in which we do testing to determine how well air pressure and vacuum can be applied to the

PHOTOS: WENCK

sub-slab below the building. To conduct this testing, we use blowers to try to create a uniform vacuum pressure field underneath the entire building, using technology that is very similar to residential radon mitigation. If there are no pressure leaks, vapors are swept away so the vapors don't make their way into the breathing space in the interior of the building. However, if left unmitigated, small cracks and pressure gradients between the indoor air and the sub-slab can allow these vapors to move indoors.

In our charter school example, we used the data from this testing to customize a mitigation design based on the pilot test pressure fields we were able to put under the building. The type of soil under a structure significantly impacts the distance that a negative pressure field will extend from the point at which we apply a vacuum. In granular soil, a pressure-field vacuum may extend 50 to 100 feet from the vacuum point, whereas in heavy clays a pressure-field vacuum may only extend 15 to 20 feet. Soil conditions often vary from one part of the building to the next, so design work must be nimble to adapt to the subsurface conditions.

Once the entire footprint of the building is mapped out to determine the location of points within the vacuum field, we switch into full-scale construction. Trenches are cut into concrete to allow the removal of some soil and the emplacement of perforated collection pipes and sump fans with a pea-rock backfill. Then the concrete is patched, and piping is routed up to a centralized rooftop blower that creates a negative pressure vacuum across the building to draw air at low pressure from beneath the slab and vent it above the roofline so it doesn't enter the indoor air.

On larger buildings, a design is pilot tested in a small space and the results are projected across the entire building. However, variations in results caused by inconsistent sub-slab conditions can pop up during building-wide implementation and design adjustments may be needed during construction. For this reason, it can be helpful to work with a contractor who can do the design and construction; a design-build model will minimize any delays if quick field decisions and design adjustments are needed mid-project.

When vapor intrusion is discovered in spaces that are already finished, there are some other techniques, such as directional boring from the exterior or less trenching and more isolated vacuum points, which can help to minimize disturbance in finished spaces. We often use combinations of these techniques, depending on the unique configuration and pilot test results obtained.

In the case of our Minneapolis charter school, we were able to identify the scope of the problem and complete the

mitigation process in time for the school's opening day. Just two weeks after startup of the system, the indoor air was below state standards and the sub-slab concentrations reduced from 70,000 parts per billion (ppb) to below 4,000 ppb. These concentrations in the sub-slab are nearly eliminated with continued operation of the mitigation system.

Necessary Diligence

A Phase I Environmental Site Assessment (ESA) is the standard by which property due diligence is completed. In 2013, the EPA changed that standard to require all environmental practitioners to make a determination of whether a project is free of potential vapor risk, based on past building use and what is known about the site through official property records. A Phase I ESA does not typically require sampling. If the ESA determines the property has a risk of vapor problems, the buyers are required to do some sort of intrusion testing, potentially leading to mitigation.

Because of this requirement, real-estate transactions drive the majority of vapor investigations and cleanups. It is simple economics—there is a buyer, a seller and a pot of money available to deal with the problem. However, we see some interest from people who are looking to position their land to sell or who intend to repurpose it someday and want to make sure it's safe. For these types of vapor-mitigation projects, the place to start still is with the Phase I ESA.

Although costs vary greatly by building size and type, building owners should expect a Phase I ESA to cost between \$2,000



USING TECHNOLOGY SIMILAR TO RESIDENTIAL RADON MITIGATION, PIPING IS ROUTED UP TO A CENTRALIZED ROOFTOP BLOWER THAT CREATES A NEGATIVE PRESSURE VACUUM ACROSS THE BUILDING TO DRAW AIR AT LOW PRESSURE FROM BENEATH THE SLAB AND VENT IT ABOVE THE ROOFLINE SO IT DOESN'T ENTER THE INDOOR AIR.


and \$4,000. If collection and laboratory testing of vapor samples is needed, it can likely cost between \$10,000 to \$40,000, depending upon the size of the property. Mitigation can vary widely based on the building size, use and specific situation. It's worth noting that in some states, such as Minnesota, there are often grants or remediation funds available that allow for reimbursement of mitigation costs. Your state's pollution control agency will provide more information.

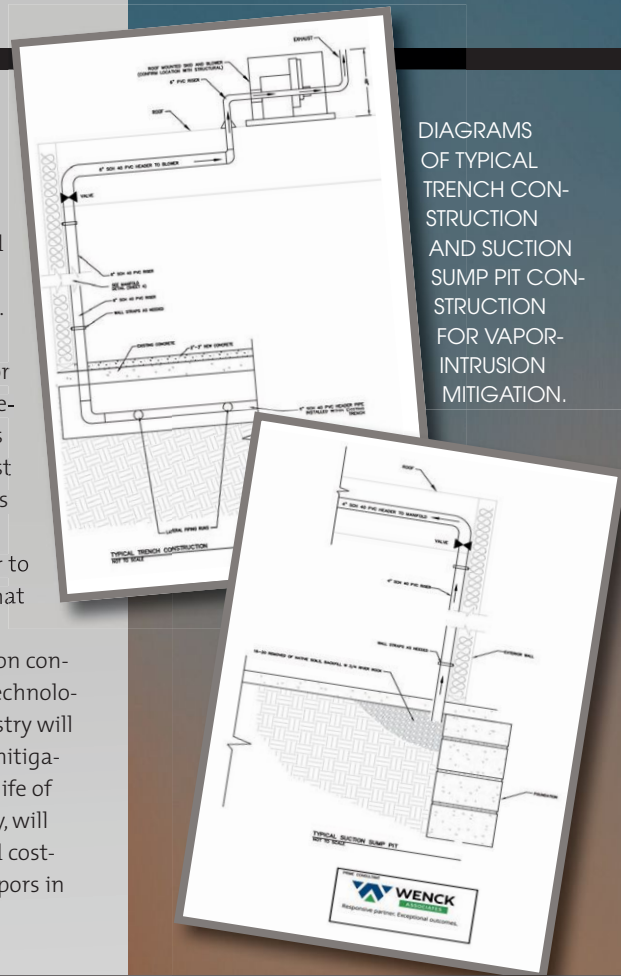
There are ongoing costs associated with vapor mitigation, as well. There can be a substantial electrical cost associated with running a blower motor to maintain permanent and consistent vacuum under a building. Often there is a deed restriction placed on the title of the property that requires current and future owners of the property to maintain operation of the system.

Looking Ahead

Some states only require mitigation of vapors once they make their way into the breathing space of a building while others, such as Minnesota, require you to mitigate

if there is a presence of subsurface vapors that have the potential of risk to building occupants. However, the trend is moving toward more proactive diagnosis and mitigation, especially as properties change ownership or intended use. A property that may have had a successful real-estate closing five or 10 years ago may not close today because vapors weren't considered as much of a risk at that time. The best way to determine if your building is at risk is to proactively work with a trusted environmental practitioner to conduct a Phase I ESA and learn what your options are for your building.

As the problem of vapor intrusion continues to rise to prominence, the technologies and best practices of the industry will continue to evolve, as well. Often, mitigation systems must operate for the life of the building, but we, as an industry, will continue to find more efficient and cost-effective methods of mitigating vapors in indoor spaces. 



DIAGRAMS OF TYPICAL TRENCH CONSTRUCTION AND SUCTION SUMP PIT CONSTRUCTION FOR VAPOR-INTRUSION MITIGATION.



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A RETURN TO THE

Gilded Age

WRITTEN BY | CHRISTINA KOCH

The 1903 Audrain Building in Newport, R.I., Transports Visitors and Occupants to the Heyday of the Automotive Industry and Newport Itself

It's no wonder Newport, R.I., often is found on lists of the best places to visit in the U.S. Known as the sailing capital of the world, Newport's sparkling waters and magnificent shorelines are only part of the city's appeal. During the Gilded Age (a time that describes the economic boom after the Civil War until about 1900), some of America's wealthiest families—the Astors, Dukes, Vanderbilts and Wideners to name a few—flocked to Newport to build summer “cottages”, like The Breakers, the Vanderbilts' 70-room, 125,339-gross-square-foot home.

Exquisite architecture wasn't restricted to the residential buildings in Newport, however. The city's Bellevue Avenue includes an architecturally significant block consisting of four Gilded Age commercial structures. Three of the historic buildings are adjoining—the Travers Building (1876) designed by Richard Morris

Hunt; Newport Casino (1881) designed by McKim, Mead and White; and King Block (1892-93) designed by Perkins and Betton. The fourth building, the Audrain Building, which was built for French antiques dealer Adolf Audrain, was designed by Bruce Price and inspired by the Florentine Renaissance. Constructed in 1903, the 2-story building features 18-foot-tall by 12-foot-wide arched windows in a red-brick façade complemented by a polychromed terracotta roofline and accents. Price designed the first floor to host six retail shops while the second story would house 11 offices.

As the years passed, the first floor eventually became medical offices while the upstairs accommodated a number of commercial tenants. Ultimately, the bland interior did little to recall the building's high-brow beginnings. In 2014, John Grosvenor, AIA, NCARB, principal of Northeast Collaborative Architects (NCA), Newport, and his team were chosen to rehabilitate



AFTER

BEFORE

PHOTO: COURTESY OF NORTHEAST COLLABORATIVE ARCHITECTS

PHOTOS: BEN JACOBSEN, COURTESY OF NORTHEAST COLLABORATIVE ARCHITECTS (unless otherwise noted)

the Audrain Building for AR Global, a New York-based real-estate investment company. Several of the firm's partners have homes in Newport and wanted a summer headquarters for their business. NCA, which was established in 1981, certainly appealed to the partners because about 55 percent of the architectural firm's work is in adaptive reuse and historic preservation. "The Audrain Building is a historic building that is listed on the National Register," Grosvenor remarks. "I know that our experience with historic landmark buildings played a significant role in their picking us."

What the design team didn't know when they signed the contract to complete the rehab in six months was that the owners would decide after work began to change the program: Only the upstairs would house offices; the first floor would become a non-profit automobile museum that would display rotating exhibitions of classic cars,

borrowing from AR Global's partners' own collections and those of local collectors, as well as assembling the museum's own collection of cars with interesting Newport history. The design team embraced the opportunity in this challenge and what began as a scheduling nightmare culminated in five design awards for NCA.

Elegant Exterior

During the Gilded Age, Newport was called the playground of the rich. Bellevue Avenue literally is the gateway to the stunning mansions for which the city is known. Today, the avenue experiences a high volume of traffic, which drew AR Global's partners' interest in the Audrain Building and made it the perfect location to showcase antique and classic cars. In fact, the building wasn't for sale when the partners approached the previous owner.

MATERIALS

TERRA-COTTA ORNAMENTATION // Boston Valley Terra Cotta, bostonvalley.com
CUSTOM WINDOWS // Fontrick Door, www.fontrickdoor.com
GLASS FOR STOREFRONTS, WINDOWS AND SKYLIGHT // Lucid Glass, www.lucidglassstudio.com
GLUMAN BEAMS // Power Beam from Anthony Forest Products, www.anthonyforest.com
CUSTOM CAGE ELEVATOR // Elevator Service Co. Inc., www.elevatorserviceco.com
CONFERENCE TABLE // Paul Downs Custom Conference Tables, www.custom-conference-tables.com
MEMBRANE ROOF // Carlisle Syntec Systems, www.carlisesyntec.com
INSULATION // Icynene, www.icynene.com
SOUNDBOARD // QuietRock, www.quietrock.com

"The partners were determined to get it," Grosvenor notes. "It really caught their imagination in how it looked. It has all this terra cotta, all these jewel tones. And it's very much a classical building in the sense of how it's put together with a base and a very heavy cornice at the top and a shaft for the body. It's just very different from any of the other stores along Bellevue, but it fits in as an urban design piece because it matches the height of the adjoining buildings on that one block."

Grosvenor and his team wanted to do the building's rehabilitation justice, so they researched its history and sought images and drawings of it. Unfortunately, they only found three images of the building in its original state. These images showcased a terra-cotta balustrade and lion sculptures perched at the roof line. The Great New England Hurricane of 1938 damaged these ornamentations and they were removed. Fortunately, Price had designed similar ornamentations on buildings, particularly in Philadelphia and, though the ornamentations weren't identical, they served as a good reference for Price's style. NCA ultimately created a competition for artists to recreate the original lions and balustrade. The competition was tirelessly managed by David de Muzio, executive director of what today is known as the Audrain Automobile Museum. Grosvenor is satisfied the winning reproductions are very close to the original.

Although AR Global was not interested in seeking historic tax credits, any alterations to the exterior of the building had to be approved by Newport's Historic District Commission. Therefore, the change in program, which Grosvenor states occurred about halfway through the original six-month timeline, prompted the design team to return to the commission (and the city's zoning board) with new proposals.

Grosvenor recalls the program change gave his team the opportunity to make the Audrain Building even more grand. When the building was constructed, a hotel existed on its south side, prompting Price to only make the west façade decorative. Today, a shopping center has replaced the hotel, allowing shoppers and passersby to see the entire south façade of the Audrain building, which was a simple, industrial brick. Among the additions to the south side are a new double-story window that matches the storefront windows on Bellevue. However, this new window opens to allow cars to



BEFORE

AFTER



AWARDS

The Audrain Auto Museum captured five awards for Northeast Collaborative Architects, Newport, R.I.:

- 2014 AIA RHODE ISLAND HONOR AWARDS; two awards, one for commercial design of the museum and the other for commercial design of the offices
- 2015 DORIS DUKE HISTORIC PRESERVATION AWARD
- 2015 RHODY AWARD FOR HISTORIC PRESERVATION
- 2015 RHODE ISLAND MONTHLY DESIGN AWARD

enter and exit the museum gallery. The north and east façades remain unchanged; Newport Casino covers the north façade while a parking garage visually hides the east façade.

To protect the exhibits, the design team specified high-impact glass that is 1-inch thick for the storefronts. “We just didn’t want cars driving in and hurting the collection,” Grosvenor says. “There’s also absolutely no noise between the outside and inside.”

A challenge appeared when the construction team took apart the corners of the building. “We could see that all the brickwork was failing,” Grosvenor says. “That’s just because of the amount of window to structure. Normally, in cathedrals, you would have buttresses. We didn’t have the buttresses, so racking took place probably in big storms that caused the brick to crack and have structural problems in the corners. We were able to engage a steel ribbon on the inside when we took all the finishes down to hold the building together.”

Dapper Downstairs

The first floor’s existing medical offices and the very steep stairway at the building’s entry were removed. Grosvenor and his team replicated a historic elevator where the original stair had been. “It is very slow moving; it’s all ceremony and it’s kind of an elevator within an elevator,” he explains. “We have a steel cage that is very reminiscent of turn-of-the-century elevators and inside of it is a 2-story lift. That is a proper elevator, but it’s been made just to do the two stories.” A new marble stair was created off the south elevation as a second means to egress.

Because the building is only 15,000

square feet—7,500 square feet upstairs and downstairs—only 15 to 20 cars can fit into the museum at one time. “This actually is an advantage,” Grosvenor says. “Most museums get rather stale, so the fact that the collection needs to turn over—and they turn it over three times a year—is an enormous plus. It has ended up being an amazing attraction, bringing in 40,000 people a year to see the museum.”

To create the clear spans needed for the first floor’s museum while ensuring the building still could support the second-floor offices, Grosvenor designed a series of steel trusses featuring intumescent paint that were inserted while work was completed on the second floor. “I modeled the trusses off of what I saw at Henry Ford’s plant,” Grosvenor recalls. “We used a typical truss, and I dressed them up to look more turn-of-the-century.”

In addition, the team inserted six 6- by 6-inch steel support columns throughout the space. The columns are spread out so there’s plenty of room for cars to drive in, turn and be set up for display.

“I put Ls around the columns so they sort of expand out, and I put LED lighting inside facing the column so it leaves this really nice shaft of light that comes out of each of the columns,” Grosvenor explains. “The columns actually coordinate really nicely with the double truss up above. Ultimately, we were trying to place elements of the car in the museum structure; all this truss work with fasteners and steel is reminiscent of the antique cars, as well as harkens back to the Ford assembly plant.”

Grosvenor notes the LED lighting, which mostly is a gray/white light, does a nice job of showcasing the columns and trusses, as well as the cars. “The lighting creates a very

nice playfulness and it’s really quite beautiful,” he says. “And with RGB LEDs, we can change the color any time, even to holiday colors if we want.”

The cars drive and are showcased on 2-inch-thick douglas fir plank floors that were stained dark. “The floors are a nice contrast because you just wouldn’t expect a car to drive on a floor, so it sets the car off as a work of art, as a sculptural piece,” Grosvenor notes. “Then we installed wainscoting around the space, so that gives the museum a dressed up, very warm feel, and it’s a nice contrast to the cars themselves.”

Working with a 1903 building created some challenges for the design team. For example, the Audrain Building actually is a parallelogram and, Grosvenor says, you wouldn’t really know it until you look at it in plan. “The geometry was not so acute that I could make the rooms feel square, but I really had to keep with the geometry because walls, when they’re not parallel, feel a little odd,” he notes.

Unique Upstairs

The design team envisioned a classic turn-of-the-20th-century men’s club for the second-story offices. This required a major transformation, one that includes \$3 million in millwork alone. An old photograph of the Audrain Building’s second floor shows very plainly detailed plaster walls with white moldings. “To transform the second floor, we doubled the size of the corridor and had it come out to where the elevator is into this wonderful sort of grand waiting area that the owner uses when attorneys come for real-estate closings,” Grosvenor notes.

Gas fireplaces were installed in all offices to relate back to the building’s original



time period. However, the design team also relied on state-of-the-art 21st-century technology. For example, the skylight at the elevator actually is a 20- by 20-foot leaded glass LED “skylight” that simply is a recreation of the outside. “We can time it to the clouds passing over and essentially get an effect as though it’s open air,” Grosvenor says. “This gives us the opportunity to have a really nicely contained volume without any threat of leaks.”

Ensuring the museum does not transfer noise to the second floor when important business is being discussed was a concern. Insulation and soundboard were placed between the structure and finishes on both floors. In addition, the first-floor ceiling has a very high STC rating.

The Jewel of Bellevue Avenue

The project began in November and was originally supposed to be completed by June 1. However, the program change pushed the completion date back to the end of August—still an impressive timeline considering the transformation that

ensued. Grosvenor recalls: “We knew from the get-go that we were going to have to closely coordinate with our contractor, Parker Construction. We also knew we were going to have to do double shifts for the project to get finished. Parker Construction did a phenomenal job, and we just had the best time with this particular project.”

Grosvenor is proud of the fact that the Audrain Automobile Museum has become a showcase on Bellevue Avenue. He says: “I knew the car collection was going to be spectacular and, having the opportunity to subtly light our interior trusses and combine that with lighting on the terra cotta, I think the building has a uniquely 24-hour presence on what is a very important section of Bellevue. The building is a little jewel, and I’m just so happy to have been involved in this Victorian turn-of-the-century block in the United States. I think that what we did with the Audrain really brought it right back in alignment with all the other historic landmark buildings on the block, and I’m very proud of it.”

RETROFIT TEAM

ARCHITECT // Northeast Collaborative Architects, Newport, R.I., ncarchitects.com

■ JOHN GROSVENOR, AIA, NCARB, principal

■ DAN HERCHENROETHER, RA, project manager

GENERAL CONTRACTOR // Parker Construction, Rumford, R.I., www.parkercci.com

STRUCTURAL ENGINEER // Camera/O'Neill, Portsmouth, R.I., www.cameraoneill.com

LIGHTING DESIGNER // Light Insight Design Studio, Boston, www.light-insightdesign.com

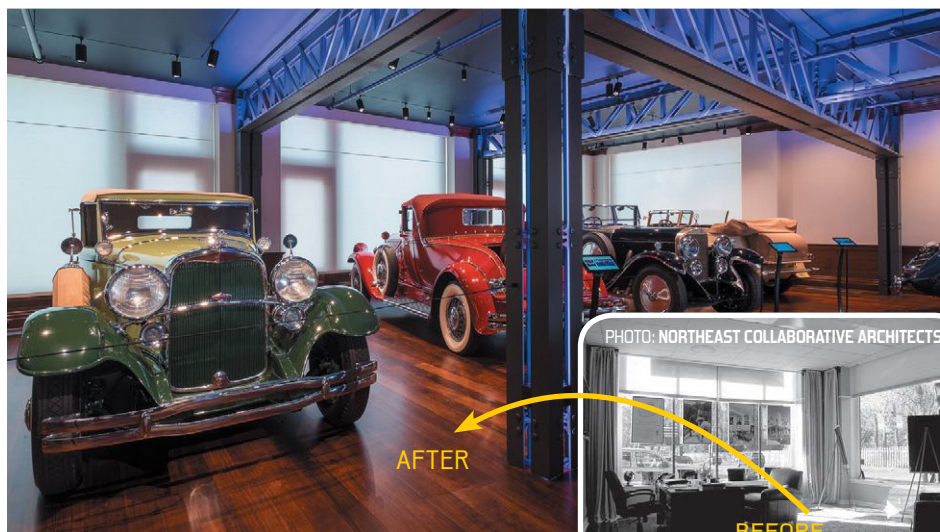
MILLWORK // Herrick & White Architectural Woodworkers, Cumberland, R.I., www.herrick-white.com

MILLWORK/WOODWORKING // Mark Richey Woodworking, Newburyport, Mass., www.markrichey.com

METALWORK // Salmon Studios, Florence, Mass., www.salmonstudios.com

STRUCTURAL METAL // West Bay Welding & Fabrication, Warwick, R.I., (401) 737-2357

TERRA-COTTA LION SCULPTOR // Allison Newsome, Warren, R.I., www.allisonnewsome.com



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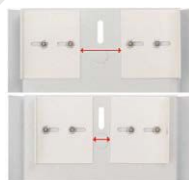
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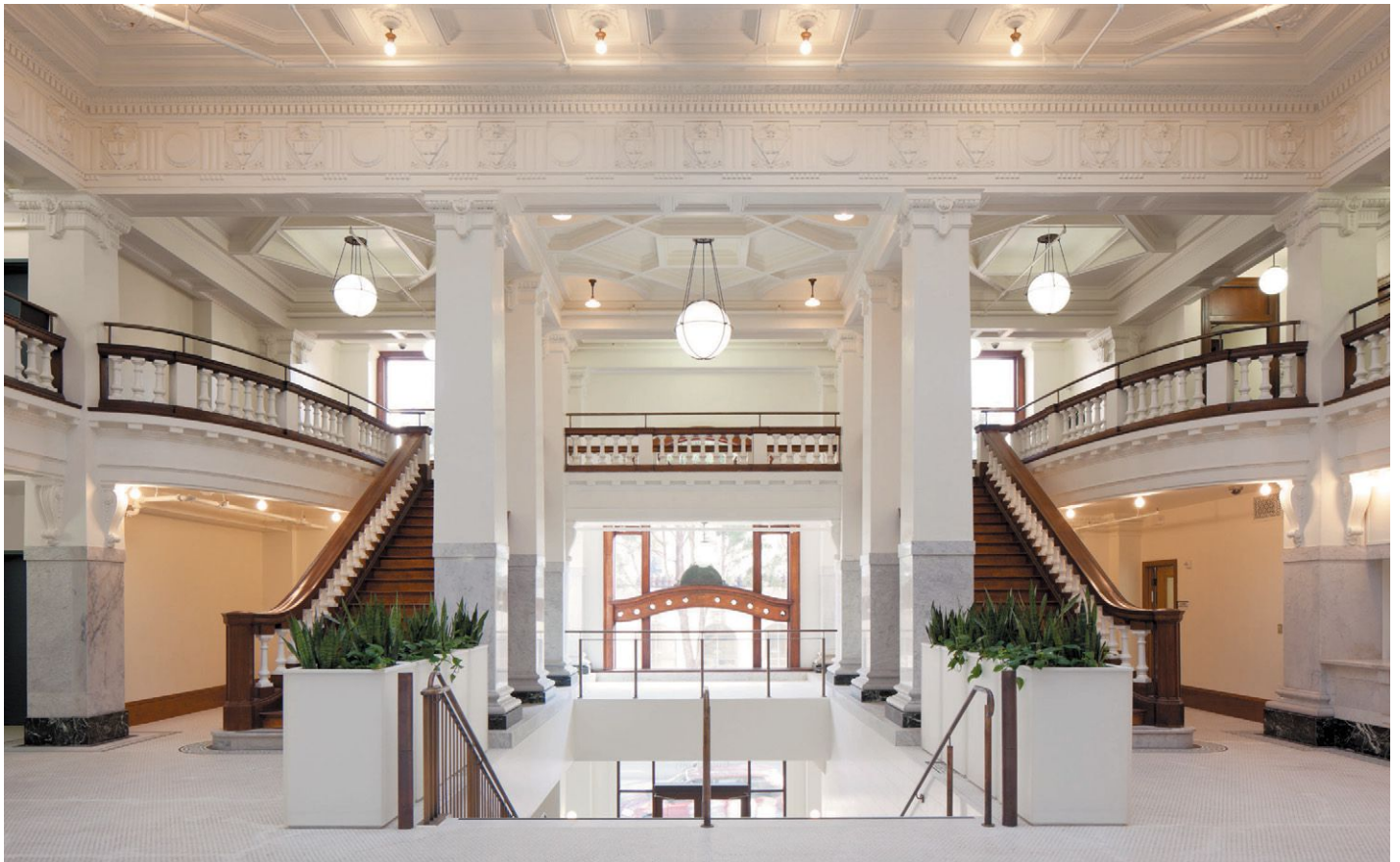
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[MULTIFAMILY]

A SOCIAL PURPOSE

PHOTOS: MARK LUTHRINGER



Sometimes the challenge in adaptive reuse is to transform not only the function or systems of an existing building but also its meaning. In contrast, for Kelly Cullen Community, an adaptive reuse of the historic Central YMCA in San Francisco, the challenge was to preserve the Y's holistic dedication to body, mind and spirit in the context of a truly innovative integration of new homes for homeless people, supportive services for residents and supportive services for the whole Tenderloin neighborhood.

The building, a National Register Criterion C, also embodies meaning in its preservation of an exceptional historic resource. The majestic 9-story classical building was designed by the prominent McDougall Brothers Architects. Their busy practice extended across California and included churches, three Carnegie libraries and other significant civic buildings.

The Y design and construction was completed in 1908 immediately following the 1906 earthquake and fire. The size and varied program of the central branch building reflected the Young Mens' Christian Association's ambitions. Despite the challenges of the period following the disaster and World War I, the San Francisco YMCA—as the association reported in the Y.M.C.A. Year Book (April 30, 1925)—was No. 1 among the 15 largest associations in North America in order of its achievements.

The building occupies a key corner in the Uptown Tenderloin National Register District. The Y faced a time limit to execute more than \$15 million of seismic improvements for the building's assembly spaces and historic standards of design and construction. Their decision to move the Y programs to a new location after 98 years of operation put the building at risk. In 2007, the

A Historic San Francisco YMCA Building Maintains Its Historic Architecture and Role in the Community

WRITTEN BY | LISA GELFAND, FAIA, LEED AP



Tenderloin Neighborhood Development Corp. (TNDC) acquired the building (now known as Kelly Cullen Community). Through a truly complex five-year long process, TNDC managed a \$95 million rehabilitation process that depended on major funding from a variety of public and private sources, each with their own criteria.

Foothold into the Future

Kelly Cullen Community is named in honor of TNDC's former Executive Director Brother Kelly Cullen, who passed away in November 2010. A dynamic force, Brother Kelly was a Franciscan friar; early resident of TNDC's Aarti Hotel, a single room occupancy residential hotel; and a tireless advocate for the Tenderloin neighborhood and its lowest-income residents. Kelly Cullen Community exemplifies his spirit, by bringing beauty and showing respect for San Francisco's poorest residents. In Brother Kelly's words, "With safe, affordable housing and the power of community, TNDC offers a foothold into the future."

Brother Kelly believed in serving the poorest of the poor. But, in its mission to house the homeless, TNDC faced real challenges in meeting the needs of people who might have lived on the streets for many years. From the beginning, the Y project was meant to locate housing and services together. This was a goal shared by the San Francisco Department of Public Health (DPH). DPH recognizes homelessness as more of a health risk factor than HIV, yet the complexity of the health problems suffered by homeless people makes it even more challenging to house them. For Kelly Cullen Community, DPH funded TNDC to house people with chronic health issues and also stepped in with a clinic to be located on the ground floor of the building. The clinic welcomes residents, as well as patients from the neighborhood and community at large.

In a new building it might have been difficult to justify including a gym, auditorium and skylit atrium lobby. Indeed, as part of the Kelly Cullen Community renovation, a small gym,

Materials

EXTERIOR

ALUMINUM STOREFRONTS // Arcadia Inc., www.arcadiainc.com
TPO ROOF SYSTEM // FiberTite, www.fibertite.com

STUDIO APARTMENTS

FLOORS // Nora Plan Classic from Nora, www.nora.com
CEILINGS, DOORS, TRIM AT DOORS AND WINDOWS // Dunn Edwards, www.dunnedwards.com
CABINETS // Lanz Cabinet, lanzcabineets.com
BLINDS // Faber from Hunter Douglas, www.hunterdouglas.com
FURNISHINGS // Multiplicity Design, multiplicitydesign.com

CLINIC

FURNISHINGS // Dina C. Design Studio, cheyettedesign.com

RESIDENTIAL CORRIDORS

FLOORS // Marmoleum from Forbo, www.forbo.com
BASE // TS Series from Burke, burkeindustries.com
WALLS, CEILINGS AND TRIM AT DOORS // Dunn Edwards

PUBLIC RESTROOMS

FLOOR, BASE AND WALLS // Daltile, www.daltile.com
BLINDS // Faber from Hunter Douglas
PARTITIONS // Bobrick, www.bobrick.com

Left: A clinic is located on the ground floor of the building. It welcomes residents, as well as patients from the neighborhood and community at large. Right: The former YMCA's assembly facilities provide residents and the Tenderloin neighborhood with a diverse variety of organizational, wellness and social activities.

handball courts, offices and the swimming pool were converted or replaced by housing. But for TNDC and DPH, the remaining assembly facilities offered a great opportunity to reach out to residents and the Tenderloin neighborhood with a diverse variety of organizational, wellness and social activities.

The project received Historic Preservation Tax Credit funding, requiring updates to comply with the Secretary of the Interior's Standards for the Treatment of Historic Properties. A series of alterations over the decades had impaired the integrity of a significant portion of the interior, most notably removal of the original grand stair from the main entry to the main lobby on the second floor. This move allowed the Y to control a single point of entry on the ground floor but created a maze of unintended circulation difficulties. Ironically, the need to create private and safe housing and public circulation for the new uses helped support the replacement of this key element.

For Executive Architect Gelfand Partners Architects and Historic Architect Frederic Knapp Architect, both of San Francisco, the construction of a new grand stair in the area of an original grand stair addressed three needs:

- It restored public access to the glorious sky-lit atrium and still intact historic interior spaces of gym, auditorium and president's office.
- It separated circulation to the private apartment realm.
- It re-established an understanding of the building that was lost for almost half its life span.

The scope of the rehabilitation included extensive exterior work,

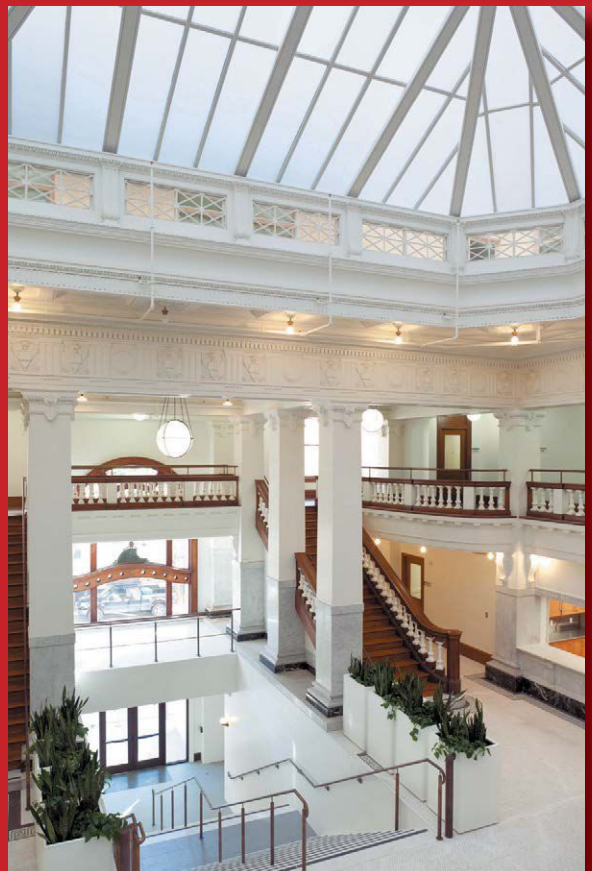
such as repairs to the original windows and reconstruction of the main entry and ground-floor storefronts that had been modified. On the interior, the grand second floor lobby was reconnected with the main entry and the missing balustrade of the twin lobby stairs from the second to third floor also was reconstructed. The auditorium was rehabilitated with only minor changes.

In addition to exterior repairs, the rehabilitation project included a full seismic upgrade and complete reroofing. The mechanical, electrical, plumbing, fire alarm, telephone and data infrastructure also were replaced. The clinic earned LEED Gold for Commercial Interiors, and the entire project, which uses solar-thermal domestic hot water, beats California's stringent energy code by 11 percent.

Significant Spaces

The project retained all the highly significant historic spaces, including the 3-story Men's Gym. Most of the first floor, heavily altered in the 1950s and later, has been converted into the DPH clinic. Although DPH would have loved to keep the pool for its potential therapeutic value, the funding was simply not available. The basement space, which housed the pool, has been converted to a resident meeting room. The pool excavation is preserved under a removable infill floor plate and the character-defining wall tile with a Vitruvian scroll pattern was retained and replicated at the deck level where the original had to be removed for structural work.

The 2-story, skylit lobby, 2-story auditorium and the Men's Gym





Funders of Kelly Cullen Community include:

- City and county of San Francisco, Mayor's Office of Housing, acquisition / construction / permanent loans with funding from HOME, CDBG and Hotel Tax Fund
- City and county of San Francisco, Department of Public Health, construction and services grants with funding from the California Mental Health Services Act of 2004 and General Fund
- California Tax Credit Allocation Committee, construction / permanent loan with funding from the American Recovery and Reinvestment Act of 2009
- California Housing Finance Agency, construction / permanent loan with funding from the California Mental Health Services Act of 2004
- PNC Bank, historic tax credit equity investor
- Citi Community Capital, construction loan
- Silicon Valley Bank, construction / permanent loan with funding from the Federal Home Loan Bank of San Francisco Affordable Housing Program
- Corporation for Supportive Housing, services grant with funding from the Corporation for National Service
- U.S. Bank, acquisition loan


occupy at least 30 percent of the floor area of the building—a large amount given the project's mission of providing affordable housing to people who have had none. But maintaining these and other rehabilitated historic spaces convey to residents the social purpose the building has always had. These spaces also are used and valued by residents and give them a sense that their home is a place enjoyed and appreciated by generations of San Franciscans. Both programmatically and physically, the project has retained the most important aspects of the building's fabric, program and community role, ensuring that this historical resource will continue to convey the associations that tie it to San Francisco's past.

Project Financing

The American Recovery and Reinvestment Act of 2009 made the project possible, providing more than \$50 million in tax-credit financing in the face of the investor community's unwillingness to finance the project. However, this financing was intended for affordable housing units. Given the commitment to historic preservation, maximizing housing units also required imagination. The majority of the spaces on the second through eighth floors, including the original hotel rooms, which were only 7-feet wide

and lacked private bathrooms, were reconfigured into studio apartments. The basic circulation scheme was retained, including a portion of the original corridor with its finishes and doors. When the handball courts on the rear of the eighth floor and the Boys' Gym on the fifth floor were demolished, 18 units of new housing were built. One hundred twelve tiny rooms have been replaced by 172 livable studios.

Kelly Cullen Community is not only beautiful, it also provides vital services. The new housing provides homes for chronically homeless people coming from the streets of San Francisco. Among them are 50 tenants who come from DPH's list of high users of emergency room services. City and DPH referrals keep the building entirely full. The ground-floor clinic is the Tenderloin's largest DPH clinic, serving 25,000 visitors annually.

The dedicated TNDC staff works tirelessly to support community, from movie nights in the auditorium to coffee and donuts in the atrium. Kelly Cullen Community's name underscores the desire to create a community not an institution. As Don Falk, executive director of TNDC, reports, "You walk in and it's just a nice place". Ultimately, Kelly Cullen Community promotes holistic wellbeing for San Francisco's most vulnerable while reducing public spending on hospitalizations. 

Retrofit Team

At the grand opening of the project, the Tenderloin Neighborhood Development Corp. presented more than 180 thank-you certificates to individuals who were instrumental in developing, designing and building this project. Following is an abbreviated list:

EXECUTIVE ARCHITECT // Gelfand Partners Architects, San Francisco, www.gelfand-partners.com

■ Lisa Gelfand, FAIA, LEED AP, principal in charge

■ Chris Duncan, project manager

■ Ariane Fehrenkamp, job captain

HISTORIC ARCHITECT //

Frederic Knapp Architect, San Francisco, www.knapp-architect.com

■ Frederic Knapp

■ Ruchira Nageswaran

STRUCTURAL ENGINEER // Tennebaum-Manheim Engineers, San Francisco, tmesf.com

■ Daniel Manheim

■ Nancy Tennebaum

MEP ENGINEER // Salas O'Brien Engineers Inc., Oakland, Calif., salasobrien.com

■ Joshua Heth, mechanical engineer

■ John Chinn, mechanical engineer

■ Jeffery Gosal, electrical engineer

ENERGY DESIGN // Bright Green Strategies, Berkeley, Calif., brightgreenstrategies.com

■ Sharon Block

GENERAL CONTRACTOR // Cahill

Contractors Inc., San Francisco, cahill-sf.com

■ Chuck Palley, principal

■ Blair Allison, project manager

■ Guy Estes, estimator

■ Matt Dennig, project engineer

■ Mark Graeven, project superintendent

WOOD-REPLICA MILLWORK //

Balliet Brothers Inc., South San Francisco, www.ballietbros.com

STOREFRONT INSTALLER // Valiant Glass, San Francisco, www.valiantglass.com

ROOFING CONTRACTOR // Alcal Roofing, Sacramento, Calif., www.alcal.com

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Circle No. 29

The Case for SAFETY

WRITTEN BY | ROBERT NIEMINEN

As the Number of Construction Projects Continues to Rise, So Do the Amount of Serious—even Fatal—Injuries Occurring on the Job Site

Among the most visible gauges of economic prosperity is the number of construction jobs and projects underway over a given period of time. Judging by the most recent economic indicators published by the American Institute of Architects, Washington, D.C., in August, there's good news for the U.S. economy: Architectural services have increased 5.3 percent and construction employment has shown growth of 2.8 percent since last year. Likewise, the Washington-based Associated Builders

and Contractors reported in June that its Construction Backlog Indicator (CBI) rose to nine months during the first quarter of 2017, up 8.1 percent from the fourth quarter of 2016. (CBI is an economic indicator that reflects the amount of construction work under contract but not yet completed. It is measured in months with a lengthening backlog, implying expanding demand for construction services.)

However, while new construction and renovation projects are a boon to the economy, an adverse trend exists in tandem

with commercial real-estate development that building owners and facility managers need to remain vigilant about: workplace injuries and fatalities. According to the Occupational Safety and Health Administration (OSHA), Washington, nearly 6.5 million people work at approximately 252,000 construction sites across the nation on any given day, and the fatal injury rate for the construction industry has the highest national average across all industries.

(continues on page 70)

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— David Kliwinski, CSP,
vice president, Safety,
Health & Environment,
Parsons Corp.

"Construction is traditionally a high-hazard industry in which workers may be exposed to serious hazards on a daily basis, often because the conditions of the job are constantly changing," an OSHA spokesperson told **retrofit**.

In spite of increased safety measures, training and safety equipment on the job site, the number of construction worker fatalities has been on the rise in recent years, increasing 18 percent from 738 to 874 between 2011 and 2014, according to the Arlington, Va.-based Associated General Contractors (AGC) of America. Incidentally, in 2016 OSHA raised its maximum penalties for safety violations by 78 percent with a maximum fine for serious violations increasing from \$7,000 to \$12,471 per violation and willful or repeated violations jumping from \$70,000 to \$124,709. (Note: The U.S. Department of Labor, Washington, adjusted civil penalties for all its agencies to account for inflation as directed by Congress.)

"Although we've been able to reduce some of the minor injuries that might result in medical aid, first aid or treatment in a medical clinic, the serious injuries, disabling injuries, and fatalities have plateaued and even increased a little bit and that's an alarming factor," explains David Kliwinski, CSP, vice president of Safety, Health & Environment for Parsons Corp., Philadelphia, and

former chairman of the National Safety Council's Construction Division, Itasca, Ill.

The leading causes of these life-threatening injuries and deaths are represented by OSHA's "Focus Four Hazards"—falls, electrical, struck-by and caught-between—which are consistently identified as the top reasons for construction-related injuries. "Injuries link the four hazards to more than half of construction-related fatalities," an OSHA spokesman explained.

Kevin Cannon, senior director of Safety & Health Services at AGC, adds: "When you talk about construction, it's been consistent for many years: falls are the leading cause of death—working from ladders, scaffolds, roofs, working at heights that you can imagine are dangerous. If the proper equipment is not utilized or the proper process not followed, accidents are bound to happen, and falls have been leading the injuries."

Factors Contributing to Safety Lapses

There are a wide variety of reasons for and circumstances that can contribute to unsafe conditions on a job site. As such, it's difficult to pinpoint a single aspect of workplace safety that can be addressed to prevent serious or fatal injuries from occurring. However, looking at the bigger picture can assist in formulating a comprehensive approach to safety that can help save lives.

"There's a lot of conjecture around why [serious injuries are] occurring," Kliwinski observes. "Is it because the workforce is changing to a less-mature, skill/craft labor workforce? I think that's part of it."

Cannon agrees it's difficult to isolate one particular factor that is more significant than another when it comes to ensuring worker safety. However, he suggests training is "very important. You have to not only train your workers to be able to identify the hazard and be aware of it, but also you have to train them



on what to do to protect themselves from that particular hazard. And I think having that knowledge is the best way to prevent any type of injury or fatality.”

Among the additional factors that OSHA identifies as contributing to unsafe working conditions and an increased risk of injury and fatality include employees who are not trained to recognize and control the hazards of their job, expedited work schedules, and the absence of a safety and health program to ensure employee involvement and training. All parties involved in a construction or remodeling project can help reduce hazards with proper planning, training, and communicating how to create and maintain safe operations, according to OSHA.

Hazards in Retrofit Projects

When it comes to construction projects, a job site is a job site—right? Not necessarily. Although new construction and renovation projects do share similar hazards, such as working at heights that can lead to falls or using power tools that can cause injuries if used unsafely, retrofitting a building does present a few unique risks that facility executives and contractors need to keep in mind and discuss at the onset of a project.

“If you’re trying to separate between new and existing projects, I would say the age of the building can present unique hazards whether it be electrical or lead paint or asbestos, those types of things,” Cannon says.

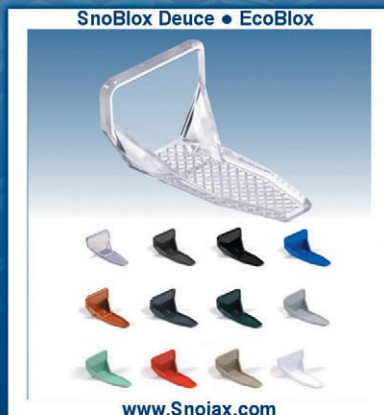
An OSHA representative told *retrofit*

that pre-planning is key in identifying hazards associated with building renovation projects: “Contractors often do not know exactly how a building was built, what materials were used or what is hidden behind a wall they need to open. Plans, specifications, as-built drawings or other pertinent information should be provided to the engineers, architects, and contractors to ensure they are aware of potential hazards before and during renovations. Projects generally include a demolition phase that involves tearing down interior walls and gutting plumbing, electrical, HVAC or other systems. Window replacements on multi-story buildings present many issues, including hazards from falls and falling objects and possible structural



Although new construction and renovation projects do share similar hazards, ... retrofitting a building does present a few **unique risks** that facility executives and contractors need to keep in mind and discuss at the onset of a project.

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AGC TIPS FOR WORKER SAFETY

According to the Arlington, Va.-based Associated General Contractors (AGC) of America, the following 13 steps have been proven to improve construction worker safety on the job site (for more details about each step, visit bit.ly/2xf0ET1):

NEW EMPLOYEES

1. Establish a buddy system for all new hires.
2. Hold safety orientation sessions for all new hires, including temporary workers.

ONGOING TRAINING

3. Ensure managers and supervisors have the appropriate leadership and effective communication skills critical to instill safety culture and concepts into the workforce.
4. Institute two separate Pre-Task Hazard Analysis training programs.
5. Hold monthly Lunch and Learn safety training programs.
6. Require all foremen and/or superintendents to attend Leadership in Safety Excellence certification courses.
7. Hold targeted safety training to address all safety incidents.
8. Make sure all training and materials are in the language of the entire workforce.
9. Train your trainers.

OPERATING PROCEDURES

10. Create worker task-specific "pocket safety guides" for every task workers are assigned
11. Establish craft-specific safety mentoring programs.
12. Issue easy-to-read badges to all workers indicating their level of training.
13. Authorize all workers to issue Stop Work Cards to address safety risks.



issues. These activities require particular attention to the structural stability of the systems as they are taken apart."

Calculating Costs and Impacts

The uptick in severe and life-threatening injuries on the construction site comes at a significant cost across the board. From loss of life and property to economic and reputation damages, the failure to fund and enforce proper safety protocol during a construction project has far-reaching effects.

"It is pretty simple in my opinion," Kliwinski says. "There are three impacts: humanitarian, financial and reputational. There is the humanitarian impact—you have the loss of life or disabling injury and the direct impact to the employees and their family. People are our greatest assets, and if we lose valuable employees—if you lose or disable a crane operator or manager or somebody who is functioning in a significant role and you're a smaller company—that's going to have a detrimental effect on your company's business."

Kliwinski also notes regulatory fines, such as the more stringent ones from OSHA mentioned previously, can add up, as can workers' compensation insurance premiums if violations or injuries are frequent. To offset those expenses, Kliwinski says some companies take on higher insurance deductibles to lower their premiums, which can be a costly mistake.

"If an injury occurs with those \$500,000/\$1 million or higher deductibles they have taken on, it could have a significant impact on the company's business because they're not profitable, or directly funding and paying for those large deductibles could have an adverse impact for the year," he says.

Additionally, Kliwinski points out legal fees and lawsuits that may result from workplace injuries or death can put a tremendous burden on small businesses, in particular. Further, the loss of income from a poor safety record can also negatively impact a business.

"If they have a significant, catastrophic event that occurs on their facility or multiple serious events that occur, reputation-

“We need to get clients to understand they have to appropriate money [toward safety]. If they do then the contractors will put it in the contracts and the work will be done more productively and safely.” — Kliwinski

ally, they may suffer the consequences or not be eligible or considered for future work,” he says.

An Ounce of Prevention

According to OSHA, safety issues can be prevented through planning; anticipating what the work will involve; and what safety equipment, scaffolding or other materials will be needed. Anticipating how structures will come apart, what may be behind a wall, or how it was put together during original construction will assist in developing the safest plan and providing the best training for crews. Collapses often result from little or no planning.


Kliwinski says safety starts at the top with leadership and trickles down to employees on the job site. “A primary factor

that’s going to drive safety performance is the supervisors and the managers who are running the work and especially the foremen over the crews. It’s their attitude, their exemplary behavior, but especially their experience and how they implement safe work practices that makes the difference. And if we don’t have leaders engaged in driving safety performance and understanding what it is that drives performance, we’re going to have the [poor] results we’re seeing now in the industry with people being injured relative to unsafe work or unsafe conditions,” he warns.

Cannon agrees and says safety should be set as a top priority from the beginning of the project and should be talked about constantly: “I think that sends the message that we want the project to be completed

in the safest manner possible.”

Ultimately, if facility executives want to communicate their commitment to safe work practices, there’s no better way to do it than with their wallets. Money talks, after all.

“Funding is a key factor because if you cut costs with regard to safety, you’re going to suffer the consequences down the road,” Kliwinski says. “And then when you have a catastrophic event, a very serious injury or incidents, it can have such an impact that it exceeds anything you think you might save in the budget. We need to get clients to understand they have to appropriate money [toward safety]. If they do, then the contractors will put it in the contracts and the work will be done more productively and safely.” 





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elkay.com/drinking-solutions // Circle No. 33

ACHIEVE THE LOOK OF STEEL WINDOWS

Kolbe Windows & Doors has added radius direct set windows to its VistaLuxe Collection. The windows feature the slim lines, narrow frames and square details of VistaLuxe products. The slim lines, paired with optional black-painted interiors, can give the appearance of steel, at a lower cost and with shorter lead times. VistaLuxe radius windows are offered as stationary direct sets in Flush and Accent styles. Radius units are available in full circle, oval, half circle, quarter circle, segment head, quarter segment and other custom shapes.

www.kolbewindows.com // Circle No. 34



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for the specific roof type, seam sealer and multipurpose sealant. Antioxidants and light stabilizers ensure the coating system's durability throughout the roof system's service life.

www.mulehide.com // Circle No. 35

INITIATIVE MAKES IT EASIER TO USE PREFABRICATED PANELS



Dryvit Systems Inc. has launched its Tech 21 Initiative, a program to make it easier

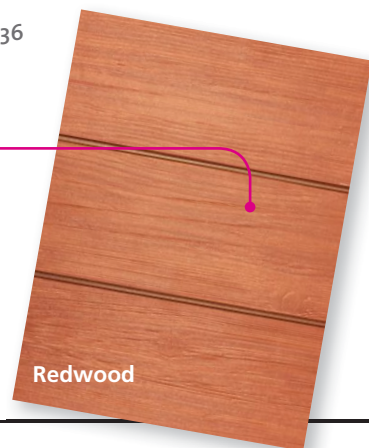
for building owners, general contractors and architects to use or specify prefabricated panels of Dryvit's Outsulation systems with Dryvit's traditional EIFS finishes or its NewBrick cladding. As part of the initiative, Dryvit has launched a Partner Fabricator Network that provides premium warranty coverage for prefabricated panels manufactured by participating contractors. Contractors who undergo additional training and meet other qualification standards are eligible to participate in the Partner Fabricator Network.

www.dryvit.com/tech21 // Circle No. 36

NEW COLORS FOR FIBER CEMENT PANELS RESEMBLE WOOD

Nichiha USA Inc. has added two colors to its Wood Series: Redwood and Ash. The colors, which were the result of extensive market research, join Cedar and Bark in Nichiha's VintageWood lineup within the Wood Series. In comparison to natural wood siding, VintageWood offers the same texture, ease of installation and cost. However, VintageWood is resistant to warping, rotting, delamination and pests. It also comes with a built-in rainscreen. The Wood Series panels can be installed vertically or horizontally in interior and exterior applications. Nichiha also provides a limited lifetime warranty on its products.

www.nichiha.com // Circle No. 37





MONITOR AND MANAGE SOLAR PANEL

LG Electronics USA has released the NeON 2 ACe in collaboration with Enphase Energy Inc. The solar panel is installed in a two-step process: Lift the microinverter out of the flat shipping position and connect the cable; there's no need to install the two products separately. Once roof installation is complete and Enphase's internal software is set up, Enphase technology remote monitoring

and management software can be controlled from any web-connected device. LG NeON 2 ACe utilizes cello technology, which replaces the industry-standard three busbars with 30 thin wires, enhancing output and reliability. The technology allows for more energy efficiency and premium temperature performance characteristics.

customer.lgsolarusa.com // Circle No. 38

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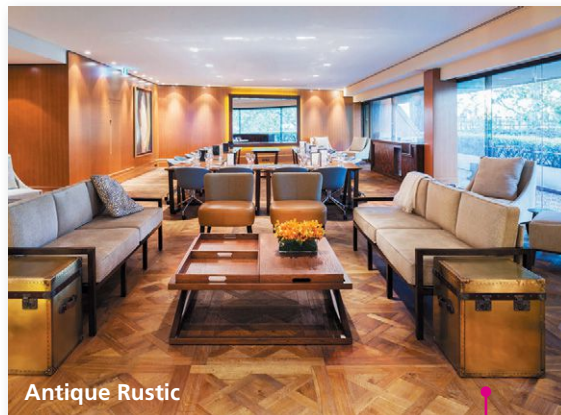
The Noritz Residential Combination Boiler (NRCB) allows for simultaneous residential domestic hot water and space heating and performs at a 95 percent annual fuel utilization efficiency. The NRCB's 316L copper primary and secondary heat exchangers provide corrosion resistance, resulting in increased durability and a longer lifespan. A third flat plate heat exchanger for domestic water heating is made of stainless steel. The NRCB is available in two models: NRCB180DV and NRCB199DV. The former has a maximum gas input Btu/h of 180,000 for hot water and 100,000 Btu/h for space heating. Its maximum flow rate is 9.8 gallons per minute (gpm). NRCB199DV has a maximum gas input Btu/h of 199,000 for hot water and 120,000 Btu/h for space heating. Its maximum flow rate is 11.1 gpm.

www.noritz.com // Circle No. 40

CREATE ROOF SUMP WITH POLYISO INSULATION

To provide contractors with a fast, easy way to create roof sumps, Hunter Panels has introduced its 4- by 4-foot Target Sump. The polyiso insulation panel is suited for low-slope applications, ships flat, is ready to install and increases the slope around drains to ensure water will flow to the drain instead of ponding. The Target Sump's coated glass facer provides improved dimensional stability, fire performance, resistance to mold growth and is compatible with all major roofing membranes and application techniques. This is Hunter Panels' second sump panel, extending options beyond the company's 8- by 8-foot hinged target sump. Both sumps are factory assembled and pre-cut for ready installation.

www.hunterpanels.com // Circle No. 41



Antique Rustic

PATTERNED HARDWOOD FLOORING INSTALLS IN PANELS

The Versailles collection from Havwoods International is a line of uniquely patterned hardwood flooring that consists of prefinished, pre-assembled panels, which make the line easy to install. The Versailles panels just need to be glued down to a secure subfloor. The collection is presented in five styles: Natural Rustic, Antique Rustic, Drift Rustic, Natural Character and White Character. Custom options also can be made.

www.havwoodsusa.com // Circle No. 39



TRANSCIVER SENDS AND RECEIVES DMX DATA

Acclaim Lighting has released its Aria Wireless DMX system, a compact, outdoor-rated wireless transceiver that can act as the sending and receiving point for DMX data. It provides up to 14 channels on the 2.4 GHz band. Its internal wireless radio features mesh networking and signal routing optimization to ensure reception of data. It comes with a 5-decibel, omni-directional antenna, which provides transmission up to 2,600 feet line of sight and 300 feet between obstructions and walls. Aria can also make a direct connection to the Dyna Drum HO and Dyna Drum SO, which have the internal receiver built-in, without the need for an additional unit. The Aria Wireless DMX system operates in temperatures between -40 to 122 F and includes a five-year warranty.

www.acclaimlighting.com // Circle No. 42

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www.measure.com/industry-drone-solutions-construction // Circle No. 43

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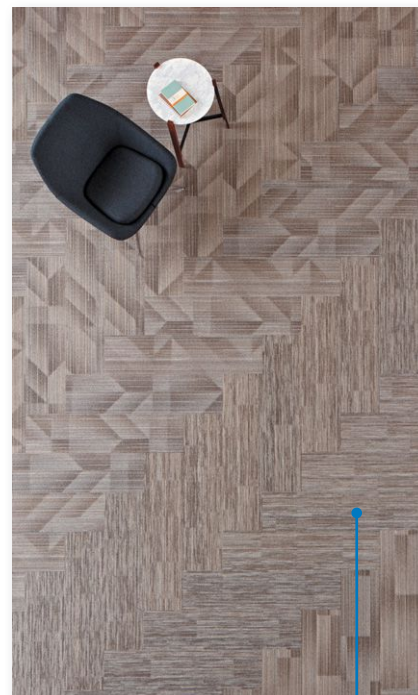
- Cost effective & easy to install
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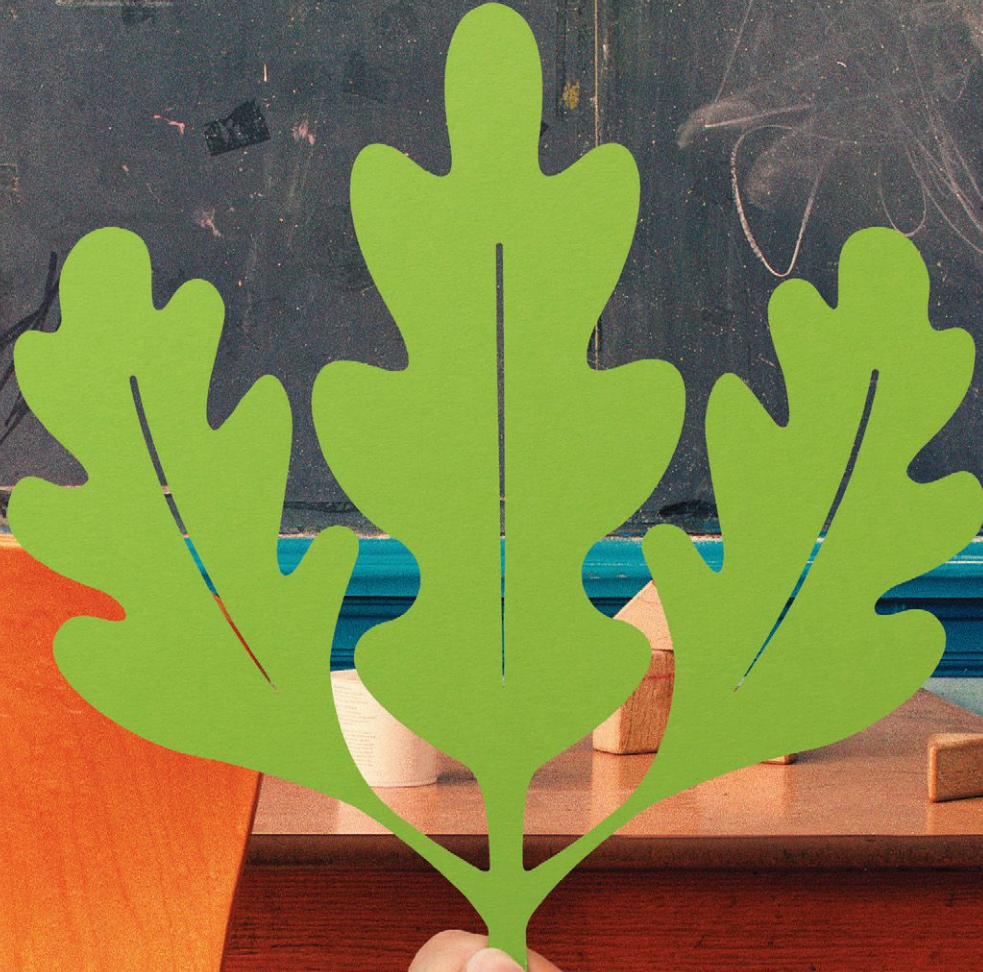


CARPET TILE'S VARIATION CREATES VISUAL DEPTH

Patcraft has released its latest carpet tile collection, Gradient Form, which captures the change in gradation and scale by using the effects of variation to create a shift in visual elements. Available in 12- by 48-inch planks and nine neutral colorways, the collection includes three styles—Rise, Run and Slope. The plank format allows for self-patterning, highlighting elements of interest through changes in gradients. The neutral colors incorporate a metallic yarn to add visual depth and luster. Constructed with Eco Solution Q and EcoWorx backing, Gradient Form is Cradle to Cradle-certified. Products are backed with lifetime warranties against stain, static and abrasive wear, as well as for colorfastness to light.

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[PRODUCTS]

ADD VOICE AMPLIFICATION TO CLASSROOM AV SYSTEMS

Extron Electronics has made available its VoiceLift Pro Microphone, which utilizes digital transmission and pairing in a dedicated spectrum to provide higher sound quality, reliability and greater range with reduced interference. VoiceLift Pro integrates with any PlenumVault, WallVault or PoleVault installation, providing a complete classroom AV and voice amplification solution. The VoiceLift Pro Microphone is based on an industry standard radio frequency technology operating in a spectrum reserved exclusively for voice communications. The VLM 3001 system includes a pendant microphone, receiver and charging station, as well as cables necessary for connecting to an Extron Classroom AV System. The VLM 3002 adds a second pendant microphone while VLM 3002H includes a handheld microphone.

www.extronclassroom.com
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OPEN SPACES WITH FOLDING WALLS

Construction Specialties has introduced Vista Air Vertically Folding Walls, a flexible space solution that permits open spaces while occupying a small footprint. The system's low-profile design features Vista Air's proprietary Rizon Lift System, which utilizes meshing gears to replace the counterweights, tension springs, straps, hydraulics and pulleys traditionally found in flexible space-management solutions. Safety and integrity are ensured by the product's durable structure, a "fail-safe" positive stop system and optional sensors to prevent hazardous closure. Vista Air is available in several mounting options and cladding materials, including metal, wood and glass. Possible attachment systems include insulated wall panels, concrete masonry units and wood framing.

vistaairwalls.com // Circle No. 48



UPGRADE EXISTING ENTRANCE WITH ENERGY-EFFICIENT DOOR

CRL-U.S. Aluminum has launched its Mojave Series Advanced Thermal Storefront and Entrance. It is NFRC-rated and engineered to meet California Title 24 requirements using the performance calculation and area-weighted prescriptive approaches. Mojave Series utilizes polyamide struts and advanced internal insulation to produce an energy-efficient door that is 1 3/4 inches in depth. This door thickness allows the system to be compatible with a wide range of locking and mounting hardware, which makes it suitable for upgrading existing entrances. Mojave Series glazed walls feature a center-glazed 2- by 4 1/2-inch thermal frame that accommodates 1-inch insulating glass units. Entrances offer a selection of narrow, medium and wide vertical stiles, as well as center hung, offset pivot or butt hinge mounting options.

www.crlaurence.com // Circle No. 49



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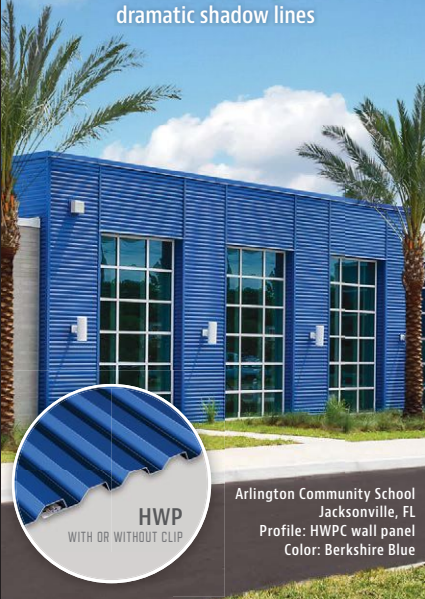
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12TH-CENTURY CASTLE IS UPGRADED WITH 21ST-CENTURY SLIDE

Conservation work at Framlingham Castle in Suffolk, England, gained global attention with the release of Ed Sheeran's ode to his hometown, "Castle on the Hill". When it was suggested the final phase of the \$1.6 million project should feature two public access staircases to enable visitors to see the restored walls close up, those involved in the project recognized they needed to work with specialists who could deliver the best solution.

Following a site visit, the scaffold/stair tower manufacturer and design specialists Creator Temporary Works and Design, Rotherham, England, finalized a scheme for two 31-foot staircases, before spending more time onsite to assist with minor modifications required to protect important historic features of the 12th-century fortress.

It was then that it was realized the temporary staircases provided an opportunity to create a unique visitor attraction by adding a slide. The unique idea posed design challenges that needed to be overcome quickly and effectively. The scaffold/stair tower manufacturer had to keep the design compact while creating a waiting area at the top of the slide and ensuring the 21-foot-high slide could curve around the temporary staircase, keeping clear of the scaffold buttress.



The solution was to move the entrance step to the opposite side of the staircase, adding an extra 5.4- by 5.4-foot bay and an entrance step going up to the first landing. This meant only two 5.4-foot bays were needed to be added for a walkway and waiting area, allowing the slide to sweep unhindered to the ground.

In two days, the equipment was onsite and erection

was completed, allowing hundreds of children to slide down the wall of an ancient Suffolk landmark. [▶](#)

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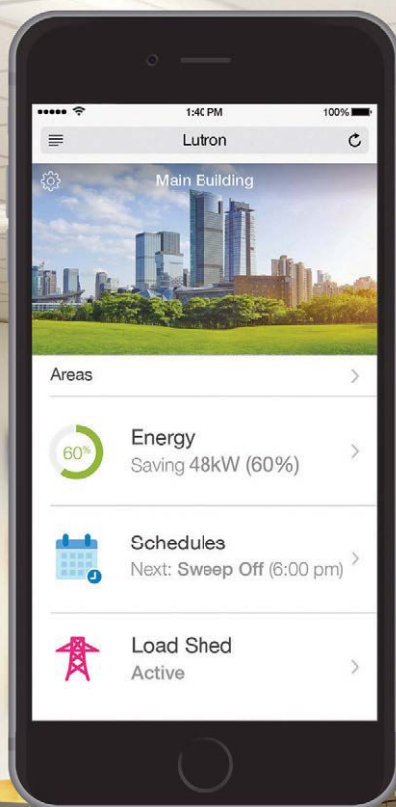
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