SEPTEMBER 2018 COMMERCIAL ARCHITECTURE Vol. 16 No. 9

CA commercial architecture

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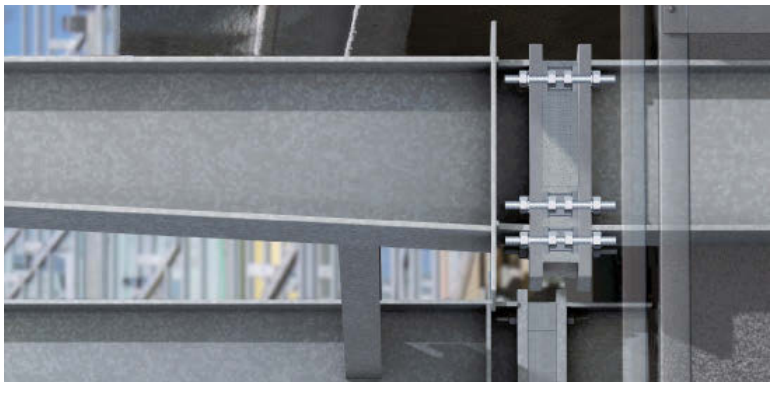

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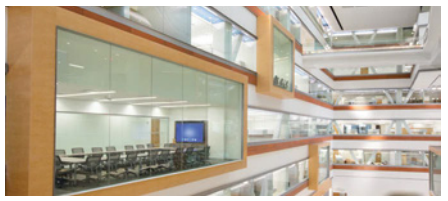

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DEPARTMENTS

About The Cover

Healthcare design is challenging because facilities incorporate a wide variety of design requirements and technologies. One example is the Centre hospitalier de l'Universite de Montreal (CHUM), the largest healthcare construction project in North America. Learn more on p. 10.

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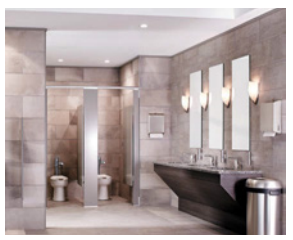

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New Online

- **Flood-control webinar.** Smart Vent experts discuss flood-control technology in a new webinar. View it at commercialarchitecturemagazine.com.
- **FEVE-coatings webinar.** Lumiflon's Kristin Blankenship discusses FEVE coatings in a webinar at commercialarchitecturemagazine.com.
- **Evergreen Brick Works geothermal system.** In a podcast, Jay Egg shares insights about the Evergreen Brickworks facility near Toronto.
- **3D-imaging laser scanning.** Matt Wheelis of Leica Geosystems discusses 3D-imaging laser scanning technology.

CA | The Architects

As part of our variety of online editorial products, *Commercial Architecture* presents podcasts to accompany each of our "The Architects" columns. Podcast discussions provide greater insight into that month's topic, along with application stories. To listen to the podcasts for the article in this issue and for previous issues, visit commercialarchitecturemagazine.com/architects.

Upgrading Boutique Offices: Eugene Flotteron

Eugene Flotteron, AIA, principal and director of architecture at CetraRuddy, New York City, shares his approach to using design ideas from large-scale residential developments to enhance opportunities in smaller, high-value commercial office properties.

Preserving Historical Structures: John D. Lesak

John D. Lesak, AIA, LEED AP, FAPT, and principal at Page & Turnbull, Los Angeles, provides additional insights into his three-step approach to using today's building-envelope, HVAC, and building-controls technology to renovate and improve historical structures.

Digital Tools for Architects: Casey Mahon

Casey Mahon, AIA, digital practice manager at Carrier Johnson + CULTURE, San Diego, discusses the various digital technologies and strategies that are available to architects and why firms of all sizes should make a concerted effort to implement the tools.

Brick-and-Mortar Retail Design: Joshua Zinder

Joshua Zinder, AIA, NCARB, LEED AP, and founding partner of Joshua Zinder Architecture + Design, Princeton, NJ, shares what his firm has been doing to develop retail-store designs to create authentic experiences that are attracting shoppers and increasing sales.

Commercial Architecture Geothermal

Jay Egg leads our geothermal coverage.

Visit IGSHPA, our sponsoring organization, at their website—igshpa.org—for standards and best-practices.

At **commercialarchitecturemagazine.com/geothermal**, Jay Egg describes the multi-faceted system at the Evergreen Brick Works site in Toronto. In addition to a geothermal design that uses borehole thermal-energy storage technology, the HVAC system uses radiant heating/cooling, a Cupolex in-floor system, and CRH Foamcrete to provide quality indoor air in a building that cannot be properly insulated. In addition to the article, we offer additional photos on our geothermal page and a podcast in which Egg provides additional details about the Evergreen system and the leading-edge environmental-technology development program that is at the core of the Evergreen operation. If you haven't had a chance, be sure to set aside some time to experience our previous articles and podcasts about the Cornell Univ. Tech Campus on Roosevelt Island, NYC; the Bottleworks Loft Condominiums in Cedar Rapids, IA; the Whisper Valley community geothermal system near Austin, TX; and the extensive use of geothermal systems in various European cities. Be sure to bookmark our geothermal page and watch for more technology articles, podcasts, and webinars in the coming months.

Also, visit the International Ground Source Heat Pump Association website at **igshpa.org** to learn more about geothermal-system design, standards, and best practices.

–Gary L. Parr, editorial director

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FUTURE *of* SHADE

FROM ENERGY-EFFICIENT FABRIC FACADES TO EXPLORATIONS OF THE HEALING EFFECTS OF LIGHT AND SHADOW TO PORTABLE HOUSING SOLUTIONS FOR REFUGEES, THE WINNERS OF THE **2017 FUTURE OF SHADE** COMPETITION REVEAL THE INTEGRAL ROLE OF FABRIC IN SHADE AND BUILDING DESIGN.

VIEW ENTRIES AT
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Building Shade

Arman Hadilou

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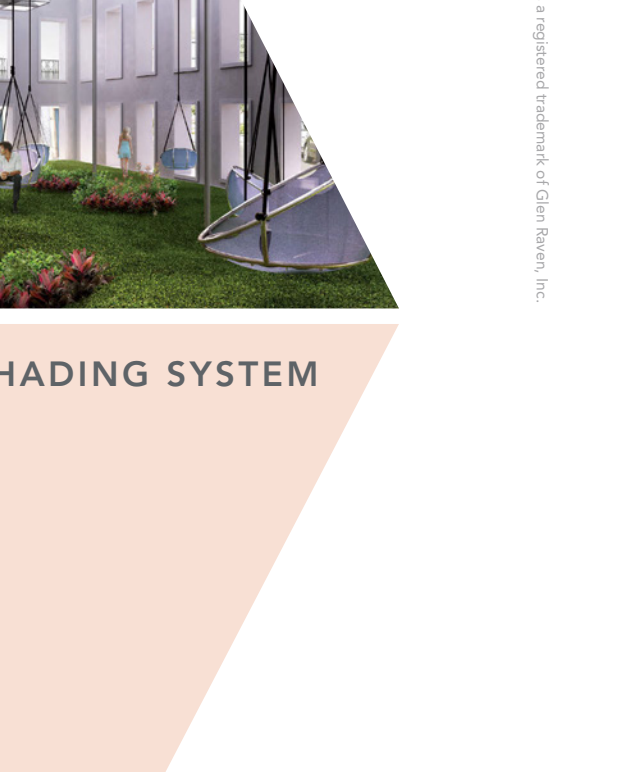

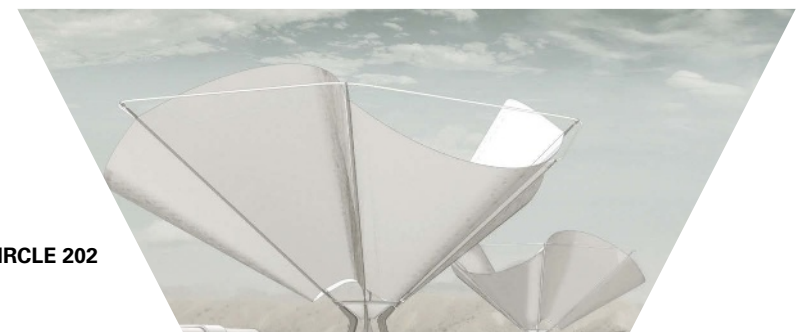

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CIRCLE 202

LANDING 53 APARTMENTS RELY ON HARVEY WINDOWS

Stylish modern apartment living matches with the individual personalities of tenants in the new Landing 53 apartments in Braintree, Massachusetts.

The newly-constructed six-story building includes an interior courtyard with gas grills and a fire pit area, a resident lounge and a rooftop terrace for spending time with friends and neighbors. An underground parking garage, outdoor heated pool, state-of-the-art fitness center and retail space built into the first floor of the structure provide envious amenities that make life easy.

The appeal of living in a new apartment complex is enhanced by the wide variety of floorplans available to residents. The team at Russell Scott Steedle & Capone Architects, Inc., met the challenge of breaking the standard apartment mold by creating 17 different layouts for one bedroom/one bath apartments, ranging is space from 607- to 804-square-feet. Impressively, they also created 35 unique two bedroom/two bath apartments, with space from 887- to 1,167-square-feet. And then there are the studio apartments in five different styles ranging from 396- to 745-square feet.

The unifying factor for each apartment is the natural light flooding into the spacious settings. Located close to downtown Boston and the scenic Monatiquot River, each unit features a multitude of custom Harvey windows, created to bring local views, fresh air and light into the apartments from an exterior clad with low-maintenance brick and siding.

WINDOWS BRIGHTEN APARTMENTS

Just opened in 2018, Landing 53 boasts 32 studio, 61 one-bedroom and 79 two-bedroom apartments, some with exterior balconies. The first residents have found that the architectural firm specified more than 1,000 Harvey windows to provide energizing light to the 172 apartments at their new home.

"We like to use a lot of glass to make apartments cheerful and rentable," says Hugh Russell, principal with Russell Scott Steedle & Capone Architects, Inc. out of Cambridge, Massachusetts. "We specified mulled Single-Hung windows from Harvey Commercial Solutions because these windows are a very cost-effective way to achieve the appeal we're looking to create with glass."

Adding to the overall structure design are modern ver-

ABOUT HARVEY COMMERCIAL SOLUTIONS

Harvey Commercial Solutions is a division of Harvey Building Products - a leading manufacturer and distributor of high quality windows and doors built on a solid reputation for outstanding craftsmanship and superior service. With a proven 50-plus year track record of best-in-class manufacturing of high quality vinyl windows and doors, Harvey has been providing custom window and door solutions to the commercial sector for more than two decades. The company's manufacturing facilities represent more than 600,000 square feet of space, with a state-of-the-art testing lab and a dedicated recycling area to help preserve natural resources. Visit www.harveycommercial.com for more information.

sions of a typical bay window featuring a triple-mulled unit on the face and smaller individual windows on the side. According to Russell the mulled units are located in the living rooms of some apartments to extend and enhance the interior space. At the same time the "bump out" window treatment provides texture and scale to the exterior.

1,000+ WINDOWS

With more than 1,000 ENERGY STAR® qualified windows in Landing 53, it was critical for Russell and his team to specify a reliable window manufacturer.

"The Harvey windows are very important in the design of this project," says Russell. "We spent a considerable amount of time working out the proportions and spacing and patterns to achieve an appearance and scale that fits in with the neighboring 19th and 20th century buildings."

To meet the structural demands for the project, the majority of windows were created to meet DP 50 and above requirements. Additionally, some units were stud-pocketed windows, while others were double- or triple-mulled units.

"We created our custom windows to meet the structural and thermal requirements of this project," says Ken Howland, Account Manager at Harvey Commercial Solutions out of Waltham, Massachusetts. "In working closely with the architects we were able to use windows in our Classic series to meet both their aesthetic and practical needs. Viewing the exterior of this building you're immediately struck by the extensive use of glass in the structure's design.

"The Classic windows are made to fit in an opening with very little carpentry needed, reducing installation time and mess. The sleek, fully-welded sash and frame design provide a one-piece sloped sill for strong performance that creates an air-tight seal … something residents at Landing 53 will surely appreciate."

CUSTOMIZED DELIVERY SCHEDULE

When it came time for installation of the windows, Howland and the Harvey Commercial Solutions team were also there to make certain the job moved forward efficiently.

"This project had three major orders and delivery schedules," says Howland. "Our Just-in-Time delivery by sections for the apartment complex meant that we perfectly matched the window delivery with the installation schedule. This kept the job site activity flowing smoothly."

Completed in early 2018, Landing 53 creates the perfect mixed-use project that fits in with the style and design of this Boston suburb.

RESOURCES

Harvey Commercial Solutions
https://harveycommercial.com/

Harvey Structural Performance Data
https://harveycommercial.com/wp-content/uploads/2018/05/Harvey-CS-Structural-Performance-Data.pdf

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HARVEY
COMMERCIAL SOLUTIONS

AIA Contract Documents

Real projects start with the Industry Standard

Before they broke ground, HBG Design ensured the **Guest House at Graceland™ Resort** was protected with AIA contracts.

AIA Contract Documents used: B103–Owner/Architect Agreement for a Complex Project, C401–Architect/Consultant Agreement, E201–Digital Data Protocol Exhibit, plus associated administrative G-forms.

Learn more about the Guest House at Graceland™ Resort project at aiacontracts.org/ca

Photography ©Jeffrey Jacobs

CIRCLE 204

Survey Defines Workspace Flexibility

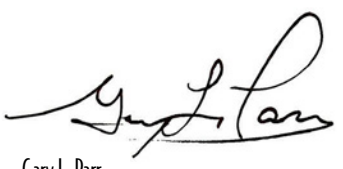
Flexible is a word that has banged around work environments for years. It was one of the major selling points of cubicles, though, once in place, the flexible part seemed to get thrown out with the packing material.

Today, flexible has little to do with which "box" is assigned to which employee and much more to do with when, where, and how a professional works. "Where" is not cubicle three, row two; or the corner office. It's whether someone is in an office, telecommuting, at Starbuck's, or at a picnic table in the local park because the weather's nice.

The people at Capital One, McLean, VA (capitalone.com), conduct an annual Work Environment Survey of 3,500 professionals and results of the recently released 2018 survey clearly define what today's employees expect and, in some cases demand, when it comes to flexible working conditions. Here are some highlights:

- 85% of office professionals surveyed believe flexible workplace design is important and 83% said they have their best ideas when working in flexible-space options. Flexible schedules also prove to be crucial to talent attraction and retention–73% of workers say a flexible schedule is one of their top two reasons to stay with a company. Flexible hours was the number one factor workers cited when asked what they expect from their next employer (58%).
- Employees also have the same expectations of technology. Of the professionals surveyed, 85% say it's important that their next employer be an early adopter and quick to invest in and implement new technology.
- The majority (79%) of surveyed office professionals believe companies can't encourage innovation unless they provide an innovative workplace environment. Executives feel even more strongly about this, with 87% agreeing that office design is key to encouraging innovation.
- What design elements define an innovative workspace? The most desired elements include: natural light (57%), easily reconfigurable furniture and spaces (37%), artwork and creative imagery (30%), collaborative spaces (30%), and a tie (25%) for bold colors and spaces for rest and relaxation. In addition, 80% of respondents say they are more productive when they move to a different room or environment while working.
- Location is not as important as design. When considering a new job, two out of three (66%) full-time professionals believe that workplace design and environment is equally important or more important than office location. Executive-level employees feel even more strongly about this, with 76% saying workplace design is as, or more, important than location.

As several of our "Architects" articles in the past couple of years have indicated, the office setup of management in windowed offices surrounding a field of cubicles is history. Also history are those offices and cubicles filled with people working 9 to 5. The Capital One survey does a nice job of quantifying what we've learned from many sources: people are more productive and creative if they can work in a flexible environment, with ample daylight and good indoor-air quality, at times that best fit their physiological makeup. The challenge is to create those spaces. CA



Gary L. Parr
Editorial Director

Research IDs Multifamily Trends

Meeting the needs and desires of renters/owners in today's urban markets presents several design challenges and opportunities.

Rick Castillo, AIA, NCARB, Principal
Carrier Johnson + CULTURE

New design-savvy mixed-use developments in Los Angeles, such as the Carrier Johnson + CULTURE-designed Eighth & Grand, integrate amenities that help attract millennials. In this project it's a Whole Foods anchor store. *Photo courtesy Carrier Johnson + CULTURE*

Whether you live in or build multifamily housing, there are many new demands on the baseline residential experience. The fact is, much of the older U.S. housing stock is out of reach and often out of step with the needs of younger residents and buyers. Old apartment and condominium configurations no longer have the same appeal, and we need to explore enhanced solutions that meet the needs of millennials and their interest in authentic experiences and technology-infused lifestyles.

With that in mind, we have studied how tomorrow's residents will live and are creating new ideas to meet these needs. Here are a few of the key findings:

- Demographics aren't what they used to be. A key challenge for housing is matching solutions to emerging demographics. Many urban markets are trending younger–the median age in Los Angeles is about 34 years old–and that means adapting architecture to emerging preferences. Younger renters and homebuyers prefer digital solutions over face-to-face interactions, stated Clayton Williams, vice president of development for Mill Creek Residential Trust, Dallas (millcreekplaces.com). "They'd rather use apps to pay their bills or sign leases because of the convenience and time savings offered by these methods," he explained.

In addition to the younger group, there's a split demand with an aging population, including baby boomers, who have changing expectations for living. Many downtown owners/developers are experiencing increased market rates and luxury development, but cities across America desperately need additional affordable and workforce housing solutions. Meeting the housing needs for all of these groups will create unique opportunities where design and quality are expected.

- New technology is reshaping living models. Advances in technology and new business models from the sharing economy are changing how developers and property owners view their communities. A few years ago, homebuyers didn't contemplate whether their leases would allow Airbnb-type privileges. No one was asking for car sharing or electric-vehicle chargers on the premises. Refrigerated storage for grocery deliveries or rooftop drone access? Unheard of then, but it's our reality today.
- More homeowners seek authentic experiences. Young buyers want meaningful experiences, especially in savvy urban markets. What creates authentic, higher-quality experiences? According to Jonas Bronk, managing director of Alliance Residential Co., Phoenix (allresco.com), "As developers, we have to continue shifting our focus toward value and uniqueness, going beyond the home itself into the building-wide and neighborhood features." This also means architecture and interior design–and integrated, experiential branding–are critical to success.
- New models are emerging in retail, services, and amenities. The overall shifting demographics in buyer and renter markets have also challenged developers to add unique services to their amenity programs to appeal to younger, more demanding renters and owners and to compete with other properties. Amenities such as on-call drivers, laundry service, and on-site dog walkers are increasingly popular. Prospective tenants and buyers are willing to pay premiums to have these perceived luxuries.
- Solutions are needed. At a recent brainstorming session hosted by Carrier Johnson + CULTURE, a group of developers, owners, contractors, and experts engaged in dialogue about the future of housing in Southern California. The group raised key issues for success, including increased density, better mixed-use solutions, and new approaches such as modular construction, co-living, granny flats, and micro-units.

More innovation is needed, and a few exemplary new projects point in promising directions. With new rules allowing more adaptive reuse, the lower-income market is served by projects such as Hotel Panama, which added 73 affordable single-room units with shared amenities and on-site social services to L.A.'s Skid Row neighborhood.

New mixed-use and high-density solutions can serve all income levels, such as new 35-story Shoreline Tower in Long Beach, CA. This complex includes 315 units in one- and two-bedroom and studio layouts. For emerging residential areas, resort-style magnets such as Pinnacle 360 help anchor budding neighborhoods. Pinnacle 360 offers big views of the Hollywood sign and rich amenities, including a fitness center, two pools with cabanas, fire pits, hot tubs, and rooftop sky decks.

To serve lower- and moderate-income needs, as well as the wishes of aspirational millennials and baby boomers, creative developers are entering the markets on the West Coast and beyond delivering successful solutions. With attention to the demands of new technology, the sharing economy, and emerging demographics, architects stand a better chance of serving the need and keeping our cities competitive and livable. CA

Rick Castillo, AIA, NCARB, is principal with Carrier Johnson + CULTURE, San Diego (carrierjohnson.com). With more than 30 years of experience, Castillo brings a deep understanding of the commercial construction and real estate markets, particularly in Southern California.

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CIRCLE 205

Wellness: Beyond Green Design

More than energy efficiency and sustainability, healthcare design seeks to promote patient well being.

Kenneth W. Betz, Senior Editor

Green buildings and sustainable design have long been a topic of discussion relative not only to healthcare but buildings generally. Lately, a new idea has emerged to supplement that thinking: Healthcare architecture is about more than curing illnesses. It's about promoting wellness through concepts such as regenerative, restorative, and resilient design.

"While the topic of green design has been a standard for architects for more than half a century, the latest iteration of green thinking embraces aspects of health and wellness for all building types. Terms such as regenerative design, restorative, and resilient have been in our toolkit for a while. However, with the advent of the International WELL Building Institute, New York (wellcertified.com), set of standards, as with LEED in green and sustainable design, the greater public and, therefore, many clients are more aware and more receptive to considering these concepts in their design and development projects," commented Turan Duda, FAIA, Duda|Paine Architects, Durham, NC (dudapaine.com).

"In design for wellness, the consideration of all aspects of human experience, health, and well being come into play as a matter of necessity," Duda said. "All facilities benefit from design that is free of material pollutants, has abundant natural light, includes elements that evoke nature, provides views of the surroundings, ensures comfort, welcomes patients and families, provides access to healthy food, and both encourages movement and is completely accessible to all. Including resilient strategies that either minimize energy consumption–such as green roofs and high-tech curtainwall systems, and renewable energy sources such geothermal and photovoltaics–is a natural extension of the thinking around green design and design for wellness.

"For us, what is most interesting is how these concepts have become part of the discussion around design for new corporate headquarters, student centers, and mixed-use developments. No matter what the building type, this future-inclined, human-centered approach to project design is good for everyone," he added.

COMMUNITY

"Healthcare Without Harm's (Reston, VA, noharm.org) broad agenda is in line with current thinking in the design community. The question we should be asking is, how can facilities dedicated to our health and well being, and all new developments, contribute to their communities?" said Jeff Paine, AIA, Duda|Paine Architects.

"While we have always advocated for the addition of public space in all our projects, no matter the client or typology, we are seeing clients' sense of the value of these spaces is increasing. The inclusion of public space and spaces that invite economic and social activity enriches projects and provides a

The Shriners For Children Medical Center

The Shriners for Children Medical Center in Pasadena, CA, combines a three-story building for surgery, clinical services, rehabilitation, and healing landscapes. As part of a campaign to replace and renovate its aging facilities, Shriners' new 74,800-sq.-ft. center focuses on outpatient services to better meet its mission of providing care to young patients. The design leverages evidence-based design strategies, the redevelopment of a suburban site, and an outward-facing building design that provides a positive emotional journey for patients and families. The two-acre site is divided into the medical building on the northern half of the property and therapeutic gardens and outdoor gathering areas on the south side. The contemporary architecture of sweeping horizontal planes, cantilevers, and setbacks, along with region-sensitive landscape, is consistent with the modernist legacy of Pasadena. Local landmarks include designs by architects Greene and Greene, Richard Neutra, and Craig Ellwood, and landscape architects Garrett Eckbo and Lawrence Halprin.

The medical center's glass-lined walls present an open and inviting character and reveal the activity within the building. A generous garden forecourt and upper-story terraces draw people outside to connect with nature and their surroundings. Three levels of underground parking provide 210 spaces for patient families, visitors, and staff.

COLLABORATIVE DESIGN

The project was collaboratively designed by CO Architects of Los Angeles (coarchitects.com), SRG Partnership of Portland, OR (srgpartnership.com), and Rios Clementi Hale Studios of Los Angeles (rchstudios.com).

The team combined their talents of medical planning, sustainable design, healthcare interiors, and landscape architecture to develop creative solutions to this complex urban project, and worked with general contractor DPR Construction of Redwood, CA (dpr.com), to achieve them. Consulting with Shriners' national and local board members, administrators, and clinicians—along with residents, builders, and subcontractors—the partnership tapped ideas from all stakeholders to create a facility supportive of well being, healing, and community.

Shriners moved its medical center from Los Angeles to Pasadena after determining that a new surgery center and clinic could be built for the same amount that it would cost to renovate its existing L.A. hospital, a 65-yr.-old facility in need of seismic upgrades. At the same time, Shriners was changing its business model from owning and operating acute-care hospital facilities to offering outpatient services and partnering with local hospitals to provide additional support. The *(continued)*

The Shriners for Children Medical Center in Pasadena, CA, combines a three-story building for surgery, clinical services, rehabilitation, and healing landscapes. The new 74,800-sq.-ft. center focuses on outpatient services to better meet its mission of providing care to young patients. Photo: Nils Timm

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- Fabian Kremkus, AIA, LEED GA, Design Principal
- Don Kim, AIA, LEED AP BD+C, Senior Associate
- Susan Han, Designer
- Veronica Carranza, Project Administrator

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- Craig Tompkins, AIA, LEED AP, Medical Planner
- Jessica Mistretta, NICDQ, LEED AP, Interior Designer
- Matt Ottinger, AIA, Project Architect

LANDSCAPE ARCHITECT:
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- Mike Cheng, Senior Associate
- Tony Paradowski, Senior Associate
- Chris Torres, Associate
- James Lively, Designer
- Anne Clark, Designer
- Tavi Pertulla, ASLA, LEED AP, Designer

GENERAL CONTRACTOR:
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MEP ENGINEER/LIGHTING:
EXP, Los Angeles (exp.com)

STRUCTURAL/CIVIL ENGINEER:
KPFF Consulting Engineers, Los Angeles (kpff.com)

MEDICAL EQUIPMENT PLANNER:
Mazzetti + NLB, Irvine, CA (mazzetti.com)

strong link back to communities. For clinical-care spaces specifically, we see a trend in the addition of flexible, multi-purpose spaces that can provide space for gatherings and events or for classes and movement studios. Often, these spaces are connected to gardens and landscaped patios and terraces that invite exchange between indoor and outdoor activities. The inclusion of coffee bars and dining options with nearby lounge spaces allow users and the public to gather or take a break," Paine said.

"We also consider the addition of art to the design equation as a critical aspect of community-oriented design. Setting aside areas or surfaces for the display of art is an option that encourages public engagement and supports local arts communities. Integrating permanent art pieces into the architecture does this as well, but also can be a key factor in further humanizing waiting areas and treatment spaces," he added.

THE PATIENT EXPERIENCE

Sustainable and energy-efficient measures cannot only provide cost savings, they can also impact the patient experience.

"Windows and glazed areas, which reduce the need for artificial lighting and save operation costs, also provide both natural light and views to the outdoors, which can improve occupant health," Turan Duda noted.

Likewise, green roofs can serve as garden spaces where building users can easily access the outdoors and as a source of calming views from interior spaces, Duda noted. "At the same time, green roofs reduce the environmental ills of traditional roofing systems, mitigate stormwater runoff, and aid in reducing CO_2 in the atmosphere," he said.

"The use of recycled and locally sourced materials reduces lifecycle and energy costs while also often improving a building's indoor air quality." Duda added.

ALTERNATIVE ENERGY?

Asked if a significant number of healthcare facilities were looking to alternative energy sources, Paine responded, "Much depends on the client and the project. These systems can require considerable upfront costs, but for institutions such as universities, hospitals, and federal facilities that often include the construction of central utility plants, alternative sources of energy can reduce energy costs, improve public health through the reduction of greenhouse gases, allow a lower carbon footprint, and provide stable energy sources.

"Using rooftops and even areas of curtainwall for solar panels can make sense for any project," he continued, "but for high-demand, critical service buildings such as hospitals, their vulnerability to changing weather patterns is a disadvantage. Geothermal energy via ground-source heat pumps is increasingly used in new construction projects as a reliable option because it uses the earth's more stable temperatures as the source for both heated (continued on p. 16)

Pasadena location near Huntington Memorial Hospital works well for the organization in meeting this goal.

EFFICIENT BUILDING ORGANIZATION

The new medical facility is half the size of the Los Angeles hospital, but is able to service three times the number of patients. The ground floor houses patient check in, exam rooms, and x-ray areas, including a low-dose imaging system and prosthetic-limb manufacturing space.

The second floor includes a surgical suite with two operating rooms and patient prep and recovery rooms, along with a light garden court that provides abundant daylight to waiting and circulation areas. Also located on the second floor is the rehabilitation department, which includes a physical-therapy gym and outdoor terrace with a therapy landscape. Rehab treatment rooms are positioned on the east side of the building to capture diffused light and clear vistas of the foothills. Natural light, views, colorful wall murals, and signage enhance clarity of wayfinding for patients, families, and visitors.

The third floor includes administrative and physician offices, a conference center, and medical library connected to the operating rooms with an electronic video-integration system to view surgeries in progress. This level also includes a large outdoor patio and sky garden for events and enjoying views of the San Gabriel Mountains.

ENVIRONMENTAL SENSITIVITY

Metal, glass, and stone on the building exterior establish the medical center's institutional presence. The stone anchors the building to the ground, while the glass and metal connect the structure to the sky. The colors of the materials become lighter from the ground to the top to visually reduce the apparent building mass.

Environmentally sensitive strategies shape the architecture to improve patient comfort, promote healing, and save energy and operating costs. The design team integrated natural lighting throughout the building so it would not feel like a dark, sterile facility. Glass on the exterior reflects solar heat and redirects and diffuses visible light into the building, while maintaining transparency. Natural light shines into interior spaces through windows with glare-preventing shades. LED lighting is used in all hallways and exam and x-ray rooms where patients can change the color of the illumination, which acts as a pleasant distraction from the clinical processes taking place.

Rooms are configured so light is passed from perimeter spaces to the interior, and internal courtyards allow daylight to reach the center of the building. On the roof, light monitors with automated louvers control peak summer sun to save energy. Deep, cantilevered canopies shade public spaces on the ground floor to reduce solar gain.

Other green features contributing to a LEED Silver (equivalent) certification include PVC roofing with a high solar-reflectance index, recycling of 50% of construction waste, water use reduction by 30%, low-VOC paints, an onsite water-retention basin for collecting stormwater, and bicycle storage areas. In addition, the project is located on a previously developed lot to take advantage of existing infrastructure.

CHILD-CENTERED DESIGN

CO Architects and SRG created the interiors with a focus on color and shape, while steering clear of childish clichés. Custom-designed murals depicting flora and fauna in colorful silhouettes run along the corridors, inviting discovery on the way to waiting areas and treatment rooms (which have similar graphics), while acting as positive distractions for stressed children. The colorful forest theme starts in the main lobby, which also sports swirls of colored terrazzo flooring. An interactive feature wall draws kids into the space and changes images with kinetic motion ignited by touch. Furnishings are comfortable and colorful in a variety of seating arrangements to accommodate families.

Pre-operative and post-anesthesia care units (PACU) are private, visually and acoustically, to preserve patient dignity. Patients can control room lighting, entertainment, and education systems, as well as nurse-assistance needs, giving them greater autonomy and sense of control. For continued privacy, consultation spaces are provided for confidential conversations.

Daylight is an integral part of the healing and well-being factor. Pre-op and PACU rooms are located on the north side of the second floor with windows for direct access to daylight, while indirect daylight is provided to operating rooms, boosting surgeon and staff awareness and energy. An interior courtyard is located adjacent to the surgery waiting room to provide daylight and outdoor access. Large-scale graphics of trees and plants are subdued in their coloration and wrap the walls in the waiting room and courtyard, providing a seamless exchange between indoors and outdoors.

LANDSCAPE FOR HEALING

Rios Clementi Hale Studios designed the multi-level landscape for healing, reflecting, and gathering. Each of

Right. Custom-designed murals depicting flora and fauna in colorful silhouettes run along the corridors, inviting discovery on the way to waiting areas and treatment room (which also sport similar graphics), while acting as positive distractions for children under stress. *Photo: Tom Bonner*

Lower right. Furnishings at the Shriners for Children Medical Center are comfortable and colorful in a variety of seating arrangements to accommodate families. *Photo: Tom Bonner*

three outdoor areas is inspired by a different ecological and cultural aspect of the Pasadena region, including the grasslands of the San Gabriel foothills, farmland of the region, and annual Rose Parade.

The building is set back on the south side by about 180 ft. to provide a landscaped courtyard as an open space amenity.

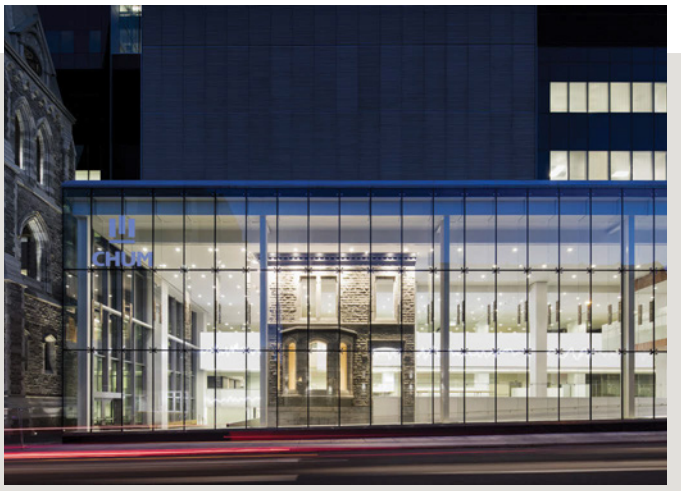
All the elevator lobbies, public waiting rooms, gathering areas, and roof terraces are on the south side of the building overlooking the courtyard. Generous canopies creating sheltered transitional areas between outside and inside establish a welcoming character that frames the expectations for the healthcare experience. The solar orientation of the building, courtyard, and upper-story terraces is organized to take advantage of the sun as a daily amenity to be enjoyed by all.

The iconic rose, Pasadena's official flower, led to the vibrant plantings and shade canopies of the gardens and plaza at the front of the site. Meandering paths, stairs, and ramps throughout this area allow young patients to exercise and traverse a variety of terrain as they heal.

The front of the site is designed so the drop-off area at the building entrance is incorporated into the landscape with its therapy garden and enclosed play area. This ground-level area includes the Rose Plaza, a paved event space. Various levels of enclosure and exposure offered by the fabric canopy, large trees, and sculptural water walls allow individuals to choose solitude or inclusion to help in the healing process.

On the second floor, the smaller, internal therapeutic garden includes a mound on which to exercise, while the larger terrace at the southern end of the building provides space for walking. Both outdoor areas serve as waiting rooms so patients and their families can experience nature without having to leave the building.

The third-floor sky garden provides an outdoor gathering area and setting for events, such as fundraisers. This large space, accessible from administrative-staff offices, includes a planted strolling garden with a boardwalk leading through trees and native grasses.



Right. The entire CHUM building is designed following universal design principles, and the majority of the rooms in the building were designed following a small number of standardized room templates. *Photo: Adrien Williams, V2com*

Far right. Neuf and CannonDesign incorporated sections of a historic church and house into the CHUM project to create an indoor/outdoor space. *Photo: Adrien Williams, V2com*

Below. After nearly a decade of work, CannonDesign and NEUF Architects recently completed Phase 1 of the Centre hospitalier de l'Université de Montréal (CHUM). *Photo: Adrien Williams, V2com*

Largest Healthcare Project In North America Opens Medical Center

After nearly a decade of work, CannonDesign, Toronto (cannondesign.com), and NEUF Architects, Montreal (neufarchitectes.com), recently completed Phase 1 of the Centre hospitalier de l'Université de Montréal (CHUM). Begun in 2009, the CHUM teaching institution is said to be the largest healthcare construction project in North America and the largest healthcare public-private partnership project in Canadian history.

"It's remarkably rewarding to see so many years of preparation, planning, design, and intense effort come to life," said Jose Silva, principal for CannonDesign. "The CHUM has always been an extraordinary project—from the bold vision that set it in motion nearly a decade ago to the beautiful building it has now become. This is an exciting moment for both those who worked on the project and those who will benefit from this state-of-the-art facility."

Initially structured as a two-phase project, the team reconfigured the indicative design of the campus arrangement and architecture in order to significantly accelerate development. As a result, Phase I, now complete, delivers the hospital's core healthcare capabilities, including all patient rooms, all operating theatres, diagnostic and therapeutics, as well as the oncology program, leaving only offices, a conference center, a few ambulatory spaces, and additional parking for Phase 2. This allows the Quebec population to benefit from the much-needed state-of-the-art healthcare infrastructure years sooner than originally anticipated.

HUMAN INSPIRATION

With social infrastructure and urban renewal as integral components to its design, the 22-story complex, spanning more than 3 million sq. ft. and encompassing two full city blocks, will play an important role in regenerating the neglected East-end of Montreal's downtown core, reconnecting the city's urban fabric and anchoring the Quartier de la Santé, Montreal's new healthcare district. In addressing the totality of that task, the design team approached the project from all scales, including the large-scale urban element, the local neighborhood context, and the fine grain of a human component, central to its vocation as a place of healing.

"Walking through the completed spaces today, we feel a spatial quality that is in line with the ambitions of this great institution," explained Azad Chichmanian, partner and architect with NEUF architects. "As the public finally begins to discover the architectural moments that have been created, from the inviting, light-filled public spaces to the state-of-the-art clinical facilities, we believe the building will succeed in completely redefining Montrealers' image of what a hospital feels like."

From a healthcare delivery perspective, each of the 772 rooms includes ample space for family involvement, and expansive windows offering some of the best views of the city. Importantly, the entire building is designed following universal design principles, and the vast majority of the 12,000+ rooms in the building were designed following a small number of standardized room templates.

ART AND ARCHITECTURE

Going well beyond the Quebec government's requirement of dedicating a minimum of 1% of a public development's budget to the integration of art, the new CHUM campus will have 13 large-scale works of art incorporated into the design and ultimately house the highest concentration of public art in Montreal since Expo 67.

"We have integrated the art directly into the architecture of the complex in ways that blur the lines between the two and provide a more human experience to the visitor and staff," explained Chichmanian. "In fact, many components of the buildings themselves can be considered as works of art, including the amphitheater, the reconstructed steeple, Maison Garth, and the Space of Contemplation—forming a series of architectural objects animating Saint-Denis Sreet. Perhaps the best example is the passerelle, an aerial bridge now spanning across Sanguinet Street. with its translucent arch emerging from the perforations of the copper shroud enveloping it."

AWARDS

Ahead of the opening, the complexities and design of the CHUM project garnered significant international accolades. In 2016, the design team was honored with an Architizer A+Award, as well as an A' Design Award presented during the European Healthcare Design Forum in London. In June 2017, the team won top prize in the Lighting Installations and People's Choice categories for the CHUM Passerelle, presented at the AzureAZ Awards.

PROJECT DETAILS

ARCHITECTS/DESIGNERS
CannonDesign (cannondesign.com)
NEUF architect(e)s (neufarchitectes.com)

PRINCIPALS IN CHARGE
Jose Silva, AIA, Cannon
Azad Chichmanian, OAQ, NEUF

ENGINEERS
Pasquin St-Jean, HH Angus, Groupe SM, Montreal (groupesm.com)

LANDSCAPE ARCHITECTS
NIP Paysage, Montreal (nippaysage.ca)

CONTRACTORS
Construction Santé Montréal, Montreal (linkedin.com/company/construction-sant-montr-al)

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and cooled air. These systems do not emit carbon dioxide or other greenhouse gases, which have enormous advantages for user health and can reduce water usage for cooling towers. However, beyond upfront investment, geothermal systems require additional real estate, which can be challenging for any project."

OTHER TRENDS

Ideas focused on health and wellness are much more holistic today than previous thinking, according to Duda. "We also see a trend toward facilities that merge different departments and functions together around shared resource and meeting spaces to foster cross-disciplinary thinking and collaboration. Also, we see more open and shared offices and multipurpose spaces that can serve training needs and allow classes in subjects as diverse as nutrition, meditation, and movement," he said.

"Health Insurance Portability and Accountability Act (HIPAA) requirements have also transformed how buildings for health services are designed," Duda continued. "Today, that challenge is being addressed in creative ways through the placement of program spaces and the use of materials that foster the transmission of light but also allow privacy. Material choice, level changes, and the arrangement of program elements can transition between more public and private spaces for care to answer HIPAA needs while not compromising the creation of a humanistic environment."

Clearly, the wellness of building occupants, whether in healthcare facilities, schools, offices, or beyond, is an emerging trend. Healthcare is a natural for this movement, but it's welcome and appropriate beyond those confines as well. CA

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Want more information?
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- Healthier Hospitals
- International Well Building Institute
- Health Care Without Harm
- American Society for Healthcare Engineering (ASHE)
- Environmental Sustainability in Hospitals: The Value of Efficiency

Ken's VIEW

Out To Lunch

Used to be that you took a break from the office by going to lunch at a nearby restaurant to recharge and to commiserate with colleagues over a martini or three. No longer. A restaurant now is where you go to work. A start-up (it's always a start-up) called Spacious has turned 25 restaurants in Manhattan into co-working spaces during the day, according to the New York Times. They also have locations in San Francisco, their website says (spacious.com). Apparently the restaurants may still serve dinner, so I guess co-working tenants can't work late.

Whatever happened to restaurants–and eating, for that matter? It seems that sitting down in a place where someone takes your order, brings you food, and you eat it with utensils instead of your fingers is passé. The alternative, apparently, is fast-food places and, now, food halls. For my part, lining up at stainless-steel counters, being jostled by other people, and having your food shoved at you on a plastic tray brings back unpleasant memories of college dorms and military mess halls. I thought those things were just rites of passage; you endured them, and the promise was that when you grew up you would be allowed to dine in more civilized circumstances.

And what's co-working, anyway? Apparently it's something like study hall in high school, where you sit in a big room with people you don't know and try not to fall asleep. The argument is that one makes contacts and shares ideas and all that. Didn't that used to be a cocktail party, a business lunch, or membership in a professional organization, social club, or gym? How do you get any work done with all that sharing, anyway? Must be noisy.

Of course, some restaurants see this as a good thing, maybe even a way to survive, since no one sits down to eat lunch any longer. Or breakfast, for that matter. I remember when I worked in Chicago and walked to the office from the train, passing restaurant after restaurant full of early-morning diners eating fatty foods and smoking cigarettes. Same at lunch, but with alcohol. Those were the days. Now the faces behind restaurant windows might be working or networking furiously, developing ulcers, hypertension, and who knows what else. Ah, healthy living.

Not to be too critical, but is typing on a laptop on a restaurant table ergonomic? Is typing anywhere on a laptop ergonomic? People used to talk about ergonomics in an office setting a lot, and the accepted wisdom was that the height of a standard table was not the best position for a keyboard. Unless maybe you're typing with your thumbs; I don't know if studies have been done on that. And lighting? Restaurant lighting isn't exactly task lighting. Ergonomic seating? When was the last time you sat in a restaurant chair with lumbar support or adjustable anything? Standing desk? Well, I suppose you could stand at the bar.

If restaurant co-working doesn't appeal to you, you can always go over to WeWork (wework.com), another New York start-up (I would have guessed California) with a somewhat longer history than Spacious. WeWork, is said to be valued at $20 billion and have a global network of 212 shared working spaces (not usually located in restaurants, I gather).

The company's co-founder Adam Neuman told the New York Times that he wants to change the world by bringing people together and encouraging strangers to share a beer at the office.

Critics complain that WeWork is little more than a corporate real-estate arbitrage firm, leasing space, sprucing it up, and subleasing it to other tenants. But WeWork seems to have ambitions beyond that. According to the Times article, the company employs "yoga instructors, architects, environmental scientists, software engineers, molecular biologists, and social psychologists." I assume they're all busy developing the perfect shared-working environment that will change the world. Oh, by the way, none of those employees get to eat meat on the company dime; meat is not served at company functions nor reimbursed on expense accounts, the newspaper reports. So far, tenants can eat whatever they please. And drink beer.

You'll understand if I wait and see about all this world-changing stuff. I do feel sorry for the un-officed. Sure, they try to put a positive spin on it, but really, they're just officeless waifs adrift in a corporate world, buffeted by the fickle fads of commerce. But maybe I should try one of these places for the displaced and dispossessed of the workplace. I'd like it better, though, if I could get a pastrami on rye with fries—wi-fi on the side, please.

— Kenneth W. Betz, Senior Editor

Richland Two Institute of Innovation, Columbia, SC
Architect: LS3P
General contractor: MB Kahn
Installing contractor: Watts & Associates Roofing
Profiles: Reveal and Flush Wall Panels, Tite-Loc Plus, HWP
Colors: Almond, Slate Gray, Sierra Tan, Interstate Blue, Silver

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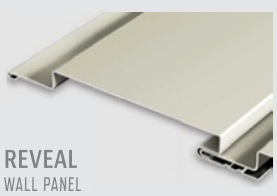

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School Of Medicine Boosts Buffalo Campus

A $375-million state-of-the-art healthcare, education, and research structure allows university to increase enrollment.

At 628,000 sq. ft., the Jacobs School of Medicine and Biomedical Sciences Building at the Univ. at Buffalo (UB, buffalo.edu), Buffalo, NY, is said to be the largest recently constructed medical-education building in the United States and the largest new building to have been erected in downtown Buffalo in decades. The eight-story structure was designed and built using sustainable materials and methods, with the goal of obtaining LEED Gold certification. UB is part of the State Univ. of New York education system.

The LiRo Group (LiRo, liro.com), Buffalo, served as construction manager in a joint venture with Gilbane Building Co. (gilbaneco.com), Buffalo; architect HOK (HOK.com), New York; and general contractor LPCiminelli (lpciminelli.com), Buffalo. The LiRo-Gilbane joint venture was formed in 2013 to leverage both firms' healthcare and higher-education experience. The State University Construction Fund (SUCF) engaged LiRo-Gilbane following the completion of the schematic design phase, just prior to the beginning of design development. As part of the joint venture, LiRo's personnel managed preconstruction and served as project managers for the general construction and the mechanical, electrical, and plumbing (MEP) work.

First and foremost, university administrators wanted to expand and modernize the medical school, but this was not feasible in its existing buildings. The new building, on the other hand, allows the school to expand the size of each of its classes in the Jacobs School by 25%, from 144 to 180 students each year. By expanding the number of doctors it will train, UB hopes to address the Western New York and national physician shortages. (The Association of American Medical Colleges (aamc.org), Washington, projects a national shortfall of between 40,800 and 104,900 physicians by 2030.)

2018 is the first academic year UB welcomed its first class of 180 students. By 2021, the school's enrollment will include a fully expanded complement of 720 M.D. students. In addition, the Jacobs School enrolls 126 Ph.D. and 86 Master's degree graduate students in its biomedical sciences programs. The new building can accommodate more than 900 students in addition to faculty and support staff, with more than 1,500 seats devoted to classrooms, lecture auditoriums, study areas, computer labs, small-group learning, and conference rooms.

The university also wanted to move the location of its medical school. For the past 64 years, the medical school was on the university's south campus, a 6-mi. commute from area teaching hospitals where students receive their clinical training. The Jacobs School's new downtown location makes it part of the 120-acre Buffalo Niagara Medical Campus (BNMC), a co-located center of healthcare (including three teaching hospitals), life-sciences research, and medical-education institutions. Interestingly, the new Jacobs School building represents a return to the neighborhood. It is situated very close to where UB's medical school was located from 1893 to 1953, prior to its move to the south campus.

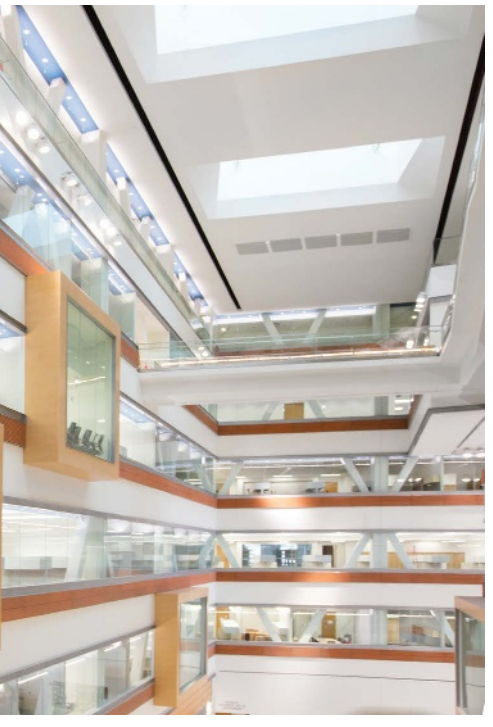
Now that the new building is in the BNMC, commutes are much shorter. In fact, the Jacobs School building was built over the Niagara Frontier Transportation Authority (NFTA) Allen/Medical Campus Metro station, making travel to the area extremely convenient. The Jacobs building highlights the Metro station, which is the gateway to the campus for the many commuters who use the station as their entry point to BNMC. This is the first time a subway station has been located under a building in Buffalo. The university struck a deal with NFTA to obtain air rights above the station.

STATION RENOVATION

As part of their construction-management services, LiRo oversaw the renovation of the NFTA station, which is connected to the Jacobs School building by escalators and an internal, second-floor pedestrian walkway that extends from the station at Allen Street to High Street. Commuters traveling to other campus buildings will soon be able to continue from this point through a proposed bridge connection across High Street to the Conventus Medical Building, which, in turn, is connected by existing bridges to other hospitals and research centers in the BNMC complex. The interior pedes-

Right. Conference and meeting rooms are stacked around a large central atrium. *Photo: Douglas Levere*

Above right. The 12,500-sq.-ft. internal atrium serves as the Jacobs School of Medicine's town square. *Photo: Trang Bui/The LiRo Group*



Specialized Mechanical Systems

LiRo Group, Buffalo, NY, managed the design and construction of a sophisticated MEP system to serve the building, including installing a newly built 23-kW substation as part of the infrastructure work. The team also had to figure out the best way, during construction, to temporarily heat such a large structure that features an expansive internal courtyard. LiRo chose direct-gas-fired exterior heaters and virtually pressurized the building to force the heat to all points in the building, creating temperatures that allowed finishes, sealants, and adhesives to properly dry and cure.

The building features complex, specialized infrastructure such as medical gases and a reverse osmosis and deionization (RODI) system. The school is equipped with lines for hot, chilled, and condenser water, and fuel-oil system lines. There is piping for high-pressure steam/condensate, domestic and tempered water, as well as cold and hot non-potable water. Carbon dioxide, oxygen, nitrogen, and a medical vacuum and compressed air have been routed to each lab. In addition, there are vent, storm/overflow and reclaim, and natural gas lines. The two-step RODI purification system includes a reverse-osmosis membrane that first purifies the water, followed by a de-ionizing resin that removes any residual charged compounds from the water. Fire sprinklers are installed throughout the building.

The mechanical penthouse is on the eighth floor. One side of the penthouse houses three air handlers on that floor's terrace. The fourth air handler on that side is set on the seventh floor, to accommodate the changing architectural line of the roof. The opposite side of the eighth floor has four air handlers, a domestic hot-water system, and a hot-water heating system. Both sides have three air handlers that are twinned with those opposite to serve the general building areas. One of the specialized fourth units serves the seventh floor's anatomy lab. The twinned air handlers have heat-recovery systems for energy efficiency, and only 100% outside air is used for all of the handlers, as a majority of the building has medical and research functions, where recirculating air was not practical.

In an effort to get the roof portions of the penthouse in and concrete decks poured, steel construction was accelerated and decking was installed to hasten concrete placement. The eighth floor is 38-ft. high to accommodate the infrastructure located on it, and it is enclosed, due to the harsh Buffalo winters. Thus, the roof—which houses cooling towers, stacks, and fans—is a full three stories' distance from the seventh floor's atrium skylight.

According to LiRo MEP project manager John Yerico, "Each of the eight air-handler units was delivered in nine oversized sections on separate tractor-trailers, which had to have special transport permits. Extensive, oversized ductwork for each of these units had to be fabricated and installed prior to the rigging and assembling of the handlers. It took some very precise orchestration to properly manage the delivery and installation of these systems." The air handlers were delivered on more than 74 trailer trucks, then lifted and assembled as required onto the eighth floor. The streets below were quite narrow, but the team was able to place these units with a hydraulic crane.

Yerico explains that LiRo and the contractor had to coordinate the delivery and assembly of the units with the installation of the supporting structure. The team sequenced the delivery and installation of each piece of the air handler simultaneously with the corresponding elements of the steel frame. The units are each two stories high and there was no space available in the building to store or move them around in case of an error, so the staging and progression of the sections' delivery was extremely carefully planned and executed. An opening was left on each side of the eighth floor at the east-side entrance, and the air-handling units were rolled into place, one at a time. These were rigged into place in assembly sequence; the team would hang several sections from the upper steel while placing the lower units onto the slab, working simultaneously with the riggers. The upper unit would be lowered down onto the bottom section, and then the riggers would connect the ductwork. All of this made for a highly complex rigging operation.

The team also managed some complicated design updates for the rooftop equipment. For example, LiRo and HVAC subcontractors developed a number of on-site updates and revisions to address maintenance-access issues in fairly tight spaces. The seventh floor also features retractable window-washing equipment for the skylights and a smoke-evacuation system.

A highly specialized area was also constructed for the electron microscope supplied by the facility. Special consideration throughout the under-slab, as well as the overhead electric infrastructure, had to be carefully planned and installed. Electromagnetic shielding was installed in many areas as well.

Other systems are located in the two basement levels. Six independent boilers and support-equipment systems were installed for steam washing, to ensure redundancy. The steam systems use a three-step process that begins with water softening, followed by water purifying, then transforming it into steam. This level houses several pump areas, a valve room, four different fire-suppression systems (wet, dry, foam, and CO_2), a chilled-water system with two chillers and pumps, water heaters, booster pumps, distribution piping for all systems, heat exchangers, and a fuel system for a UPS generator that is installed on the roof.

The basement also features other mechanical systems as well as the master data room, RODI water-treatment room, medical-gas room and compressors, a water-harvesting system that recovers condensation from coils, and a water system for safety showers and eye-washing stations. This area also has catwalks for access to mechanical and support equipment. The main data room is hardwired using underground connection to UB's other campuses. The data infrastructure is routed from the main data center and throughout the building.

Floors three through five feature modern, light-filled laboratory spaces. Internally, the laboratories are connected by equipment corridors, allowing research spaces to share core facilities. *Photo: Douglas Levere*

trian path supports the connection among buildings and their occupants.

It was also vital to the university that the new building support active learning. The school, along with higher education in general, is moving away from older methods of teaching where professors lecture and students passively take notes. While the former south-campus medical-school buildings were traditional 1950s-era structures that were segmented for lecture-heavy education, the new Jacobs building was designed to encourage interaction among students and faculty. To achieve this, the design uses a great deal of glass and open spaces that promote chance encounters. Offices are glass-walled; conference rooms are stacked around a large central atrium; lounge furniture has been placed in open areas to encourage group discussions; and spaces are flexible, with modular research laboratories that can be expanded or contracted, and desks that can be reconfigured to become conference tables.

The two interlocking L-shaped wings that form the building are split by glazed walls to minimize the perceived bulk of the structure. The conjoined Ls fit together to form an internal atrium that serves as a town square, while each structure is independent and integral to the other. Overall, the building's façade uses a rainscreen system with a terra-cotta tile finish to reflect some of the area's historic buildings, especially the character of those within the surrounding Allentown neighborhood. The design specified the use of nearly 27,000 locally made terra-cotta tiles. From floors two through seven, the front of the atrium is glazed with a custom-designed curtainwall system in the void between the two Ls. The façade's punched windows, all of which feature low-e glazing for energy efficiency, are in assemblies that are two- and three-stories high and, depending on the façade, are three- or four-rows high.

The primary building entrance presents a transparent view into the two-story atrium. The dominant feature of the lobby, serving to draw people into the building, is the light tower constructed from opaque glass. It has an internal lighting system that allows colors to shine through, whether UB's signature blue or one of any number of other possible hues. The lobby and light tower are visible to Metro passengers who traverse the building's internal corridor from the station to Conventus and other buildings in BNMC.

INTERIORS

The interior's main feature is the centrally located atrium rising from the second floor to the skylighted roof, placed at the midpoint between the seventh and eighth floors. Within the atrium, which measures more than 50-ft. wide and 250-ft. long, some floors have balconies, while other floors (such as those with labs) overlook the atrium windows. Similarly, some of the floors feature steel bridges with glazed railings that traverse the atrium. Overall, the building was designed so that the various functional spaces that ring the atrium gain shared sunlight and visual access to the atrium and the surrounding areas. For example, student-gathering areas are strategically placed at the void between the intersecting Ls to allow a light exchange between the exterior and the atrium, while also providing visual connections. Bridges span the atrium at critical junctures to encourage

Construction Challenges

Structurally, the Jacobs School of Medicine and Biomedical Sciences Building features a bathtub foundation 40-ft in depth. The excavation work took place next to the existing NFTA Metro station and tunnel. To maintain safety, the team carefully monitored the site conditions, including using motion detectors in the subway tunnel to evaluate vibrations during construction. The team could not exceed the maximum vibration of 2,000 micro-in./sec. In addition, temporary structures were erected where necessary, such as a retaining wall that held the soil adjacent to the tunnel in the station. This retaining wall was later incorporated into the new building and, subsequently, the subway station itself has been incorporated into the building.

Sharing a common first floor, the upper floors of each L-shaped wing of the main building are connected at the perimeter and by bridges that traverse the atrium at key points to maximize the interconnectivity of the building's functional areas. The project team had to address the need for large free spans necessary to bridge the NFTA station as well as the large lecture halls that were part of the school. The largest of these trusses, approximately 20-ft. high and 120-ft. long, is placed above the NFTA station at the building's edge along Main Street. Addressing seismic and vibration issues resulted in structural cross-bracing at strategic locations, extending from the first floor to the roof to create trusses that span the height of the building. Varying in size, the largest occupies a portion of the structure 100-ft. wide.

The structure spans nearly two city blocks and is bounded by public streets on three sides and an existing building on the fourth side, which served to multiply the logistical and technical challenges that were enormous from the outset. The approximately 450-ft. by 200-ft. site is in a tight, restricted urban area and the streets are fairly narrow. Plus, the location is within close proximity to busy hospitals and the resulting emergency traffic. Fortunately, the city approved a complete street closure on one side of the site, so all deliveries were brought there. As there was no room for materials storage on site, deliveries were immediately hoisted up using a tower crane placed in the atrium. Similarly, the buck hoist for worker and material access to the building was placed in the void where the curtainwall would ultimately be placed.

The existing Allen/Medical Campus Metro station beneath the site—and incorporating this station into the new Medical building—provided added challenges, particularly because the subway station had to remain operational throughout excavation, demolition, and new construction. After all, this station is the main hub for access to Buffalo General Medical Center, Roswell Park Comprehensive Cancer Center, UBMD Physicians' Group at Conventus, and Gates Vascular Institute. Thus, the construction team put in a great deal of effort to coordinate with NFTA, the contractors,

The Jacobs School of Medicine and Biomedical Sciences Building is said to be the largest recently constructed medical-education building in the United States and the largest new building erected in downtown Buffalo, NY, in decades. *Photo: Douglas Levere*

pedestrian movement through the building. Individual stairs also provide vertical connections between floors, many occurring at the bridges to also encourage movement.

Entering through the first-floor lobby at Main and High Streets, one progresses past the monumental stair that wraps the light tower. Designed to enhance transparency, the stair is of steel construction with terrazzo treads and features a glass railing with under-mounted LED strips.

From there, one enters the functional areas of the building past the security desk, through the security doors, and into the corridor that connects to the entry from Washington Street. At the midpoint of this corridor is a staircase that leads to the second floor and the base of the atrium. (The atrium is not seen from the first floor until one is standing at the base of the stair.)

In a bold connection to the past, the designers had the team install the original gaslight lanterns that illuminated the medical school's High Street lobby from 1893 until 1953. The lanterns were restored by two UB faculty members using a 3D printer and CAD technology to replicate pieces of the metalwork that were missing or decayed. The luminaires were then updated with LED technology and are connected to the lighting-control system installed throughout the facility.

Leaving the first floor, one traverses the main stair extending to the second floor, which is the base of the atrium serving as the schools' main social space. As the stair progresses from the first floor to the second, there are two landings with large seating areas off of them that provide breakout areas for student interaction. A second staircase is internal and leads from the first-floor corridor to the second floor and atrium.

The atrium itself features drywall and wood-panel finishes, while the floor is white terrazzo with an added mix of highlights. The LED lighting fixtures within the atrium are primarily on the walls. Overall, the effect of the atrium is one that fosters a sense of community and the active learning environment the university wished to emphasize.

LIGHT TOWER

The most interesting element in the atrium is the two-story-high, 32-ft.-tall light tower built from a steel skeleton clad in opaque curtainwall-type glass panels. The tower has an internal LED-based lighting system that has the ability to change colors, showcasing UB's blue or other colors, depending on the program.

While the architects developed the concept of the light tower, it was LiRo and LPCiminelli that brought it to life. "The construction team helped make real the architect's vision, all while making it as user friendly and as maintenance free as possible," explained LiRo MEP project manager John Yerico. "The LiRo team coordinated closely with the trades to mount LED lights on white Plexiglas panels that were then sandwiched between the LED lights on one side of the panel and the electronics and controls on the other side. By using special holders, we ensured that the panels would be easy to remove and replace," he added. Inside the tower is a platform and controllers for the light. Due to

and SUCF. LiRo and other members of the construction team planned consistent meetings with all relevant parties and solved problems methodically.

The team took a pro-active approach to all anticipated issues to avoid as much disruption to the Metro as possible. Crews built a temporary station within the existing NFTA station to separate the construction work from subway passengers. Specifically, the temporary station was constructed within the existing station structure, allowing the existing station to be demolished while passenger access and safety was maintained. This temporary structure continued to provide safety while the building was erected above. A three-week shutdown was required to allow the first two floors of steel to be erected, while future shutdowns for continued steel erection were restricted to a few miscellaneous weekend outages so that the weekday business commuters would not be affected and full access to the surrounding businesses was maintained.

All shutdowns were phased, planned well in advance, and well publicized to the public. NFTA provided bus service during those times. Other than these shutdowns, the team performed work after hours and off-shift to accommodate the subway schedule. Further, team members carefully built over and around the existing electric substation that serves the entire Metro system.

While winters in Buffalo are harsh under any circumstances, the winter of 2014-2015 brought prolonged inclement weather that set back the schedule of excavation and foundations significantly. In turn, this affected the team's ability to enclose the building prior to the winter of 2015-2016.

According to LiRo project executive, Stephen Burke, "Rather than leaving the entire building open, curtailing interior construction, we recommended constructing a temporary roof at the fifth-floor slab. This would allow interior work to progress in the basement and floors one through four, while the structural work continued above." The team also recommended installing a temporary drain system so that workers could more easily remove the inevitable winter detritus of freezing rain, ice, and snow. They sloped the center section to the temporary drain system and removed snow and ice accumulations as needed.

Additional logistical difficulties arose due to the fact that the Jacobs site shares a street with new 13-story Oishei Children's Hospital of Buffalo, which was being built at the same time, and was in the same stages of construction. Trucking in the steel columns and girders down narrow city streets to the erecting tower cranes would have been difficult even without the added construction site just a few yards away. To overcome this challenge, the team created an off-site lay-down area and accompanying logistical plan that called for the erection of the steel sequence, truck scheduling, and alternate routes, including backing the steel delivery trucks into the site by driving in reverse for two or three blocks. The same was done for the large mechanical equipment that was delivered on oversize-load trucks. Many of these vehicles could not make the turns and had no other way of accessing the unloading area.

Interior construction also called for creative solutions. For example, bridging the atrium between the two Ls during construction was something of a challenge, so the construction team used an oversized scaffold to temporarily connect the floors between buildings.

Construction Team/Funding

The LiRo Group (LiRo), served as construction manager in a joint venture with Gilbane Building Co., architect HOK, and general contractor LPCiminelli.

The Jacobs School of Medicine and Biomedical Sciences' project team also included structural engineer Ysrael A. Seinuk, P.C.; civil engineer Foit-Albert Associates; and MEP engineer Vanderweil Engineers. In addition, the Jacobs Consultancy served as the laboratory-planning consultant, Cline Bettridge Bernstein Lighting Design served as lighting designer, and the commissioning agent was Facility Dynamics Engineering.

The Jacobs School was the first project to receive funding through the NYSUNY 2020 Challenge Grant Program, an initiative to spur economic growth throughout New York while simultaneously strengthening the academic programs of its public universities and colleges, to elevate SUNY as a catalyst for regional economic development and affordable education. UB received $35 million in 2011 for the new building, administered through the Empire State Development Corporation and SUCF. The grant terms required the project to be built on an accelerated schedule to meet the requirements of the 2020 Challenge Program.

Left. The dominant feature of the primary building entrance's two-story lobby is a two-story-high, 32-ft.-tall light tower. The tower has an internal LED-based lighting system that has the ability to change colors. *Photo: Douglas Levere*

Above. The new building can accommodate more than 900 students, in addition to faculty and support staff, with more than 1,500 seats devoted to classrooms, lecture auditoriums, study areas, computer labs, small-group learning rooms, and conference rooms. *Photo: Douglas Levere*

the fact that the tower is so prominent, the access door had to be carefully hidden. To do this, the door was mounted on a balanced-post swing. When it is closed, it is not seen as a door. Rather, it looks like another panel.

Of the building's eight above-grade floors, seven are for programming and the top-most floor is a mechanical penthouse. The first and second floors feature classrooms, other teaching spaces, a 440-seat auditorium, and a smaller 200-seat auditorium. The auditoriums, located on the second floor, are equipped with state-of-the-art audio-visual systems. The second floor also houses a faculty lounge, a student lounge, student meeting and team rooms, a bank branch with an ATM, and a casual café. For full-service dining, students, faculty, and staff members are encouraged to visit surrounding businesses.

Floors three through five feature modern, light-filled laboratory spaces for research purposes. Internally, the laboratories are connected by equipment corridors, allowing research spaces to share core facilities. Organizationally, the laboratories are situated on the wide side of the corridors, adjacent to the building exterior to provide access to natural light, while private offices for senior staff are on the other side, overlooking the atrium. There are also cubicles interspersed throughout for junior researchers and administrative staff.

The sixth floor offers specialized learning spaces. The Behling Simulation Center, for example, allows students to train using lifelike mannequins in realistic emergency-medical scenarios. The Clinical Competency Center allows students to interact with volunteer "patients" to simulate real-world doctor-patient interactions. Surgical suites and robotics suites with specialty lighting and multiple operating tables are also located here and on the seventh floor, so that students, medical residents, and professionals may train in the newest techniques. A gross-anatomy lab is also housed within these floors, to provide students with traditional training, as well as access to visualizations for in-depth detail. Moreover, the facilities feature extensive audio-visual equipment with multiple cameras and screens that enable recording for reference and other educational opportunities.

A pharmacy, computer lab, home-healthcare class (with a homecare simulation lab), and a disabled-care training room are also within this floor. There are also some smaller specialized surgery rooms with glass enclosures for observation, as well as a morgue, open break rooms, landscaped areas between specialized rooms, a large human-anatomy lab with prep rooms and tables, and rooms with beds that simulate hospital rooms.

Overall, surgical and clinical simulation areas allow medical, nursing, and pharmacy students to interact and "practice" by experiencing clinical simulations. Administrative offices and a dean's office suite are also on this level. All laboratories on these floors have sealed, high-performance, non-skid, epoxy medical flooring that can be cleaned and sanitized frequently without damage.

Both the classrooms and open spaces, dubbed "learning landscapes," promote the collaborative interactions the university wanted to foster among students and faculty. The active-learning classrooms contain triangular tables that are electronic. Any student can easily contribute by presenting data to an entire 180-person group from his or her seat. Smaller technology-enabled classrooms and study spaces are peppered throughout the building for more intimate gatherings.

"This building fully integrates medical education into Buffalo's growing academic health center, emphasizing interdisciplinary collaboration and strengthening our relationships with our clinical partners, said Michael Cain, MD, vice president for health sciences at UB and dean of the Jacobs School.

"A medical school that is just steps away from UBMD Physicians' Group at Conventus, John R. Oishei Children's Hospital, Buffalo General Medical Center, Roswell Park Comprehensive Cancer Center, and all of our other partners will foster synergies that will expand and improve health care in Western New York," Cain concluded. CA

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- Jacobs School of Medicine and Biomedical Sciences
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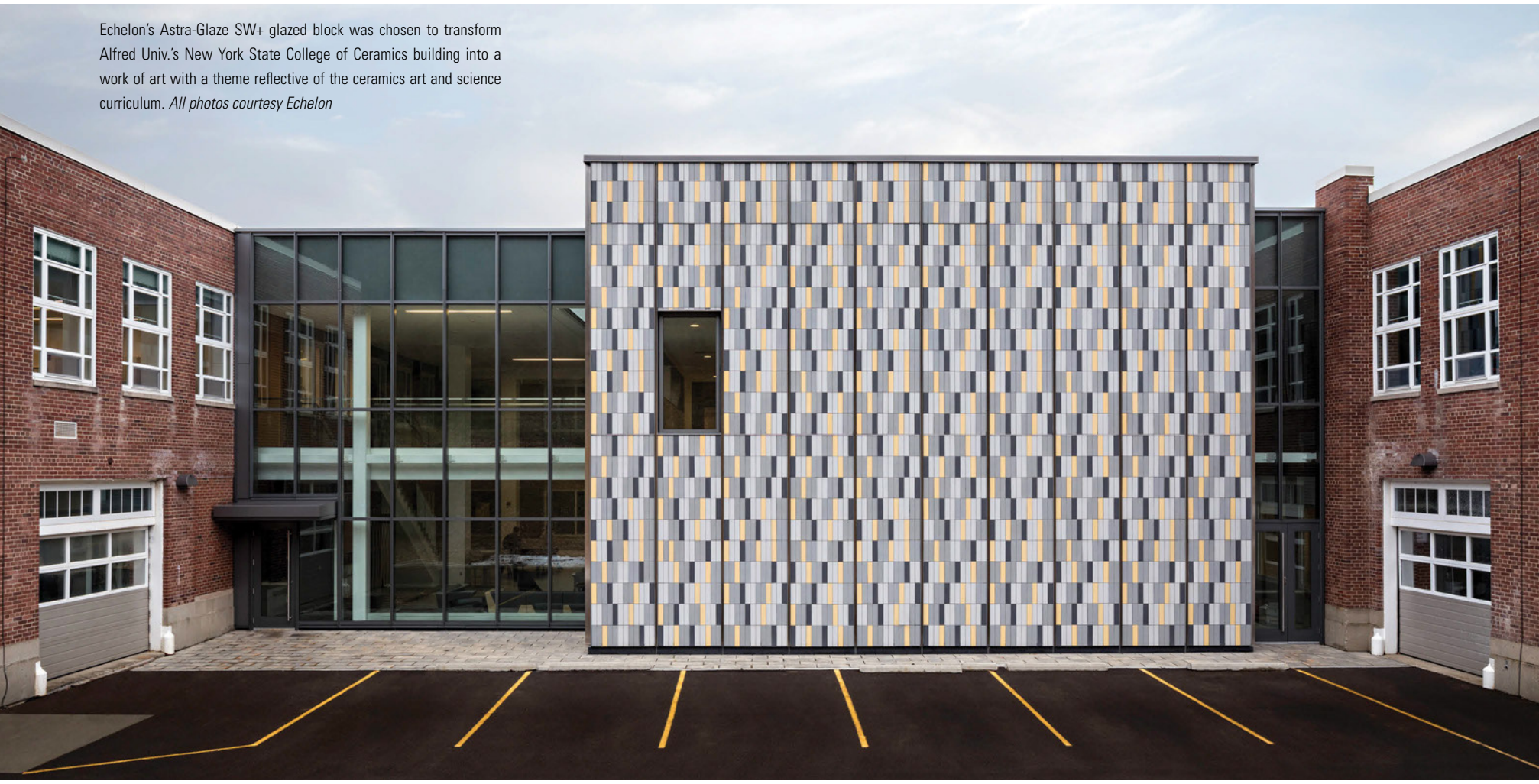

Echelon's Astra-Glaze SW+ glazed block was chosen to transform Alfred Univ.'s New York State College of Ceramics building into a work of art with a theme reflective of the ceramics art and science curriculum. *All photos courtesy Echelon*

Glazed Block Provides Character

Blocks create an ultra-modern, artistic design solution for Alfred Univ.'s College of Ceramics building.

NBBJ Architecture, Boston (nbbj.com), was faced with a design challenge at Alfred Univ.'s New York State College of Ceramics (NYSCC). Echelon Masonry (echelonmasonry.com), part of Oldcastle Architectural, Atlanta, joined the project with a creative concept that would win over their team designers. The concept would transform the college building into a work of art unto itself with a theme reflective of the ceramics art and science curriculum. NYCSS includes the School of Art and Design, the Inamori School of Engineering, and the Samuel R. Scholes Library.

Founded in 1836 in Alfred, NY, the university (alfred.edu) began as a co-ed school, which was very unusual for the time period. The avant-garde school did not stop challenging societal norms. In 1850, it became the second racially integrated college in the nation. This enterprising spirit is apparent in the school's celebrated history of engaging in the interface of art, science, and technology. The College of Ceramics, which offers degrees in ceramic engineering and ceramic art, is associated with five galleries as well as numerous exhibition spaces. With such a distinct and progressive history, the new building would have to exemplify innovation and novelty, inside and outside.

As a new addition to the older 1952 McMahon Engineering Building, the building was designed as an infill into a courtyard constructed to hold the College of Ceramics' sensitive imaging equipment used in creating ceramic artwork and lab-testing engineered ceramics. The design team at NBBJ also envisioned a broader purpose for this space.

"Our goal was to give some character to what could have been a simple concrete box," said William Voulgaris, AIA, principal and architect with NBBJ. "So, in trying to be relevant to the ceramic school, we wanted to use an unconventional, forward-thinking material in the design."

The college originally wanted the building to be tiled with actual ceramics. What seemed like a great idea was quickly deemed impractical. Though ceramic tiles would capture the university's vision for the building, ultimately the tiles would never hold up to the weather or wear and tear and would have presented a maintenance nightmare. A creative, new solution soon presented itself.

With the expertise and guidance of consultants at Echelon Masonry, NBBJ was able to formulate a winning solution: glazed block, which had all the advantages of

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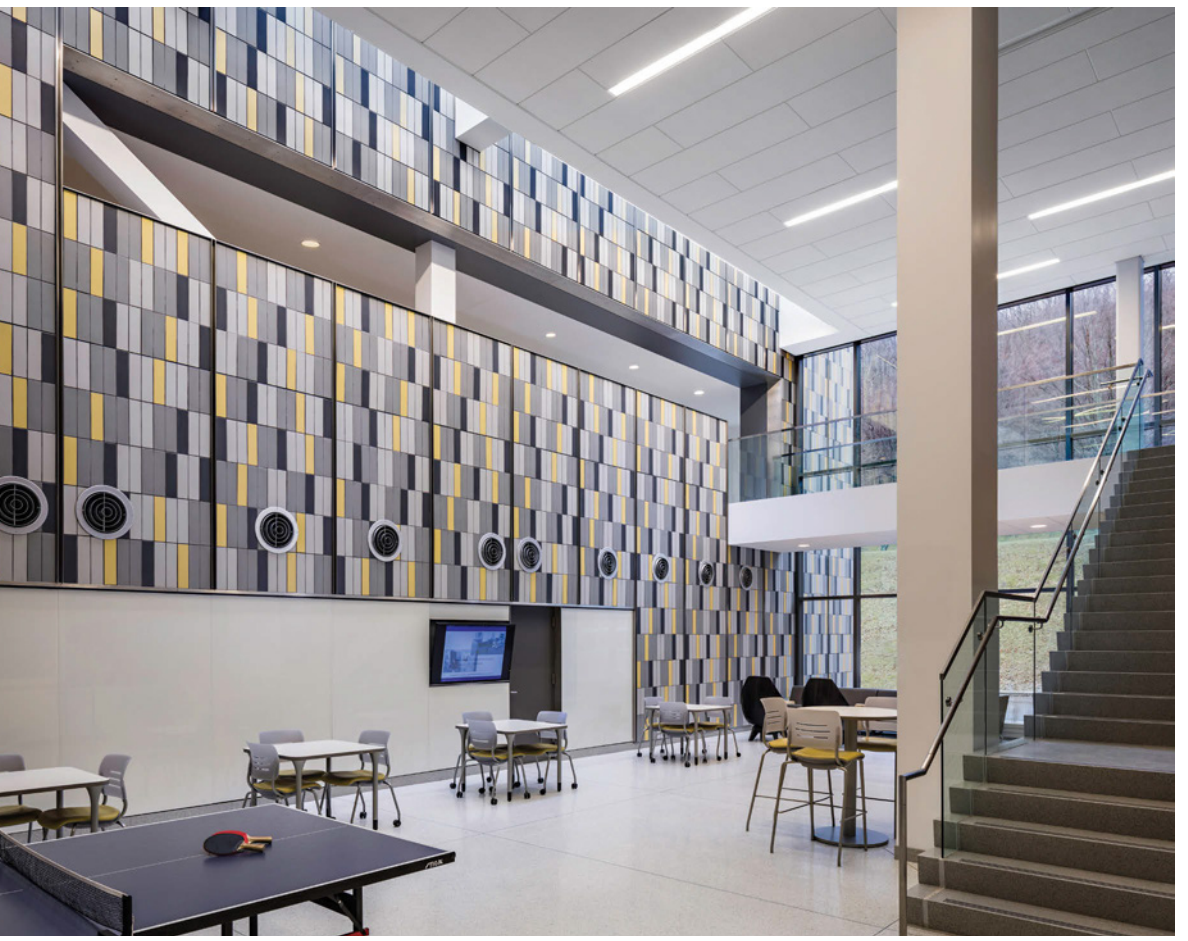
Above. The outer design carried into the interior, on the wall and through furniture. Mimicking the glaze-block placement, the furniture varies in shades of gray with the occasional pop of yellow.

Below. The random placement of the glazed block is artwork in itself. The colors, Earl Gray, Silver Gray, Pewter, and Wheatfield Yellow provide contrast and color, giving the building a modern look without appearing too busy.



masonry but with the illusion of a ceramic tile. While traditionally the blocks are laid in a horizontal configuration, the architects placed the block vertically, arranged in a random pattern with Echelon's Astra-Glaze SW+ chosen as the glazed block. When scored down the center, the block actually look like ceramic material. Bold colors add to the illusion.

The units are pre-faced architectural concrete masonry blocks featuring a thermoset glazing compound permanently molded on one or more faces. This exterior is cured and heat-treated to create an impervious surface that repels water and resists mold, is easy to clean, and installs in only one step. It is also resistant to graffiti and has a 4-hr. fire rating, both important in a school setting.

"At first, we were a little concerned about how the glaze facing on the blocks would weather in New York's extreme environment," said Voulgaris. "However, Echelon representatives showed us some good examples of past performance on other building facades. They also worked with the masons on the unique block positioning."

After working with NBBJ to ensure the block was up to their team's design standards, Echelon project manager, Terry Page worked closely with King Brothers Masonry Construction LLC, North Java, NY, to facilitate the installation. King Brothers laid the glazed blocks on end, or vertically. The mason made a score down the center of the CMU (concrete masonry unit) glazed face lengthwise, which gave it the appearance, when laid up, of being a 4-in.-wide by 16-in.-high CMU, then pointed in the scored joint as he went along. It was used for the entire outer face of the building and for common areas on interior walls. This cutting-edge approach not only allowed the mason to lay one block instead of two in those cases and made it easier to line up the score, but also saved the college money.

The random placement of the pieces is artwork in itself. The colors, Earl Gray, Silver Gray, Pewter, and Wheatfield Yellow provide contrast and pops of color, giving the building a modern look without appearing too busy. The outer design is carried on into the interior, on the wall and through furniture. Mimicking the glaze-block placement, the furniture varies in shades of gray with the occasional pop of yellow.

"One of my favorite aspects of the building is the seasonal sunlight that hits the colors giving the inside a constant changing character," added Voulgaris.

The aesthetics of the project were paramount for a school that produces artists. In addition to storing sensitive imaging equipment used for ceramics, the space also acts as an inspiring common area for students to gather and collaborate. CA

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Typar MetroWrap is a building wrap designed for use on multi-family dwellings, office buildings, and other commercial structures. Able to withstand exposure to harsh chemicals and cleaning techniques found on commercial jobsites, the product is said to have a tear strength nearly five times that of leading polymeric wraps. Its enhanced UV resistance provides 12 months of protection.

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Oldcastle Architectural, Atlanta
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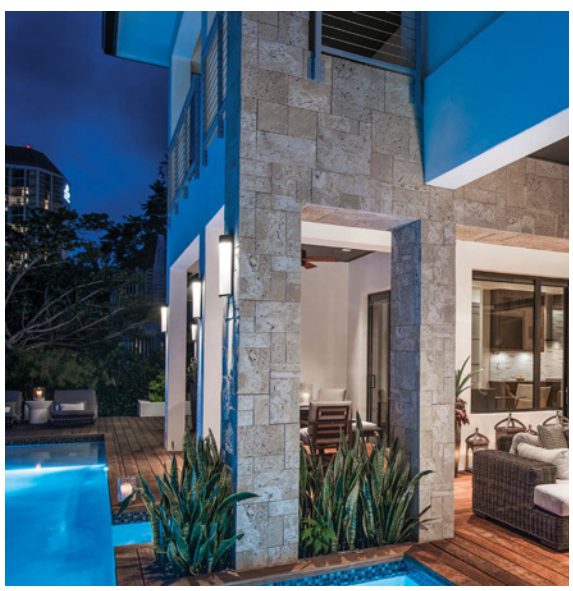

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College Landmark Embarks On Yet Another Life

Approaching its third century, St. John's College McDowell Hall is upgraded to meet current standards.

St. John's College dedicated McDowell Hall in 1789. It served as the college's multipurpose academic and administrative building well into the 19th century.

Following a devastating 1909 fire, the St. John's College yearbook predicted it was "taps" for the college's historic McDowell Hall that dated from the late 1700s. Dedicated students and faculty were determined to rebuild, sparking the first of several renovations the structure would receive into the current century.

Located on a tree-covered hill between King George Street and College Avenue in the heart of historic Annapolis, MD, the latest improvements will help McDowell Hall remain the focal point of the St. John's campus, as well as a classical venue for hosting community events. The building reopened to students and faculty in late March 2018.

The renovation team consisted of Cole & Denny Architects, Alexandria, VA (coleanddenny.com); Advanced Project Management Inc., Chantilly, VA (advanced-project-management.com); Vantage Construction Corp., Sterling, VA (vantage-construction.com); and Potomac Energy Group, Falls Church, VA (pegroup.net), MEP engineer of record.

Enhancements throughout the 23,000-sq.-ft. five-floor building included:

- A new "roomless" traction elevator from Otis Elevator Co., Palm Beach Gardens, FL (otis.com), connecting basement and first floor, replaced an existing elevator that was not ADA (Americans with Disabilities Act) compliant. Enlarging the elevator shaft was a major undertaking.
- The existing restrooms were upgraded to be ADA compliant, and ADA water fountains were installed in the basement and first floor. Porcelain tiles from Dal-Tile Corp, Dallas (daltile.com) were used in the restrooms.
- Vestibules were revamped with all-glass storefronts from Oldcastle Building Envelope, Dallas (obe.com), and CR Laurence Inc., Los Angeles (crlaurence.com).
- The existing constant-air-volume HVAC system was replaced with a variable-volume system from Trane, Davidson, NC (trane.com), which allows individual temperature control in the seminar rooms, as well as better energy efficiency, air handling, and climate control. Getting the mechanical equipment into the attic was a challenge. The contractor cut a hole in the ceiling of the east stair to hoist the equipment into position.
- Flooring on the first level was replaced with Wellborn + Wright, Richmond, VA (wellbornwright.com), reclaimed heart-pine flooring. Floors on other levels were refinished.
- New Decoustics, Woodbridge, Ontario (decoustics.com), acoustical ceiling and wall panels were installed in classrooms.
- Existing florescent and incandescent lighting was replaced by LED lighting systems.

Above. New ductwork and HVAC equipment in the attic was hoisted through a hole cut in the ceiling of the east stair and configured to accommodate the building's heavy timbers.

Below. New restrooms were designed to be ADA compliant.

"It is rewarding to work on a building steeped in such history and heritage," said C&D's Louie Barbieri, AIA, who served as project architect. "Our project team successfully upgraded McDowell to a level where its future potential will be met while retaining its historic character. Building on previous structural improvements, our goal was to ensure that McDowell remains a productive and

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History Of McDowell Hall

Originally known as "Bladen's Folly," McDowell Hall was initially planned as an official residence for Thomas Bladen, Maryland's proprietary governor. Bladen's swift departure from office in the mid-18th century interrupted the building's intended purpose and its construction. Only a foundation and exterior brick walls existed when St. John's College purchased the property in the 1780s. Ironically, a state government connection would remain. As McDowell took shape, it would share several stylistic similarities with Maryland's iconic statehouse, another nearby Georgian-style structure, both showcasing pediments with oval-shaped windows over opposite entryways, an octagonal cupola base topped with a bell tower, and a hipped-inclined roof.

St. John's College officially dedicated McDowell Hall in November 1789. It was immediately pressed into service as classrooms, dormitory, dining hall, infirmary, and administrative offices. It would serve as the college's multipurpose academic and administrative building well into the 19th century, save for temporary requisition in the 1860s by Union troops during the Civil War.

McDowell's Great Hall, with new heart-pine flooring, sconce lighting, and refreshed finishes, hosts seminars, concerts, social engagements, community activities, and academic ceremonies.

pleasing environment for current and future generations of students, faculty, and alumni."

As with any historic renovation, there were inherent challenges, from developing a collective vision by multiple stakeholders to ensuring that renovations conformed to historic guidelines. "The project team identified challenges early in the design process and worked with various stakeholders to develop the best solutions," Barbieri added. "For instance, building codes requiring the HVAC system to provide make-up fresh air and relief interior air necessitated installation of a louver on the building's exterior. Working with engineers, college administrators, and the Annapolis Historic Preservation Commission, we were able to determine the most unobtrusive location to install this louver was just below the bell tower."

"Serving as a focal point of the college, McDowell Hall's improved accessibility and energy-saving features give it a new lease on life for hosting seminars, concerts, social engagements, community activities, and academic ceremonies. Many of those functions take place in its Great Hall, a stately colonial room complete with chandeliers and a cantilevered second-floor balcony," said Tim Leahy, IT director for St. John's. "The architects, engineers, and contractors have increased this building's operational performance for years to come," he added.

Total construction cost was $3.5 million, facilitated by a grant from the Maryland Independent College and University Association (MICUA). MICUA grants allow private educational institutions to apply for appropriation grants every three years.

"Approaching its third century, these significant improvements should help McDowell Hall maintain its status as the emblematic structure of our historic campus," Leahy said. CA

Above. Looking down the east stair, new heart-pine flooring is seen on the lowest level and refinished floors on the other levels.

Below. A typical teaching space in McDowell, this classroom features a brick fireplace and a new dropped ceiling with Decoustics acoustical tiles.

DATA CACHE

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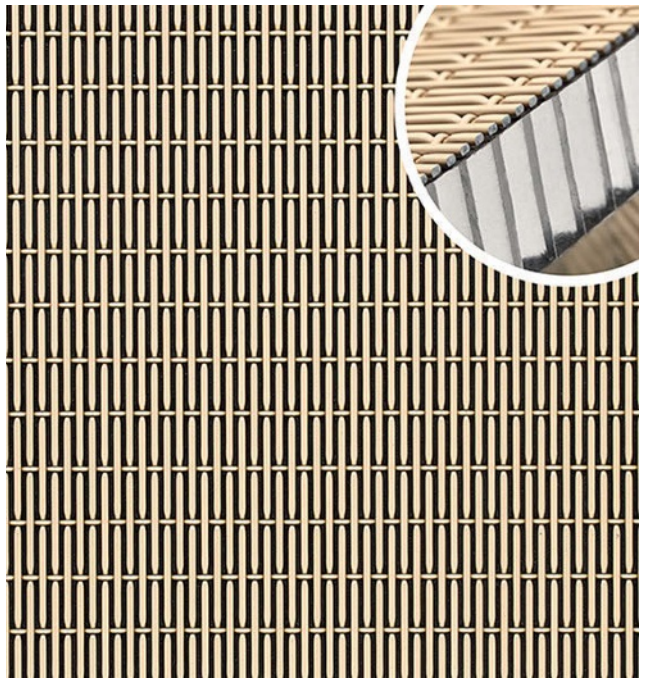
CIRCLE 213



EDITORS' CHOICE

Acoustic mesh panels

Acoustic mesh panels:

- **Sag-free support plate**
- **Dampens noise to aw = 0.9**
- **Ceiling fittings can integrate**

Interior aluminum-based acoustic mesh panels improve workplace and commercial acoustic environments. Panels have a sag-free, 1-in.-thick honeycomb support plate layered with an intermediate blanket of fiber-free acoustic fleece. This dampens noise to a sound-absorption value of aw = 0.9, making them near silent. Ceiling fittings such as lights, downlights, and sprinklers can be integrated within the panels. Panels can be removed and refitted for maintenance purposes.

GKD Metal Fabrics, Cambridge, MD
Circle 61
gkdmetalfabrics.com

Porcelain tile

Divinity HDP porcelain tile has a surface of veining, striations, and the subtle imperfections of natural stone. Four colors, Dawn, Dusk, Horizon, and Mist, range from soft beiges to a cool dark gray. The tile is available in 12 x 24 and 24 x 24 formats.

Florida Tile, Lexington, KY
Circle 63
floridatile.com

Masonry veneer planks

Craft Weathered Planks line of masonry veneer products is evocative of weathered barnwood and fences that have a acquired a patina over time. The line includes five mix-and-match products: Barrelstave, Blueskye, Greenfield, Milkpaint, and Redbarn. Colors vary from vibrant to burnished and weathered. A range of sizes is available.

Creative Mines, Carlsbad, CA
Circle 62
creativemines.us

Resilient flooring

AdMix Encore resilient flooring is available in 36- and 12-in. square tiles and 24 colors. The flooring has homogeneous construction and a seamless moisture barrier. Colors can be used independently or together in applications including way-finding, logos, and orientation use within a space. The product is Floorscore certified.

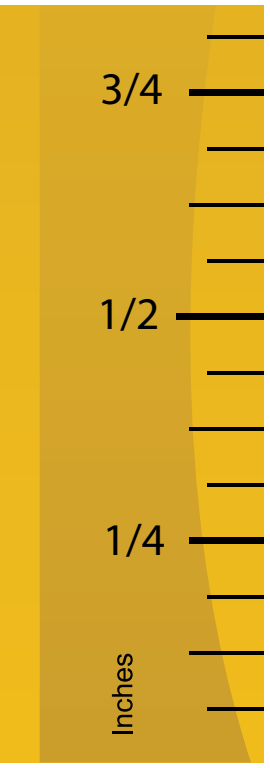
Patcraft, Cartersville, GA
Circle 64
patcraft.com

Ergonomic flooring for high traffic

Cosmos Rx is a sound-absorbent, ergonomic flooring solution available in a variety of modern finishes for traditional and contemporary interiors. With 5 mm of vulcanized composition rubber backing fusion-bonded to a heterogeneous vinyl sheet, the product offers anti-fatigue capabilities that enhance force reduction and energy restitution, delivering increased comfort underfoot and reducing the risk of injury associated with falls.

Ecore Intl, Lancaster, PA
Circle 65
ecorecommercial.com

FLOOR/CEILING SOUND CONTROL SIMPLIFIED.



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ACOUSTI MAT 1/4

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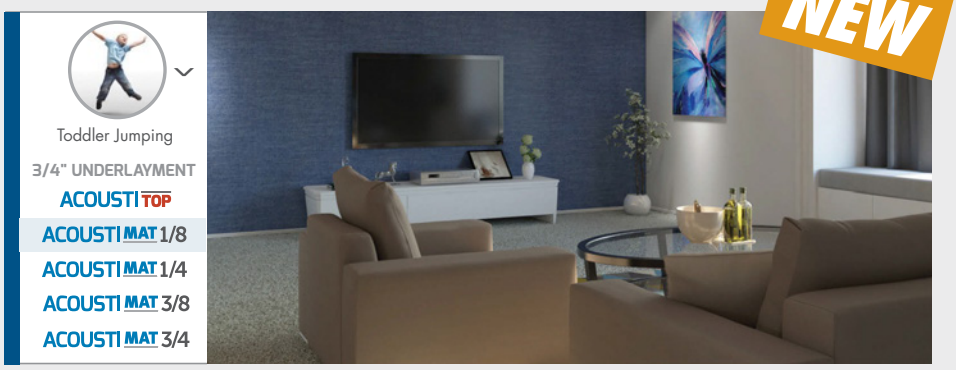

Listen to a variety of multifamily living common complaint noises and hear how mat thickness can impact sound performance. **WWW.MAXXON.COM/VAA**

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CIRCLE 214

Acoustic panels

The Island wall system acoustic stone-wool panels provide acoustic improvement for areas such as lobbies, atriums, and reception areas. Panels are tested to achieve a Noise Reduction Coefficient as high as 1.15 with a 2 9/16-in. air space. The smooth, white surface also provides high light reflectance (0.86 LR) and light diffusion.

Rockfon, Chicago
Circle 66
rockfon.com

Wallcovering

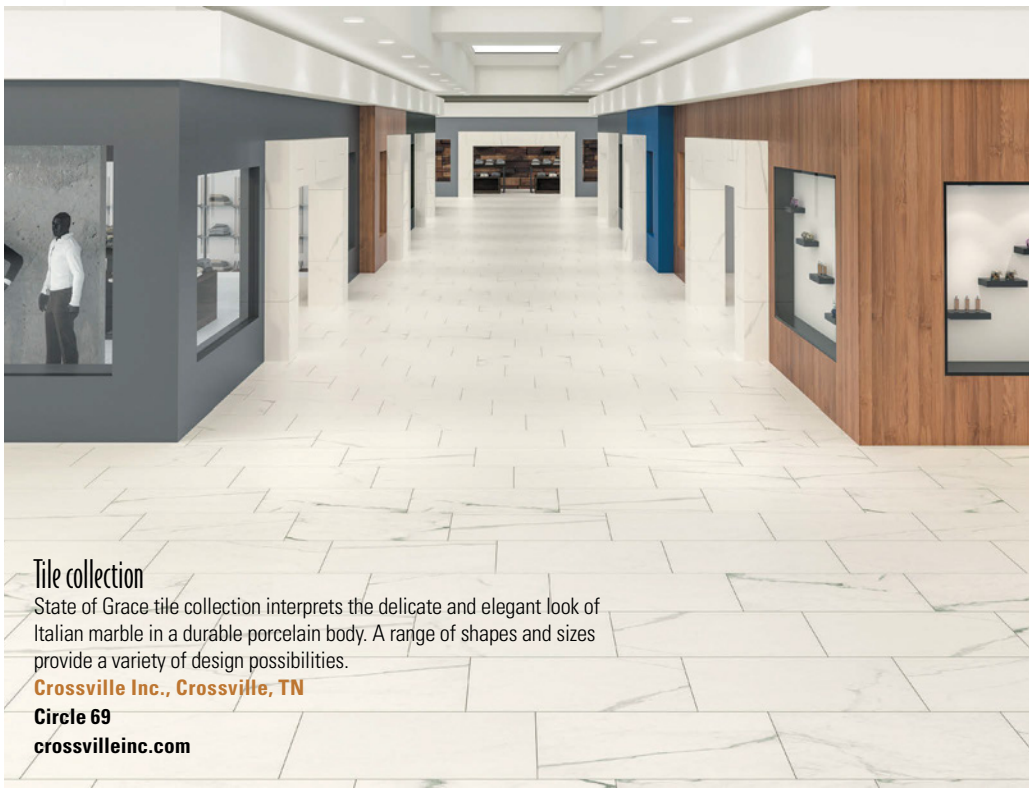
Juxtapose wallcovering combines nature with materials that provide practical, contract-level performance. Colorful highlights and a large repeat evoke the product's mineral inspiration, while an iridescent surface softens the angular shards of the 39-in.-wide pattern. The product is available in ten colors.

Innovations, New York
Circle 67
innovationsusa.com

Invisible wireless charger

The WCS4 under-desk-mount charger is out of sight with no work-surface obstruction. The unit includes a drill bit with a needle point that pokes through the desk surface, so light emitting from the charger shines through to show the charging target.

Doug Mockett & Co. Inc., Manhattan Beach, CA
Circle 68
mockett.com



Tile collection

State of Grace tile collection interprets the delicate and elegant look of Italian marble in a durable porcelain body. A range of shapes and sizes provide a variety of design possibilities.

Crossville Inc., Crossville, TN
Circle 69
crossvilleinc.com

Environmentally friendly flooring

Tailor Grace resilient flooring includes four collections: Natural Nautical, Denim and Leather, Tasteful Modern, and Urban Classic. The flooring provides sound reduction, indentation resistance, and comfort under foot. FloorScore certified and 100% phthalate-free, the vinyl flooring uses water-based inks.

Mats Inc., Stoughton, MA
Circle 70
matsinc.com

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CIRCLE 215

Design With Direct-To-Glass Digital Printing

Technique adds visual impact to interior and exterior spaces.

When it comes to creating unique signature designs, architects and interior designers can explore endless opportunities with direct-to-glass digital ceramic printing. According to Stephen Balik, director of architectural sales and marketing, GGI, Secaucus, NJ (generalglass.com), almost any design can be created and reproduced on virtually any type of glass and glass configuration, including tempered, laminated, insulated, and bent glass.

Creative, elaborate, beautiful designs are produced using ceramic frit paint that is digitally jetted onto the surface of the glass, then fused into the glass during the tempering process. The result is a durable, decorative, and functional glass solution that can be used for exterior and interior applications.

Direct-to-glass printing offers several important benefits over traditional silk-screen printing and printed interlayers, Balik said. Among these are:

- **High durability.** Ceramic frit is fused into the glass creating a permanent design. Images are UV-, fade-, and scratch-resistant–suitable for any interior or exterior application and ideal for public art displays.
- **Digital files**. No screens, setup, or storage fees are needed. Variable data and unique panel sizes and shapes are easily incorporated into the design; files are saved electronically and can easily be accessed and reprinted.
- **High-resolution printing.** The method is suitable for producing fine lines, typography, and complex images. This is useful for reproducing photographs, artwork adaptation, and material imitation.
- **Precision processing and printing.** Images can be printed in layers, creating different views on each side of the glass. Single images can be tiled across entire facades and walls, with accurate alignment between panes. The layering of three or more designs is also possible, adding more dimension to the design.
- **Insulated for greater functionality.** Direct-to-glass printing can be incorporated into insulated glass units for building facades. A high-performance low-e glass can be used on the outboard lite for energy-efficiency, or fire-rated and other protective glazing on the inboard as needed to meet fire-safety or impact code requirements.

The following projects provide illustrations of the direct-to-glass printing technique, found in a range of applications and installations.

Harlem Hospital

NEW YORK, NY

In this design, 429 completely unique, laminated, insulated, digitally printed pieces of glass come together in a 13,000-sq.-ft. modern masterpiece that pays homage to historic murals. Careful testing was conducted to determine the varying opacity levels needed for the digital imagery. This helped control the light levels required to maintain privacy in the building, while creating a marvelous glow, inside and out.

ARCHITECT
Goettsch Partners, Chicago (gpchicago.com)

GLAZING CONTRACTOR
W & W Glass, Nanuet, NY (wwglass.com)

Ma Stair Plan

EL PASO, TX

This 40-ft. public art project commissioned by the City of El Paso required complex color matching to accurately render the work of the prominent graffiti artist WERC. It is an example of the color and intricate detail that can be achieved using direct-to-glass digital printing. It also demonstrates the cost-effectiveness over using screen printing when the design incorporates multiple distinct images.

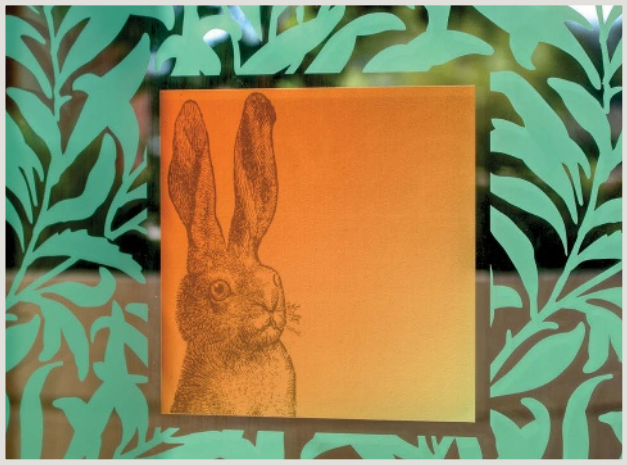
GLAZING CONTRACTOR
Arrow Building Corp., El Paso (arrowbldg.com)

ARTIST
WERC (wercworldwide.com)

Palo Alto Medical Center

SUNNYVALE, CA

Digital imaging can create biophilic designs that effectively connect people with nature. This custom-leaf pattern, inspired by a William and Morris wallpaper design, is digitally printed on the glass, turning a structural façade into art. The direct-to-glass printing process allows the pattern to fade as it moves upward. This helped fulfill the architect's vision of creating an interior garden by animating the interior space with a shadow play of light, combined with an energy-efficient low-e on the outboard lite to control solar heat gain.



ARCHITECT
Hawley Peterson Snyder, Sunnyvale, CA (hpsarch.com)

GLAZING CONTRACTOR
Exterior Cladding Systems, Corona, CA (ecsinc-usa.com)

ARTIST
Larry Kirkland, Washington, DC (larrykirkland.com)

2 Gatehall Dr.

PARSIPPANY, NJ

A feature wall showcases a gradient of various shades of yellow and brown that, when seen from a distance, creates the illusion of a landscape. With 15 glass panels and back lighting, the wall creates a compelling abstract design and adds warmth to an otherwise minimalistic building lobby.

ARCHITECT
Studio 1200, Short Hill, NJ (studio1200.com)

GLAZING CONTRACTOR
AMC Precision Glass, East Hanover, NJ (abraprecisionglass.com)

PHOTOGRAPHY
Brett Beyer, New York (brettbeyerphotography.com)

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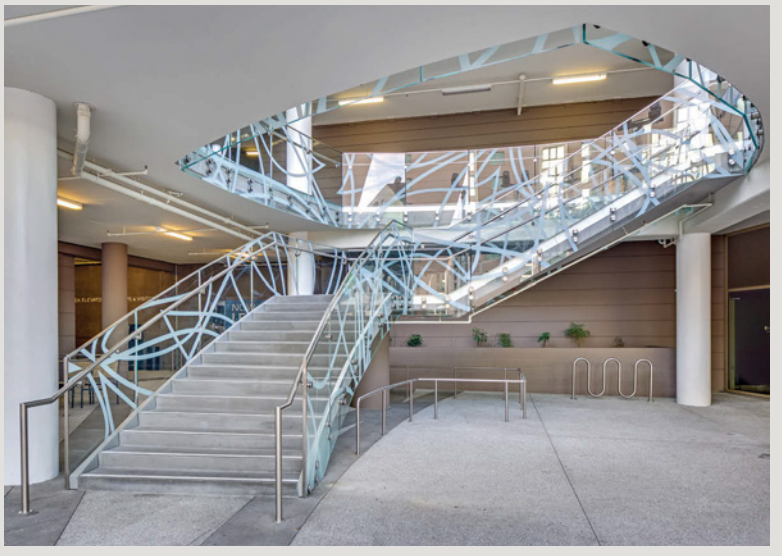


The Vermont Hotel Staircase

LOS ANGELES

Artist Cliff Garten worked with Jerde Partnership to ensure the artwork on this unique staircase would complement the "Heart of Compassion" public art display suspended over the entrance of The Vermont Hotel. The staircase consists of 1-in.-thick tempered, laminated, low-iron glass panels on each side, with an intricate design digitally printed on each panel using ceramic frit paint. This illustrates the strength and visual unity that integrates the art and architecture as the staircase flows throughout the building.

ARCHITECT
Jerde Partnership, Los Angeles (jerde.com)

ARTIST
Cliff Garten Studios, Venice, CA (cliffgartenstudio.com)

GLAZING CONTRACTOR
Walters & Wolf, Los Angeles (waltersandwolf.com) CA

EDITORS' CHOICE

Low-profile threshold for terrace doors

A 1/2-in. low-profile threshold for single outswing Series 900 terrace doors meets Fair Housing Act accessibility standards, and is said to virtually eliminate floor-level protrusions to provide unobstructed passage for individuals using a cane, crutch, walker, or wheelchair. An optional 10-in. bottom door rail is available to further enhance accessibility. Even with the low threshold, the doors reportedly provide exceptional protection against invasive weather conditions. The doors are AW-PG 80-ATD AAMA rated, and have been ASTM E331 and E547 water tested. In addition, double weatherstripping within the doorframe mitigates air infiltration.

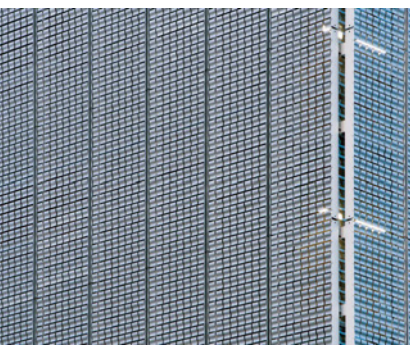
C.R. Laurence Co. Inc., Los Angeles
Circle 55
crlaurence.com

Series 900:

- **Low-profile threshold**
- **Eliminates floor-level protrusions**
- **Meets Fair Housing Act standards**

Flapper-panel system

Kineticwall dynamic façade system adds movement to building enclosures and wall systems with its flapper-panel design. The panels react to wind currents, creating the look of rolling waves across the wall system. Structurally designed to withstand hurricane-force winds and torrential rainfall, the system is said to be light enough to allow easy installation, natural ventilation, and visibility from the inside. Made of flappers attached to stainless-steel rods, the system can be specified with square or curved polycarbonate, glass, aluminum, or steel flappers, and in different sizes. The metal framing and standard 6-in. flappers may be finished in a broad choice of finish types and colors, and can be recycled at the end of their useful life.



EXTECH, Pittsburgh
Circle 56
extechinc.com

Inswing door unit

The Ultra series inswing door unit is a built-to-order system with a range of customization options and finishes. Available in traditional or contemporary style, options include wood species, stain color, shape and size, divided lite, specialty glass, and hardware.

Kolbe Windows & Doors, Wausau, WI
Circle 57
kolbewindows.com

Setting The Foundation For Future-Ready Facilities

To stay competitive, facility owners must digitally transform their properties with integrated building solutions.

Jim Nannini, Vice President
Building Wide Systems North America
Johnson Controls

To become a smart, future-ready facility, connected building systems can be implemented to enable a holistic approach to building optimization and management.

Whether planning for new construction or retrofitting an existing structure, to stay competitive, facility owners must digitally transform their properties with integrated building solutions to provide a flexible foundation for smart, secured, future-ready buildings. But how can facility owners ensure the implementation of the right integrated systems? It takes careful consideration. To reap the many benefits of an integrated-systems approach, balancing the benefits and risks associated is an important foundational step.

At its simplest definition, a smart building is digitally transformed and future ready. This means it can support the needs of its owner and occupants now and in the future by using data to help make decisions that improve building operations, comfort, safety, productivity, and cost savings. More technically, it is a facility driven by the Internet of Things (IoT) and uses building-management systems to control its operations. Connecting separate entities, such as lighting, access control, and HVAC, allows communication between these systems to streamline operations and improve safety.

Integrated solutions offer an abundance of benefits to facility owners, managers, and occupants. This holistic approach analyzes data from a facility to provide greater insight into the efficiency and functionality of systems, energy usage, and workplace productivity. Corning Optical Communications, Corning, NY (corning.com), is demonstrating this innovative approach with the implementation of a next-generation headquarters to improve occupant comfort, productivity, and generate savings by reducing energy usage.

By integrating intelligent lighting, HVAC controls, and sensors with additional building systems, Corning Optical is offering employees a more comfortable workspace. The connected systems allow the company to sense occupant levels in various locations, such as in a conference room, and can automatically shift airflow to provide a more comfortable temperature, in turn increasing workplace productivity.

Additionally, managers can review the data from connected systems and controls to analyze how long employees are at the office, and measure those findings with output generated to determine the productivity of a specific timeframe. This presents current insights that help with future business decisions.

Beyond workplace productivity, businesses such as Corning Optical are integrating sensors and video surveillance with electricity controls to enhance connectivity and energy efficiency. Sensors and video surveillance can monitor when an occupant enters or leaves a room, initiating HVAC and lighting controls to turn on or off in that specific area. The cost savings from reducing energy usage can be used toward additional infrastructure and technology upgrades that are quickly installed thanks to the wire-it-once approach and flexibility of systems integration.

This future-ready approach can also prepare smart buildings to maintain high-level security and life-safety standards to keep people and assets safer. Connecting fire-detection solutions with additional systems, such as mass notification, sensors, lighting, and HVAC controls, can prove valuable in the event of an emergency. When integrated with fire-detection solutions, HVAC systems can communicate with other building systems if a fire is detected. Mass-notification systems can then deliver directions based on the location of the threat to lead occupants to safety.

CONSIDERATIONS

There's no denying that integrated building solutions provide exceptional benefits, but it is still important to

weigh the associated risks. For most, the daunting questions revolve around budget and operations. What is the financial cost? What happens if these systems fail? The answers to these questions are unique to each facility, but to avoid risks and garner the benefits of integrated building systems, facility owners can—and should—meet with technology contractors and key stakeholders early on to begin collaboration and define clear project goals before implementing any systems.

Prioritizing outcomes and setting budget boundaries during the planning and design phases can help reduce risks associated with the implementation of technologies and the construction process. Not doing so makes the process more costly, difficult, and time consuming. The involvement of key stakeholders early in the process allows buildings to be conceived, designed, and delivered with the end goals in mind, ensuring that systems are smart, secured, and sustainable today, while also supporting future innovations.

It's also important to acknowledge that all facilities are unique and require integrations that coincide with industry-specific needs. For example, the mission for leaders in healthcare is to provide patients with exceptional care. As with clinician skills, operational efficiency must be of expert level. While the needs of an operating room and a patient recovery area differ greatly, the efficiency of both are vital to patient outcomes. Connected building solutions allow the customization of specific facility locations, which is a valuable asset in the healthcare industry. By linking building-management systems with surgical scheduling, clinicians can optimize their operating rooms by controlling room conditions and simplifying the documentation of surgical events. Additionally, patients benefit from a room that can adjust temperature and lighting hues, depending on the needs for their specific recovery phases.

On another spectrum, airports using building-automation systems can ensure that travelers and staff are safe and happy, while reducing energy output. Connecting building systems with flight schedules ensures that the building controls in a busy concourse are automatically optimized. This means that if a terminal is particularly busy, lighting controls can provide wayfinding functions to streamline traffic through the facility, while self-adjusting HVAC and lighting down in an area that is unoccupied.

In the digital-transformation area, it is increasingly important to build or retrofit infrastructures with advanced technologies that holistically link to the purpose of the structure. To truly be smart and future ready, facilities need to encompass a foundation that is wired and integrated with solutions that allow easy implementation and advancement of future technologies. The implementation of necessary systems and technologies allows buildings to be intelligent contributors to business success and occupant comfort and safety, today and for years to come. CA

Jim Nannini brings 30 years' experience to his role as vice president, Building Wide Systems Integration at Johnson Controls, Milwaukee (johnsoncontrols.com). He has held a variety of leadership positions with organizations, including FieldCentrix, Digital Technologies, and Resource Phoenix Corporate.

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Get information on Johnson Controls Building Management.

EDITORS' CHOICE

Building-control software

TwinCAT 3:

- **Building-automation software**
- **Full Visual Studio integration**
- **Eight programming languages**

TwinCAT 3 building-automation meshes with existing TwinCAT 3 modules for HMI and IoT, along with Analytics and Scope, and bundles important functions for building automation into one universal tool. Handling the engineering and control of all building systems on a single software platform is said to uncover significant benefits, such as simple IoT communication, cloud-based analysis of building data, and the rapid creation of individualized operator interfaces. The software provides full Visual Studio integration, an integrated engineering environment, eight programming languages with interacting modules in a single runtime, simple reusability of source code, and scalability to suit different controller performance levels.

Beckhoff Automation, Savage, MN
Circle 58
beckhoffautomation.com

Key-management system

KeyWatcher Touch key-management system provides a touch screen and uses the company's SmartKey system with KeyAnywhere technology, said to make it simple to return a key to any key cabinet in an enterprise. Enhancements include a new database design, a desktop fingerprint reader that allows users to enroll fingerprints through TrueTouch software, and the ability to use multiple KeyWatcher Touch server instances with a single SQL database.

Morse Watchmans, Oxford, CT
Circle 59
morsewatchmans.com

Indoor dome cameras

The V800D series H.265 indoor dome cameras, includes the 2 MP and 4 MP models. Available with a choice of fixed or motorized varifocal autoiris lens, the products include IR illuminators for viewing in all lighting conditions. True Wide Dynamic Range (T-WDR) further improves picture quality by balancing high contrast between bright and dark areas, including difficult-to-see spaces with backlit lighting. Cameras are designed for easy installation and mounting on walls or ceilings.

Vicon Industries Inc., Hauppauge, NY
Circle 60
vicon-security.com

WaterSense-approved faucets use no less than 0.8 gal./min. (gpm) and no more than 1.5 gpm, which is a 30% reduction over standard 2.2 gpm models.

Ensure Happy Users With High-Efficiency Plumbing

User satisfaction and efficiency are not incompatible.

Mark Malatesta and C.J. Lagan
LIXIL Americas, American Standard Brands

CALGreen Building Code

The 2016 California Green Building Standards Code, known as CALGreen, is the first statewide regulation of its kind. The comprehensive code "was developed to reduce GHG [greenhouse gas emissions] from buildings; promote environmentally responsible, cost-effective, healthier places to live and work; reduce energy and water consumption; and respond to the environmental directives of the administration."

The intent of mandatory measures for water efficiency is to conserve potable water in new or renovated buildings. The code further reasons that reducing water consumption "also results in decreasing the amount of energy needed to transport, process, and treat water, thereby contributing to a reduction of greenhouse gas emissions."

In projects larger than 50,000 sq. ft., including tenant spaces that consume more than 100 gal./day, the state code defines maximum allowable flow rates for the following plumbing fixtures and fittings:

- **Water closets**: The effective flush volume of all water closets shall not exceed 1.28 gpf and be WaterSense certified.
- **Urinals:** The effective flush volume of wall-mounted urinals shall not exceed 0.125 gpf and floor-mounted urinals shall not exceed 0.5 gpf.
- **Nonresidential lavatory faucets**: Lavatory faucets shall have a maximum flow rate of no more than 0.5 gpm at 60 psi.
- **Showerheads:** A single or hand-held showerhead shall have a maximum flow rate of no more than 2.0 gpm at 80 psi and carry the WaterSense label.

Federal regulations stipulate a maximum flow rate for plumbing fixtures. By choosing a low-flow model, additional savings between 30% to 87% can be captured.

Restrooms provide the biggest opportunity to conserve water in commercial buildings. However, property owners and facility managers can be reluctant to adopt the latest high-efficiency fixtures, given the frequent complaints that commercial restrooms can generate:

- Toilets have to be flushed twice.
- Sensor faucets are hard to activate and always run cold.
- Urinals have an odor issue.
- Shower pressure is disappointing.

The challenge is that many buildings are still using low-flow technologies from the 1990s or early 2000s that fail to meet user expectations. These first-generation, water-saving fixtures often have internal components that were not re-engineered to match the reduced flow rates. With a lifespan of at least 10 yr., these outdated fixtures continue to create user skepticism and frustration.

The good news is that today's low-flow commercial fixtures have been designed and re-engineered to deliver high-performance results, including a quality user experience, water savings, and reduced maintenance. It all starts with specifying restroom fixtures with the proper commercial design and operation.

FLUSH WITH CONFIDENCE

Toilets that clog easily, cannot remove solid waste with a single flush, and leave behind unpleasant stains are a major concern to commercial maintenance teams and building owners. If users need to flush multiple times, this lack of performance not only negates any water-saving benefits, but also adds frustration and embarrassment to the user experience. Proper fixture specification will ensure toilets and urinals have been engineered with demanding commercial use in mind. Specifiers should source commercial toilets with these features:

- **WaterSense Certification.** WaterSense-certified toilets use no more than 1.28 gal. per flush (gpf), which is less than the federal standard of 1.6 gpf. The WaterSense label balances conservation with performance, as the EPA standard includes "a minimum flush volume of 1.0 gpf to ensure plumbing systems have adequate flow to function effectively."
- **Flush Valve.** Flush valves with a self-cleaning refill orifice deliver reliable performance by preventing clogs that cause the valve to continuously run and waste water. The self-cleaning refill orifice is especially beneficial for areas with poor water quality such as debris, sand,

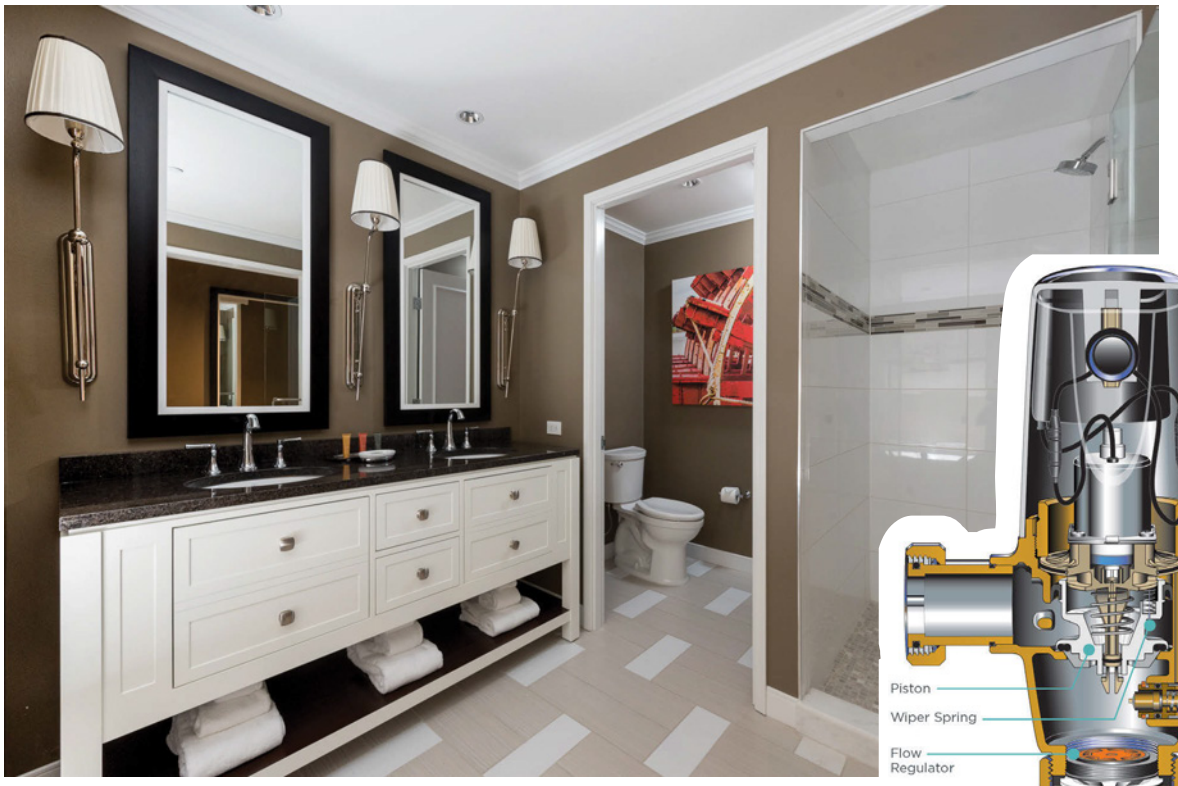
The Importance of MaP Scoring

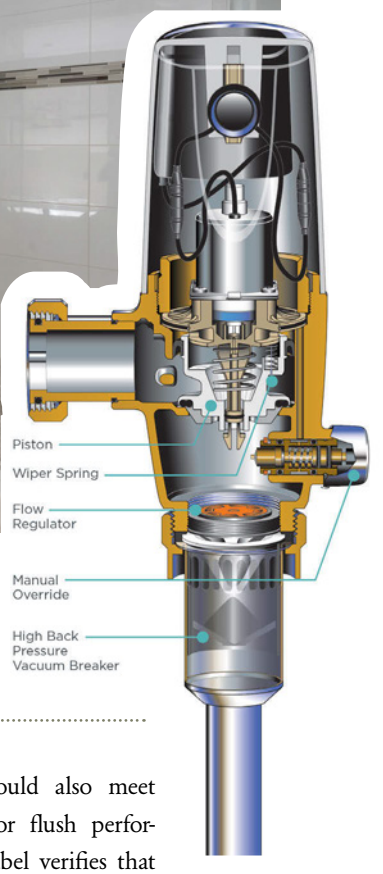
Maximum Performance (MaP) is a voluntary testing standard that verifies how many grams of solid waste a toilet can completely remove in a single flush. This independent program evaluates the flushing power of models to 1.6 gpf (gal./flush). The test starts with one 50-gram (g) specimen formed into a cylinder at a fixed length and diameter along with four crumbled handfuls of toilet paper. Its purpose is to determine at what point the material will clog, plug, or fail to restore the trap seal after flushing.

Toilet model maximum performance (MaP) level is identified as the maximum media loading (in discrete increments expressed in grams) at which a toilet model successfully clears all test media from the fixture in at least four of five attempts when cased media is used; and in at least two of three attempts when uncased media is used.

The MaP score is assigned at the last mass interval that the toilet successfully extracted 350 g, 400 g, 500 g, 600 g, 800 g, or 1,000 g. (The latter is just more than 2 lb. of waste.) A separate MaP Premium Rating is awarded to all single-flush models that meet the 600 g-or-above level and have a rated flush volume of 1.1 gpf or lower.

Building owners should look for toilets MaP rated 600 g or higher for consistent performance.





Above. Water conservation should not require guests to sacrifice a rejuvenating shower experience.

Right. Flush valves with a self-cleaning refill orifice deliver reliable performance by preventing clogs that cause the valve to continuously run and waste water.

scale, or minerals from hard water. It greatly reduces maintenance, which results in a lower cost of ownership over the lifetime of the product. To work properly, the refill orifice must stay unblocked so that water can flow into the upper valve chamber to pressurize and close the valve. One solution is to use devices such as an integral wiper spring to clean the refill orifice with each flush, delivering consistent operation.

- **Trapway size.** A wider trapway prevents clogs and reduces service calls. Additional glazing seals the trapway to create a smooth surface that streamlines the passage of waste.
- **Bowl wash.** Leftover bowl residue compromises the user experience. A good bowl wash should swirl 360 deg. around the entire surface, pushing all materials down to the trapway.
- **Siphon jet.** This performance feature enhances waste removal. Water is channeled directly from the tank or flushometer to the entrance of the trapway. This jet of water then propels waste out through the trapway, where the extra push of water helps establish a siphon to remove the waste.
- **Water surface area**. The more generous the water surface area, the less dry surface there is for materials to cling to, resulting in less maintenance and fewer odors. A larger water-surface area can also minimize splashing.
- **Elongated bowls**. An oval shape is better suited to adult anatomy because it provides space where it is needed most. The additional room also ensures skin does not touch porcelain.

Finally, specifiers can ensure the best performance and the most water savings by using hydraulically matched chinaware fixtures and flush valves that have been engineered to work together. This is done by optimizing the discharge from the flush valve to meet the hydraulic requirements of the fixture.

As specifiers work to design restrooms that offer the best-possible user experience, it's important to consider external factors that can positively affect performance, such as low water pressure, inadequate drain-line-carry pipe slope, or extended piping within a building that does not have sufficient supplemental water flow.

URINALS

Low-flow urinals can use as little as 1 pint/flush. A model with a flushing rim will ensure that water washes down all sides of the urinal, rinsing away any residue that may lead to stains or odors, and resulting in fewer service calls for busy facility professionals. Water-efficient urinals should also meet ANSI/ASME A112.19.6 for flush performance. The WaterSense label verifies that water-efficient urinals have not sacrificed performance.

SHOWERHEADS

When guests stay at a hotel or shower at a spa, they expect to have an exceptional experience. Part of the allure of showers is to feel pampered. For those on a business trip, a rewarding shower can be an energizing start or the perfect end to a long day. Few things are more disappointing to a guest than to step under a showerhead and have a weak stream of water. Low-flow showerheads use between 1.5 to 2 gal./min. (gpm). Water conservation should not require guests to sacrifice a rejuvenating shower experience. If a low-flow showerhead is not living up to guest expectations, it might be suffering from one of these problems:

- **Pressure compensation.** This essential feature ensures a constant level of water pressure despite a lower flow volume. It's important to note that a pressure balance valve is not standard on every showerhead model. This type of valve regulates flow by applying a fixed differential pressure, which creates a uniform water-force level using less water.
- **Spray force.** Separate from water pressure, spray force can make a big difference to user satisfaction. This performance attribute is so important that a min-

imum level of water force is required for all WaterSense-certified showerheads.

- **Spray coverage.** Coverage radius is also critical to a showering experience. Users may feel like a spray width is inadequate if it is too concentrated or too diffused. WaterSense measures coverage radius to verify that the width distribution of a spray pattern falls within a suitable range.
- **Spray patterns.** Another way to deliver a rewarding shower experience is to use low-flow models with multiple spray options. Users appreciate choice and are less likely to complain about water-saving fixtures if they can customize their spray pattern. Weak water pressure can stem from a number of design and maintenance issues. One common issue is mineral deposits from calcium or lime. If not periodically cleaned, these deposits can cut off adequate water flow from shower spray holes.

BATHROOM FAUCETS

In the specification of a low-flow faucet, several features are necessary to deliver the performance level required in commercial restrooms:

- **WaterSense certification.** WaterSense-approved faucets use no less than 0.8 gpm and no more than 1.5 gpm, which is a 30% reduction over standard 2.2 gpm models.
- **Aerators.** The purpose of aerators is to achieve a lower flow rate while providing a firm stream of water for users. Three aerator styles are available: standard aerated (uses a small mesh screen to force air into the stream), spray (creates a pattern like a showerhead), and laminar (produces a solid stream).
- **Ceramic-disc valve cartridge.** Most faucet valves use ceramic-disc cartridges, instead of rubber washers, to start and stop the flow of water. Ceramic discs are much tougher and better equipped to deal with extreme temperatures and can last for years.
- **Sensor protection.** Some hands-free or motion-activated faucets are factory set for a maximum flow of 0.09 gal./activation. These metering faucets automatically shut off water at the end of the cycle to reduce consumption and should require little maintenance for the sensor itself. It is critical that these metering faucets include an in-line filter, which keeps the solenoid valve clean.
- **Battery life.** Frequent battery outages can undermine the efficacy of automatic low-flow faucets. Batteries that can operate for 5 to 10 years ensure continuous water savings with lower maintenance.

Last but not least, an issue that can affect the perceived quality of flow rates is hot-water supply. Users may experience a delay when using hot water and feel reluctant to wash their hands in cold water. In the absence of a closed-loop plumbing system, insulating pipes or installing a point-of-use electric heat booster may be needed.

WATER SHORTAGES

Water conservation is a pressing concern for many commercial properties. In the U.S. alone, as many as 40 states will face water shortages by 2024. Because offices, hospitals, schools, and hotels are large consumers of water, it is important to switch to low-flow fixtures to leverage the greatest volume of savings.

The Energy Information Administration (EIA), Washington (eia.gov), used data from the most recent Commercial Buildings Energy Consumption Survey (CBECS) to estimate that, in the United States, there are approximately 46,000 commercial buildings greater than 200,000 sq. ft. that use 980 million gal. of water each day. This level represents an estimated 2.3% of the total public water supply in the United States.

On average, these buildings used 7.9 million gal./building, 20 gal./sq. ft., and 18,400 gal./worker in 2012. On a daily basis, they used an average of 22,000 gal./building, 55.6 gal./1000 sq. ft., and 50.1 gal./worker.

A report by the Office of Energy Efficiency and Renewable Energy, Washington (energy.gov), calculated an annual price escalation rate, using pricing from more than 60 water utilities and 40 wastewater plants. From 2008 to 2016, the average water rates increased by nearly 40%, and the average wastewater rates rose by 24%. This translates into a 4.1% annual price escalation rate for water and 3.3% increase for wastewater for building owners. CA

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EDITORS' CHOICE

Low-leakage insulated control damper

TED40x2:

- **Insulated control damper**
- **Produces less sound**
- **Thermal break prevents heat transmission**

The TED40x2 low-leakage insulated control damper has insulated airfoil blades that provide greater strength and sealing ability, produce less sound, and reduce static pressure loss. With an 8-in. frame and aluminum construction, when closed, the damper traps a minimum 4 in. of dead air space between the double blade assembly. A thermal break between frame sections prevents heat transmission through the frame. Blade cavities are filled with urethane foam. The damper's double-edge blade seal design allows higher pressure on either side to assist in blade-to-blade seal shutoff. Seals are mechanically locked in extruded blade slots, but can be replaced in the field. The damper also has linkage concealed out of the airstream for low maintenance and reduced air turbulence.

Ruskin, Grandview, MO
Circle 71
ruskin.com

Expanded rooftop replacement line

The York Direct Fit rooftop replacement solution includes 10-ton XX packaged heat pumps and 3- to 5-ton ZQ 14 SEER air-conditioning units. The units feature an exact-fit replacement design that matches the units to footprints of other manufacturers' units and reduces installation time, cost, and complexity. Smart Equipment reportedly makes system setup, optimization, and monitoring easier than older, electromechanical controls. An optional Mobile Access Portal (MAP) Gateway provides access using a smartphone, tablet, laptop, or remote PC.

Johnson Controls, Milwaukee
Circle 72
york.com

Enhanced pump performance

The Optimized Efficiency (Oe) high-performance package for commercial pumps adds a permanent-magnet ECM motor and VFD to pumps in the company's commercial line. Efficiency and service life are increased while exceeding upcoming DOE regulations. Pumps between 3 and 30 hp are available with the Oe package.

Taco Comfort Solutions, Cranston, RI
Circle 73
tacocomfort.com

Groove fitting adapters

ProPEX groove fitting adapters for direct copper tube size (CTS) or iron pipe size (IPS) connections transitioning from PEX to metal piping are available in 2-, 2 1/2-, and 3-in. sizes in lead-free (LF) brass. The adapters provide direct connection from the company's PEX to groove fittings and couplings.

Uponor, Apple Valley, MN
Circle 74
uponor-usa.com

Wireless hygro-thermometer

The RH200W multi-channel wireless hygro-thermometer is reported to accurately track and display temperature and humidity readings with as many as eight remote sensors for extensive coverage of a facility. The base station connects wirelessly with remote sensors that can be placed almost 100 ft. away indoors or outdoors. The display cycles temperature and humidity readings from each sensor in use with large digits readable across a room.

Extech Instruments, Nashua, NH
Circle 75
extech.com

Tankless water-heater system

The Commercial Water Heater System speeds and simplifies the installation of multiple tankless water heaters. Commercial-grade tankless units are combined with system controllers, manifolds, and other necessary components and accessories into fully assembled metal rack systems for shipment anywhere in North America. The prefabricated system significantly reduces the burden on the installer, who needs only to connect the water and gas lines, build the vent runs, and set up the pre-wired system controller.

Noritz America, Fountain Valley, CA
Circle 76
noritz.com

Pressure-assisted toilets

Pressure-assisted toilets use Flushmate technology to reduce backups or clogs. The Flushmate vessel pushes waste out of the bowl and into the drainline faster than a gravity flush. The toilets provide flush volumes of 1.0 gpf, 1.28 gpf, and 1.6 gpf in standard and ADA-compliant models.

Sloan, Franklin Park, IL
Circle 77
sloan.com

International lifestyle company Mexx sells clothing and accessories in more than 65 countries. When Mexx extended its range to include business fashion, it began to modify the décor and lighting in its stores.

Move Beyond Energy Savings

Today's lighting technology contributes much more than cost-cutting.

Omar Rivera, LEDVANCE

The LED revolution has changed many things, one of which is the conversation the building industry is having about lighting. Since the beginning of the revolution, an important topic has been how much light can be squeezed out of lamps and luminaires for the lowest wattage and cost. While energy efficiency is important, the lighting industry has reached its practical limit and, as always, efficiency must be balanced with other considerations.

Light may be a commodity to be obtained for the lowest ongoing energy cost, but properly designed lighting can be a powerful asset. For the sighted, vision is how people get most of their information about the world. As the medium of vision, light produces physiological and psychological effects. These effects vary according to lighting, which is the application of light in a space. From highlighting key merchandise to facilitating interpersonal communication in an office, lighting is a critical part of a building's design.

It's time to change the lighting conversation by going back to basics and looking at new lighting capabilities that are redefining the basics. The conversation we should be having is about applications and users, not just energy. Are users getting the right amount of light where they need it? Is the illumination visually comfortable and supportive of wellness and productivity? Is the system robust in control capabilities?

No matter how much lighting technology changes, good lighting is about proper design and application. Consider these elements of good lighting design:

To present a formal look and feel for business attire, Mexx embraced a townhouse look, combining authentic white wood moldings on ceilings and walls with bright, antique furniture to create an elegant, yet cosmopolitan, atmosphere.

turn on instantly, operate in cold environments, offer long life, integrate with intelligent control, produce actionable data that can be used to create new services and generate revenue, and is resistant to shock and vibration. Be sure to familiarize yourself with everything today's LED lighting technology can do to gain a much larger toolbox to solve application problems and correct issues that otherwise would be very difficult to address in the field.

- **Control is king.** The latest generation of energy codes and standards is very demanding in terms of mandatory lighting-control requirements. Today, compatible lighting controls can switch or dim LED sources very easily to save energy. Due to the complexity of code requirements, a big trend is integrating control into the luminaire, along with intelligence allowing either autonomous, out-of-the-box energy-code compliance or centralized, programmable operation managed by a trained and authorized user. Meanwhile, easy access to dimming offers new opportunities to use controls to support visual needs in a much broader application range.

Controls are now going much further than traditional switching and dimming, creating new lighting and building applications by allowing color control and the generation of data. The latest advanced-lighting systems offer wireless connectivity for highly responsive energy management, color tuning, and occupancy, thermal, and other data to be collected for analysis. These connected lighting systems are potentially foundational for Internet of Things implementation, as the luminaire could integrate many types of sensors. Cloud connectivity allows future-use case applications to be rolled out to enhance space utilization, focusing on providing customer solutions beyond energy conservation and great lighting design.

- **Stay up to date with trends.** New trends are emerging in lighting, such as a growing

- **Layering is flexibility.** One of the most important fundamentals in lighting design is layering. This entails combining general (ambient) lighting, task lighting, and accent lighting as needed to accomplish visual goals in a space. This approach provides extraordinary flexibility, allows the creation of visually interesting scenes using controls, and offers opportunities to increase energy efficiency by placing light sources closer to the task. With layering, the designer gets to decide what the user focuses on in a visual hierarchy.
- **Start with light levels and visual comfort.** The main job of lighting is to make it possible for users to perform visual tasks. Make sure you are familiar with the latest Illuminating Engineering Society, New York (ies.org), recommendations for minimum light levels. Ensure the light is delivered to the user without glare at typical viewing angles, a rule that applies to electric light and daylight. Zone the lighting appropriately for whatever is needed, whether it is a dynamic visual hierarchy of focal points or uniform light distribution across the task area.
- **Application efficiency is critical.** While selecting efficacious luminaires is important, real energy efficiency resides at the work plane, where light is consumed. This entails placing light only where it is needed and emphasizing the task-lighting layer. If relying on furniture-mounted task lighting to deliver minimum recommended light levels, ensure this lighting will, in fact, be installed.
- **Take advantage of dimming.** This is part of a general rule to take advantage of the new capabilities LED brings to lighting, but one that deserves special attention. In the old days of fluorescent and HID lighting, dimming was an expensive proposition. With LED, the majority of products are dimmable at a negligible cost. This offers a powerful capability for lighting design, not only to save energy, but also for task tuning to right-size light levels and mitigate glare. Dimming provides an excellent way to fine tune an installed design.
- **Understand LED's capabilities.** LED lighting can change color, white-light shades,

For a lighting concept that reflects modern elegance, makes customers feel at home, and shows products in the best-possible light, Mexx chose LED lamps from LEDVANCE.

understanding between light and human health, leading to the potential to design more circadian-friendly spaces. Lighting products are not inherently circadian friendly, though some are more so than others. As with other trends, good application and design is essential.

- **Design for maintenance.** Maintenance in the LED era can be challenging because of dramatically compressed product cycles and non-standardized components. What does the warranty cover, and how long will the manufacturer maintain replacement parts?
- **Choose your supply partners carefully.** It's absolutely essential to choose suppliers who will stand by their product over the long term, while also offering support from a deep well of application experience and technical knowledge. Because of the wide variation in product quality in the market, of course it also applies that any specified product should be rigorously scrutinized. When in doubt, seeing is believing, which is why mockups are often advisable.
- **Be the lighting expert.** Continue your education, familiarize yourself with trends and advanced capabilities, and choose partners able to provide this education along with the other support you need as a designer and specifier.

It is an exciting time to be in the lighting industry as it undergoes a massive technological shift that is bringing with it opportunities and challenges. Change brings risk but also opportunity. Designers who seize this opportunity will gain valuable expertise and more satisfied clients.

The good news is, while technology is changing, the fundamentals of good lighting are the same. As your lighting expertise grows, you will find that today's lighting technology delivers far more opportunity than risk. CA

Omar Rivera is head of luminaires in the United States and Canada for LEDVANCE, Wilmington, MA (sylvania.com). A 30-yr. lighting-industry veteran, he is Lighting Certified with the Illuminating Engineering Society, New York (ies.org), and a Certified Lighting Energy Professional with the Association of Energy Engineers, Atlanta (aeecenter.org).

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EDITORS' CHOICE

High-performance high bay

Peloton:

- **High-bay luminaire**
- **Uplight option eliminates cave effect**
- **Wide and narrow distribution levels**

Peloton high-performance high-bay luminaire from Columbia Lighting has an uplight option from 1,000 to 4,000 lumens to eliminate the cave effect and reportedly alleviate contrast concerns that lead to decreased light uniformity. Wide and narrow distribution options are available for open area and aisle applications and visual comfort can be enhanced with a variety of lens options. The product is tested and certified to the UL 924 emergency-lighting standard. With a lumen output range of 8,000 to 60,000, the luminaire provides a unified look in facilities with a range of ceiling heights. NX Distributed Intelligence provides options for standalone and networked-integrated sensor with wired or wireless connectivity and remote programmability.

Hubbell Lighting Inc., Greenville, SC
Circle 78
hubbelllighting.com

Sealed-enclosure luminaire

The EnviroPro EPHB series LED luminaire combines an iconic appearance with certified performance enhancements, making it optimal for harsh high-bay applications and aesthetic architectural environments. The series features as much as 31,510 lumens and offers a choice of three uplight options: 11%, 8%, and a standard <1%.

Kenall Mfg, Kenosha, WI
Circle 79
kenall.com

LED downlights

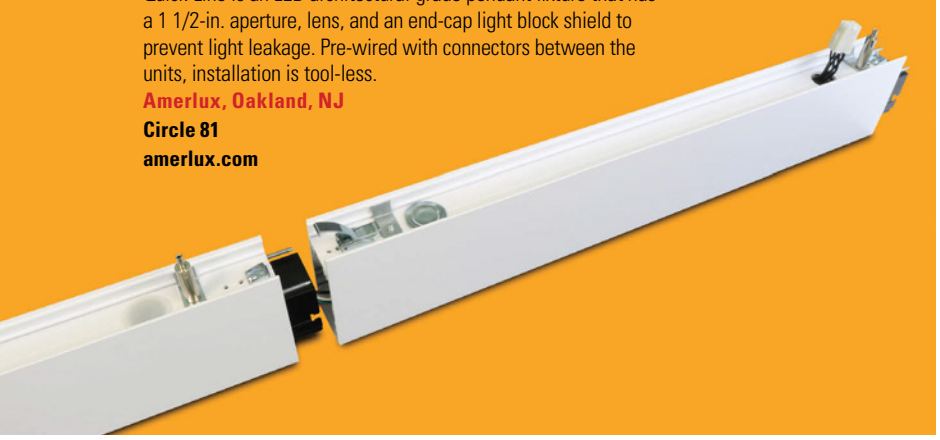
Marquise II series of LED downlights use Cree COB technology. COB (chip on board) technology allows better optic control and offers three beam spreads: spot, narrow flood, or flood beam. Both IC and non-IC options are available with 900 to 2500 lumens in 2700 K, 3000 K, 3500 K, and 4000 K with 90+CRI.

Nora Lighting, Commerce, CA
Circle 80
noralighting.com

Linear lighting

Quick-Line is an LED architectural-grade pendant fixture that has a 1 1/2-in. aperture, lens, and an end-cap light block shield to prevent light leakage. Pre-wired with connectors between the units, installation is tool-less.

Amerlux, Oakland, NJ
Circle 81
amerlux.com



Site, roadway fixture

Linear EXT site and roadway fixture has fully rotatable LED arrays that provide precise placement of light, regardless of the orientation of the luminaire. With nine distribution patterns, the optical modules are field rotatable in 90-deg. increments and field replaceable. Each LED is individually controlled by a lens that has distribution type and direction of light throw molded into it. Five standard textured finishes are available along with custom colors.

U.S. Architectural Lighting, Palmdale, CA
Circle 82
usaltg.com

LED vapor-tight strip lights

Available in 4- and 8-ft. versions, a line of LED vapor-tight slim strip lights support a range of applications. Impact- and corrosion-resistant, measuring 1 1/2-in. in diameter, the fixtures are rated for indoor and outdoor use.

Litetronics, Bedford Park, IL

Circle 83

litetronics.com

Edge-lit recessed downlights

Edge-Lit LED recessed dome downlights produce a soft glow, rather than stark, direct lighting. The concealed light source bounces light off the inside of the dome, producing diffused, functional light. Square and round models are available, all with a beam angle of 90 deg. and are dimmable.

Jesco Lighting Group, Port Washington, NY

Circle 84

jescolighting.com

Infrared outdoor sensor

Wattstopper FSP-300 series passive infrared outdoor sensor adds Bluetooth technology communication to the FSP family of occupancy sensors. The series adds enhanced security while improving commissioning of lighting projects with wireless access, eliminating the need to use ladders or tools. Sensors are available in three models providing different options for mounting inside a fixture, outside a fixture using a 1/2-in. knockout, or to a pole.

Legrand, San Jose, CA

Circle 85

legrand.us

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PLEASE RECYCLE

These complex geometric shapes can be seen in the North pier, which is a significant portion of the Oslo (Norway) airport expansion project, completed in 2017. The 985-ft.-long pier is used for international and domestic flights. The overall expansion, an excellent example of energy and people-moving efficiency, increased the airport's annual capacity from 19-million to 30-million people. *Architect: Nordic Office of Architecture, Oslo. Photo: © Dag Spant*

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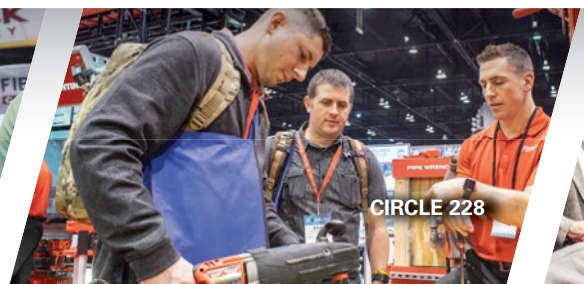

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