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El Dorado's Highlander Accelerator in Omaha

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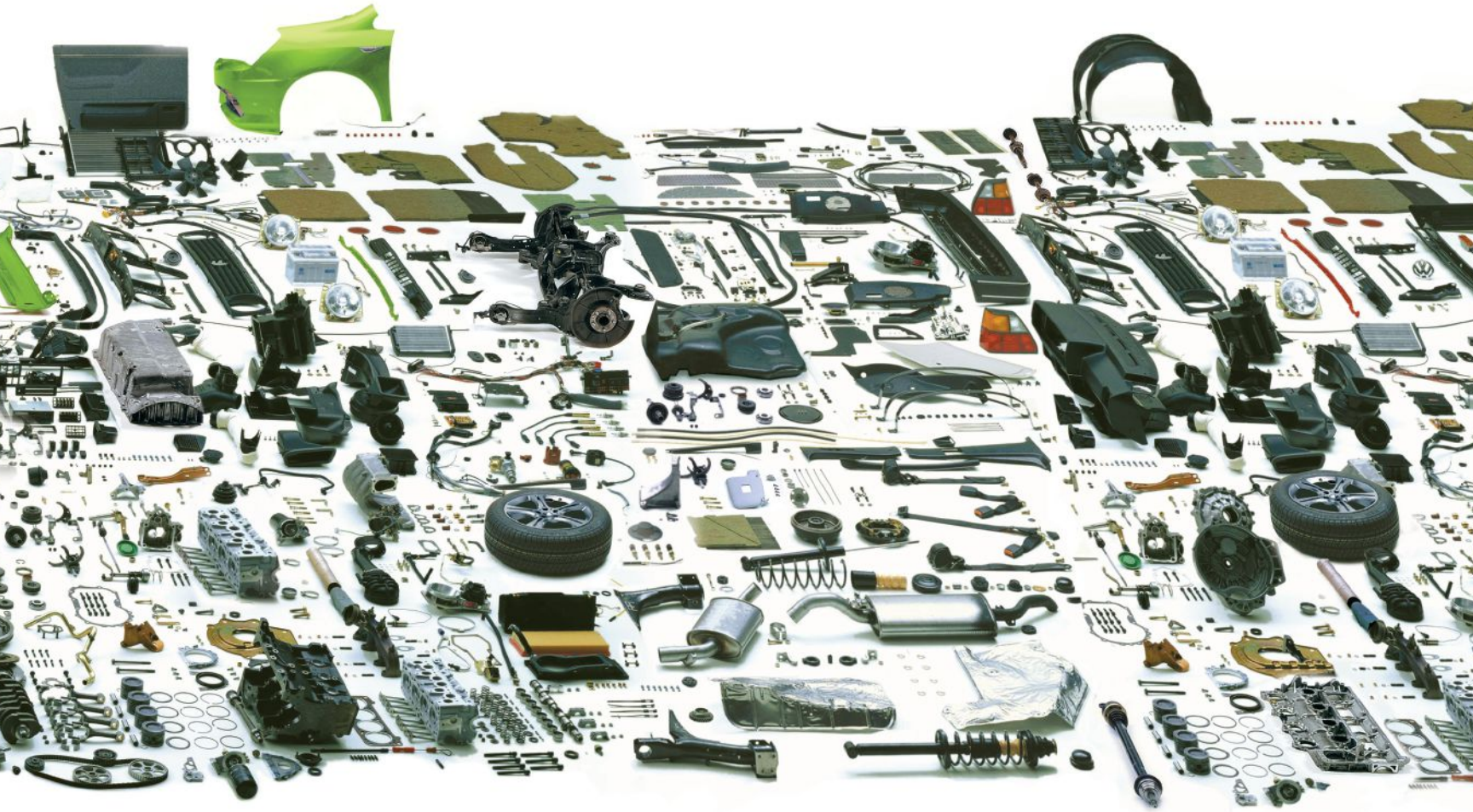

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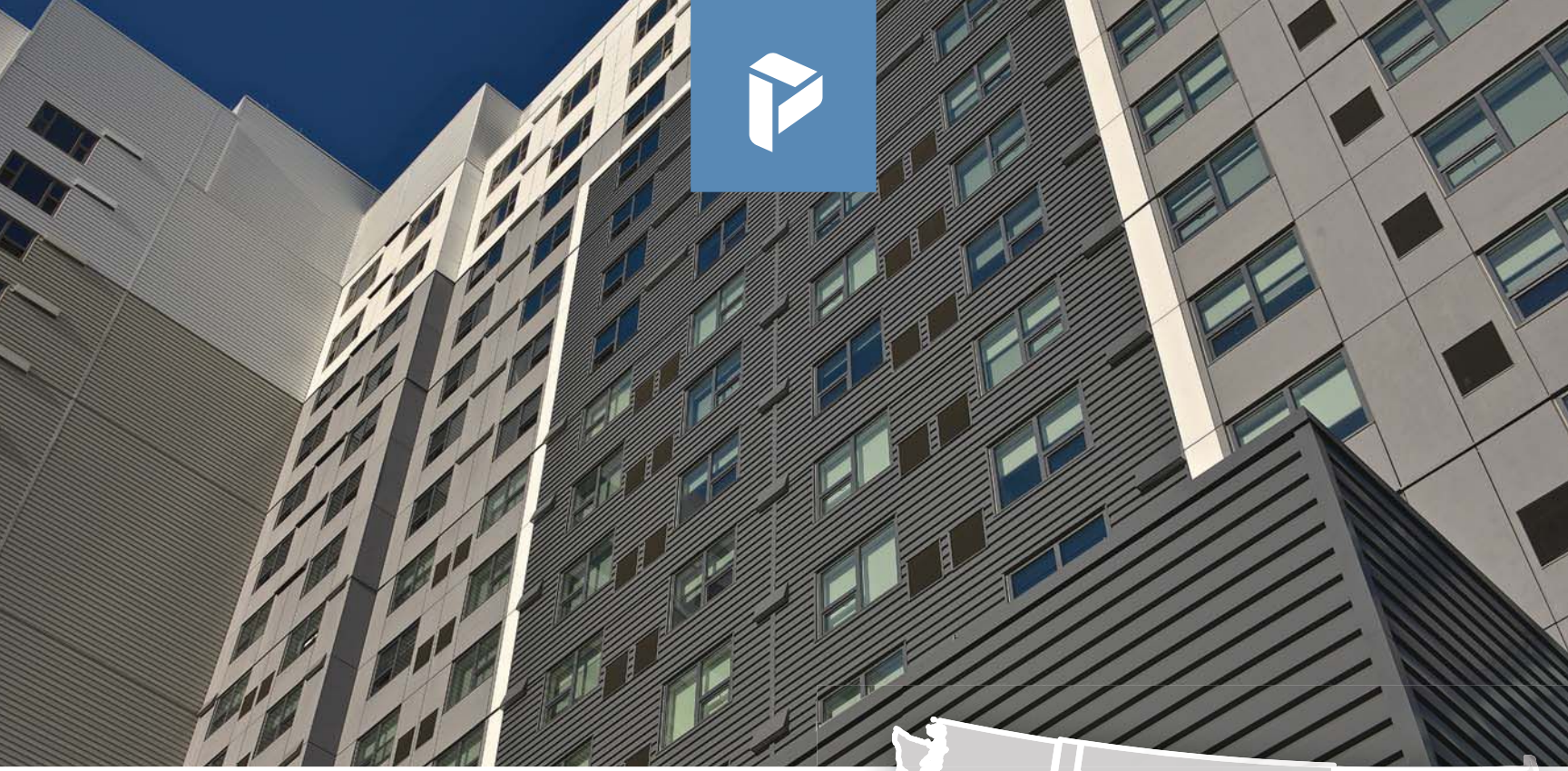

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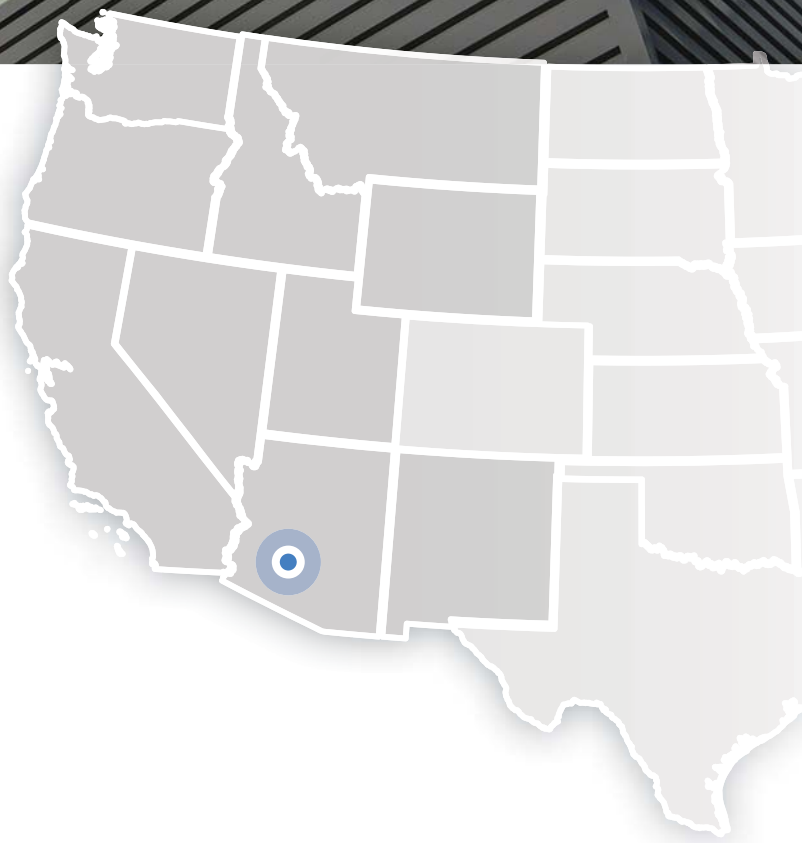

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Beyond the Glass


Photographer: Ryan Kurtz Photography

HOW PELLA ARCHITECTURAL SERVICES HELPED CREATE A MODERN MASTERPIECE.

River Birch House | Jose Garcia Design | Cincinnati, OH

Aiming to create a strikingly modern residence with narrow sightlines, expansive glass and natural materials, Jose Garcia Design turned to the Pella Architectural Support Services team. From preliminary drawings to installation advisory, Pella worked with the acclaimed firm and contractor to deliver solutions that met challenging design requirements – and created one of Cincinnati's most innovative structures.

JARON VOS
Manager, Architectural Services

AT THE DRAWING BOARD

Pella's experts started by drawing up plans for Garcia's extra-large window combinations. Using design parameters provided by structural engineers, the team developed several conventional mullion-reinforcing options that would withstand wind loads at spans greater than 14 feet.

"Conventional reinforcing options are too wide for a project like this, so the width of the mullions was very important," said Jaron Vos, manager of Architectural Services at Pella. "So we designed a one-inch custom extrusion that was deeper than the frame but could hold a narrow width."

A NEW USE FOR TRUCK BED LINER

A span this long required a unique solution. To obtain the right structural capacity, the depth of the aluminum extrusion needed to extend beyond the window frames and into the interior. This design presented the potential for condensation. And though the extrusion would be insulated by wood trim, the team wanted to be sure that condensation would not be an issue.

After utilizing thermal modeling and conductance testing, Pella's architectural engineers concluded that a coat of truck bed liner applied to the extrusion would solve the issue.

"It has durability and low thermal conductivity. Plus, it's thin enough to not interfere with the trim," Vos said. "Once the interior trim was installed, the condensation concern was alleviated."

SMART INSTALLATION PRACTICES

Because large combinations and custom extrusions were new to the installer, a field services specialist from Pella Architectural Support Services worked on-site to advise on the installation procedures.

"With specialized engineering, drafting, testing and field services, we can say 'yes' to an architect's vision, help contractors make those visions reality, and provide customers the looks and performance they want," Vos explained.

ARCHITECTURAL EXPERTISE FROM BEGINNING TO END

Design and performance analysis

Thermal analysis

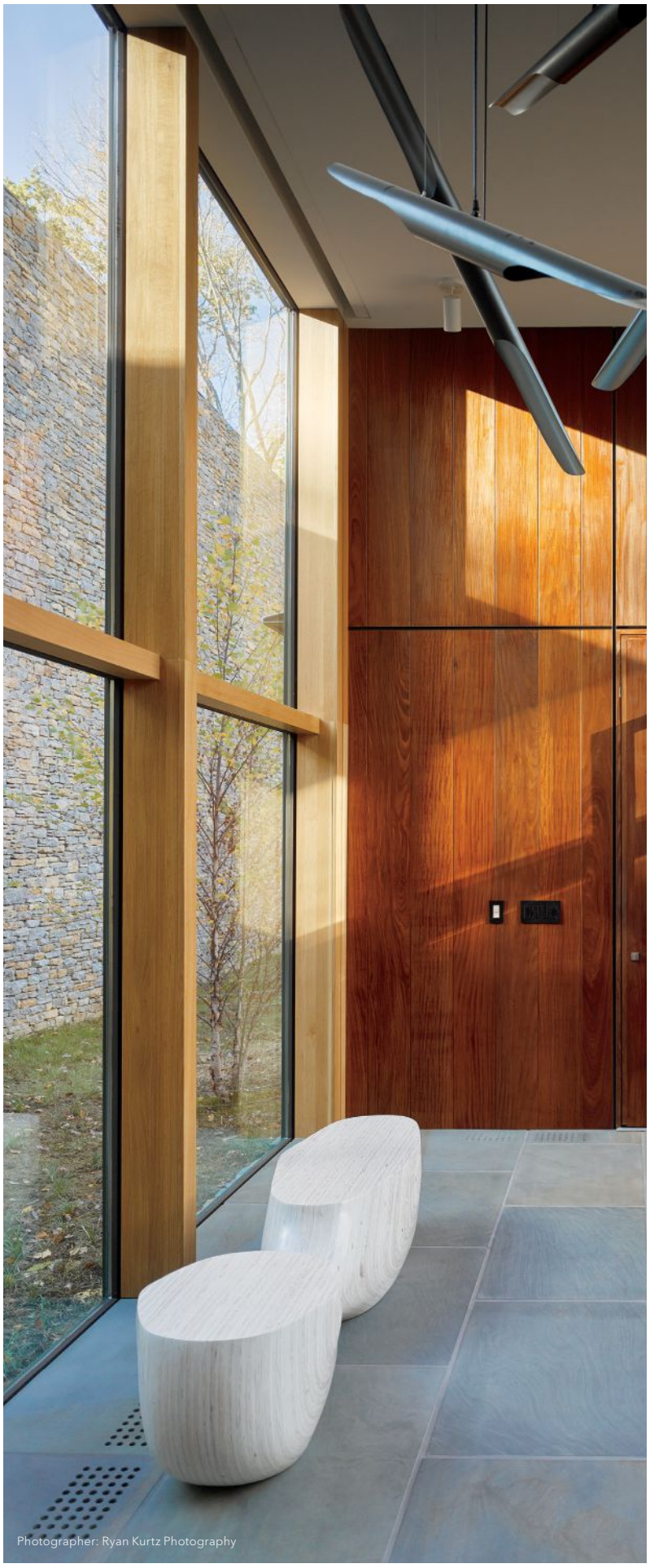
Custom extrusion design

Preliminary design drawings

Custom product design

Installation shop drawings

Field services and on-site training

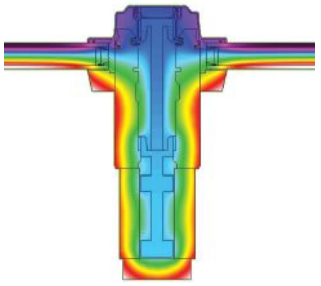


Photographer: Ryan Kurtz Photography

We owe this project to one thing – truck bed liner.

When Jose Garcia Design needed a custom aluminum extrusion for their contemporary masterpiece, we were game. But Pella's thermal and performance analyses determined that condensation might be a problem. So the Pella Architectural Support Services team got creative, recommending a coating of truck bed liner to deliver a building envelope that exceeded performance requirements – and helped our client achieve their most ambitious goals.

FROM CONCEPT THROUGH COMPLETION.



Thermal model represented is specific to this project.

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Volume 107, number 10. October 2018.
On the cover: The Accelerator at Highlander, by El Dorado. Photo by Mike Sinclair.

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OWNER: University of Cincinnati
ARCHITECT: Henning Larsen Design + KZF Architects
CONTRACTOR: Turner Construction Company
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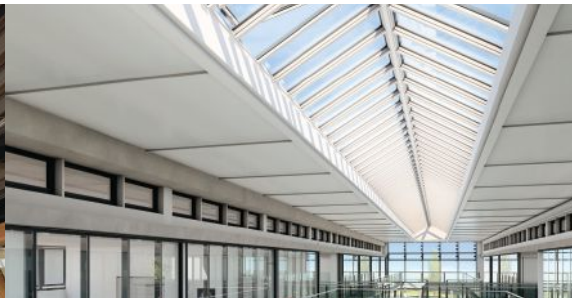

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Scottish Cliffs

On Sept. 15, London's Victoria & Albert Museum opened an outpost in Scotland: the V&A Dundee, part of a 30-year, £1 billion ($1.3 billion) redevelopment of the city's waterfront that kicked off seven years ago. Tokyo- and Paris-based Kengo Kuma and Associates derived the 8,445-square-meter (90,901-square-foot) museum's form from the country's sharp cliffs and the site's maritime history. At its most dramatic point, the building angles nearly 20 meters (roughly 65 feet) past its base. The exterior is clad with 2,429 precast concrete panels of various size and orientation, designed to cast fluctuating shadows on the façade. —SARA JOHNSON

> *Visit ARCHITECT's Project Gallery to see more images of the V&A Dundee: bit.ly/VandADundee.*

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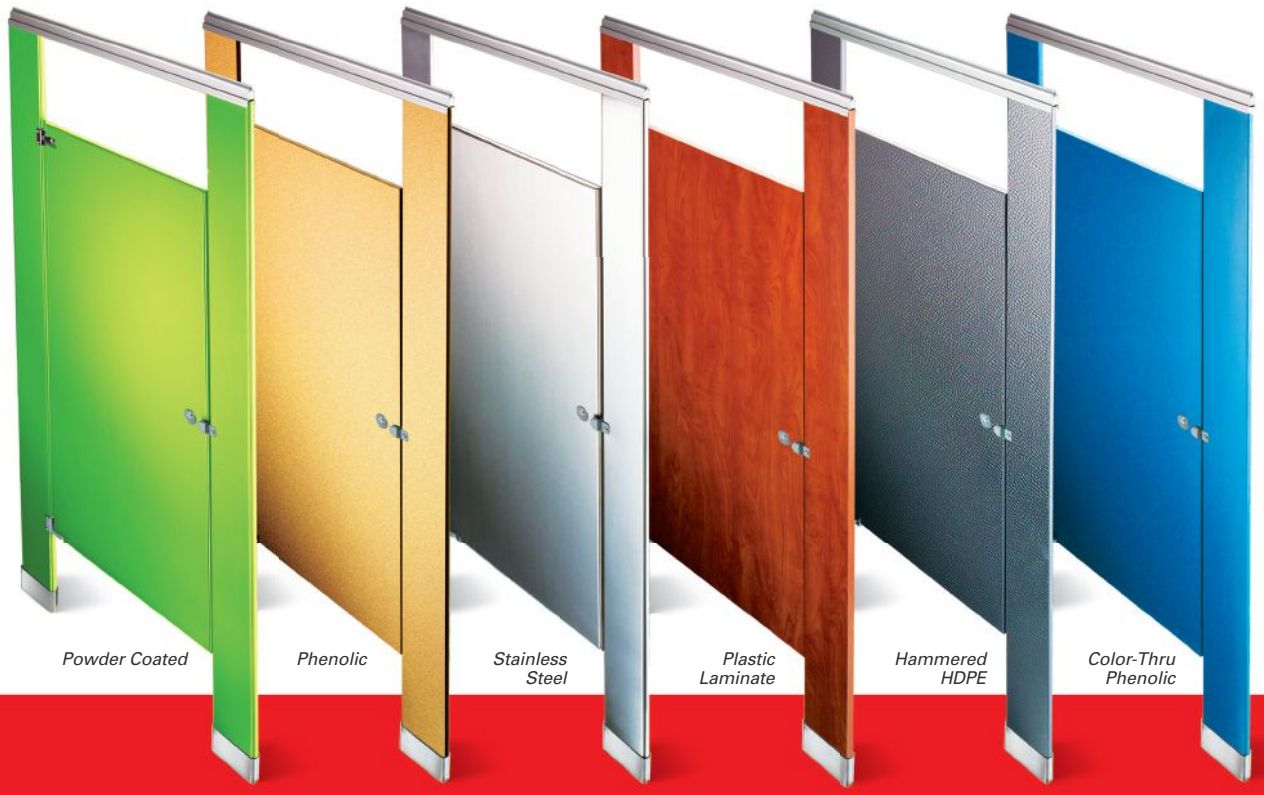

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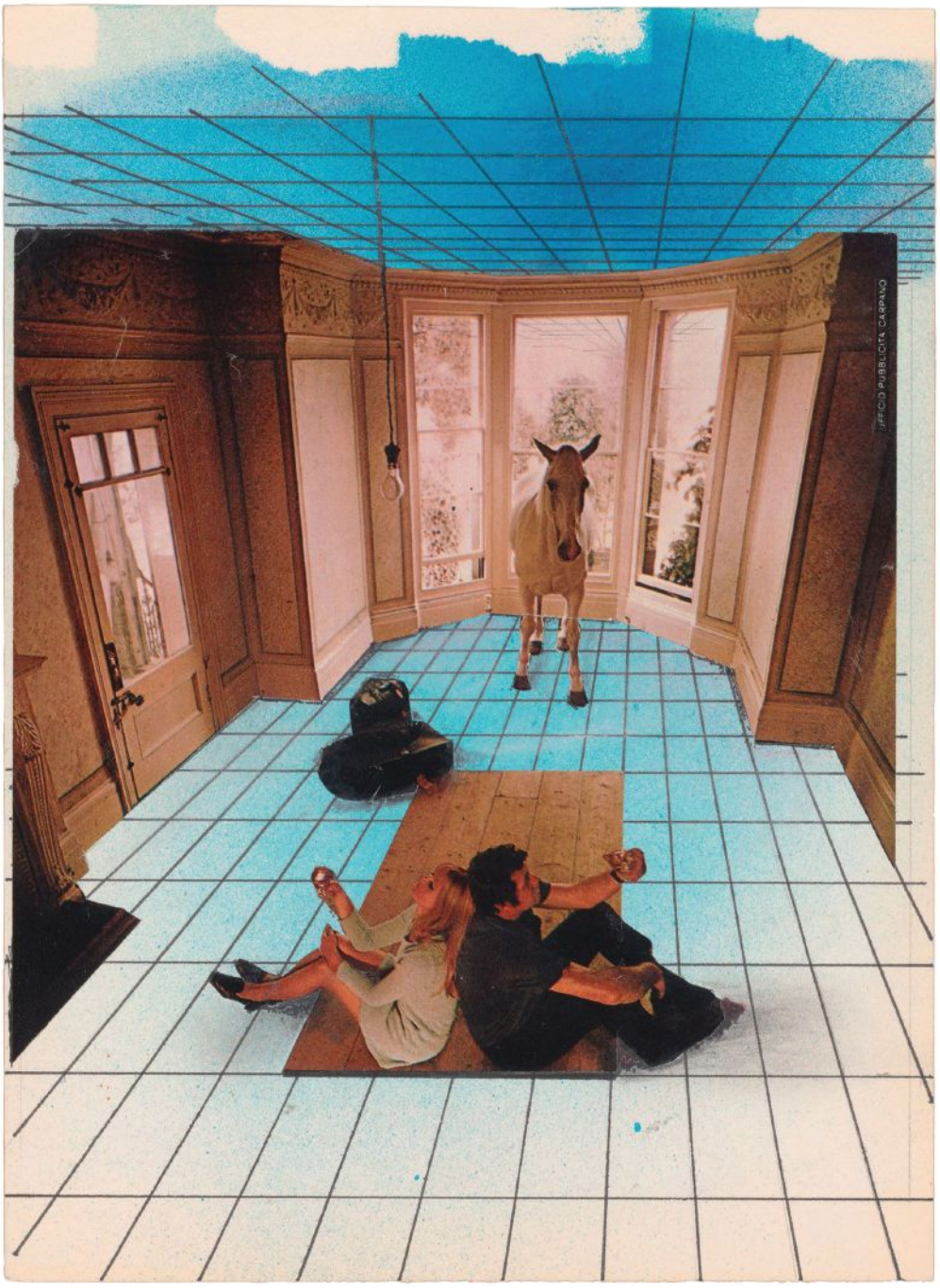

ALESSANDRO POLI FONDS, CCA. © ARCHIVIO SUPERSTUDIO

A Radical's Home Movies

In the 1960s and '70s, Italian architecture students, the Radicals, challenged the modernist establishment with a succession of countercultural projects: interiors, objects, images, and events. Inspired by the vibrant underground cinema scene of the time, the Radicals also experimented in film. Almost 50 years later, visitors to the Canadian Centre for Architecture exhibition, "Scripts for a New World: Film Storyboards by Alessandro Poli," on view until Jan. 20, 2019, can now view a collection of Poli's storyboards, scripts, and collages for projects from this period, including "Supersuperficie" ("Supersurface," shown above). —KATHARINE KEANE

> *To learn more about Alessandro Poli and the Radicals in Italy, visit bit.ly/AlessandroPoliCCA.*

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Concrete, It's Electric!

Concrete is transforming from an inert substance into a material with energy-generation and storage capabilities, thanks to a collection of recent technologies. For example, researchers at ETH Zurich have developed a self-supporting structure (shown) for the ETH NEST HiLo project, a research facility focused on lightweight and adaptive construction. The structure offers thermal regulation, insulation, waterproofing, and power generation supplied via an ultrathin concrete shell with a thickness ranging between 1 and 2 inches along the edges, topped with strips of thin film photovoltaics. —BLAINE BROWNELL, AIA

> *Read about more developments in "power concrete" at bit.ly/FutureConcrete.*

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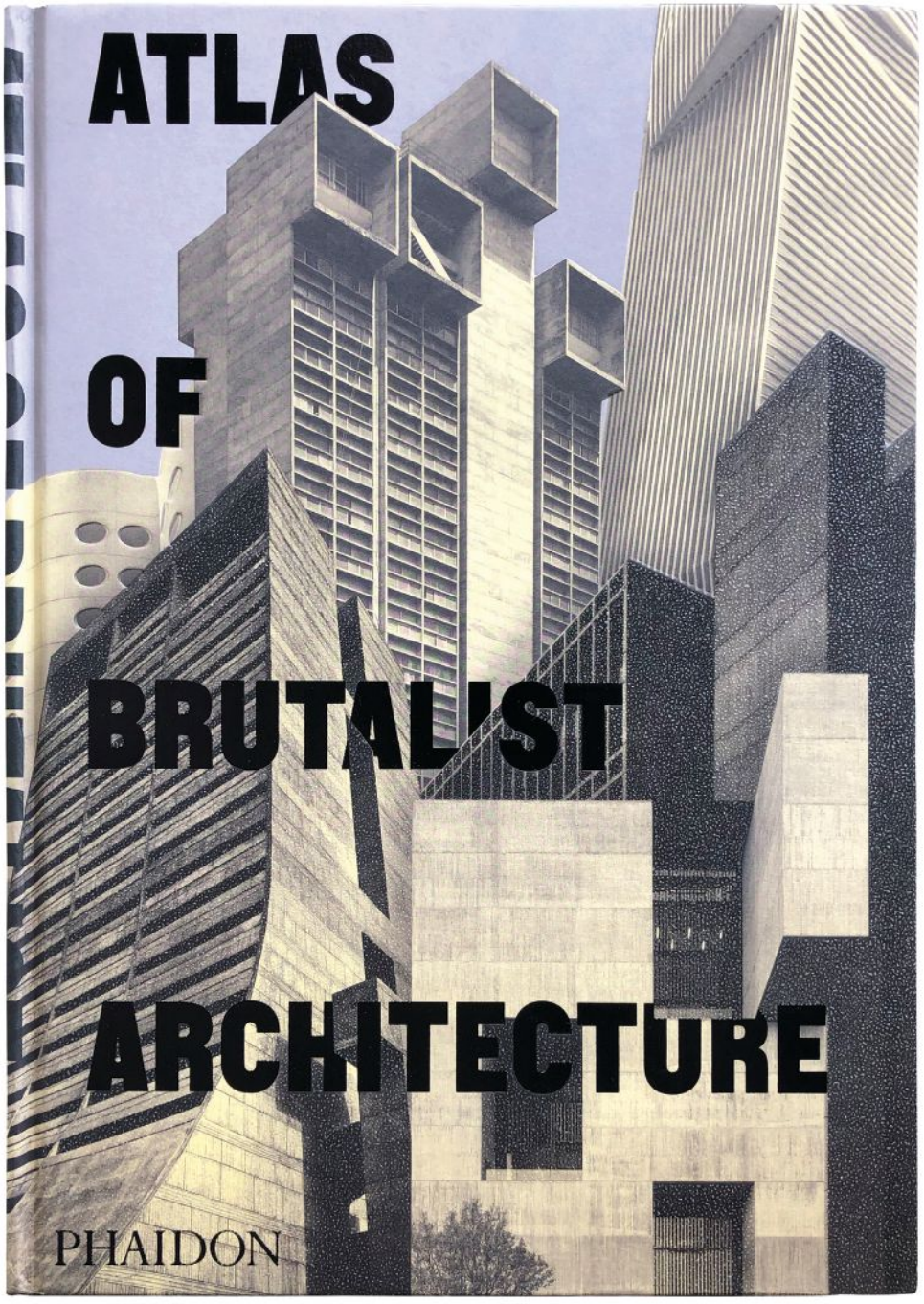
Transparent Chicago

On the last day of August, the Chicago Architecture Center opened its new home: a mix of exhibition and educational spaces, retail, and offices for the organization formerly known as the Chicago Architecture Foundation. Designed by local firm Adrian Smith + Gordon Gill Architecture, the center is inside a Ludwig Mies van der Rohe building next to the River Cruise dock. "The design doubles down on the remarkable visibility to create an open, accessible space that invites the city to step inside and provides a perch from which visitors can watch the city at work and play," said partner Gordon Gill, FAIA, in a press release. —SARA JOHNSON

> *Read more about the Chicago Architecture Center at bit.ly/ChicagoArchitectureCenter.*



Heavy Volume

The *Atlas of Brutalist Architecture* (Phaidon, 2018), authored by the publisher's editors, captures *béton brut* in all its beguiling variations, including the sublime (Marcel Breuer's recently restored Whitney Museum of American Art), the detested (the now-demolished Tricorn Centre in Portsmouth, England, which Prince Charles likened to "a mildewed lump of elephant droppings"), and the dubious (OMA's maybe-Brutalist Seattle Central Library). Featuring 878 buildings from 102 countries, depicted in striking black-and-white photographs, the atlas is an exhaustive guide to this resurgent period of architecture, as well as few outliers. —ERIC WILLS

> *Read more about the* Atlas of Brutalist Architecture *at bit.ly/BrutalistAtlas.*

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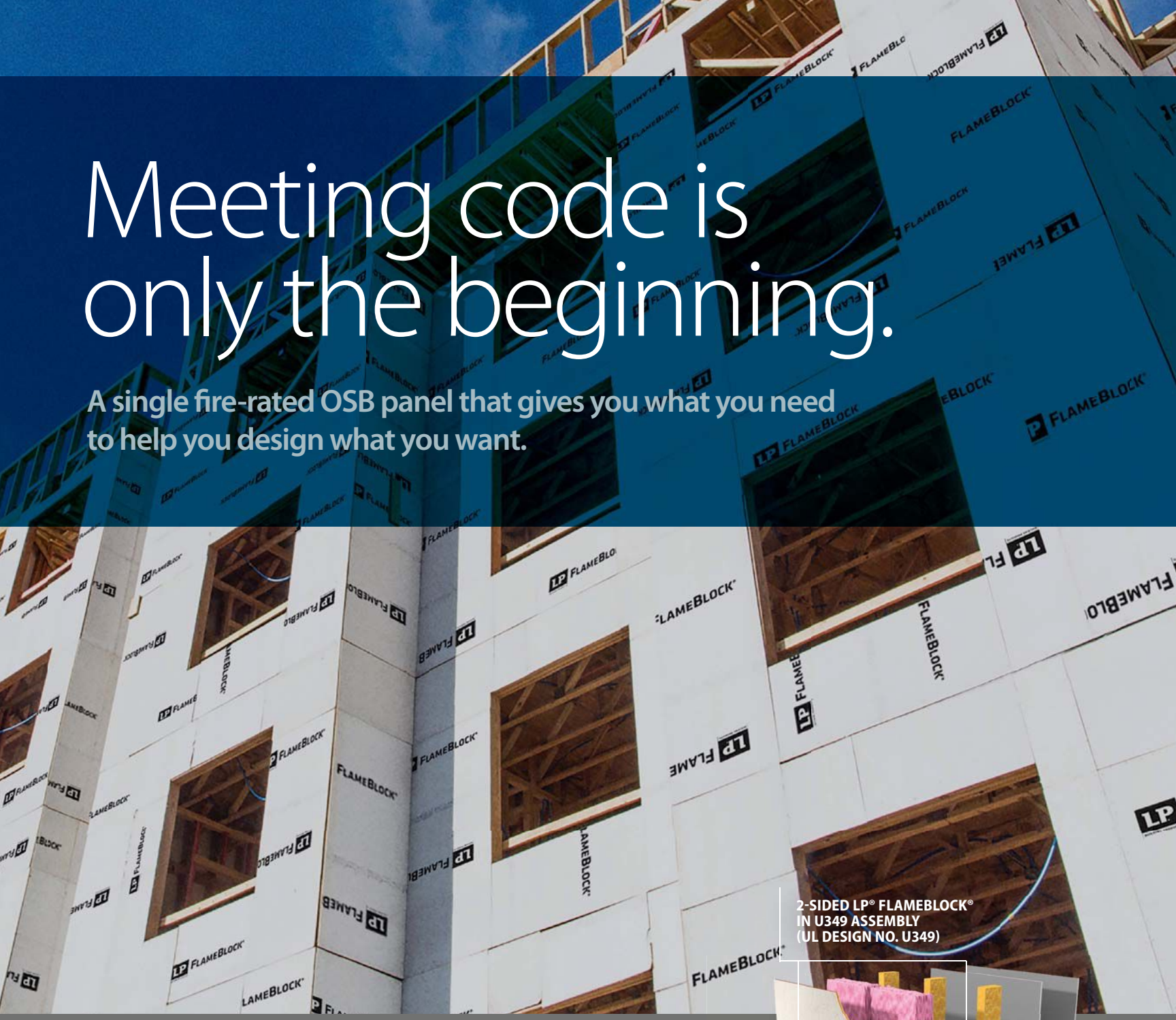

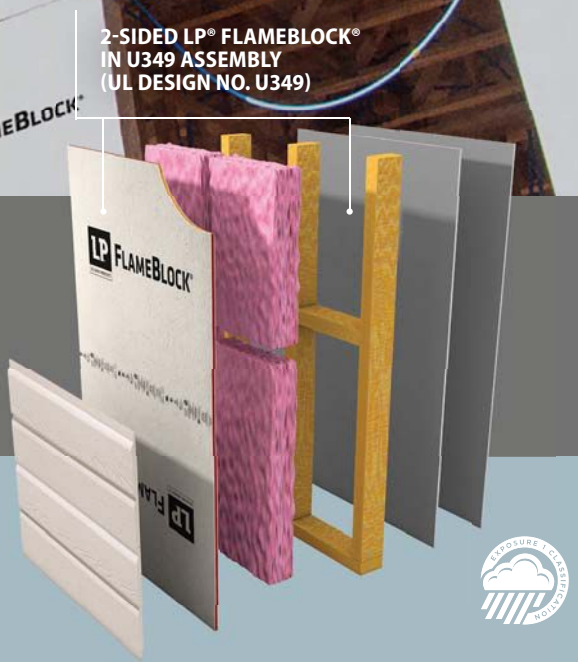

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COURTESY FACEBOOK

Facebook's Campus Adds a Friend

Just three years after moving into its Menlo Park, Calif., MPK 20 campus designed by Frank Gehry, FAIA, Facebook unveiled an expansion called MPK 21, also by the architect. Designed to achieve LEED Platinum certification, MPK 21 features a 3.6-acre rooftop garden with 200 trees, 1.4 megawatts of solar panels, and a water recycling system. The new building is connected to MPK 20 via an "amphitheater-style courtyard" offering sheltered outdoor meeting and work spaces, and is equipped with five eateries, open-plan office seating, and a 2,000-person event space. —KATHARINE KEANE

> *Read more about MPK 21 at bit.ly/GehryMPK21.*

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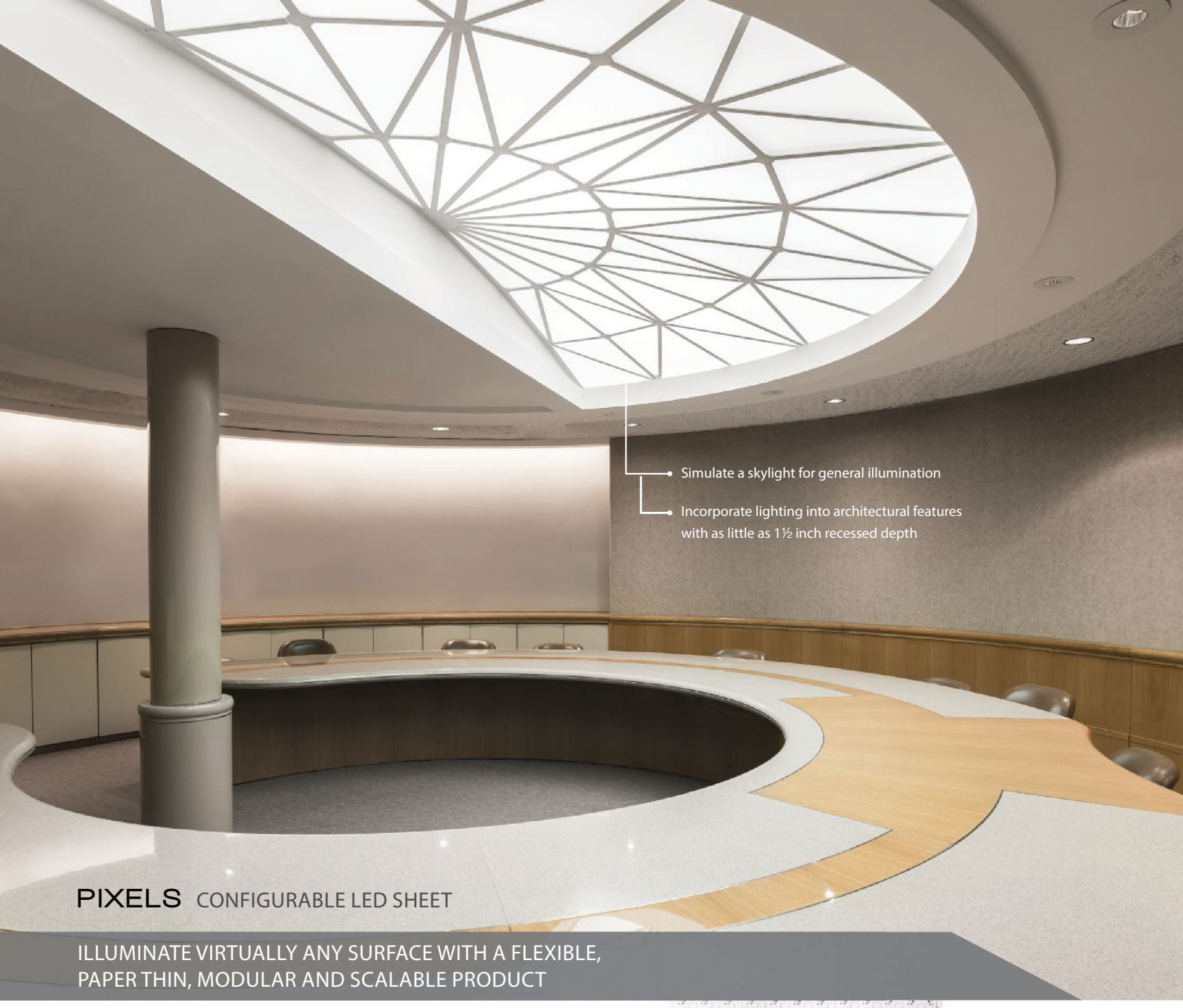
Musical Tribute

Seventeen years ago, on Sept. 11, 2001, the 40 passengers and crew members of United Airlines Flight 93 diverted their hijacked plane, crashing into a field in Shanksville, Pa. Last month, a new portion of the Flight 93 National Memorial, designed by Beverly Hills, Calif.–based Paul Murdoch Architects and Charlottesville, Va.–based Nelson Byrd Woltz Landscape Architects, was dedicated ahead of the anniversary. The 93-foot-tall precast concrete Tower of Voices features 40 polished aluminum wind chimes, one for each of the deceased—the first structural chime system of its kind, according to the National Park Service. —KATHARINE KEANE

> *Read ARCHITECT's interview with Arup's Elizabeth Valmont on the Tower of Voices chimes at bit.ly/911MemorialChimes.*



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Major Florida Keys

Out of almost 300 entries, 41 projects from 32 firms were recognized in this year's Florida/Caribbean Honor & Design Awards, presented by AIA Florida this summer. The four-person jury bestowed design awards in eight categories, such as renovations and additions, historic preservation and restoration, unbuilt design, and interiors. Winning projects include the Bay Pines STEM Center in St. Petersburg by Rowe Architects (shown) and the Kotler-Coville Glass Pavilion at the John and Mable Ringling Museum of Art in Sarasota by Architects Lewis + Whitlock. —MIABELLE SALZANO

> *See more winning projects in the 2018 Florida/Caribbean Honor & Design Awards at bit.ly/AIAFloridaAwards18.*

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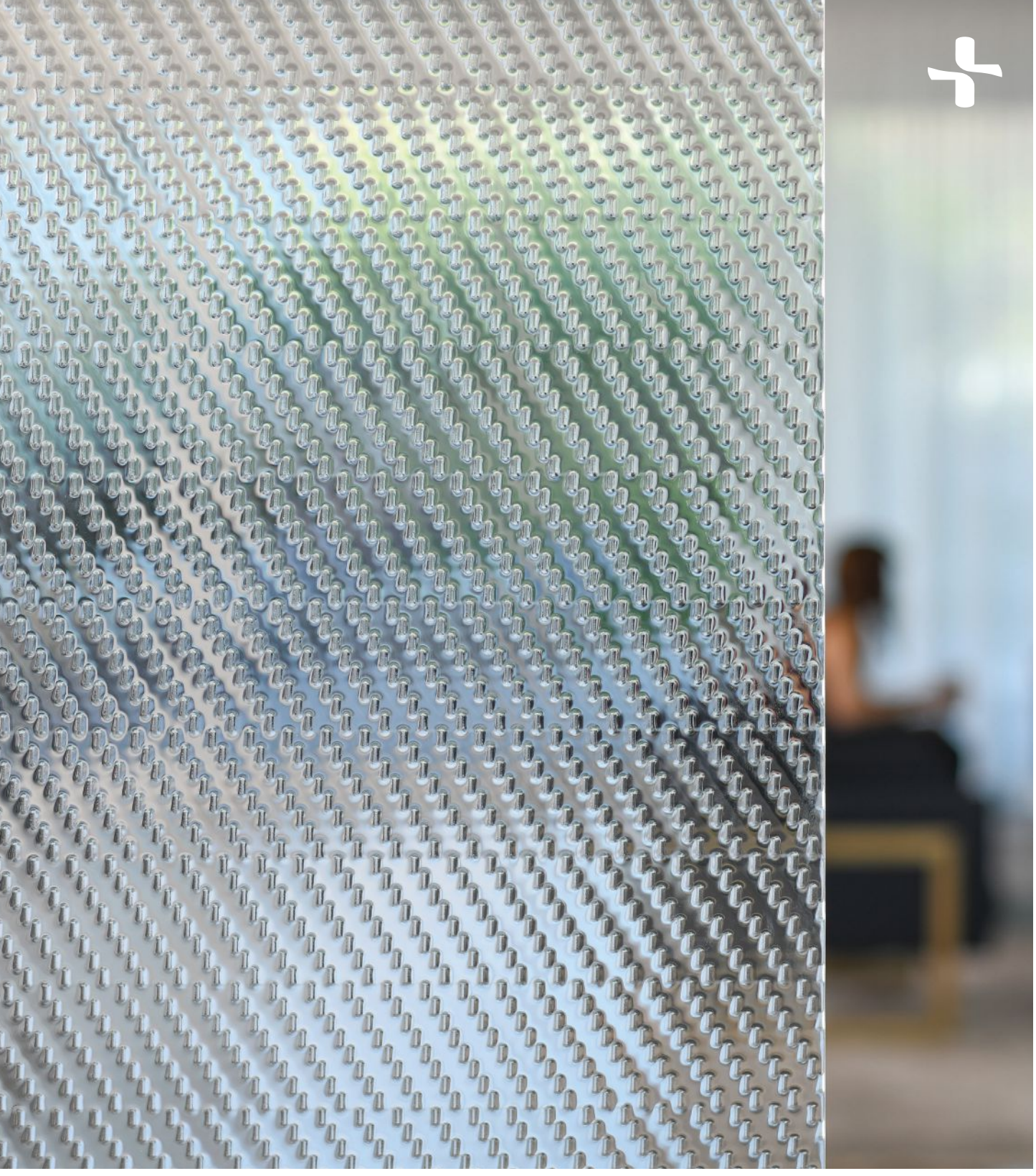

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Best Practices: When to Hire a CTO

TEXT BY JEFF LINK

Digital design and fabrication have been transforming architecture for some time now. To keep apace, large and midsize firms can consider adding a chief technology officer (CTO) to the team. Here, several CTOs relay how their work and expertise have benefited their respective firms.

Consider Your Goals

For CannonDesign, the need for a CTO became clear in 2016 when the 24-office firm opened a private data center outside Chicago for additional digital file storage and computing power. Soon after, the practice hired Hilda Espinal, AIA, to guide its digital design and technology strategies. "Technology [isn't] something you [can] live without or ignore these days," she says.

While some firms may have a chief information officer to manage IT infrastructure, CTOs have a more strategic role that is focused on company-wide innovation. The position requires a deep knowledge of not only computational tools and workflows but also of architectural practice and market trends. "You have to be intimately knowledgeable of the profession and technology so that you can marry these strategically," Espinal says.

Embrace New Perspectives

Finding an individual with a forward-thinking, bird's-eye approach to integrating design and technology is key to leveraging a CTO's full potential. Cory Brugger, ASSOC. AIA, who began as CTO at HKS's Los Angeles office in February, says his enterprise-level role—meaning it joins those who are responsible for internal workplace management—comes with its share of day-to-day tasks. The bulk of his work, however, centers on reconceptualizing the role of technology within the firm.

Citing the 2016 McKinsey & Co. report "Imagining Construction's Digital Future," which names the construction industry as among the least digitized of 22 market sectors—just ahead of agriculture and hunting—Brugger notes that architecture has much to learn from healthcare, transportation, hospitality, education, and other fields further along the digital transformation curve.

In that regard, one of Espinal's responsibilities is to forecast how emerging technologies might alter the size, arrangement, and use of physical facilities for CannonDesign's clients. When she recently accompanied CEO Brad Lukanic, AIA, on a pitch to a prospective healthcare client, Espinal proposed limiting the size of some patient rooms in anticipation of the predicted industry-wide transition to automated health screenings—an idea that helped the firm win the project.

Diversify Your Offerings

As advanced building models and visualizations become integral to winning business, CTOs can help firms expand their services to stay competitive in an evolving marketplace. Shiva Rajaraman, WeWork's New York–based chief product officer—the company's equivalent of a CTO—exemplifies how a CTO may redirect a firm to expand its business model.

Since arriving in August 2017, Rajaraman has helped build the roughly 600-person technology division that now actively uses insights from WeWork's proprietary occupancy-monitoring system as the basis for automated floor templates and iterative design decisions. He is working to leverage the value of such insights by incorporating them into the suite of design and real estate services that WeWork offers under the name Powered by We. With this program, the company is redesigning the offices of large organizations, such as the financial services company UBS Group—projects that conventional architecture firms might have won in the past.

> "You have to be intimately knowledgeable of the profession and technology so that you can marry these strategically."
>
> —Hilda Espinal, AIA, CTO, CannonDesign

"Every small thing matters when you're talking about scale, and when people will be working in spaces eight to 10 hours a day," Rajaraman says. "I'd love to have as much fluidity with bricks as pixels."

> *For more on the role and benefits of bringing on a CTO, visit bit.ly/ARCTOs.*

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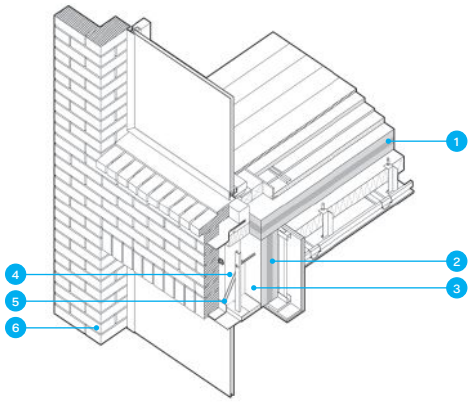
Detail:
Dalston Works Building Envelope

TEXT BY TIMOTHY A. SCHULER

The 155,000-square-foot Dalston Works in London is the largest CLT building in the world, but passersby would never know. Comprising five- to 10-story-tall volumes, the mixed-use project is clad entirely in brick. "It's counterintuitive to clad a lightweight building in heavy stuff," acknowledges project architect Dave Lomax, a senior associate at the local firm Waugh Thistleton Architects. But normalizing mass timber construction is a priority for the firm. "We don't think that sustainable buildings always have to ... have a whirligig on top that spins in the wind," he says. "We want to develop beautiful architecture that shows no sign that it's sustainable."

Except for a concrete podium, the structure is CLT, from the floors to the walls to the elevator cores. As a result, Dalston Works weighs just one-fifth of its hypothetical concrete counterpart, enabling developer Regal London to increase the number of housing units by 25 percent. "In real hard pounds and pence, if you have 25 percent more homes to sell, that's going to win the debate for our clients," Lomax says. "And that means we get our narrative: taking carbon and locking it away in our buildings." Copenhagen-based structural engineering firm Ramboll—which, along with B&K Structures in Derby, England, helped design the timber skeleton—estimates that Dalston Works sequesters 2,866 tons of carbon dioxide in its 136,000 cubic feet of CLT.

The spruce CLT wall panels range from 4 to 5.5 inches thick while floor slabs range from 4 to nearly 8 inches thick. For residential units' interior walls and ceilings, a layer of plasterboard provides fire protection while office walls are exposed wood. On the exterior, the CLT is protected by a vapor barrier, a 4.3-inch layer of foil-faced rigid insulation, and the brick façade, which attaches via stainless steel masonry support angles developed specifically for CLT. "It's not the most exciting bit," Lomax says, "but for us to be able to go specify things off-the-shelf that work with CLT just shows how the industry has matured."



1. CLT floor panel, 4" to 8" thick
2. CLT wall panel, 4" to 5.5" thick
3. Vapor barrier (not depicted)
4. Foil-faced rigid insulation, 4.3" thick
5. 3.5"-deep masonry angle attached to 10"-tall by 5.6"-deep steel shoe
6. Brick

DANIEL SHEARING

> *To read more about the design and fabrication process of Dalston Works, visit bit.ly/ARDWorks.*

The curving form of One North was inspired by the owner's trip to Barcelona, Spain and observing the works of renowned architect Antoni Gaudi. "We achieved the curving nature of the buildings in two ways," says project architect Kevin Valk. "In places where we could create curves that were good for the building and the tenants, we did that. The public facing side, we have these apertures that curve, but off a fairly square wall. The apertures were prebuilt." Courtesy of Holst Architecture | Photo: Andrew Pogue

WOOD: MARKETPLACE DIFFERENTIATOR, ENVIRONMENTAL PACESETTER

The timeline for **One North** starts with a question: Can you build an exceptionally sustainable office center at market rate? This $28.4 million, 85,540 SF Portland, Ore. office center replies with a resounding yes.

The East and West buildings of One North in North Portland's Williams District have a secret.

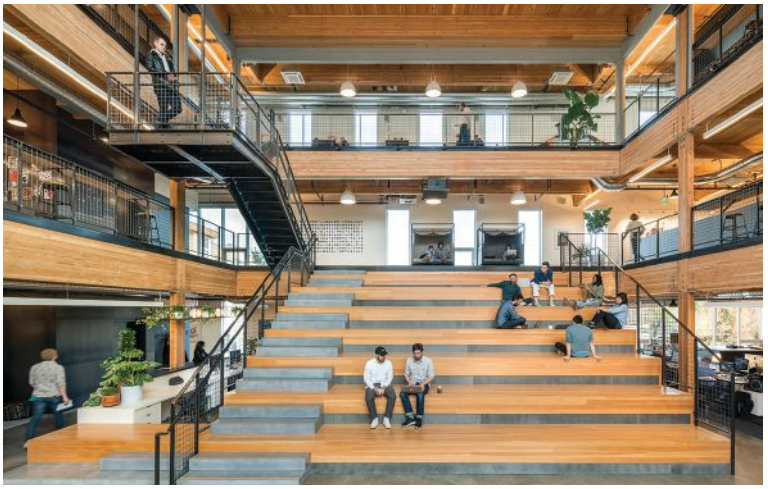
Beyond the curvaceous, sinewy cedar-clad form and distinctive cantilevered-massing, the office buildings operate at a fraction of the cost of other Class A Portland office properties. In fact, each One North structure uses less than half the energy of a typical office building. This perpetual energy dividend was achieved in a way "… that's realistic, affordable, and replicable," according to project architect Kevin Valk.

Valk is a principal at Portland-based Holst Architecture. The One North owner challenged Valk and his team to prove that a sustainable, Class A office center could be constructed on a market-rate basis.

Hybrid Building System

"Both structures are a glulam post and beam system. The floor is tongue and groove mass timber sealed by a 2-1/2 inch concrete slab. On the floor underside reveals exposed wood decking and glulam. The exterior wall is typical light construction using 2x6-inch studs with plywood shear walls. The only thing that isn't wood is the ground floor concrete podium," explains Valk. The five-story West building is a Type III-B structure; the East building is Type V-B.

Not surprisingly, wood construction played the starring role. In addition to its significant cost advantages, wood addresses the owner's sustainability and operational directives: Wood is renewable and has good insulating characteristics.



Courtesy of Holst Architecture | Photo: Andrew Pogue

Good Neighbor

The siding is primarily Western Red Cedar with stucco elements. All the cedar was locally sourced. Both structures have sprinkler systems and "had no issues" meeting code according to Valk.

One North not only respects the environment, but also the neighborhood as well. The most prominent example of that is the 14,000 square foot central courtyard. Local residents are welcome to use the space as a public gathering place. For a neighborhood experiencing rapid redevelopment, the courtyard is a tranquil island of community calm.

Leased-Up

The business performance of One North is especially gratifying. As office space, One North stands apart: It is the only Class A office building in the neighborhood and lays claim as Portland's only new-construction, all-timber office center. Wood construction effortlessly differentiates One North in a crowded Class A office marketplace. Today, One North is fully leased.

"The availability of wood, the beauty of it, and understanding what it provides for warmth, texture, color, and service as both a finishing and structural material is unique," says Valk. "There's nothing like it."

Although the owner did not pursue LEED certification, "my guess is One North would probably exceed LEED and Passive House standards," says project architect Kevin Valk. Courtesy of Holst Architecture | Photo: Andrew Pogue

Owner: Karuna Properties II LLC
Architect: Holst Architecture
Structural Engineer: Froelich Structural Engineers
General Contractor: R&H Construction Co.
MEP/FP Engineer: McKinstry
Landscape Architect: Lango Hansen

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Next Progressives: OJT (Office of Jonathan Tate)

EDITED BY KATHARINE KEANE

Location:
New Orleans

Year founded:
2011

Firm leadership:
Jonathan Tate

Education:
B.Arch., Auburn University Rural Studio; M.Des., Harvard Graduate School of Design

Experience:
Mockbee/Coker, Buildingstudio

Firm size:
Six to eight

Mission:
Revel in complexity to make something concise and artful.


Jonathan Tate

Origin of firm name:
It's a bit ironic that the office is titled after someone who has a proclivity to self-deprecate. Short-term decisions often lead to long-term uncomfortableness. To rectify this, we currently have an internal competition to cleverly reassign the letters of the acronym.

First commission:
We had a peculiar start with a multifamily housing project in the Central City neighborhood of New Orleans. Due to a series of extenuating circumstances, the project was built halfway, and then torn down. Twice. There is a parking lot on the site now.

Favorite project:
As with children, you love them all, but differently. That said, the projects that stick around our consciousnesses are those that successfully embrace a myriad of concerns and resulted in clear, assertive solutions. We've tended to hit the mark with our housing in New Orleans. Something about the neighborhood context there enables and highlights newness while connecting to a historic lineage.

Second favorite project:
All the other ones. We feel privileged to be able to say that, actually.

Memorable learning experience:
Taking on the role of developer *and* architect for our Starter Home projects has taught us to make our own opportunities. When nobody came asking for us to do what we were talking about, we had to move out of the realm of abstract and into something real in order to prove it. Some of our more fruitful projects have been realized through alternative and uncommon development and funding processes that we have initiated.

Biggest challenge in running a successful practice:
Generating a fresh playlist that accurately anticipates and responds to the office mood and speed every day.

Special item in your studio space:
Our family of ferns—nothing like plants to make a space feel like home.

Design aggravation:
Schluter brushed-chrome trim

Design tool of choice:
3D printer. There is nothing more gratifying than having a computer model come to life as a colorful plastic piece.

The best advice you have ever gotten:
There is always time for lunch.

Skills to master:
Instagram

Vice:
French Truck Coffee and chocolate-covered espresso beans. Basically, caffeine in liquid and solid forms.

COURTESY OJT

> *To learn more about OJT and its work, visit bit.ly/AROfficeJT.*

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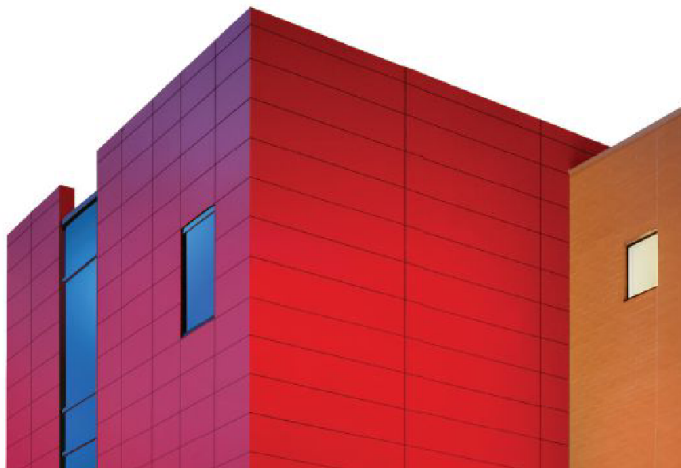

Next Progressives:
OJT (Office of Jonathan Tate)

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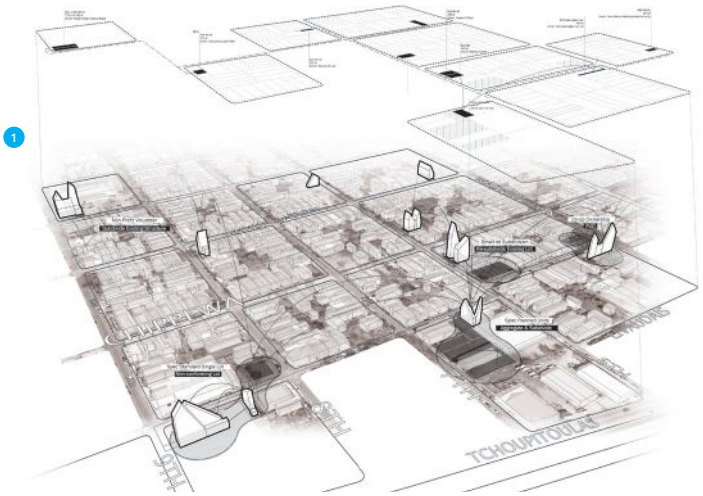

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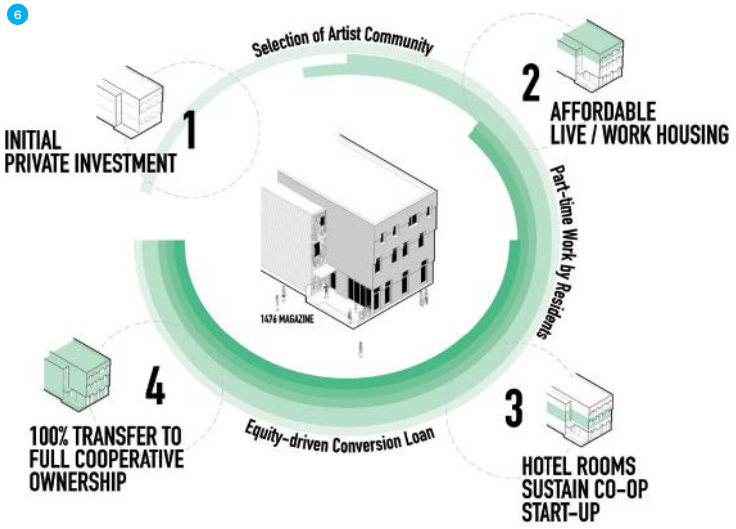
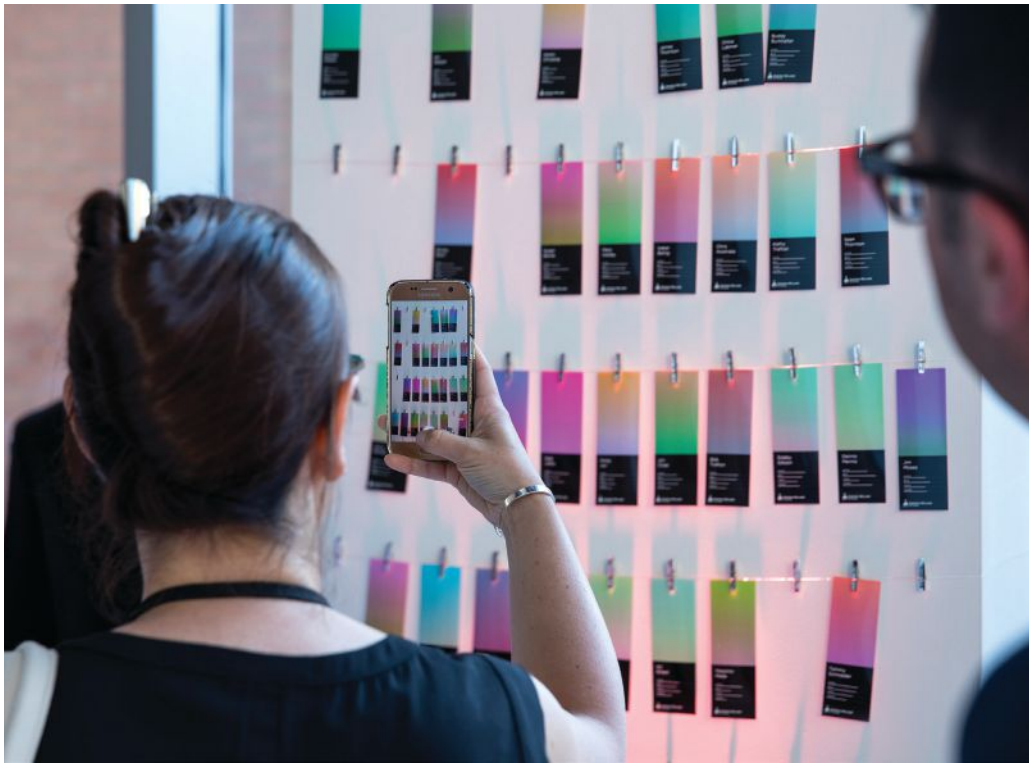
1, 4, 5, 6, 7: COURTESY OJT; 2, 3: WILL CROCKER



1. OJT's Starter Home research proposes reconceptualizing the thousands of empty and irregularly shaped lots in New Orleans to be viable for development by "embracing fluidity" of residential design, structural orientation, layout, and square footage. 2. The firm built a new single-family residence on a site occupied by an existing house to accommodate three generations of a family. Fit together like puzzle pieces, the two buildings share outdoor space but allow for private circulation. 3. A 2018 AIA Housing Award winner, this single-family structure in New Orleans was the first test site for OJT's Starter Home thesis. 4. An idea derived from the Starter Home research, the speculative 9th Street development project replaces an existing warehouse and vacant parcel with 10 single-family residences and one two-family structure. 5. In their *Wetland Urbanism* (Miscellaneous Tactics, 2015) research book, co-editors Tate, Rebecca Fitzgerald, and Ann Yoachim explore the "paradoxical struggle" of accommodating resource extraction industries in Southeastern Louisiana while prioritizing the natural environment. 6. OJT designed an 8,000-square-foot artist-owned and -run bed-and-breakfast for a vacant lot in New Orleans' Lower Garden District. Funded initially by a crowdsourced investment of $112,000, the structure will be owned by a co-op of artists who will operate the nine hotel rooms part-time in exchange for residing in one of the building's four affordable housing units. 7. This Housing Northwest Arkansas Competition submission proposes reorienting a conventional mid-rise, mixed-use block into a zigzag to address the shortage of affordable housing in Bentonville, Ark.

THINKING IN COLOR EVENT GETS INTO ARCHITECTS' HEADS

The first-ever immersive color experience uses the latest technology to translate brainwaves into color



Architects like Bill DuBois spend a lot of time thinking about—even obsessing about—color.

"Color, to me, means emotion. It evokes a feeling that we are not always conscious of," says DuBois construction specifier/architect at Gensler, an integrated architecture, design, planning and consulting firm. "It can have a very big impact on the space."

But what would happen if DuBois and other architects could actually see what it's like to think in color?

That was the tantalizing question Sherwin-Williams Coil Coatings set out to answer with its exclusive Thinking in Color event during the New York City AIA Conference on Architecture this summer.

Passionate about color themselves, the people at Sherwin-Williams wanted to demonstrate that it's truly possible to create anything architects can dream up. "We share an obsession with architects as it relates to color," says Mike Bourdeau, President of Sherwin-Williams Coil Coatings.

So Bourdeau and his team worked with Los Angeles-based technology and design company Incite to develop EEG-translation technology specifically for the Thinking in Color event. The immersive experience put the color obsession on display for architects. At the event, architects simply put on a brainwave-sensing headband that translated their thoughts into color—and then watched in amazement as those color were displayed on a larger-than-life, 17-foot high video wall. After the 45-second experience, each architect walked away with a swatch showing a gradient of the hues their mind created including the two most common colors.

"I have never seen anything like this before," remarked Aaron Christine, national sales manager, architectural specification for OmniMax International, after experiencing the Thinking in Color event. "It inspires me to be creative."

Sparking architects' wonder and artistry is exactly what the folks at Sherwin-Williams were hoping to do. "Color is one of the most important elements of design," says Isabel Bartig, Sherwin-Williams Marketing Communication Specialist. "We wanted to give architects the opportunity to experience color in a completely different way."

Along with showing architects what it means to Think in Color, the event was also a powerful representation of how color shifts and evolves depending on the moment and the person—and just how creative architects can be when it comes to finding that perfect color.

"Allowing architects to see their minds create color affords a personal connection with those hues, further driving new ideas and possibilities," says Jeff Alexander, Vice President of Sales for Sherwin-Williams Coil Coatings. "Architects have specific colors in mind that are integral to their designs. We have the meticulous drive to bring their visions to life by creating those exact hues. Our goal is to inspire creativity by bringing out what's inside of them."

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

Photography ©Jeffrey Jacobs

Products: Metal Fittings and Finishes

TEXT BY AYDA AYOUBI

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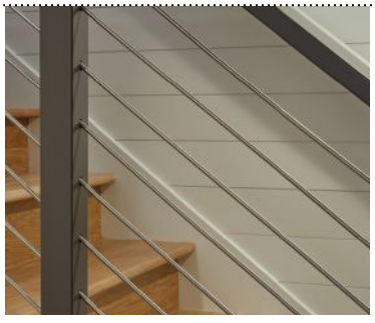

Stainless Rod Railing, Viewrail
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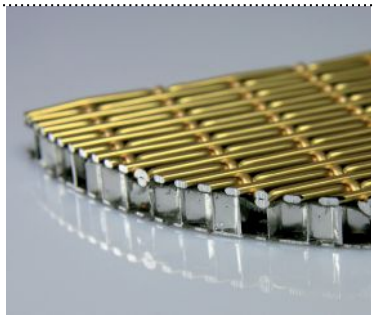

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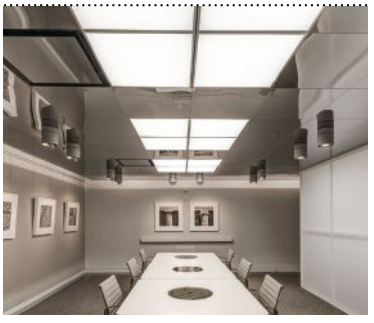

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Experience. Innovation.


Photo: Ryan Leasure

Smoke Vents Ensure Safety for Rebuilt Cold Storage Business

A ferocious fire in August 2016 destroyed the Columbus, Ohio facility of Dick Cold Storage, which had served the region for nearly 100 years. More than 400 firefighters tackled the blaze at the 144,000-square-foot warehouse, and their task was complicated by the facilities' contents and lack of smoke vents.

"Buildings that do not lend themselves to ventilation, such as cold storage buildings, are especially dangerous to firefighters. If there is no known life-safety issue, firefighters will retreat to a defensive position and fight the fire from outside the building instead of going inside," said Steve Martin, Battalion Chief for the Columbus Fire Department. "Two of the biggest challenges we face in fighting any fire are heat and smoke. The heat of the fire radiates on everything surrounding it, causing the flames to spread and causing rapid degradation of structural elements."

In June 2018, the business unveiled a reconstructed facility with 50-foot ceilings for expanded vertical storage, six million cubic feet of storage space, 15,000 pallet positions and seven multi-temperature storage rooms. The new facility for Dick Cold Storage incorporates the latest in cold storage technology and the capacity to serve a 550-mile radius, covering a population of more than 138 million people.

The new building also has additional fire protection safeguards, such as horns and strobes, pull stations at doors, linear heat detection in freezers, and 18 automatic smoke vents manufactured by The BILCO Company.

"Additional fire protection was one of the elements that we wanted to have in the new building," Dick Cold Storage CEO Don Dick said. "We don't have sprinklers, but we have a lot of other measures for fire protection throughout the building."

Tippmann Innovation worked alongside Spohn Associates to use quad leaf design vents from BILCO. The vents include BILCO's patented Thermolatch® II positive hold/release mechanism to ensure reliable operation when a fire occurs. The latch automatically releases the vent covers upon the melting of a 165°F (74°C) fusible link and can be supplied for smoke detector or fire alarm activation. Gas spring operators are designed to open the covers against snow and wind loads and include integral dampers to assure that the covers open at a controlled rate of speed.

"Vents allow for the removal of heat and smoke and potentially slow the spread of fire," Martin said. "They will also permit firefighters to see and enter the building, to possibly extinguish the fire early, preventing the entire building from becoming a loss."


Photo: Walker Evans, Columbus Underground


Photo: Ryan Leasure

Roofing components were selected carefully for the new Dick Cold Storage building. Roofing at cold storage facilities is especially critical, because Improperly installed or inefficient materials could lead to excess moisture that can create bacterial growth. Other side effects could include structural damage from ice buildup on walls and slabs, higher utility costs, safety issues for workers and equipment that may require more maintenance or not reach its expected lifespan.

The most critical feature was constructing a vapor-tight and energy efficient roof system. Tippmann used a single-ply roofing system with 45-mil and 60-mil TPO, which serve as vapor barriers. Single-ply systems also minimize air leaks.

Dick Cold Storage made a huge financial investment in its new facility, and Tippmann Innovation paid close attention to the construction materials, especially the roofing. With a new building that can better withstand the potential of product and facility loss that can be caused by fire, the business heads into its second century ready to serve its expansive base of clients.

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Opinion: You Might Think You Know Me

TEXT BY A.L. HU, ASSOC. AIA

Relying on the trope of the stable gender binary—men versus women—is inadequate to characterize the pervasiveness of sexual harassment that occurs in architecture. Missing from many conversations is the existence—and persistence—of men who harass other men, women who harass men, and any mention of transgender, nonbinary, intersex, and other gender-nonconforming people.

Only after we've let go of the gender binary can we begin to come to terms with the underlying, rotting ideologies of inequality—sexism, misogyny, racism, and classism, to name a few—that have been normalized in offices and studios for far too long.

Intersectionality—a theory by renowned civil rights expert and law professor Kimberlé Crenshaw that social categorizations such as race, class, and gender interconnect and create overlapping and interdependent systems of disadvantage—is a fundamental framework for rethinking and redesigning power structures after #MeToo. Sexually harassing a woman of color is not merely a tool of patriarchal control, but also a tool of racism. Likewise, conversations on sexual harassment that assume interactions are between cisgender men and women not only uphold the gender binary as a harmful social construct, but also erase the experiences of transgender, nonbinary, and intersex people.

A profession that truly recognizes the intersectional nature of oppression and takes measures to mitigate inequality is one that can conceivably—and finally—level the playing field.

As an example, I am an Asian-American Millennial whose gender is nonbinary. Intersect the biases associated with each of these three identities and you can begin to see how the layers of race, gender, and age play out in my everyday life. Professors interpreting my passion as anger and aggression have penalized me because Asian people aren't expected to speak out or argue for their own ideas. People have dismissed my nonbinary gender as a trend or a fashion statement rather than as an essential expression and part of who I am, often refusing to acknowledge my identity or engage with me. During lunch and learns, some vendors avoid making eye contact and discount my questions because someone of my age *probably* doesn't make any *real* decisions about design.

These individual experiences of discrimination collectively take their toll. While others have the agency to assert their design decisions and promote their capabilities—and thus, themselves—I can't help but worry whether attaining acceptance and success in the field will require me to follow all of the "rules" ascribed to my perceived gender and race—that is, to stay in my "place." This implicit pressure to deny and erase my identities further destabilizes my self-esteem and makes me susceptible to abuses of power.

Some will claim that identity politics have nothing to do with architecture, that architecture is apolitical. But consciously choosing to avoid politics and turning a blind eye to our differences is itself a political act. Architects need to recognize their role and responsibility in reconstructing the profession anew. Answer these questions honestly:

What stereotypes about power do I believe when it comes to men, women, and other genders?

Have I made assumptions about someone's work ethic, personality, or politics based on what I perceived to be their age, gender, race, or class?

Do I listen to students, reports, consultants, and clients with the intent to understand, or to critique?

What would a conversation about inclusion beyond binaries—man/woman, supervisor/worker, professor/student—look like?

Those in leadership positions need to hold their peers accountable, as tough and as uncomfortable as it might be to start that conversation. Change will require an ongoing process of learning to unlearn and then relearning to rebuild, together.

A.L. Hu, ASSOC. AIA, is an architectural designer at Solomonoff Architecture Studio in New York and an activist working to improve the profession of architecture.

> *To read more opinion pieces by thought leaders in the design community, visit bit.ly/AROpinion.*

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Technology: The Difficulty of Building Carbon12

TEXT BY BRIAN LIBBY

The future of architecture and high-rise construction lies in wood, if you ask Portland, Ore., developer and architect Ben Kaiser. "To make an impact around environmentally conscious construction," he says, "you have to start with the big idea." Then, he continues, you have to win over lenders, public officials, and other stakeholders.

Kaiser's big idea centers on mass timber and, in particular, cross-laminated timber (CLT). CLT makes up the structure of Carbon12, an eight-story condominium tower completed in January and designed and developed by Kaiser's firms Path Architecture and Kaiser Group, respectively. "It's such a dramatic improvement on the carbon footprint created by steel and concrete," he says of the engineered wood product.

First used in Europe, CLT comprises layers of lumber boards stacked crosswise at alternating 90-degree angles and adhered together. It forms the floors and structural components of Carbon12, which, at 85 feet tall, rises well above the former 65-foot height threshold for timber-framed structures allowed in local codes. (These regulations have since been updated.)

As such, well before construction could even begin, the condominium tower faced a series of regulatory and financial hurdles.

Code Restrictions

In the past, Portland's building code restricted wood-framed buildings to six stories. "Wood has historically been very limited in what you can build, and how high you can go because of fire concerns," says Amit Kumar, a senior structural engineer with the city's Bureau of Development Services.

In 2015, the American Wood Council introduced four new standards for mass timber framing that were adopted in that year's International Building Code. Kaiser, whose companies had previously built the five-story, mass timber Radiator building, also in Portland, says he "went into the project overly optimistic, as we have to do as developers," thinking the local code would be updated in time for Carbon12 to be built.

That both did and did not happen. A stroke of luck in the form of a state-based workaround enabled Carbon12 to be constructed ahead of new codes being implemented in Portland. The city had been prepared to approve a wood building exceeding 65 feet tall if the owner agreed to an outside design review; Kaiser believed the estimated $400,000 to $600,000 fee for this service was too costly. But in a lucky break, Oregon issued a Statewide Alternate Method (SAM) directive in 2015 allowing tall CLT timber buildings to be built immediately—just in time for the team to break ground in July 2016.

Meanwhile, Kaiser, unaware of the coming workaround, had chosen CLT for Carbon12's building structure for the express purpose of expediting approvals, knowing the material had higher fire safety ratings and charring capabilities than other wood products. Gov. Kate Brown, whose office approved the SAM implementation, even attended Carbon12's topping-out ceremony.

Building codes have continued to evolve since Carbon12's completion.

Carbon12 features retail space, 14 residential units, and underground parking.

ANDREW POGUE

In April, an International Code Council committee recommended allowing the construction of mass timber structures (including nail-laminated timber, glue-laminated timber, and structural composite lumber) of up to 18 stories.

> *To learn more about Carbon12, visit bit.ly/ARCarbon12.*

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Technology: The Difficulty of Building Carbon12

In August, the state of Oregon issued an addendum to its SAM directive, removing the six-story limit and allowing mass timber buildings up to 85 feet.

"If we went to the City of Portland today with a project similar to Carbon12, there would be very few hurdles, if any, to overcome," Kaiser says. "Everyone has realized that the term 'wood structure' needs to be reimagined as something far different than it once was. These products, when correctly manufactured and installed, act more like concrete than the wood we're accustomed to."

Financing Demands

Kaiser knew he wanted condominiums—of which there are 14 in the building, starting at $712,000 for 1,810 square feet and going up to $1.35 million for 2,200 square feet—because they provided "the only development model that could absorb the increased upfront costs" associated with CLT. But he hedged his bet with two commercial tenants on the ground floor at 1,375 square feet each.

The first bank Kaiser approached to finance Carbon12's construction, a large national lender, declined to issue a loan because comparable examples of wood-framed buildings at its height did not exist. So the developer-architect turned to local lender Pacific Continental Bank, and, more specifically, its now-retired executive vice president and director of commercial real estate, Charlotte Boxer. "I had a reputation for financing buildings other banks wouldn't finance," Boxer says, including "atypical buildings in emerging areas." Knowing that Carbon12 offered condos on the quickly gentrifying Williams Avenue with its wide bike lanes, organic grocers, and host of trendy, pedestrian-friendly restaurants, Boxer decided to fund the project.

When seeking financing for cutting-edge projects such as Carbon12, Boxer adds, one should "find a lender that believes in the developer and the architect, is willing to listen and to research, and willing to present it to the credit committee as a positive opportunity. … I had to do a lot of research about other CLT buildings across the United States." She also notes the architect and developer have to have relevant experience. Given Kaiser's portfolio of local development and design projects completed over a decade, he fit the bill.

Each state and authority having jurisdiction follows different regulations and codes, and not all lenders will see mass timber high-rises as the future. But Kaiser believes there's no going back. "People have come from around the world to tour this building," he says. "Had I used concrete or steel, no one would have visited. People understand that [tall timber] has the potential to significantly impact climate change. It feels exciting."

The condo interiors feature exposed Douglas fir columns, beams, and ceilings.

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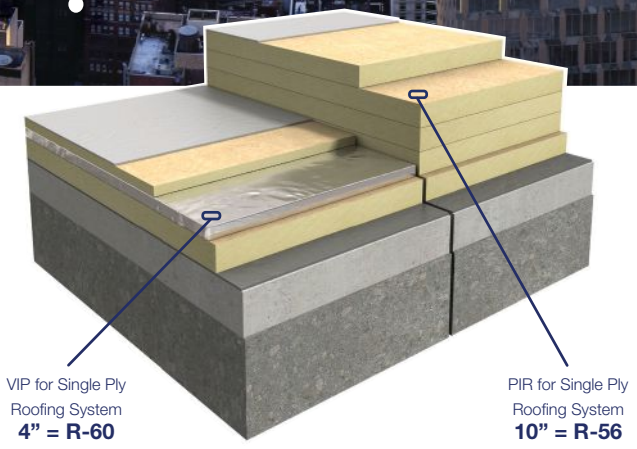

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Architectural Lighting: Design Opportunities with OLEDs

TEXT BY ELIZABETH DONOFF

LEDs and OLEDs are often grouped together in industry discussions, but while the former has taken ahold of—and transformed—the lighting sector, the latter has followed a more gradual trajectory of development and adoption. Performance, life span, and cost have set the two lighting sources apart, but recent advances in OLED panel technology accompanied by successful field-testing have narrowed the gap.

The Basics

OLEDs, or organic light-emitting diodes, share a portion of their name with LEDs but that is where the similarities end. LEDs use two electrodes—a cathode and an anode—to produce and emit light and can be configured in linear or circular arrays as a component directly within the luminaire assembly. OLEDs sandwich organic compounds between the cathode and anode, which are then applied to a substrate that typically is rigid, such as glass. In recent years, OLED manufacturers have explored other substrates such as plastic, which enable flexible and curved OLED panels, as well as larger panel sizes and shapes beyond the conventional 2-inch-square or 4-inch-square format.

Early Future by Ingo Maurer

COURTESY INGO MAURER

Perhaps the most important distinction between LEDs and OLEDs is the type of light they produce. LEDs are direct point sources that offer tight and focused beam control. OLEDs, in contrast, are a thin, planar, diffuse, and glare-free source, and are well suited for ambient lighting or backlighting applications such as signage.

One factor that affects industry adoption of any light source is its performance and, more specifically, its efficacy, or how many lumens are output for every watt a source consumes. As of the U.S. Department of Energy's (DOE) October 2016 OLED Stakeholder Meeting Report, the efficacy of OLED panels ranged from 40 to 50 lumens per watt (lm/W), compared to the measured 98 lm/W of commercial LED luminaires in product testing for the DOE's LED Lighting Facts 5 database. Today, OLED panels can output 85 lm/W.

With these technical advancements come an unprecedented opportunity to challenge conventional luminaire form factors. Still, the lighting industry's mindset remains a lingering challenge. Because the performance of first- and second-generation OLED panels could not compete with that of LEDs, designers considered OLEDs more suited for specialty installations and one-off decorative designs. One of the first OLED-only light fixtures was Ingo Maurer's Early Future task lamp, which featured 10 5.2-inch by 1.3-inch OLED panels on a glass substrate.

Designed in 2008 and manufactured by Osram Opto Semiconductors, the Early Future task lamp was mostly an experimental exercise, as the cost of OLED panels at the time were prohibitively expensive. "The design community has a preconceived idea of what OLED is about and what it can do," says Jeannine Wang, the San Francisco–based director of design partnership for Acuity Brands Lighting's Custom Architectural Lighting Solutions (CALS) Group, which is tasked with developing OLED luminaires for the commercial marketplace.

Advancing OLEDs

OLED panel manufacturers are not alone in driving the technology's adoption. Luminaire manufacturers have a vested interest, motivated by the source's quality of light and potential for new form factors and applications. OLEDWorks is another company, along with Acuity, that is seeking to advance the technology and educate lighting professionals about OLEDs.

Headquartered in Rochester, N.Y., OLEDWorks is the only OLED panel manufacturer based in the United

> *For more coverage on OLEDs, visit archlighting.com.*

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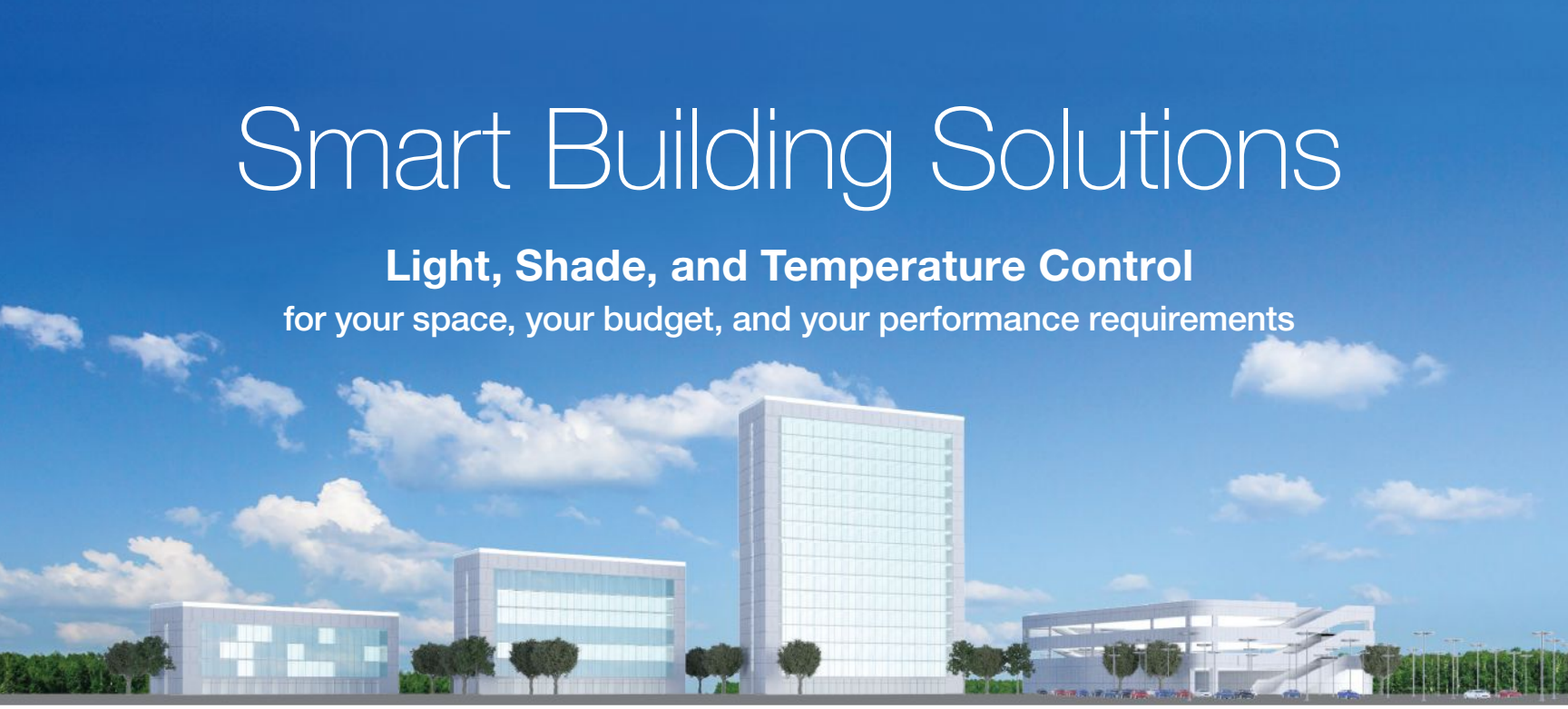

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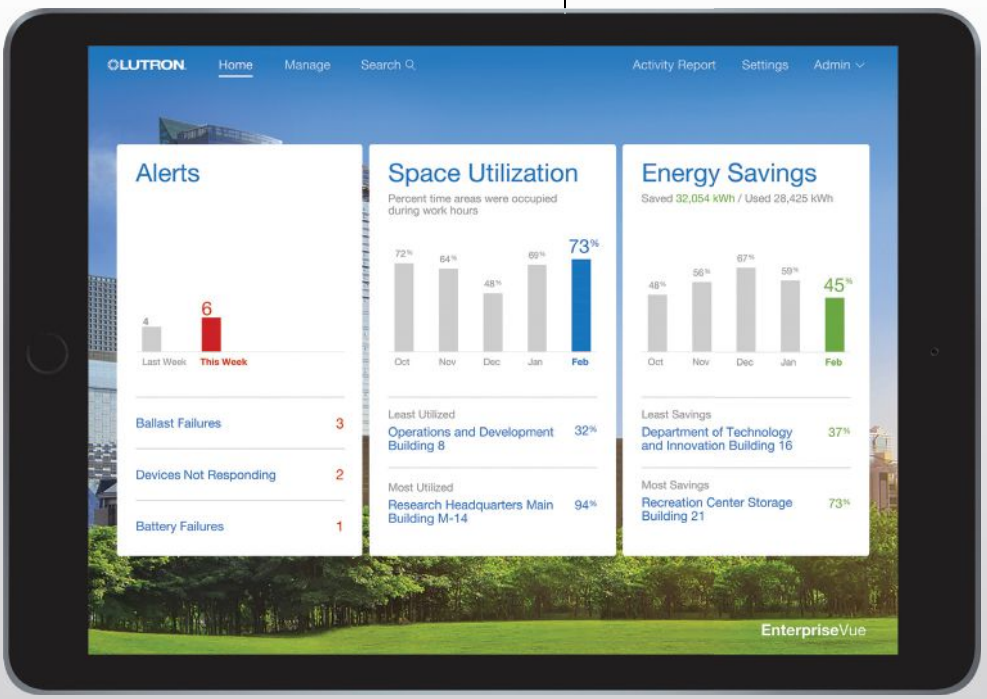

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States. The company acquired Philips' Lumiblade OLED technology platform and business unit in 2015 and maintains offices in Aachen, Germany, where the Lumiblade technology originated. OLEDWorks has developed three generations of OLED panels, all with increasingly greater efficacies and life spans, which in turn have helped to reduce OLEDs' overall cost.

The latest generation, Brite 3, released earlier this year, introduces a round shape to the existing square and rectangular OLED panels, in direct response to specifiers' request. The round OLED can deliver up to 200 lumens and 75 lm/W, acceptable for functional lighting applications, while the square and rectangular panels can deliver up to 300 lumens and 85 lm/W. All panel shapes offer two color temperatures—3000K (warm-white) and 4000K (neutral-white)—and a color rendering index of 90-plus.

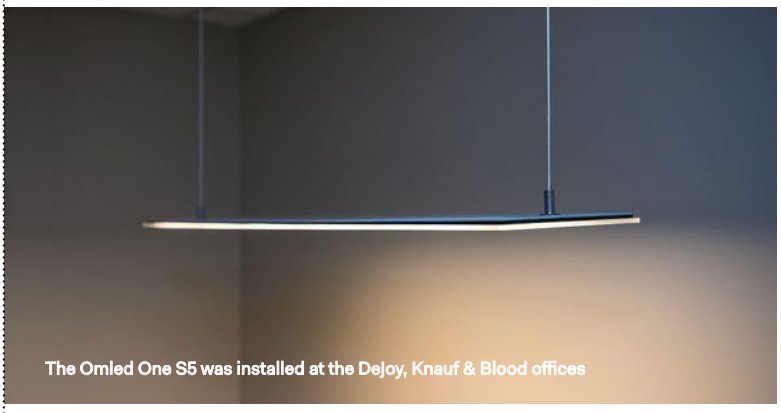
OLEDWorks' customers "love the light quality" of its latest OLED family, says Gina Phelan, the company's director of business development. Coupled with the higher efficacy and life span approaching 100,000 hours, it makes OLEDs an enticing option for the illumination of architectural spaces, despite their still-higher cost over LEDs.

Also included in the company's Brite 3 family is Curve, one of the first bendable OLED panels to hit the commercial market. (LG Display also makes a bendable OLED panel.) Produced on 0.1-millimeter-thick Corning Willow glass, Curve's total thickness is approximately 0.5 millimeter, making it among the thinnest products available to date.

Acuity has also prototyped several OLED luminaires and hybrid OLED–LED luminaires that have now entered the company's brand portfolios. With products that include the ceiling-mounted Revel and Trilia fixtures, the Nomi wall sconce, and the Canvis pendant, Acuity hopes that specifiers will recognize OLED luminaires as market-ready lighting solutions.

OLEDs at Work

Though the latest technical specs are promising in themselves, few things are more convincing to designers than real-world installations. Though some office spaces currently use OLED luminaires, it wasn't until the DOE's 2016–2017 Gateway program installation at the offices of DeJoy, Knauf & Blood (DKB), an accounting firm in Rochester, N.Y., co-founded by OLEDWorks chairman and co-founder David DeJoy, did the lighting industry have an installation with measured performance data and user feedback that could serve as a reference for evaluation.



The Omled One S5 was installed at the Dejoy, Knauf & Blood offices

COURTESY OLEDWORKS

The overall project is notable for a few reasons. First, it incorporates several OLED fixture types—tasklighting and decorative accents—throughout the office, including several from Acuity Brands, to complement the workplace's primary fixtures (LEDs) and natural light. Second, the OLED luminaires were installed at "visually prominent" locations, including conference rooms and breakrooms so that employees could experience and perform activities under OLED lighting conditions.

The study included fixtures with OLEDWorks' Brite 2 panels and dedicated OLED drivers (both integral and remote) that were connected to zero-to-10V dimmers. According to the accompanying July 2017 Gateway report, none of the OLED panels or drivers failed during the nine-month test, nor did any of the panels exhibit flicker exceeding what's allowable by IEEE (the Institute of Electrical and Electronics Engineers). The study also found that all of the OLED fixtures delivered between 21 lm/W and 58 lm/W, and that luminance levels (the amount of light provided) was measured as high as 9,318 candelas per square meter and as low as 3,000 candelas per square meter when employees dimmed the fixtures. Those readings are significant because they demonstrated that the OLED fixtures provided a sufficient and comfortable amount of light to perform work without any visual discomfort.

Overall, DKB employee feedback was positive with workers noting that the OLED fixtures provided a "soft, minimal shadow lighting" that made facial expressions easy to see and recognize. They also noted that the additional ambient OLED light helped to increase the overall room brightness and was

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Architectural Lighting: Design Opportunities with OLEDs

particularly good for delivering light to vertical surfaces without glare. And, finally, participants lauded the ability and ease by which they could dim the panels.

To ensure that the ongoing study remains up to date, some of the hybrid LED/OLED fixtures first installed were replaced with newer OLED products introduced in 2017. With such positive performance data from the second generation of panels, the numbers only stand to improve with the third generation as well as future generations.

Expanding OLEDs' Design Potential

This past spring, Brooklyn, N.Y.–based studio Rich Brilliant Willing (RBW) used OLEDWorks' panels for its "Light Inflection" installation at the company's SoHo showroom. As the first foray into OLEDs for the design studio, which had until that time focused on LED fixtures, the project explored the technology's sculptural and functional potential, including five different lighting concepts and oversized sconces and pendants in S-curves and arcs of up to 12 feet long.

Because RBW wanted to emphasize "the extreme flexibility and the evenness" of OLED light, says founding partner and director of development Theo Richardson, the designers used "similarly slim, flexible components: long swaths of ⅛-inch-thick aluminum and 3D knit fabrics" in the design of the OLED luminaires. This allowed RBW to "explore simple gestures: light and shadow, flexibility, the bending of material under its own weight, and the irregularity of fabric stretched across a surface."

As a result, the work offers a design perspective that blends experimentalism with pragmatism and is not limited by the traditional processes of luminaire design. "The success of our design practice stems from embracing and adopting technological advancements, pushing the boundaries of our services and product offering," Richardson concludes.

The Outlook of OLEDs

At press time, the 20th annual OLEDs World Summit was underway in San Francisco. The greatest challenge for the OLED community will be how it charts the technology's course for growth and development beyond the automotive and display-screen markets.

To that end, OLED panel manufacturers are aware of the growing interest in architectural lighting applications. The OLED Coalition, an industry-based organization, was formed in 2013 to provide a forum for sharing technical information and market data. Members include large- and small-scale companies involved in different types of OLED panel production.

In 2009, Barry Young, now the Austin, Texas–based CEO of the OLED Association, predicted at the OLEDs World Summit that the OLED industry might be as large as $900 million by 2015. According to the OLED Association website, "In 2016, OLED displays dominated the high-end of the smartphone market and in total shipped over $15 billion U.S." What percentage of that OLED panel market is dedicated to lighting applications is unclear.

OLEDs hold great potential in architectural lighting applications and luminaire design. But if the design community is to acknowledge OLED as a viable, market-ready light-source option, it will require more lighting manufacturers to get on board. "We need all manufacturers to embrace this [technology] and get behind it so it gives confidence to the specifications market," says Ron Schimmelpfenning, vice president of Acuity's CALS group. "Designers need to see that this is real and that there are options."

"Light Inflection" installation by Rich Brilliant Willing

FEDERICA CARLET

So long as OLED panel development continues to yield increasing efficacies and, as a result, more accessible price points, then OLED lighting solutions stand a chance to compete with LEDs for certain applications. Most importantly, the lighting community needs to remember that OLEDs are a complementary technology and market to LEDs with an extraordinary ability to redefine lighting quality, form factors, and ultimately how light is integrated into architecture.

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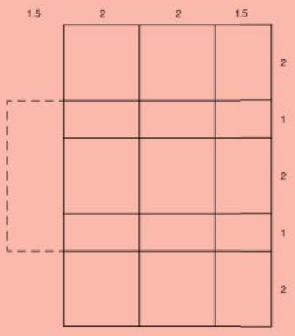

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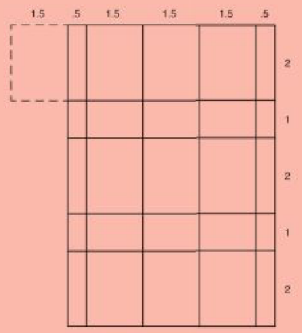

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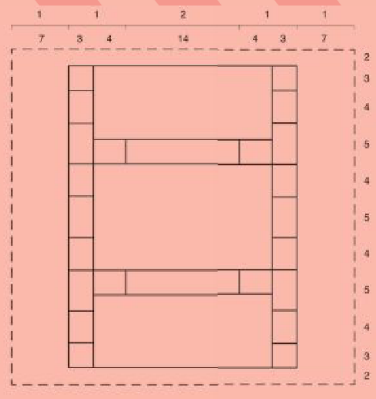

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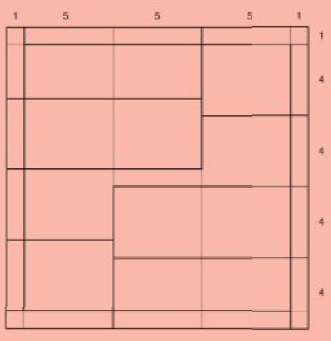

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TEXT BY EDWARD KEEGAN, AIA

Casa BLQ meets the street with a blank concrete façade floating above a band of windows at ground level, bisected by the diagonal of an articulated, enclosed stair. The 200-square-meter (about 2,200-square-foot), two-story house located in a gated community between Buenos Aires and La Plata, Argentina, was designed by local architect Luciano Kruk as a permanent residence for a couple and their two children.

"The location of the staircase in a two-story house is always key," Kruk says. The foyer and concrete stair, the defining feature of the house's south elevation, are wrapped in frosted glass—providing privacy from passersby—while the curtainwall for the remainder of the ground floor façade is transparent.

The house's seemingly taut rectangular geometry isn't quite pure: The eastern elevation is slightly inflected in plan to match the angled property line of the suburban plot.

Glass dominates the north façade (the primary source of solar heat gain in the Southern Hemisphere), with concrete brise-soleil fins on the second floor set perpendicular to the concrete volume.

The main spaces on both floors are oriented toward the backyard. The ground level's open plan encompasses kitchen, dining, and living spaces, with somewhat more private spaces for a powder room and office at the east end. An almost 2-meter (6.6-foot) overhang of the second floor on the north side protects these spaces from direct

With its brise-soleils, the glazed north façade provides views of the site's ample backyard.

DANIELA MAC ADDEN

> *Visit ARCHITECT's Project Gallery for more images of Casa BLQ: bit.ly/CasaBLQ.*

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The frosted glass in the foyer helps provide privacy.

Project Credits
Project: Casa BLQ, Nuevo Quilmes, Buenos Aires
Client: Withheld
Architect: Luciano Kruk
Project Manager: Ekaterina Künzel
Construction Manager: Pablo Magdalena
Collaborators: Andrés Conde Blanco, Belén Ferrand, Denise Andreoli, Dan Saragusti
Size: 200 square meters (approx. 2,200 square feet)
Cost: $280,000

sunlight, while covering part of the terrace as well as an outdoor cooking and eating area adjacent to the kitchen. On the upper level, a hallway parallel to the concrete stair connects three bedrooms, with bathrooms at each end. The master bedroom to the east opens onto a terrace.

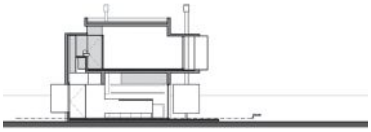
Two parallel concrete beams, 20 centimeters wide by approximately 70 centimeters tall (roughly 8 by 28 inches), run the full 15-meter (about 50-foot) length of the house. Spaced 4 meters (about 13 feet) apart, these exposed structural elements are supported both by the exterior walls and by interior partition walls. This structural layout facilitates the open plan on the ground floor, and permitted Kruk freedom in expressing the front and rear faces of the house.

The exterior composite walls consist of a 15-centimeter-thick (about 6-inch-thick) cast-in-place concrete exterior and an interior wythe of 10-centimeter-thick (about 4-inch-thick) masonry finished with painted plaster. All glazing is double pane, and a radiant-floor system provides the minimal heating required in Buenos Aires' temperate climate.

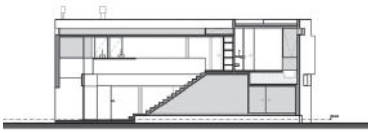
The exposed concrete was formed using 10-centimeter-wide (roughly 4-inch-wide) horizontal pine boards, and then finished with a light wash of cement and milled white marble to mask imperfections without covering what Kruk refers to as "the expressive qualities of the concrete."

While the design draws clear parallels with Le Corbusier's later work in concrete, Kruk says Ludwig Mies van der Rohe was another important inspiration in the design's "search for simplicity in the constructive and organizational solutions of the project, structural sincerity, transparency, and use of few materials."

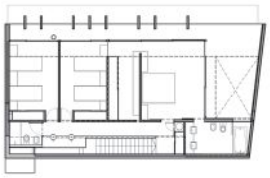
Section A–A1



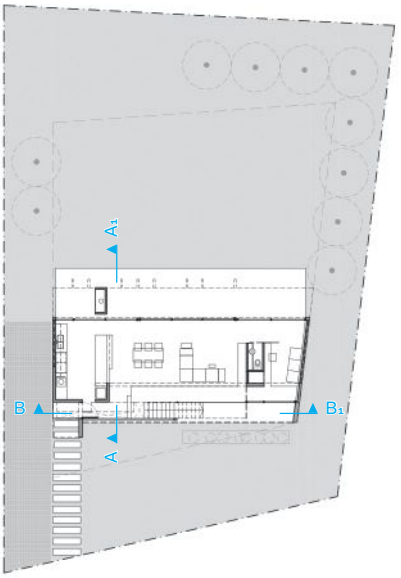
Section B–B1



Second-Floor Plan



Ground-Floor Plan



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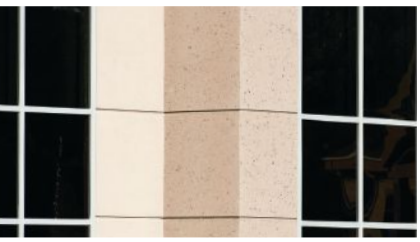

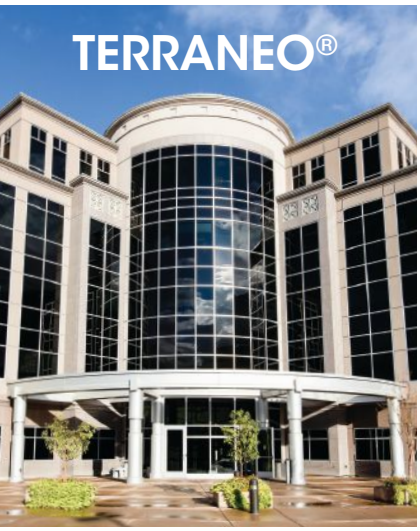

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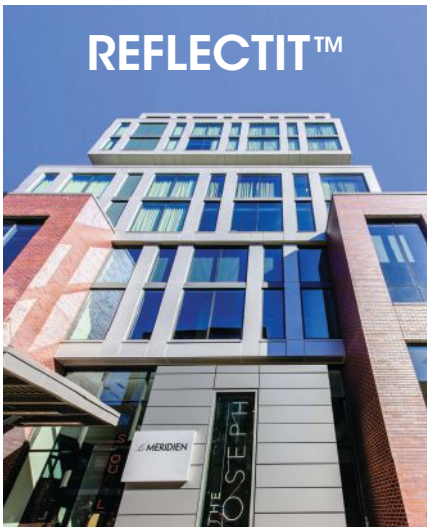

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Luciano Kruk

1. The exposed concrete stair anchors the southern edge of the open-plan first-floor living space. **2.** The house's muted color and material palettes prevail throughout the interior, as seen here in the first-floor kitchen and dining areas. **3.** Translucent glazing and landscaping in front of the south façade provides privacy from the street.

DANIELA MAC ADDEN

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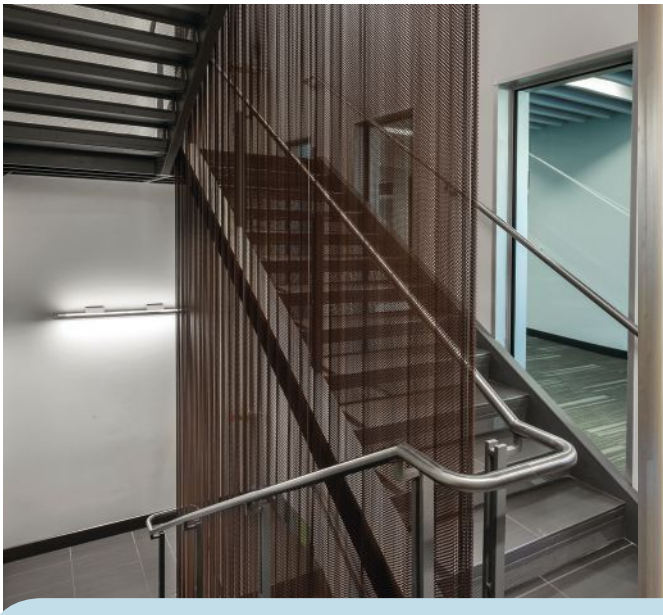

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Project: VGM Campus Expansion • Location: Waterloo, IA • Architect: INVISON Architecture

Residential:
Luciano Kruk

1. The second-floor hallway contains two sinks outside the bathroom on the west end. **2.** The master bedroom opens to a terrace.

DANIELA MAC ADDEN

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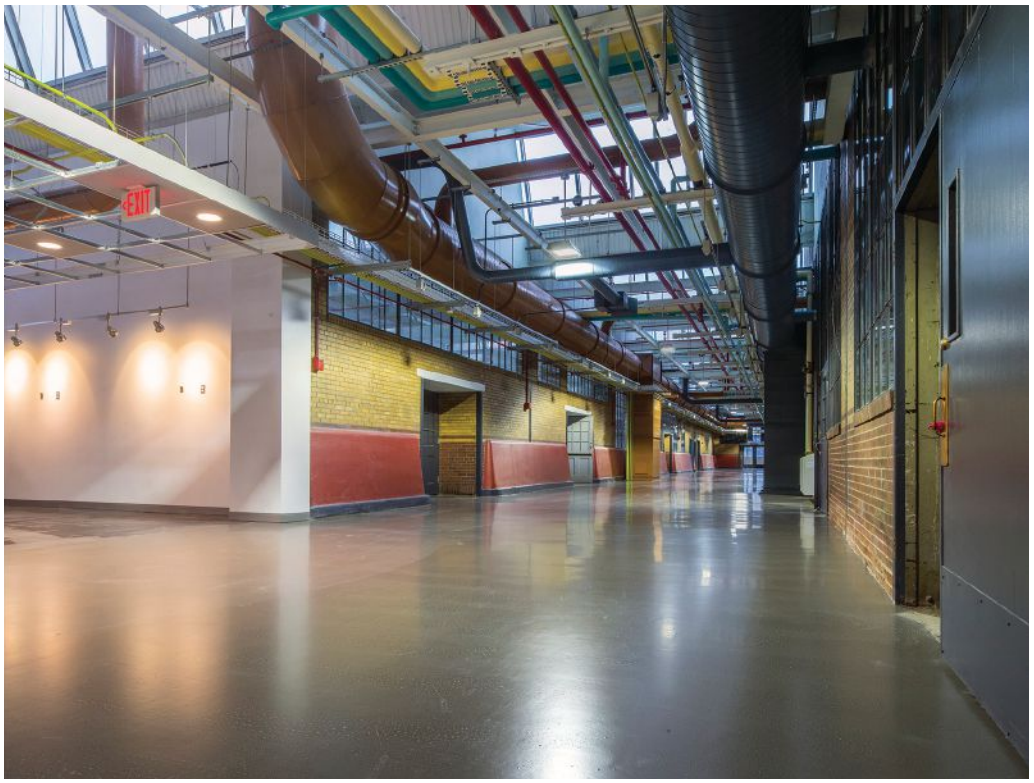
HIGH PERFORMANCE COATINGS FOR INDUSTRIAL AND DECORATIVE FLOORS

Presented by: covestro



LEARNING OBJECTIVES

Upon completion of this course the student will be able to:

1. Explain the history and basic science behind modern polyurethane and polyaspartic floor coatings and sealers
2. Compare several sustainability market drivers and aesthetic preferences for floor coatings and how they fit into green building standards
3. Illustrate the surface preparation, safe use, and handling requirements for professional application of these coatings
4. Identify floor coating case study examples from real world projects that re-tasked or adapted existing concrete floor space and the reasons for their selection

CONTINUING EDUCATION

AIA CREDIT: 1 LU
AIA COURSE NUMBER: AR102018-6

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HISTORY AND SCIENCE BEHIND HIGH PERFORMANCE COATINGS

Polyurethane coatings have been around for decades and have a proven track record. Polyurethane as a class of technology was first invented by Otto Bayer in the late 1930's. The first use of **polyurethane** as a coating was in the 1940's, as an **aromatic hardener**-based coating. Aromatic hardeners posed a challenge in exposed applications due to the double bonds in the molecular structure that were susceptible to sunlight and broke down the bonds causing the material to yellow. The biggest issue with these broken bonds, particularly in the coatings industry, was that chromophores (color bodies) formed in the polymer matrix. For example, when the sun hit a blue pigmented, aromatic-based polyurethane coating and the polymer matrix turned yellow over time, this added yellow color to the blue hue, eventually giving the coating the appearance of being green. Or, if an aromatic hardener-based coating was used as a clear coat on top of gray concrete, the concrete surface turned beige as the coating yellowed over time.

To combat this challenge, **aliphatic hardeners** for coatings were developed in the 1960's. The chemistry of aliphatic hardeners is very similar to a clearcoat of polyurethane on many high-end vehicles. An aliphatic hardener does not have double bonds, so when sunlight hits the coating there are no double bonds to break, which keeps the color stable and the polymer from breaking down as well as yellowing over time.

Waterborne polyurethane dispersions (PUDs) were introduced in the 1970's. An aliphatic polyurethane backbone is made in a reactor and then dispersed into an aqueous phase using solvents and water. These early polyurethane dispersions, although considered waterborne, still had a lot of solvents in them.

The 1970's also saw the advent of **2K solventborne polyurethanes**. The two component material is a resin blend with additives, such as leveling aids, catalysts, solvents, pigments, and extender pigments, reacted with either an aromatic or aliphatic hardener. The early resins used in these systems, typically polyester resins, had a very high viscosity. It was necessary to add solvents to create a coating that could be applied with a spray machine or brushed and rolled onto the surface. Without the high solvent level, the coating would have been too thick to flow and level.

COATINGS TERMINOLOGY

The different classes of infrastructure coatings can be formulated using a variety of choices.

Hardener:
Aromatic (yellowing)
Aliphatic (light stable)

Backbone:
Polyester
Polyether
Polycarbonate
Polycaprolactone

Carrier:
Solventborne (SB)—Coating where the primary co-solvent is an organic solvent which may or may not be classified as a VOC.
Waterborne (WB)—Coating where the primary co-solvent is water. A waterborne coating may still contain some small amount of an organic solvent which may or may not be a VOC.
Solvent-free (SF)

Number of Components:
One component (1K)—ready to use out of can, moisture cure (MC) or polyurethane dispersion (PUD)
Two component (2K)—contains a formulated resin component and a hardener component

Polyurethane dispersion (PUD) typically contains:
A polymer dispersion primarily composed of a polyester, polyether, or polycaprolactone resin pre-reacted with an aliphatic hardener and dispersed in an aqueous carrier. Additional additives may include pigments, flow and leveling additives, and/or defoaming agents.

Later in the 1970's, **2K solvent-free aromatic coatings** were formulated. The basic building blocks of aromatic coatings, resins and hardeners have a low viscosity, therefore, they do not necessitate thinning with a lot of solvent to make them easy to spread or level. They do, however, still have the issue of color change when exposed to light.

In the 1980's **polyaspartic** coating technology was invented. A polyaspartic coating is a two component system very similar to a polyurethane, but instead of using hydroxyl (OH)-terminated resins the polyaspartic technology has amine-terminated ends. A polyaspartic molecule is reacted with an aliphatic hardener to make a polyaspartic coating. The first generation of **2K waterborne polyurethane** coatings were also developed in the 1980's. These first generation 2K waterborne polyurethane coatings had adequate but limited physical properties and still contained quite a bit of organic solvent in addition to the water used to thin the formulated coating.

Over the past three decades, major advancements in both polyurethane and polyaspartic chemistries have occurred, leading to the development of the second generation of **2K waterborne polyurethanes** in the 2000's. These second generation 2K waterborne polyurethane coatings have much higher physical properties with ultra-low VOC and solvent levels. In addition, **waterborne UV-curable** coatings were developed. Waterborne UV-curable coatings are UV resins mixed with a photo initiator that instantly cures when exposed to light.

In 2015, polyaspartics technology further improved with the development of an extremely low viscosity polyaspartic resin. To remain user friendly, the original polyaspartic systems needed a small amount of solvent to keep the viscosity down. With the advent of new low viscosity polyaspartic resins, polyaspartics can now be formulated with no added solvent, resulting in an ultra-low- to zero-volatile organic compound (VOC) coating.

HYDROGEN BONDING AND CROSSLINKING = HIGH PERFORMANCE

There are two fundamental reasons that polyurethane and polyaspartic coatings have such high performance: hydrogen bonding and cross-linking. The polyurethane segments in the polymer chains act like small magnets with a positive and negative end. Hydrogen bonding occurs when billions of these micro-magnets find each other, with their combined forces equating to added physical strength. Hydrogen bonding provides the properties of extraordinary hardness and flexibility for polyurethane- and polyaspartic-based coating technologies.

Another reason polyurethane and polyaspartic coatings provide superior performance is a high crosslink density. Crosslinking is an entanglement and reaction of polymer chains that increases physical strength and chemical resistance. The long polymer chains, with hydrogen bonding, get entangled and linked like a ball of ropes. When one rope is pulled, all the ropes follow rather than just the one. Two component polyurethane and polyaspartic coatings have a higher crosslink density than their one component analogs.

TIMELINE OF HIGH PERFORMANCE COATING DEVELOPMENT

1930s	Urethanes developed by Otto Bayer
1940s	Aromatic hardeners used in coatings
1960s	Development of aliphatic hardeners for coatings
1970s	Waterborne (WB) polyurethane dispersions (PUDs) introduced
1970s	2K solventborne (SB) polyurethane coatings
1970s	2K solvent-free aromatic coatings
1980s	2K polyaspartic and 1st gen 2K waterborne polyurethane coatings
2000s	2nd gen 2K waterborne polyurethane coatings
2000s	Waterborne UV-curable coatings
2015	Low viscosity polyaspartic technology

Contractors must be aware of the difference between working with polyaspartics and polyurethanes. Polyaspartics have a shorter working time but are very fast to go back into service. Waterborne polyurethane coatings have a longer working time and therefore a longer wait before they can be put back into service.

The analogy often used in the coatings industry compares a screen in a window with a piece of screen used to keep deer and birds out of a garden. The garden screen typically has fairly large holes in it and is very flexible. If you tried to tear that screen, it would rip easily because there is a limited amount of crosslinking. A window screen, on the other hand, tends to be more rigid and has many more intersection points or crosslinking so it is hard to rip and the holes are much smaller. If those were 'holes' in a polymer chain, the smaller holes would be harder for chemicals to pass through. This is a good analogy of how crosslink density can affect both chemical resistance as well as abrasion and physical strength.

This course will cover several floor coating technologies, including polyaspartic coatings and one- and two-component polyurethane waterborne coatings, all of which contain no added phthalate, formaldehyde, or heavy metals. Polyaspartics are low- to zero-VOC two component (2K) aliphatic coatings. They cure fast, equating to earlier return-to-service time, can be applied thicker than many traditional coatings, and are light and weather stable. One- and two-component waterborne coatings are ultra-low-VOC polyurethane coatings with low odor and a medium to long open time (working time). Because they are aliphatic they are also

Two component waterborne polyurethanes have excellent properties as a colorcoat, clearcoat, or penetrating sealer over polished concrete and pavers.

light and weather stable. Contractors must be aware of the difference between working with polyaspartics and polyurethanes. Polyaspartics have a shorter working time but are very fast to go back into service. Waterborne polyurethane coatings have a longer working time and therefore a longer wait before they can be put back into service.

SUSTAINABILITY MARKET DRIVERS

There are a variety of industry drivers for sustainability in the floor coating market. To meet VOC compliance, the biggest sustainability factor, ultra-low- to zero-VOC options are available. There are a variety of different national, regional, state, and local VOC regulations across the country. For example, the Ozone Transport Commission (OTC) states encompass 13 states and the District of Columbia in the Northeast part of the country. In California, CARB (California Air Resource Board) and the Southcoast Air Quality Management District (SCAQMD) regulate emissions with the SCAQMD rules typically being more stringent than CARB. In general, the allowed VOC content is always going down as regulations become tighter, so many decision makers choose to specify a material that is ultra-low-VOC so they can use it anywhere in the country.

Coatings can contribute to energy efficiency when used in reflective, lighter color flooring because less artificial lighting is needed. In addition, coatings manufacturers can meet current consumer preferences by utilizing environmentally preferred content in their products. Environmentally preferred content can include renewable materials such as natural oil polyols; re-usable materials such as thermoplastic urethanes; and recycled content such as used polymers and fillers. Some components that are regulated for use in unrelated areas such as automotive interiors may not be restricted for use in building products, but specifiers are savvy and many will still choose a more environmentally friendly product.

Life-cycle assessments (LCAs) demonstrate the sustainability, environmental footprint, and long term performance of coatings. In the past, environmental performance just considered the individual components in a coating, but new environmental standards that include durability ensure that materials that last longer, keeping waste out of landfills, are considered favorably as well.

Another sustainability driver is local manufacturing, which lowers the carbon footprint of moving floor coating products around the country and world by reducing the amount of carbon dioxide generated in transportation. Considerations are also given to the coating's end of life downstream. Once applied and cured, floor coatings are fully reacted materials so if the concrete floor is torn up in the future and the concrete goes to a landfill or is reused as aggregate in new concrete, it does not have to meet any special disposal requirements.

Decorative Floor Coatings and LEED v4

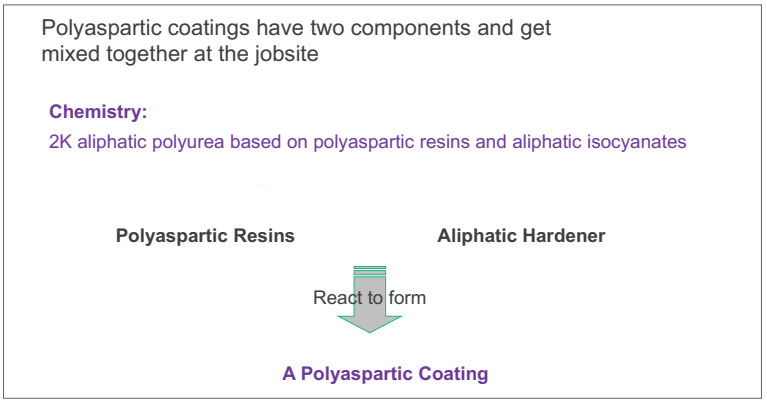
In LEED v4, there are some credit options for low-emitting materials in New Construction (NC) and Existing Buildings (EB). Floor coatings typically meet those requirements by passing a third party organization's testing. The floor coating, along with a variety of other low emitting options in a building, can earn an owner 1 or 2 LEED points. Because there is no LEED testing to confirm that a floor coating material meets their requirements, a floor coating will never by itself earn a LEED point. LEED accepts certification by a third party like SCAQMD Rule #1113, CDPH Standard Method v1.1, or Green Seal GS-11, with GS-11 being the most common. If the coating fulfills third party requirements, such as those listed above, it fulfills that component of LEED.

In the case of LEED NC and Existing Building Operations & Maintenance (EBO&M), high performance floor coatings can contribute to innovation in operational efficiencies by their demonstrated long term durability over other coating systems as well as prefab floor coverings. It is important to note that all products have different traits so consult with your specific coating supplier who will have listing information for their products.

HIGH PERFORMANCE COATINGS TECHNOLOGIES

Polyaspartic Coatings

As mentioned earlier, polyaspartics are a 2K aliphatic polyurea (because there is an amine



The two components, polyaspartic resins with formulated additives and aliphatic hardener, react to form a polyaspartic coating.

CASE STUDY

Sustainable Polyaspartic Coating Provides the Look of Marble on a Concrete Budget

Ave Maria University
Naples, FL

The project team wanted the 70,000 square feet of concrete floors in the newly-constructed Ave Maria University near Naples, FL to have a dramatic look and be extremely durable, yet affordable. An alternative, more sustainable solution to traditional flooring surfaces was recommended in an affordable combination of acid stain and polyaspartic coating that would have the appearance of marble and be extremely durable and easy to maintain. A rich "aged leather" color was chosen for use throughout. The acid stain provides a beautiful, marble-like finish while the polyaspartic coating locks in the finish and creates a high-gloss polished look. It's extremely durable—it won't scratch and it's easy to maintain.

Three specialty contractors were hired to execute the project. Miami-based flooring contractor, Concrete Floor Solutions, began by diamond-grinding the surface of the new concrete to a 100 grit surface finish. This provided an excellent surface for the acid stain, and allowed proper adhesion of the polyaspartic coating. Once the concrete was prepped, experienced crews from Crown Concrete and Cutting Edge Concrete applied the acid stain then rolled the polyaspartic coating on all 70,000 square feet of concrete floor. Because the coating was easy to use and fast drying, a second coat was applied just a few hours later. The Ave Maria job had a very tight timeframe and the quick-drying polyaspartic coating helped to keep the project on schedule. It was even more important that the end result would give the University years and years of beautiful wearability. As the University grows, so will the foot traffic across the acid stained concrete floors. Thanks to a unique polyaspartic coating system, their marble-like finish will shine for years to come.

QUIZ

1. Which of the following describes a coating where the primary co-solvent is an organic solvent and may or may not be classified as a VOC?
   A. Solventborne
   B. Waterborne
   C. VOCs
   D. Hydrogen bonding

2. An _____ hardener is light stable.
   A. Aromatic
   B. Aliphatic
   C. Resin
   D. High-performance

3. True or False: With the advent of new low viscosity polyaspartic resins, polyaspartics can now be formulated with no added solvent, resulting in an ultra-low- to zero-VOC coating.

4. True or False: Hydrogen bonding is an entanglement and reaction of polymer chains that increases physical strength and chemical resistance.

5. _____ are low- to zero-VOC two component aliphatic coatings that cure fast, equating to earlier return-to-service time, thicker application than many traditional coatings, and are light and weather stable.
   A. Polyurethane dispersions
   B. Polyaspartics
   C. Waterborne polyurethane coatings
   D. Hydrogen coatings

6. True or False: Waterborne polyurethane coatings have a longer working time and therefore a longer wait before they can be put back into service.

7. True or False: Polyaspartic technology allows for one-coat, high-build finishes as opposed to two or three thinner coats necessary to get the same film build with other systems.

8. True or False: High performance floor coatings are contractor applied materials so training is needed to ensure that the correct ratio and mixing technique is used and that proper safety and handling procedures are followed.

9. True or False: When cleaning concrete, you should use solvents to remove oil and grease.

10. 80 percent or more of coating or sealer failures are due to _____.
    A. Application issues
    B. Thin application of the coating
    C. Wrong coating
    D. Poor surface preparation

reacting with the hardener rather than an hydroxl). 2K refers to the two components of the material: polyaspartic resins with formulated additives and aliphatic hardener. These materials react to form a polyaspartic coating.

This article continues on http://go.hw.net/AR102018-6. Go online to read the rest of the article and complete the corresponding quiz for credit.

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COMPARING CONCRETE, STEEL AND WOOD

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LEARNING OBJECTIVES

Upon completion of this course the student will be able to:

1. Recognize how design decisions, from material and product selection to envelope design and construction, can affect environmental impacts of a building.
2. Learn how the life cycle perspective when making design decisions, such as material and product selections, can help create sustainable projects.
3. Identify how critical issues such as land use, human health, energy efficiency and greenhouse gas emissions can impact environmental and functional performance.
4. Understand how life cycle assessment, from production through end-of-life, can play a role in evaluating environmental impacts of design decisions for the structures that are built.

CONTINUING EDUCATION

AIA CREDIT: 1 LU/HSW
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By: Lionel Lemay, PE, SE, LEED AP. Executive Vice President, Structures and Sustainability, NRMCA
James Bogdan, LEED AP, QEP. Senior Director, Sustainability Initiatives, NRMCA

INTRODUCTION

With the construction sector experiencing a resurgence in growth, the impact building materials have on the environment will continue to increase. Products used for construction have an environmental impact from material extraction through end-of-life. While the construction industry generates up to 15% of the global GDP, it is also responsible for one-third of the total energy use and greenhouse gas emissions (GHG), and half of all resources extracted from the earth. And, it is projected that the energy use and related emissions from buildings can double or possibly even triple by 2050 because of several key trends, including: growth in population, relocation to urban areas, changes in family size, rising levels of affluence and behavioral changes.

The U.S. construction industry also accounts for 160 million tons, or 25 percent, of non-industrial waste generated each year, according to the U.S. Environmental Protection Agency (EPA). This means architects and other design professionals have the responsibility to provide long-term solutions that minimize the environmental impacts of the structures they design.

THE LIFE CYCLE PERSPECTIVE

Since the early 1990s, an increasing number of methods have been used to evaluate the environmental impacts of buildings. Life Cycle Assessment (LCA) has become the dominant method for measuring environmental impacts and the effects on ecological and human health from products or services over their complete life cycle. LCA quantifies the interactions with the surroundings, whether they are inputs to the system—such as natural resources, land, and energy—or as an output of the system—for example emissions to air, water, and soil.

The standard for LCA is established by the International Organization for Standardization (ISO) 14040 series. LCA is characterized as a framework which permits the formation of objective criteria and plans for the environmental impact evaluation of products (e.g., land use, global warming potential, human health effects, etc.). The life-cycle of a building material can be generalized to have four stages:

- Production (extraction and manufacturing)
- Construction
- Use or Operational
- End-of-life

The strength of LCA is its comprehensive, multi-dimensional scope. Historically, many "green" product claims were based on a single life-cycle stage or a single environmental attribute. These single-attribute claims may be misleading because they ignore the possibility that other life-cycle stages, or other environmental impacts result in offsetting impacts. For example, a product with high recycled content may sound appealing, but if the recycled material requires significant energy to process, which leads to significant GHG emissions or acid rain, then the benefit of recycling is diminished.

LCA thus broadens the environmental discussion by accounting for shifts of environmental problems from one life-cycle stage to another, or one environmental medium (land, air, water) to another. The benefit of the LCA approach is in implementing a trade-off analysis to achieve a genuine reduction in overall environmental impact, rather than a simple shift of impact. Throughout this article, you'll learn about some environmental impacts from each life-cycle stage of common building materials.

For most buildings the major environmental impacts occur during the use or operational stage, but we are also being made increasingly aware of the impacts associated with the production (material extraction and manufacturing) stage. This is evident in green building standards such as LEED v4 and Green Globes, among others, which integrate product LCA and environmental disclosures along with operational stage impacts such as building energy use, water consumption and indoor environmental quality.

PRODUCTION: EXTRACTION

Extracting raw materials from the land takes a toll on the environment. Unfortunately, environmental impacts from land use aren't always included in LCA. However, comprehensive studies titled *Assessing the Relative Ecological Carrying Capacity Impacts of Resource Extraction* and *Ecological Carrying Capacity Effects of Building Materials Extraction* conducted by Forintek Canada Corp., the disruption to the land resulting from these operations are "at least as important, if not more important, than other more readily measured environmental impacts."

These studies compare the ecological impacts of logging for wood products, iron ore mining for steel, and limestone and aggregate quarrying for cement and concrete. The Forintek report ranks each building material's impact based on extensiveness, intensity, duration and site significance. Table 1 summarizes the results.

Table 1: The environmental impact of resource extraction of building materials

Building Material	Extent	Intensity	Duration	Significance
 logging for wood	High to very high	Moderate	Variable, complex	Very high (some sites)
 iron ore mining for steel	Very low to low	High	High	Very low
 limestone and aggregate mining for concrete	Low to moderate	Moderate to high	Moderate	Low

Definitions

- **Extent:** amount of land disrupted by extraction
- **Intensity:** gauges the degree of disruption
- **Duration:** length of time before the disrupted area returns to normal, if ever
- **Significance:** The importance of the site—the beauty and ecological richness of the site

The study concludes that the impact of concrete and cement materials extraction is less than that of other construction materials because limestone and aggregate quarries are easily reused. Their disruption to the environment can be intense, but closely contained and temporary. In as little as one or two years after closing, quarries can be restored to agriculture, nature reserves, parks and many other uses. In addition, resource depletion is not an issue for cement and concrete. Limestone, the key ingredient of cement, and sand and gravel, key ingredients of concrete, for all intents and purposes are inexhaustible according to the researchers.

Other materials have less flexibility in both how and where their raw materials are extracted. Production of steel products relies on iron ore as its principal raw material. And unlike limestone and aggregate quarries, iron ore extraction often involves very deep pits which are rarely restored. The Forintek study indicates that the duration of an iron mine may be forever.

But the Forintek report concludes that the ecological impacts associated with extraction are the greatest for wood:

> "The ecological impacts associated with the extraction of wood as a resource are more extensive than the ecological impacts associated with other materials considered in this study. This is in part because forests provide many ecological and physical functions including pollution absorption, climate regulation, soil production, watershed protection, carbon recycling, wildlife habitat, and human recreational activity."

From these rankings, the study goes on to develop an impact index, assigning the impacts of extracting raw materials for concrete an index of 1, since it has the lowest impacts. From there, they assign an impact index of 2.25 for extracting iron ore for steel manufacturing. And they conclude by assigning an impact index of 3.25 to logging coastal forests, meaning it hurts the land 3.25 time more than mining aggregates for concrete.

Furthermore, the most harmful impacts of deforestation are to the productivity of forest ecosystems, reduced biodiversity, soil erosion, reduced water quality, and the application of herbicides to control broadleaf plants and accelerate the growth of replanted saplings.

But what is most surprising is the logging industry's contribution to climate change. Deforestation is the single largest cause of climate change according to G. R. van der Werf, et al., in the article *CO_2 Emissions from Forest Loss*, published in Nature Geoscience. The article goes on to describe how deforestation is responsible for roughly 12% of the world's greenhouse gas emissions. Harvesting trees from nature removes the most important carbon sink on the planet. A live tree can absorb as much as 48 pounds of carbon dioxide per year and one ton by the time it reaches 40 years old. Once cut, it no longer absorbs carbon dioxide, and will eventually emit GHG back into the atmosphere.

PRODUCTION: MANUFACTURING

The environmental impacts from the manufacturing stage of the life cycle come from two primary sources—energy and waste. Every building material requires energy to produce, which results in the depletion of non-renewable energy and emissions to air, land or water; and each has some level of waste which cannot be used for another purpose and thus must be landfilled.

According to the U.S. Department of Energy (DOE), cement production accounts for 1.3% of energy consumed in the U.S. This level is relatively low in comparison with other industries, such as steel production at 7.2% and wood production at 2.5%. According to DOE, cement production accounts for 0.7% of CO_2 emissions, whereas iron and steel manufacturing accounts for 1.1% and forest products account for 2.4%.

Concrete Manufacturing

In its basic form, concrete is composed of cement, water and aggregates (sand and gravel) that are combined in a mixer to form concrete. Cement is manufactured from a combination of naturally occurring minerals—mainly from limestone (calcium carbonate) and heated in a large kiln to over 1500 °C to convert the raw materials into clinker. Clinker is combined with other materials to make portland cement. For the most part, CO_2 is generated from two different sources during the cement manufacturing process:

- Use of fossil fuels in the burning process
- Calcination, when calcium carbonate is heated and broken down to calcium oxide with the release of CO_2.

The amount of carbon dioxide embodied in concrete is primarily a function of the cement content in concrete mixtures. But concrete only uses roughly 7% to 15% cement by mass depending on the performance requirements for the concrete. Additionally, most concrete incorporates industrial byproducts such as fly ash, slag cement and silica fume to supplement a portion of the portland cement. These industrial products, which would otherwise end up in landfills, are called supplementary cementitious materials or SCMs for short, and react with portland cement to improve workability, strength and durability. Using SCMs can reduce the embodied CO_2 in concrete by as much as 70%, with typical values ranging between 15% and 40%. As a result, approximately 250 to 400 kg of CO_2 is embodied in every cubic meter of concrete depending on the quantity of cement and SCMs.

Concrete is the only building material that can sequester carbon (absorbs and retains carbon dioxide) during the manufacturing stages through advanced carbon sequestration technology. One technology currently in use uses carbon dioxide to cure precast concrete products which result in stronger products and carbon sequestration. A related technology injects carbon dioxide into fresh concrete at the batch plant. The carbon dioxide reacts with calcium in the cement and forms a solid mineral—$CaCO_3$, or limestone which increases strength and facilitates lower cement contents.

Steel Manufacturing

Steel used for structural applications is manufactured from refined iron ore and combined with recycled steel. Iron ore, coke (a by-product of coal) and limestone (mined from quarries) are combined into a blast furnace. A blast of hot air is injected through nozzles into the base of the furnace, heating the furnace to white-hot intensity, and the iron is melted out to form a pool of molten metal (pig iron) in the bottom of the furnace. The limestone combines with impurities to form a liquid slag which floats to the top.

Pig iron is about 92–94% iron and 3–5% carbon with smaller amounts of other elements. Pig iron has only limited uses, and most of this iron goes on to a steel mill where it is converted into various steel alloys by further reducing the carbon content and adding other elements such as manganese and nickel to give the steel specific properties.

Today, steel making comes from both recycled steel as well as from pig iron. The primary refining process is called electric arc furnace method where scrap steel is combined with pig iron to form high-quality steel. The electric arcs heat the metals up to 1650 °C to melt the metal and convert it to high-quality steel ingots. The steel is then hot rolled to achieve the required shapes for structural applications.

Environmental impacts of steel manufacturing include air emissions (CO_2, CO, SO_x, NO_x, and particulates), wastewater contaminants, hazardous wastes and other solid wastes. Most of the CO_2 emissions are related to energy consumption averaging about 1.77 tons of CO_2/ton of steel produced. Slag makes up the largest portion of waste but most of it is processed and sold to the concrete industry as an SCM or lightweight aggregate.

Wood Manufacturing

Most trees destined to be cut into lumber are grown in forests either owned by a lumber company or leased from the government. The typical sequence of operations for processing trees into lumber is as follows:

Felling: Trees are cut down or felled. If a road does not already exist, one is cut and graded using bulldozers. Most tree felling is done with gasoline-powered chainsaws. Once the tree is down, the limbs are trimmed off with chainsaws, and the tree is cut into convenient lengths for transportation. The logs are then loaded on trucks and transported to a lumber mill.

Milling: Once at the mill, logs are debarked, cut to length and desired cross-sectional dimension. Each step creates waste that will either be used as a decomposing product (i.e. mulch) or used as a fuel further emitting GHGs.

Drying: Most lumber is kiln dried, depending on the required moisture content of the finished piece. Lumber is stacked in an enclosed kiln and heated air (44–82 °C) is circulated through the stack until a specified moisture content is met.

Planing: The dried pieces of lumber are passed through planers, where rotating cutting heads trim the pieces to their final dimensions, smooth the surfaces and round the edges.

Unfortunately, it's during the production process (extraction and manufacturing) where most of

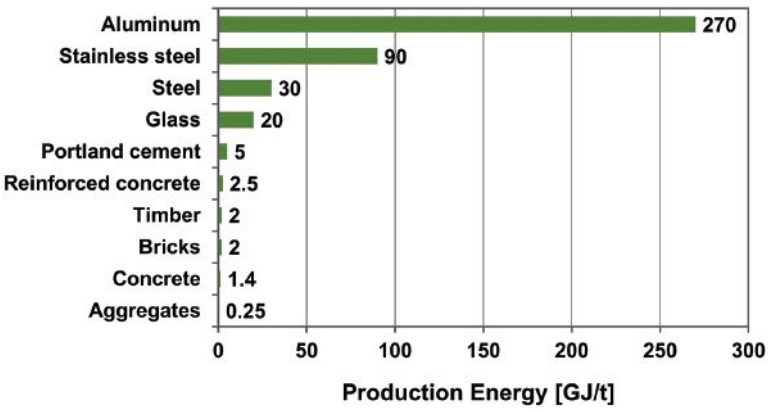
the benefits of growing trees, such as carbon uptake, biodiversity and erosion control are reversed. When a forest is logged, emissions are generated through several channels, the most important being:

- The release of GHGs once stored in trees when slash, needles, roots and stumps decay or are burned on site;
- Carbon dioxide released when soils are disturbed and eroded;
- GHGs released when wood waste is generated and then decays during processing or used as biofuel, and;
- GHGs released as wood products decay in landfills.

The importance of including these emissions in any LCA are highlighted in the report *US Forest Carbon and Climate Change Report* authored by Ingerson. The paper notes that "not all harvested carbon makes it into a finished wood product". Assume that a live tree containing 1 metric ton of CO_2e is cut, "With losses at each step of the chain, the net gain in carbon stores may be little as 0.152 metric tons CO_2e—15.2% of the carbon originally stored in the live tree." More than 70% of the CO_2e of the live tree is emitted to the atmosphere from logging and mill residue.

Energy of Production

In his article *Concrete and Sustainable Development*, Penttala compared the energy of production of common building materials for raw material extraction, transportation and manufacturing. The study concluded that the energy required to produce reinforced concrete is 2.5 GJ/t compared to 30 GJ/t for steel and 2.0 GJ/t for wood. Energy required to produce unreinforced concrete, which is often used for pavement applications is only 1.4 GJ/t. Other building materials such as glass, stainless steel and aluminum have significantly higher energy of production.



Energy of production for common building materials. Adapted from Penttala.

QUIZ

1. Life Cycle Assessment (LCA) is the study of:
   a. Long-term costs
   b. Environmental impacts
   c. Political implications
   d. Environmental regulations

2. Which of the following is considered an input when conducting an LCA of a product or building?
   a. Atmospheric emissions
   b. Manufacturing
   c. Recycling
   d. Energy

3. True or False. Extracting the raw materials for concrete has a lower impact than that of other construction materials such as steel and wood.

4. What life cycle stage of a building typically has the highest environmental impacts?
   a. End-of-life
   b. Production
   c. Material acquisition
   d. Use or Operational

5. It is projected that building energy use and carbon emissions can triple by 2050 for the following reason(s):
   a. Growth in population
   b. Relocation to urban areas
   c. Rising levels of affluence
   d. All the above

6. True or False: It is during the production process (extraction and manufacturing) where most of the benefits of growing trees, such as carbon uptake, biodiversity and erosion control are reversed.

7. The typical range that SCMs can reduce the embodied CO_2 in concrete is:
   a. 15–40%
   b. 5–10%
   c. 60–75%
   d. 45–60%

8. Thermal mass can help reduce _____ of a building.
   a. Overturning moment and associated damage during an earthquake
   b. High fluctuations between indoor and outdoor temperatures
   c. Embodied impacts
   d. Recycled content

9. True or False: In the research "Quantifying Environmental Impacts of Structural Material Choices Using Life Cycle Assessment: A Case Study," wood construction clearly provides the overall lowest global warming potential (GWP).

10. Which is the only material that can sequester carbon at end-of-life?
    a. Concrete
    b. Steel
    c. Wood
    d. All of the above

This article continues on http://go.hw.net/AR102018-1. Go online to read the rest of the article and complete the corresponding quiz for credit.

SPONSOR INFORMATION

BUILD WITH STRENGTH

Build with Strength, a coalition of the National Ready Mixed Concrete Association, educates the building and design communities and policymakers on the benefits of ready mixed concrete, and encourages its use as the building material of choice. No other material can replicate concrete's advantages in terms of strength, durability, safety and ease of use.

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See why non-combustible materials like concrete and steel stand the test of time

Any structure made entirely of lightweight wood is nothing more than a matchbox. Look no further than the recent fires of low- and mid-rise structures ripping throughout America. Weaker building codes, lax inspections and so-so sprinkler systems are fanning the flames for residents and communities. It's time to create new solutions that embrace non-combustible materials like steel and concrete.

S

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- Offers the safety of a fire-resistant structure.
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AN INTRODUCTION TO ELECTROCHROMIC GLASS: WHAT IT IS AND HOW IT WORKS

Electrochromic glass preserving great views at the University of Colorado, Boulder.

LEARNING OBJECTIVES

At the end of this course, learners will be able to:

1. Understand the importance of electrochromic (EC) glazing and how it can be used to solve the challenges of simultaneously achieving energy performance, daylight and views, and comfort.
2. Analyze the aesthetic performance of next-generation EC glazing and how it works compared to conventional solar control solutions.
3. Examine EC's benefits.
4. Explain how EC systems can be controlled to meet energy performance and user comfort needs.
5. Understand the key aspects of zoning with EC and how zoning can be used to optimize tradeoffs between the competing goals of glare control, daylight admission, energy performance, and light color quality.

CONTINUING EDUCATION

AIA CREDIT: 1 LU
COURSE NUMBER: AR102018-4

Use the learning objectives above to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR102018-4 and complete the quiz for free as you read this article. If you are new to Hanley Wood University, create a free learner account; returning users log in as usual.

ELECTROCHROMIC GLASS: BENEFITS, FEATURES, AND COMPARISONS TO STATIC WINDOWS[1]

Electrochromic (EC) glass, sometimes known as smart glass or dynamic glass, is an electronically tintable glass used for windows, skylights, facades, and curtain walls. It is automatically controlled by light sensors and can also be directly controlled by building occupants. It is popular for its ability to maximize access to daylight and outdoor views, reduce energy costs, and improve occupant comfort.

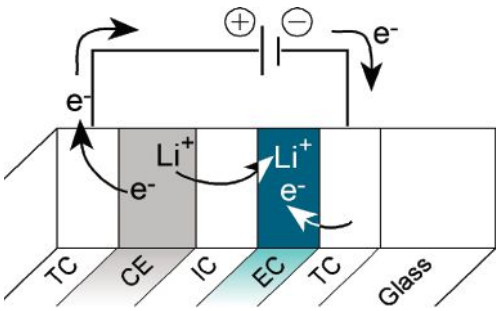
Electrochromic Glass versus Other Smart Glass

Electrochromic glass can also be referred to as "dynamic glazing" or "smart glass." Dynamic glazing is defined as "'any fenestration product that has the fully reversible ability to change its performance properties, including U-factor, solar heat gain coefficient (SHGC), or visible transmittance (VT).'"[2] The category not only includes electrochromic glass, but also photochromic (PC), thermochromic (TC), suspended particle device (SPD), and polymer dispersed liquid crystal (PDLC).

With electrochromic glass, an electric charge is applied that allows it to change its performance properties, specifically visible light transmittance and solar heat gain coefficient. Suspended practice devices and polymer dispersed liquid tend to be either on or off, meaning they are either transparent or opaque; however, some have intermediate tint states. Electrochromic, photochromic, and thermochromic are all able to provide gradations of tint but do not become opaque. Photochromic means that light initiates its ability to change, and thermochromic changes are initiated by heat. As opposed to photochromic and thermochromic glass, which are reactions that cannot be controlled, electrochromic is a unique smart glass that can be controlled and set.

Components of Electrochromic Glass[3]

For some manufacturers, electrochromic coating consists of five layers that are less than a fiftieth of the thickness of a single human hair. The five layers of electrochromic coating include two transparent conductor (TC) layers; one electrochromic (EC) layer, sandwiched between the two TC layers; the ion conductor (IC); and the counter electrode (CE). Applying a positive voltage to the transparent conductor in contact with the counter electrode causes lithium ions to be driven across the ion conductor



Movement of lithium ions and electrons between the layers gives EC the ability to change tint.

and inserted into the electrochromic layer. Simultaneously, a charge-compensating electron is extracted from the counter electrode, flows around the external circuit and is inserted into the electrochromic layer.

The tint of electrochromic glass is controlled by the amount of voltage applied to the glass. Applying a low voltage of electricity darkens the coating as lithium ions and electrons transfer from one electrochromic layer to another. Removing voltage, and reversing its polarity, causes the ions and electrons to return to their original layers, causing the glass to lighten and return to its clear state.

The result is that one piece of glass that can dynamically alter its visible light transmittance at different times as needed. While there are differences among manufacturers, there are typically four primary tint states to electrochromic glass: 60% (clear), 18% (intermediate state #1), 6% (intermediate tint state #2) and 1% (fully tinted).

While coatings enable these transitions to be made, the control system is the intelligence that allows users to take full advantage of electrochromic glass's range of functions.

In-Pane Zoning

In-pane zoning achieves multiple tint states, or zones, within a pane of glass and offers the ultimate level of daylight management and glare control. At many points in time only a portion of a given window is subjected to glare and strong solar radiation. To control this, entire windows would typically have to be tinted, which would detract from the quality of natural light emitted into a space. However, in-pane zoning allows for some areas of a pane to be tinted while others remain clear. The clear areas of the pane permit natural light to enter a room while the tinted areas control glare and heat gain. Light quality can be maintained even if just 10-15% of a glazed area remains clear.

Control Categories

Electrochromic glass offers a variety of control options. Users can operate automatic control settings to manage light, glare, energy use, and color rendering. The controls can also be integrated into an existing building automation system. For users who desire more control, electrochromic glass can be manually overridden using a wall panel, allowing the user to alter the tint of the glass. Depending on the manufacturer, users can also change the tint level via mobile app.

Different manufacturers approach system design differently; however, there are two main categories for control systems: centralized and decentralized. All systems are comprised of EC glass in an integrated glass unit (IGU), along with sensors, cables, control panels, and switches. From a user standpoint the system design approach is not a factor, it just refers to how the glass is setup and controlled but the resulting functionality is the same.

In-pane zoning on display at the University of New Mexico Farris Engineering Center.

Overall, the components of electrochromic glass allow it to maximize daylight and views while still offering control of energy usage and glare. These functions help to increase productivity and aid mental health, all while adding to the aesthetic of a building's design and lowering life cycle costs.

Sunlight

Electrochromic glass's ability to provide both energy and health benefits is inseparable from its ability to control and distribute sunlight. When the sun rises in the morning, electrochromic glass can fully tint east-facing windows to block harsh morning sun. Other orientations remain clear, maximizing (or harvesting) daylight. By noon, when the sun is directly overhead, portions of glass can be tinted as needed. For example, some can be moderately tinted to 20%, while others are at 6% or perhaps, if facing to the south and west, fully tinted.

The different tint states of electrochromic glass in action at Ashford Castle in Cong, Ireland ©Sean Conboy.

EC glass allows patients at this hospital enhanced control of their environment from their bed.

Late afternoon, in a cooling-dominated climate zone, is peak load time. The grid is often stretched, and energy rates can spike; consumption must be lowered. During this time of day, the BMS can override standard controls and become fully tinted, maximizing heat rejection and load reduction. By sunset, the majority of the building is back to a clear state. With zoned glare control, where only part of a pane tints, glare can be blocked while daylight enters.

Daylight and Views[4]

Controls translate to a building's functionality in several ways, but initially by regulating natural daylight and views. Daylight, as opposed to artificial electric light, has been shown to provide mental health benefits and increase productivity. Research has demonstrated that with daylight and a view of the outdoors, mental function and memory are 10-25% better, cell processing is 25% faster, and hospital stays are 25% shorter. Daylight also allows workers to be 18% more productive and students to score 5-14% higher on test scores and learn 20-26% faster. When buildings have sufficient natural daylight, retail sales increase 15-40%. Daylight and views contribute to better health, better sales, and better buildings.

While daylight and views can contribute to the overall well-being of the individuals within a structure, significant amounts of daylighting and views have the potential to cause unwanted heat gain or loss in addition to glare. Blinds have been the traditional "solution" to preventing temperature fluctuations and controlling glare. However, blinds eliminate daylight and views, negating the initial purpose of the window installation. Electrochromic glass provides a genuine solution to all of the issues mentioned above.

Electrochromic Glass Versus Traditional Glass

By adapting to the external climatic conditions, electrochromic glass minimizes energy use by reducing heating loads in winter, air conditioning in summer, and electrical lighting all year long. According to the U.S. Department of Energy,[5] energy lost through conventional windows accounts for approximately 30% of heating and cooling energy.

Conventional windows also contribute to glare and heat gain and require blinds and shades to offset the negative effects of the sun. Electrochromic glass eliminates the need for additional solar shading systems, as well as the use of additional energy and resources for their manufacturing, transportation, and installation.

If shades and blinds are used, not only do the windows need to be cleaned and maintained but also the window coverings. With electrochromic glass, there are no additional maintenance requirements besides keeping the glass clean, thus limiting the environmental impact of the building.

Because EC glass delivers the performance of four different types of glass, it is further helpful to compare it to several types of traditional static glass.

No static glass can meet the performance of EC at 1% Visible Light Transmittance (VLT) and 0.09 Solar Heat Gain Coefficient (SHGC).

	VISIBLE TRANS (%)	VISIBLE REFL. OUT (%)	VISIBLE REFL. IN (%)	SHGC	WINTER U-FACTOR
TYPICAL EC (CLEAR STATE)	60	16	14	0.41	0.28
COMPARABLE STATIC GLASS (TRIPLE SILVER LOW-E)	51-70	11-14	12-19	0.23-0.39	0.29
TYPICAL EC (TINT #1)	18	10	9	0.15	0.28
COMPARABLE STATIC GLASS (NEUTRAL REFLECTIVE)	19-21	6-20	7-18	0.15-0.17	0.24-0.25
TYPICAL EC (TINT #2)	6	10	9	0.10	0.28
COMPARABLE STATIC GLASS (NEUTRAL REFLECTIVE)	9-13	10-12	7-27	0.13-0.19	0.24-0.33

EC values can vary by manufacturer as well as substrate color. Values listed are for standard clear glass. Data on comparable static glass products derived from Oldcastle BuildingEnvelope's GlasSelect tool, Oct. 2017. Data indicative, does not represent all comparable static glass products available.

For triple silver low-E products, shown on line two, the values are all within range of typical static options, with the SHGC slightly higher. For EC product at the first tint state, which is referenced in the third line, the benchmark is neutral reflective products, as seen in the fourth line. Most values are within the typical range, with the interior and exterior reflectance at the lower end of the range. At the second tint state for EC glass, noted in the fifth line of the chart, are "more aggressive" neutral reflect products. Here, EC outperforms SHGC and is at the low end of reflectance, with a U-factor in the middle of the range. While EC glass varies by manufacturer, this chart still provides a general sense of the differences between static and electrochromic glass.

When evaluating EC, it is important to understand that glare control is a function of proper controls but also the inherent product capability. Lawrence Berkeley National Labs maintains, "An EC with a broader switching range and a very low transmittance (1% or less) […] would reduce or eliminate the dependence on interior sun-blocking shades for some applications."[6] Having 1% VLT eliminates the need for shades or blinds and avoids the blackout that occurs with 0% VLT.

The components of electrochromic glass gives users precise control over the amount of sunlight entering a space, helping to lower a building's energy costs all while eliminating the need for shades or blinds and maintaining natural views.

SUSTAINABILITY, CODE, AND DESIGN[7]

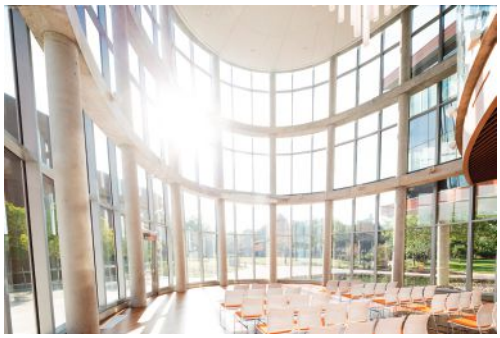
In addition to maximizing occupant comfort, electrochromic glass is also a sustainable product that allows architects and builders to elegantly solve solar-control challenges without sacrificing aesthetics. A building even partially glazed with EC can be designed to take advantage of natural daylight without compromising the connection to the outdoors, making it a great fit for projects aiming to achieve sustainability certifications.

Energy Performance

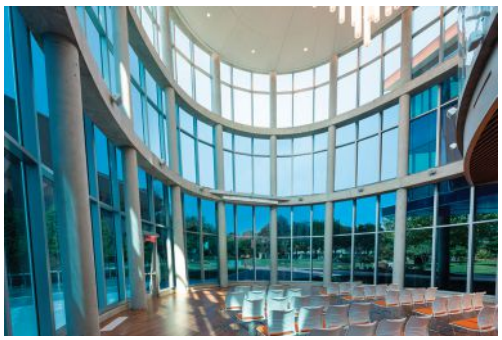
In addition to occupant benefits, electrochromic glass helps building owners achieve their sustainability goals through energy conservation. By maximizing solar control while minimizing heat and glare, electrochromic glass allows building owners to achieve cost savings

over the building's life cycle by reducing overall energy loads by an average of 20 percent and peak energy demand by up to 26 percent.

Due to electrochromic glass's reliance on low-voltage electricity, it takes less electricity to operate 2,000 square feet of electrochromic glass than to power a single 60-watt light bulb. Maximizing daylight through the strategic use of smart glass can reduce a building's reliance on artificial lighting and significantly reduce its cooling load. In addition to sustainability and occupant benefits, architects are also given the freedom to design without the need for blinds and other shading devices that clutter the exterior of the building.



Uncontrolled glare and heat gain at Bowie State University could have made this space unusable.



Electrochromic Glass tints to control heat and glare, making the space usable again.

This article continues on http://go.hw.net/AR102018-4. Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. How many layers are in electrochromic coating?
   a. 2 b. 3
   c. 4 d. 5

2. True or False: In-pane zoning can achieve multiple tint states within a pane of glass.
   a. True b. False

3. Users can operate EC glass control setting to
   a. manage light and glare b. energy use
   c. color rendering d. All of the Above

4. True or False: Daylight enables more worker productivity, higher student test scores, and increased retail sales.
   a. True b. False

5. Most EC products have a range of VLT from below _____% to above _____%.
   a. 2,5 b. 3,10
   c. 5,10 d. 10,50

6. True or False: It takes less electricity to operate 2,000 square feet of electrochromic glass than to power a single 60-watt light bulb.
   a. True b. False

7. EC glass can help earn credit towards green building certifications such as
   a. LEED b. BREEAM
   c. WELL d. LBC
   e. All of the Above

8. EC glass installed at SCHEELS reduced energy demand and the need for HVAC in the store by blocking up to _____% of solar heat.
   a. 33 b. 45
   c. 51 d. 91

9. True or False: EC glass can eliminate the need for blinds.
   a. True b. False

10. True or False: No static glass can meet the performance of EC at 1% Visible Light Transmittance (VLT) and 0.09 Solar Heat Gain Coefficient (SHGC).
    a. True b. False

SPONSOR INFORMATION

SageGlass®

SageGlass is wholly owned by Saint Gobain, one of the world's largest glass manufacturers. SageGlass electrochromic glass is a revolution in building products, providing glass that automatically changes tint in response to exterior conditions, transforming glass from a static to active part of building design.

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LEARNING OBJECTIVES

1. Evaluate how the healthcare industry is evolving to meet the demands of changing demographics, provide more patient-and provider-centered care, and offer a retail approach to healthcare.
2. Identify design solutions that meet evolving healthcare challenges, which include provider burnout, rising costs, and poor patient outcomes.
3. Analyze how surface materials provide safety, efficiency, and patient comfort through the 3D's of healthcare design: disinfection, durability, and design.
4. Describe applications for surface materials in healthcare design, including public, patient, procedural, and staff areas.

CONTINUING EDUCATION

AIA CREDIT: 1 LU/HSW
IDCEC CREDIT: 0.1 CEU

AIA COURSE NUMBER: AR102018-5
IDCEC COURSE NUMBER: CEU-107611

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HEALTHCARE INDUSTRY EVOLVING WITH CHANGING DEMOGRAPHICS

The mission of healthcare organizations is to provide patient care that is effective, medically relevant, and operationally efficient in a comfortable, convenient environment where the patient-provider relationship is at the center. To achieve these lofty goals, the healthcare industry has consciously shifted its focus towards patient-centered care that also considers the provider experience, and offers a retail approach to healthcare.

Today's hospitals and healthcare organizations must continually assess and plan to meet the needs of a changing patient population that is becoming more diverse. Population size, age, obesity, race, culture, religion, language, and education all affect availability of resources, cost of care, and conditions associated with each population group. These characteristics drive expectations for care and define hurdles that have to be overcome in order to establish a patient-provider relationship that fosters trust. To build trusting relationships, this cultural complexity must be considered when creating the built environment where healthcare is delivered.

In addition to challenges that come with patients' changing needs, there is also a shortage of trained health professionals to care for the aging population. By 2060, the number of Americans ages 65 and older will more than double, from 46 million today to over 98 million, and this group's share of the total population will rise from 15 percent to nearly 24 percent in that same time period. In order to accommodate these increases, the healthcare industry must build more long-term care facilities, as well as plan accommodations for those patients with mental health challenges.

An aging healthcare workforce will also require facility accommodations in order to effectively do their jobs. Ergonomic and mechanical lift devices, along with additional training, can help workers avoid injury on the job and in their interactions with patients. Changes to hospital planning can also improve the design of patient units to address the need for appropriate furniture, lighting, and surface materials such as countertops, vanities, walls, flooring, and more.

Biophilic-inspired HPL and Solid Surface promote rest and recovery.

Solid Surface supports disinfection for treatment areas.

Championed by architects, designers, product designers, engineers, and environmental design researchers, the concept of "Universal Design" is a promising start in treating patients effectively while meeting the needs of people from all walks of life. The goal of universal design, within the context of healthcare environments, is for "all people, to the greatest extent possible, without adaptation or specialized design" to experience a healing space that supports patients and workers alike.

HEALTHCARE DESIGN CHALLENGE: PATIENT AND PROVIDER EXPERIENCE

Poor patient outcomes and high provider burnout are two healthcare industry challenges that can be improved with universal healthcare design that supports the physical, psychological, and emotional needs for all who use the space, including providers and family. Patient satisfaction and provider experience can go hand-in-hand, with both ultimately affecting costs and outcomes.

Physicians and other members of the healthcare workforce, such as nurses and receptionists, report widespread burnout and dissatisfaction. In the U.S., provider burnout is at epidemic levels with 54 percent of physicians reporting they experience one or more symptoms of burnout. These physicians have twice the 2-year turnover rate compared to non-burned out physicians. Burnout is also associated with lower patient satisfaction, reduced health outcomes, and increased costs. According to the Annals of Family Medicine article, *From Triple to Quadruple Aim: Care of the Patient Requires Care of the Provider*:

- "Dissatisfied physicians and nurses are associated with lower patient satisfaction.
- Physician and care team burnout may contribute to overuse of resources and thereby increase costs of care.
- Unhappy physicians are more likely to leave their practice; the cost of family physician turnover approaches $250,000 per physician.
- Dissatisfied physicians are more likely to prescribe inappropriate medications which can result in expensive complications.
- Physician burnout is associated with reduced adherence to treatment plans, resulting in negatively affected clinical outcomes.
- Burnout also leads to lower levels of empathy, which is associated with worsened clinical outcomes for patients with diabetes.
- Patient safety is threatened by nurse dissatisfaction; many nurses report that their workload causes them to miss important changes in their patients' conditions.
- Dissatisfied physicians are 2 to 3 times more likely to leave the medical practice, thereby exacerbating the growing shortage of primary care physicians and complicating the achievement of a healthy population."

The same source reveals that healthcare providers that improve work life have more satisfied physicians who have been known to:

- Show more patient empathy.
- Enjoy more trusting relationships.
- Have higher rates of patient compliance with higher satisfaction scores.
- Experience better clinical outcomes.
- Have lower costs to facilitate the healing process.

HEALTHCARE DESIGN CHALLENGE: LOWER COSTS AND BETTER OUTCOMES

Healthcare-associated infections (HAIs) such as MRSA, staph, ventilator-associated pneumonia, central line-associated blood stream infections, and catheter-associated urinary tract infections are also a major challenge to the healthcare industry nationwide. According to Healthcare Industry Manager Dr. Mark Krejchi, "HAIs are a significant risk to the health, safety, and welfare of the patients, their loved ones, and the staff occupying a built environment." The Centers for Disease Control and Prevention (CDC) describes the impact of HAIs as, "A significant cause of illness and death with devastating emotional, financial, and medical consequences… These infections lead to the loss of tens of thousands of lives and cost the U.S. healthcare system billions of dollars each year." Tom Frieden, MD, MPH, Director of the CDC acknowledges that, "Although there has been some progress, today and every day, more than 200 Americans with healthcare-associated infections will die during their hospital stay." In addition to the human cost and suffering, legal liability, and destruction of brand value, the estimated financial cost to the industry is great.

The Multistate Point-Prevalence Survey of Healthcare-Associated Infections published by the New England Journal of Medicine states that, "Approximately 1 in every 25 inpatients in U.S. acute care hospitals has an infection related to hospital care." Most notably, research shows that when healthcare facilities, care teams, and individual doctors and nurses focus on prevention strategies, rates of some targeted HAIs can decrease by more than 70 percent. HAIs must be mitigated in order to lower costs and produce better outcomes for healthcare facilities.

Environmental surfaces play an important role in the mitigation of HAIs. According to an American Journal of Infection Control article, "There is now compelling evidence… that contaminated surfaces contribute to the transmission of hospital pathogens. The finding that admission to a room previously occupied by a patient with a hospital pathogen increases the risk of acquiring that pathogen, combined with intervention studies showing that this increased risk can be mitigated by improved environmental decontamination, provides the most powerful evidence that contaminated surfaces contribute to transmission and that more needs to be done to improve surface decontamination. Improvement strategies include interventions to reduce and contain the shedding of pathogens into the environment and interventions to improve the efficacy of cleaning and disinfection. The most appropriate strategies to address surface contamination will depend on the setting and on local epidemiology."

QUADRUPLE AIM

How is the healthcare industry responding to these challenges? Evolving healthcare practices, advanced technology, and innovation in design have converged, highlighting the need for a healthcare built environment that not only supports physical tasks for those committed to delivering care, but also the psychological and emotional needs of patients, providers, and loved ones who occupy the space. The focus has transitioned from merely treating injury or illness to encouraging changes in lifestyle that result in ongoing wellness. This is a major paradigm shift in the strategy of delivering healthcare.

Minimal design attention that merely provides a pleasant, clean and sterile-like environment are long gone. Facilities must also provide an environment for healing that encourages healthy choices which lead to faster recovery and overall wellbeing.

The design of healthcare facilities should alleviate stress, mitigate the spread of disease, improve occupant comfort, and produce better outcomes. It should also enable the coordination and delivery of care across multiple specialties, such as routine patient care in a family practice setting coupled with same-site mental health services. Building trust between the patient, provider, support staff, and organization is another factor of successful healthcare design, as is maintaining the continuity of that trust through an extended network of services that follow the patient's healing journey across multiple facilities.

The industry refers to this strategy as the Quadruple Aim of Healthcare. The Quadruple Aim is a coordinated approach for delivering healthcare that is aligned with four pillars to create the Patient-Provider trust necessary to deliver exceptional outcomes at a lower cost. When coordinated properly, a holistic solution can be delivered that is valued by all the stakeholders involved.

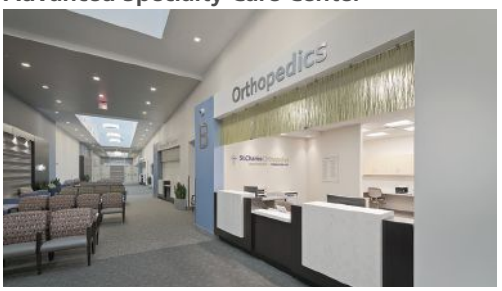
How is the execution of the Quadruple Aim strategy reflected in the built environment?

- Convenient, coordinated and capable delivery of healthcare services that provide quality patient outcomes.
- Expansion of medical office building (MOB) construction that penetrates more deeply into the community to connect and build patient-provider trust.
- Brand Value that connects facilities across expanding geography and consistently delivers on the brand promise regardless of the service or facility location.
- Design for coordinated care that best positions the provider to help their patients heal, and creates an environment that facilitates the patient's healing process.

The Quadruple Aim is a coordinated approach for delivering healthcare that is aligned with four pillars to create the Patient-Provider trust necessary to deliver exceptional outcomes at a lower cost.

CASE STUDY #1— STONY BROOK MEDICINE

Advanced Specialty Care Center



Quartz, along with Solid Surface and Laminate, grace the countertops, casework, and windowsills throughout specialty common areas, reception desks, and nurse stations.

"The best ideas in medicine." This is the tagline of Stony Brook Medicine, a leading academic medical center, whose pursuit of excellence hinges upon a commitment to advanced education, technology, and innovation. The latest archetype of this pledge takes form in a new 120,000 sq. ft. state-of-the-art Advanced Specialty Care Center in the heart of Long Island. Paving the way for the next generation of multispecialty facilities, this integrated healthcare system was developed to support the growing healthcare needs of the Commack community and offers more than 30 medical specialties.

Designed to provide high-quality healthcare and value in numerous fields of health services, the facility is a highly demanding built environment—one that requires surfaces that can match performance. With more than seven designs across three products, a broad range of engineered surfaces were incorporated into the design. A stairway made out of Quartz is a perfect example of function and splendor. An atypical application of Quartz provides patients and staff with a unique lobby feature that can stand up to the constant hustle and bustle of patient care while maintaining its appeal.

Quartz, along with Solid Surface and Laminate, grace the countertops, casework, and windowsills throughout specialty common areas, reception desks, and nurse stations. In addition, the patient exam areas and bathrooms feature a variety of Quartz and Laminate. The overall design is a seamless blend of beauty, high-performing finishes and materials that transform the space into a welcoming and functional environment.

RETAIL APPROACH TO HEALTHCARE

In response to increasing marketplace pressure to provide convenient, coordinated, and capable healthcare, the industry is also incorporating retail strategies. The Retail-ization of healthcare has created market pressure to expand access to medical services within the community which creates a competitive position for capturing

more patients and gaining referrals. This pressure has increased the utilization of MOB-type architectural structures that must be connected through brand recognition and service value to the main medical campus.

Clinics capable of providing quality care are now conveniently located in retail stores, supermarkets, and pharmacies. But, this strategy extends beyond co-locating clinics in existing retail spaces to include micro-hospitals and stand-alone specialty care centers. Labs, pharmacies, and exam spaces are located in the same building, providing coordinated and collaborative care for efficient patient diagnosis and treatment. This healthcare model draws potential customers into the network and provides multiple customer touch points through an integrated systems approach. Providing stand-alone service platforms in the community creates a built environment configured to execute on the promises inherent to satisfying the quadruple aim.

Brand is about the nature and value of your relationships with those you serve and brand value is built on trust. Because the decisions we make about our healthcare are extremely personal, unpredictable in occurrence, and often made in dire circumstances, consistency between a brand's promise and the brand experience is more critical in healthcare than in any other industry.

Transparent partnerships between providers and patients result from merging homogenous corporate and personal values; this is a prerequisite for the development of trust that leads to patient loyalty. Trust forms through shared values, so in the highly competitive and culturally complex healthcare markets of today, it is risky to ignore the importance of establishing the trust that leads to loyalty.

This article continues on http://go.hw.net/AR102018-5. Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. True or False: The number of Americans ages 65 and older will more than double from 46 million today to over 98 million by 2060.

2. The design of healthcare facilities should:
   a. Alleviate stress
   b. Mitigate the spread of disease
   c. Improve occupant comfort
   d. Produce better outcomes
   e. All of the above

3. In the U.S., provider burnout is at epidemic levels with _____ percent of physicians reporting they experience one or more symptoms of burnout.
   a. 25
   b. 42
   c. 54
   d. 75

4. Research shows that when healthcare facilities, care teams, and individual doctors and nurses focus on prevention strategies, rates of some targeted HAIs can decrease by more than _____ percent.
   a. 50
   b. 60
   c. 70
   d. 80

5. The four pillars of Patient Experience, Provider Experience, Lower Cost Care, and Better Outcomes make up the _____.
   a. Healthcare Axis
   b. Quadruple Aim of Healthcare
   c. Quadrant of Care
   d. The Missing Aim

6. True or False: The retail model of healthcare draws potential customers into the network and provides multiple points of customer contact through an integrated systems approach.

7. True or False: The 3Ds of healthcare design are Disinfection, Durability, and Design.

8. Surfaces in healthcare applications must be:
   a. Easy to clean and disinfect with minimal seams and smooth textures
   b. Manufactured from materials with non-porous, moisture-resistant properties
   c. Made from materials that allow flexibility in form and function
   d. Available in designs that provide awareness, orientation, and comfort to patients and staff alike
   e. All of the above

9. _____ is a smooth, non-porous, colorthrough surface that's easy to clean and disinfect and an excellent solution in high-touch areas such as healthcare interiors where infection control is critical.
   a. Quartz
   b. High Pressure Laminate
   c. Solid Surface

10. Which surface material is ideal for nurses' station cabinets?
    a. Solid Surface
    b. High Pressure Laminate
    c. Thermally Fused Laminate

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KEYNOTE

Steven Johnson,
Author, *Wonderland* and *How We Got to Now*

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Odyssey Elementary School by VCBO Architecture
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Creating a Blueprint for Better

Illya Azaroff, AIA, founding principal of architecture firm +LAB and associate professor at CUNY – New York City College of Technology, has expertise in disaster mitigation and resilient planning, design, and implementation. As a regular adviser for local and federal officials, his guidance is evident in the New York Department of City Planning's Housing Retrofit Guidelines, as well as FLASH (the Federal Alliance for Safe Homes)'s Resilient Design Guide and Enterprise Community Partners Multi-Family Resilient Strategies. Additionally, his studio, in collaboration with industry partners, is engaged in the design of a residential prototype (#HurricaneStrong) in Breezy Point, in Queens, N.Y.

As told to Caitlin Reagan

Architecture is rooted in culture, and that culture is defined by the place, the people, and the circumstances that form that particular moment in time. Often, we tap into the narrative of what the future may hold by working with these communities. Whether we do that through community workshops or individual clients, we uncover the collective vision of where they want to be and where they want to go. It's a holistic approach to design that considers the desires of the client but also recognizes the forces at play—the geographies, the specificity of the place, the science. Every project, I learn something new—a different place, a different person, a different circumstance.

Following Superstorm Sandy, the idea of information sharing became second nature to everyone. Those strong bonds, threads, and bridges that were built during that period still exist today. As architects, our open, collaborative nature became infectious, with agencies and officials ultimately increasing sharing across various platforms in the government processes. They've learned a lot from architects in that collaborative process. For the most part, that has been key to New York advancing its sustainability and resilient policies. The question remains—have these attitudes proliferated to the next generation of leaders and architects? That, I'm not sure about. I hope that it does, given the trend towards social impact design.

For the model home, our goal was to bring together the best practices across the industry to create a resilient and sustainable home that will not only inform policy but spark future innovation.

Our hope was to bring that collaborative effort together with FLASH and a team of industry partners to create this home. We'll be sharing the plans, the house's operation and all of the performance data with nonprofits, industry partners, and governing bodies. We're hoping we're going to change policies in the way that people really look at replacement of housing. That's the ideology behind this, being agents of change. Changing people's minds, changing policy, and making resiliency accessible to the general public. AIA

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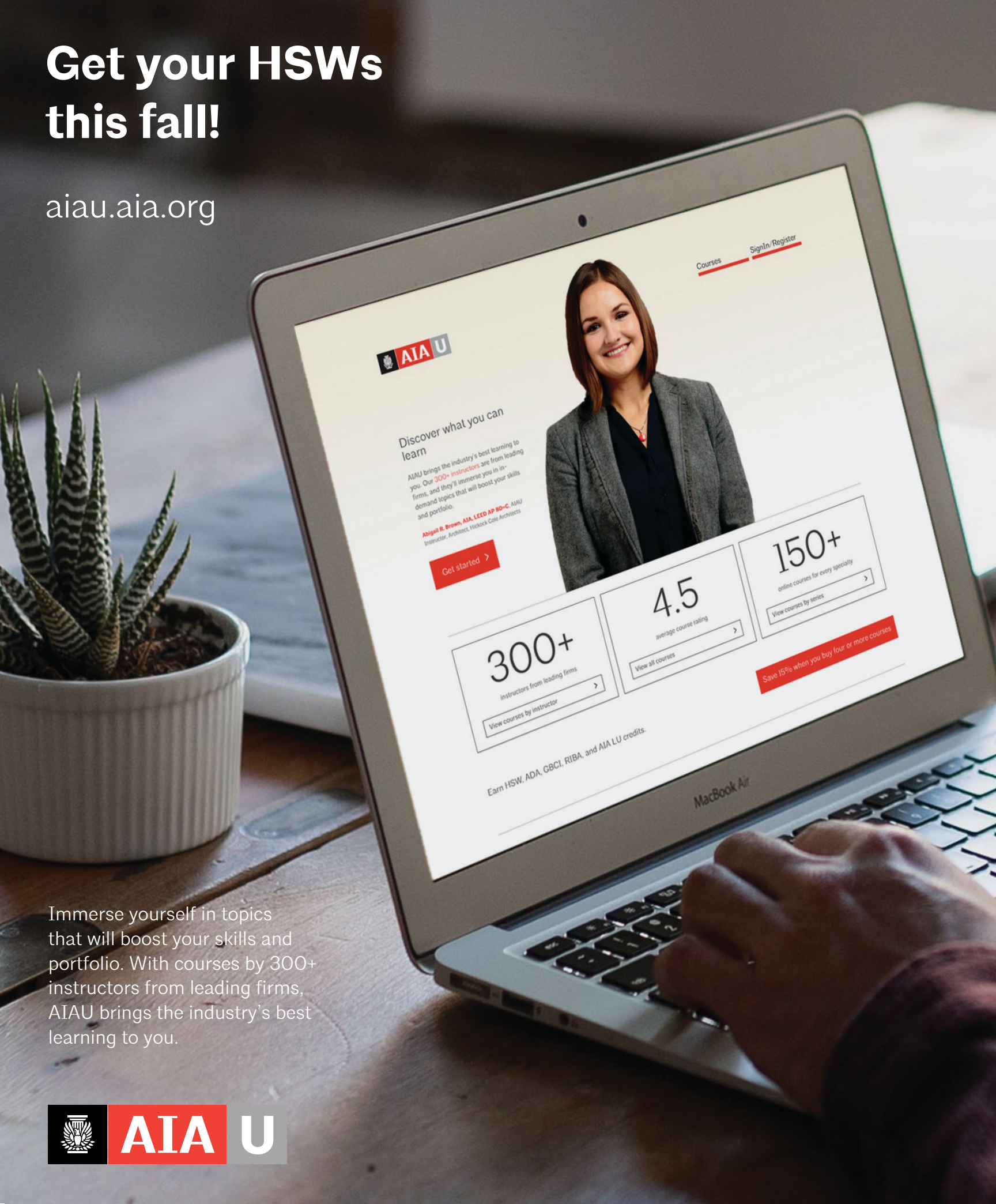

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AIANow

By Katherine Flynn

Your New Home, Cubed

A designer upgrade to the modular house model.

In space-strapped London, the biggest obstacle to building new houses is, simply, the availability of land to put them on. New London-based developer CubeHaus, which bills itself as a creator of "modular homes at reasonable prices," saw a ripe opportunity to marry unmet demand with good design.

Tapping well-respected architectural practices Adjaye Associates, Carl Turner Architects, Skene Catling de la Peña Architects, and Faye Toogood to create four standardized housing models, CubeHaus aims to take advantage of small or awkwardly shaped urban sites that might not easily lend themselves to the rigidity of a traditionally designed home. The bulk of the structures will be manufactured off-site, in solid panels of cross-laminated timber. Ideally, lower margins and use of off-site production mean the end product will be 10 to 15 percent cheaper than an equivalent house in any given area.

ILLUSTRATION: LAUREN NASSEF

AIAFeature

Designing for Healthy Decisions

A series of modest and well-researched design strategies can make healthy living the only choice on college campuses.

By Steve Cimino

ILLUSTRATIVE SITE PLAN: CLARK CONSTRUCTION, HKS, AND SAFDIE RABINES ARCHITECTS

The North Torrey Pines Living and Learning Neighborhood at the University of California, San Diego was designed as a living lab that will reinforce how the built environment impacts human health and well-being.

College can be a breeding ground for unhealthy behaviors and mental health issues, with campuses offering a plethora of easy-to-access fatty foods while forgoing windows to promote beneficial movement and exercise. According to a 2017 study by the American College Health Association, over 60 percent of college students reported feeling overwhelming anxiety and almost 34 percent are overweight or obese.

Upali Nanda, ASSOC. AIA, is associate principal and director of research at HKS, and one of her goals is to reinforce how design can alter behavior. In 2016, she produced a report—funded in part by an AIA Upjohn grant—called "Healthy Choices = Healthy Campuses." It found that supporting healthy behaviors on college campuses doesn't have to be comprehensive or costly. In fact, it should be neither.

"At the core of healthy living are the choices you make around diet and movement," Nanda says. "That's when the conversation began between architecture and public health, and how we stumbled upon point-of-decision design."

The Centers for Disease Control and Prevention (CDC) have used point-of-decision prompts to incentivize healthy choices, such as reducing tobacco use by limiting advertising at the register and steering people toward the stairs rather than the elevator by making stairwells more appealing. Those choices are instantaneous, and design has to work hard in obvious and subtle ways to combat habits and routines. But, as the saying goes, people can change—even in a split second. Point-of-decision design (PODD) is a framework Nanda proposes to focus on design at critical moments amid the myriad choices on typical college campuses. Ideally, students will make better choices without even realizing it.

This framework has numerous potential applications on campuses, where many students are making choices on their own for the first time. Nanda and her research team—with input from policymakers, planners, designers, and students—determined 14 points of decision where design could provide a helpful nudge, such as classrooms, courtyards, and even digital spaces like the ever-present smartphone. They also offered 24 design strategies that may influence positive behaviors, including an interactive app with geotagged healthy spaces, tree-lined walkways, community gardens, and dinnerware designed with portion control in mind.

"We mapped out not only personas of numerous college students but also how you'd organize a campus around their desires and these points of decision," she says. "One thing we recognized was that students will always go for coffee. So what if you take a coffee shop and put a hydration station there as well, or more green space, or a healthy food truck? What if you make the common routes to that shop more appealing and walkable? More than anything, we wanted to avoid thinking of design in isolation."

Nanda noted that because student health is linked closely to academic achievement, there is an appetite for these strategies among many administrators. Yet, as is often the case, it comes down to money. Her findings implore designers to take a reasonable, person-centered approach to campus design, but convincing all the school's decision-makers to go along isn't always easy.

"There are going to be challenges with relationships already in place," Nanda says, "with food vendors, with the transportation network, and with the city. It is not a solution that can be crafted in isolation. But the power of PODD, especially on a limited budget, is that it helps prioritize where you put your money. Where are we going to be most effective with a design intervention? And as you get traction and see better outcomes, you will hopefully get more money for better, healthier environments going forward."

Bringing Health to the Forefront

You might think that the connections between design and health are clear by now. The AIA has certainly made the topic a pillar of their sustainability portfolio. But if you ask Michelle Eichinger, a member of Nanda's research team, she would be forced to disagree.

"It can be a difficult conversation with some firms," she says. "I'll be in a meeting with designers, to discuss public health and design, and they'll say, 'We're not here to build a hospital.' Well, I'm not talking about *just* a hospital. Let's talk about making neighborhoods healthier. Let's talk

AIA Feature

CONTINUED

The neighborhood at UC San Diego will include underground parking designed to reinforce a bike and pedestrian culture, along with a centrally located market and common kitchen facilities in all residential buildings.

about connectivity to places, or creating an environment that supports walking or running or biking or access to healthy food."

Eichinger is a public health adviser who specializes in how the communities we're a part of impact our well-being. As her career has advanced, she's realized public health can accomplish only so much. Collaborating with other sectors is paramount to enacting real change in healthy behaviors, and no sector is more valuable to her than architects and designers.

"It's a relief sometimes to find an architect who gets it," she says. "A lot of architects don't, and it's not because they don't care. It's just not on their radar, or they are more concerned with the bottom line."

How design can impact health is glaringly obvious to Eichinger, often in the small ways Nanda also preaches. Beyond the work the CDC did with tobacco cessation and stairs promotion, there's putting healthy food up front at grocery stores. There's encouraging movement of any sort, whether it's walking from point A to B or highlighting bike paths. It's just a matter of emphasizing the right elements, especially if they're already present.

"Designing for health may feel like a risk, because it's not what many architects are used to, and they aren't sure about the long-term investment," Eichinger says. "But we are seeing, especially with Millennials, that they want to have more walkability. They want to live in communities that foster healthy behaviors. There is a market for it."

Which brings the conversation back to college campuses and Nanda's research. Eichinger believes the campus is the perfect breeding ground for building healthy behaviors, mostly because it is the center of a student's universe.

"This is not just their academic environment," Eichinger says. "This is their living environment. This is their social environment. If we talk about the whole student, and show them that their well-being is really our concern, that will speak volumes."

"We are trying to make the healthy choice the default," she adds. "Then it becomes no longer a choice; it becomes a habit."

The Gold Standard in San Diego

Though every college and university would support the abstract idea of healthier and more productive students, following through is less guaranteed. Yet, if you look to the University of California, San Diego (UCSD), you'll see a school that is making health a priority in ways large and small.

Matthew Smith is an architect and project manager at UCSD currently working with Nanda. "We agree with Upali, beyond intuition, that the built environment has a profound effect on individuals' well-being," Smith says. "And a designer can study and deliver desired outcomes through evidence-based design."

Fortunately, this thought process does not lead to many uphill battles at UCSD. The university has a vision of transformation, where the campus becomes both a destination and a socially dynamic space within the campus as well as the greater San Diego community. Nowhere is this clearer than the North Torrey Pines Living and Learning Neighborhood, a project that broke ground in June 2018. It will be the new home of the university's Sixth College, but its aims are considerably more impressive than a loose grouping of buildings.

"When we developed the detailed project program with our partners," Smith says, "we included more qualitative and aspirational information than a typical programmatic document. We worked to communicate how the faculty, staff, and students envisioned their social and intellectual futures, and how the built environment can facilitate that transformation. We also contemplated a measurement and verification research study that affirmed goals like activated ground plane transitioning into contemplative spaces, promoting serendipitous interaction."

"If we talk about the whole student and show them that their well-being is really our concern, that will speak volumes."
—Michelle Eichinger

AIAFuture

The detailed ask was answered by a team led by Clark Construction, including HKS and Safdie Rabines Architects. "They responded to each of our guiding principles, describing how the design they're proposing will achieve our aspirations," Smith says. "They leaned on Upali for that."

The intention is to turn the 1.6 million-square-foot neighborhood into a living lab. Beyond concepts that focus on general wellness—such as a centrally located market with an anaerobic digester, significant amounts of bike parking, common kitchen facilities in all residential buildings, and operable windows everywhere for natural ventilation—the design teams plans to collaborate with the university in a longitudinal study to validate if the nudges they're incorporating really do improve the well-being of UCSD students, faculty, and staff. It's a massive endeavor, far beyond the scale Nanda advocates in her research, but the LEED Platinum project is an opportunity to test these ideas in a supportive environment and apply outcomes to the university's ongoing transformation.

"You do need to have operational buy-in," Smith notes. "It starts with the culture of a research-focused university and the commitment of all the constituent parts—housing, dining, and hospitality; the divisions of Social Sciences and Arts and Humanities, Sixth College, Facilities Management—to realize UCSD's vision of transformation. And, of course, a design team that can deliver."

Nanda recognizes that UCSD has unique DNA; most schools are not growing with these ideals in mind. But there is an understanding that this is a chance to infuse a neighborhood-scale project with small-scale strategies that can be adopted in campuses everywhere—at little cost.

"Transformative design doesn't have to cost more." Smith notes. "With a clear vision, open collaboration with stakeholders, and an intentional process, you can achieve desired outcomes."

It is Nanda's mantra from Smith's mouth, with more available resources but the same thoughtful approach. It is a too-rare chance to both push healthy behaviors and then test the outcomes, with a broader importance that Nanda cannot stress enough.

"If college campuses take these design ideas and apply them when students are asking themselves how to get to class or what to eat," Nanda says, "we could—without a whole lot of money, without drugs, without healthcare—perform a real public service." AIA

ILLUSTRATIVE SITE PLAN: CLARK CONSTRUCTION, HKS, AND SAFDIE RABINES ARCHITECTS (OPPOSITE) | PHOTOGRAPHY: SHoP ARCHITECTS (THIS PAGE)

325 Kent is the first of five buildings slated to open as part of SHoP Architects' master plan for the historic Domino Sugar Refinery site.

Private Money, Public Space

A recent P3 case study boosts public access to an iconic Brooklyn site, urged forward by productive community meetings.

In June, an iconic section of Brooklyn's Williamsburg waterfront opened to the public for the first time in 160 years. Domino Park is one of the first completed elements of the larger Domino Sugar Refinery Master Plan, a transformation of an 1880s factory site into a brand-new multiuse development that will reshape the borough's skyline.

What makes the park unusual—aside from the equipment salvaged from the original refinery, such as a row of 36-foot-tall syrup-collection tanks and two metal cranes repainted a vibrant shade of turquoise—is that it was underwritten entirely by private funding. Two Trees, a Brooklyn-based development company, worked with landscape architects James Corner Field Operations to surpass the minimum requirements for public waterfront access required by New York City zoning to create a public amenity that serves as a public ambassador, of sorts, for one of the borough's biggest development projects of the last decade.

Lisa Tziona Switkin is a senior principal at James Corner Field Operations, which worked on the High Line, among other high-profile projects. She says that her firm's main goal for the park design was to create a connection between the park and the surrounding neighborhood.

"We wanted to take very seriously reconnecting [the space] back into the city, and do that in an effective way," she says.

Chris Sharples, AIA, co-founder and principal at SHoP Architects, the project architects for the entire 11-acre Domino Sugar Refinery project, was not enamored with the previous plan for the site. "There's always the dead end where streets stop and you don't sense that connectivity," he says. "We looked at how the streets would actually comb through the development and reconnect the Williamsburg community with the waterfront. It was really a cross-grain way of thinking."

The historic refinery site's redevelopment has been in the works since 2010, but following the recession when the original developer couldn't follow through with its city-approved plan (and evoked controversy for the somewhat insular nature of its plan), Two Trees stepped in, retooling the existing plans to include 60 percent more public space along the waterfront.

"The base plan pretty much privatized the waterfront," Sharples says. "It was really

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designed for the development and culminated in a series of cul-de-sacs, but it didn't really invite the community outside of the development into the public open space along the waterfront."

Justin Garrett Moore, who managed the project's urban design when he worked at New York's Department of City Planning and currently heads the NYC Public Design Commission, says that Two Trees reasoned that a better configuration of public space would allow better long-term design for the neighborhood, and a better added overall value. The full redevelopment will eventually include four new buildings situated in close proximity to the park, as well as the renovation of the original 19th-century factory building.

"It's an amenity that immediately serves the development, but it also changes the site plan dynamic," Moore says of the park. "Two Trees said, 'We want public space to be at the heart of this development.' They wanted to create a new gathering point for the neighborhood. It's not just a waterfront walkway, but a place for the life of the city to have a space. They, by far, exceeded the zoning requirements."

New Model, New Trend

Domino Park is just the latest example of a larger trend—across the country but particularly in New York—of new public spaces being brought to fruition through private money. As recently as a decade ago, the term "public-private partnership" was most frequently used in the context of big, if not particularly inspiring, public projects: highway infrastructure, and other undertakings whose costs usually topped $100 million. More recently, however, city governments have seen partnerships with private companies as viable options in delivering innovative public spaces.

"In this tax-cut world, public-private partnership and cross-sector partnership is really important," says Susan Chin, FAIA, executive director of Design Trust for Public Space. "What we've found is that having that cross-sector partnership [means that] everybody has kind of a piece of the action and owns this place. If you want volunteers to garden, they're really eager and happy to get involved in some way, shape, or form. And then, having that developer be involved—they're proud of this development, right? They want to show that they've done the best thing that they possibly could for the community."

There are plentiful examples around New York of how this new model is playing out. Brooklyn Bridge Park's construction was funded through city capital funds, but its operation is entirely financed through revenue generated by a hotel and condo building located on the adjacent property.

Chin emphasizes that community input and involvement are essential components in the process of bringing any new public space to fruition, something which SHoP and James Corner Field Operations, in partnership with Two Trees, tried to be mindful of when planning Domino Park.

"They [Two Trees] actually had those conversations with people in the community to get input and buy-in around the idea that a better public space, or a different configuration, was something that could be a positive," Chin says. "Eventually, when they got to a certain point of really figuring out the project, they did charrette-style meetings where the designers would come and present ideas and get feedback. That's fairly atypical for a developer to do that."

Lastly, Chin says that a key component for successful management of a public space created by a private entity is a commitment from that entity to maintain the amenity over time.

"The compact that you're going to have—for not only just building it but also maintaining it—is really critical, whether it's maintained with the same level of quality and interest you had envisioned," Chin says. "Having that level of community engagement, where the community holds the property owner and the folks who are involved [accountable]—holds their feet to the fire—is also a critical piece."

The Future of Public-Private Spaces

Public spaces play a vital role in the social and economic life of communities, and in New York

PHOTOGRAPHY: SHoP ARCHITECTS

SHoP hopes that Domino Park, which anchors the 11-acre "megaproject," will forge a deeper connection between Williamsburg and the waterfront.

AIAFuture

CONTINUED

City in particular they're at the heart of public life—shared resources where experiences and value are created. Domino Park is one of the shiniest and newest examples of a privately underwritten public space, but it's unclear how this new model is going to play out over time when it comes to issues of maintenance, upkeep, and security.

Another older and more well-established example of innovative management models that have proven to be successful includes Manhattan's Bryant Park, which is publicly owned and privately managed by the Bryant Park Restoration Corp. The park's 55 summer employees oversee security, sanitation, gardening, and special events. It has become such a popular spot for banner events during the summer months that one of its biggest problems has been having to turn down engagements that look promising in terms of generating revenue. The park is able to financially support itself because of its popularity, but in the process it has arguably lost some of the spontaneity inherent to non-programmed spaces.

Bryant Park, unlike Domino Park and its counterparts (such as the 4 acres allocated as public space in the public-private Hudson Yards development on Manhattan's West Side largely constructed on city land and managed by the Hudson Yards Development Corp.), has been a part of New York's urban fabric since 1911, and has more or less always been a product of its prime Midtown location. The NYC Public Design Commission's Moore posits that public space is supposed to serve the existing community first and foremost—an ideology that has fueled critics of the High Line, which, despite generating a predicated $1 billion in tax revenues to the city over the next 20 years, is overwhelmingly visited by white tourists, according to a City University of New York study.

With this new model, then, inevitably comes a slew of new questions about who these spaces will primarily serve, as well as how security will be enforced and whether that security will favor the space's owner or its users. How will the spaces integrate with the existing surrounding communities? According to the U.K.'s Joseph Rowntree Foundation, a social policy research center, "People make places, more than places make people."

In the case of privately funded and managed public spaces, the push and pull between people and the spaces they inhabit may take new and unprecedented forms. AIA

Katherine Flynn

AIAPerspective

PHOTOGRAPHY: GABRIELA MARKS

Existing Buildings: The Elephant in the Room

For those who knew of me before I became AIA President, it is probably for coining the phrase: "The greenest building is ... one that is already built." For more than 20 years I have devoted myself to articulating the relevance of existing buildings to sustainability, resiliency, climate change, and livable communities. In the early years of my quest, it was common to hear statements like "What do existing buildings have to do with [fill in the blank]?" While discourse has progressed considerably, recognition of the importance of existing buildings is far from mainstream in the architectural profession today.

Building-sector statistics are compelling. Architects have been busy beavers since World War II. From coast to coast, the United States has accumulated so many buildings that economic projections estimate that over the next 30 years more than twice as many will be renovated than newly constructed. To put it another way, today's early-career architects will spend substantially more time renovating buildings than designing new ones. And yet few firms—and even fewer architecture schools—take seriously the opportunities and challenges of existing buildings.

There is plenty of architecture to be found working with existing buildings. First and foremost, existing buildings must be maintained or—using terms from the field—preserved, conserved, or restored. In addition, after generations of use many existing buildings also need to be adapted to new uses, that is, rehabilitated or renovated. Increasingly, existing buildings are expected to meet entirely new criteria, requiring their transformation. Ideas about existing buildings are evolving. Like water and energy, existing buildings are a resource to be used purposefully and managed.

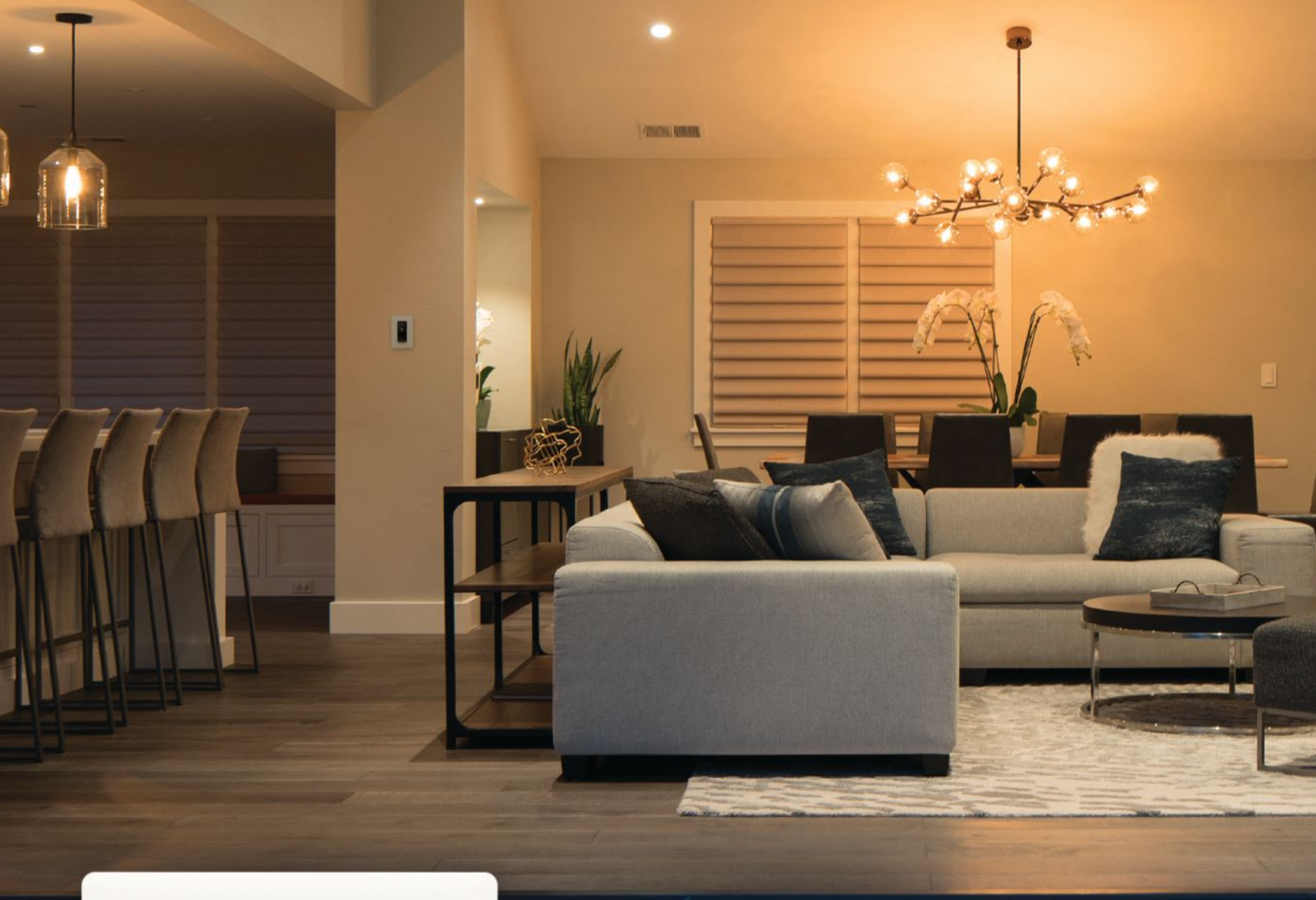
Existing buildings are a resource for growth. Every city and town in the nation has dozens, hundreds, even thousands of abandoned and partially occupied buildings. Simply occupying every floor of every existing building would absorb years of demand for growth and revitalize countless neighborhoods. Renewing existing buildings is the smartest smart-growth strategy.

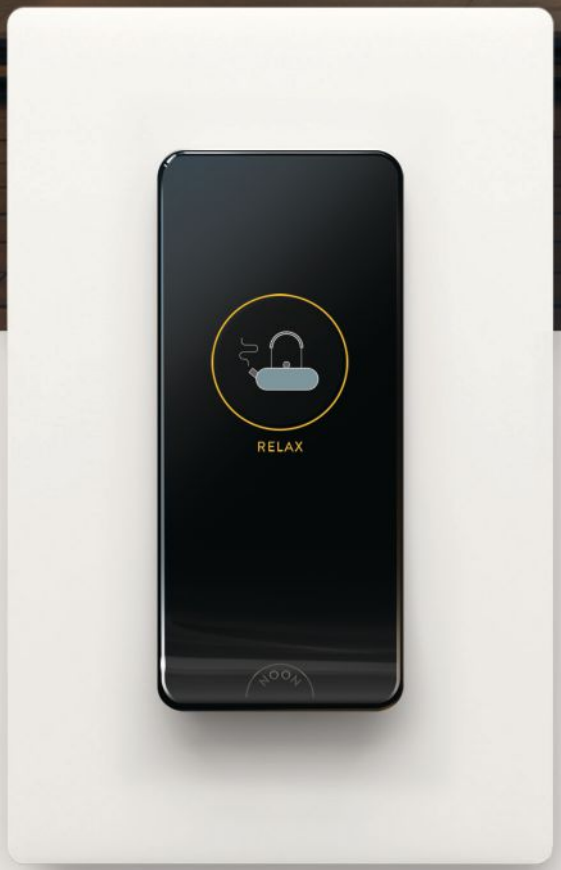
Existing buildings are a resource for tackling climate change. Buildings represent "embodied carbon." Keeping and using existing buildings avoids the release of massive quantities of greenhouse gases, emissions caused by needlessly demolishing and replacing existing buildings. Retrofitting existing buildings to meet high-performance standards is the most effective strategy for reducing near- and mid-term carbon emissions, the most important step in limiting climate disruption. Existing buildings are also a resource for learning about life before buildings were addicted to fossil fuels, and cities and towns were addicted to automobiles in the name of progress.

Existing buildings are cultural and historic resources. What interest would our cities and towns have without the layering of generation upon generation of building? Who would we be without places passed down from parent to child to grandchild and beyond?

For the next generation of architects, embracing the opportunities and challenges of existing buildings is the elephant in the room. How long before our profession notices? AIA

Carl Elefante, FAIA,
2018 AIA President





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“McDonald’s made a conscious decision to turn its back on kitsch. The corporate players on the design team crafted a set of goals, including ‘pure simplicity’ and ‘enduring authenticity.’”

Ross Barney Architects’ McDonald’s Makeover by Karrie Jacobs

The new McDonald's flagship in Chicago's River North neighborhood

A couple of decades ago, I had a boyfriend who liked to work at McDonald's. He didn't flip burgers for the global fast-food giant; rather, he adopted it as his version of Starbucks. He'd sit at a table with his computer for hours, absorbing caffeine from a monumental Diet Coke, maybe munching on some fries. At the time I was mystified by his habit, but I recently experienced a much-belated glimmer of empathy. In early September, I had a leisurely lunch at the new McDonald's flagship in the River North neighborhood of Chicago, which has long been a stronghold of flamboyant chain restaurant architecture.

The new McDonald's, a sparkling 19,000-square-foot-glass box, is a dramatic replacement for the Rock 'n' Roll version of the franchise that previously occupied the site. It is a surprisingly exuberant work of architecture. Ross Barney Architects, whose offices are five short blocks away, designed the building in close cooperation with the McDonald's creative team and Sydney-based interior design firm Landini Associates, which has been conjuring up a future-forward version of the hamburger purveyor, mostly in Australian and Asian cities, since 2014.

I visited on a bright afternoon and found myself in an arcade of touch screens, mounted on posts around eye level. I'd describe them as hamburger ATMs, although McDonald's regards the setup as "kiosk ordering." I chose a Filet-O-Fish meal, found a place to sit, and waited for my sandwich, fries, and Diet Coke to be delivered to my table. It didn't take long.

As novel, and oddly luxurious, as the kiosk/table service combination seemed to me, it's not unique to this location; the new system has been rolled out

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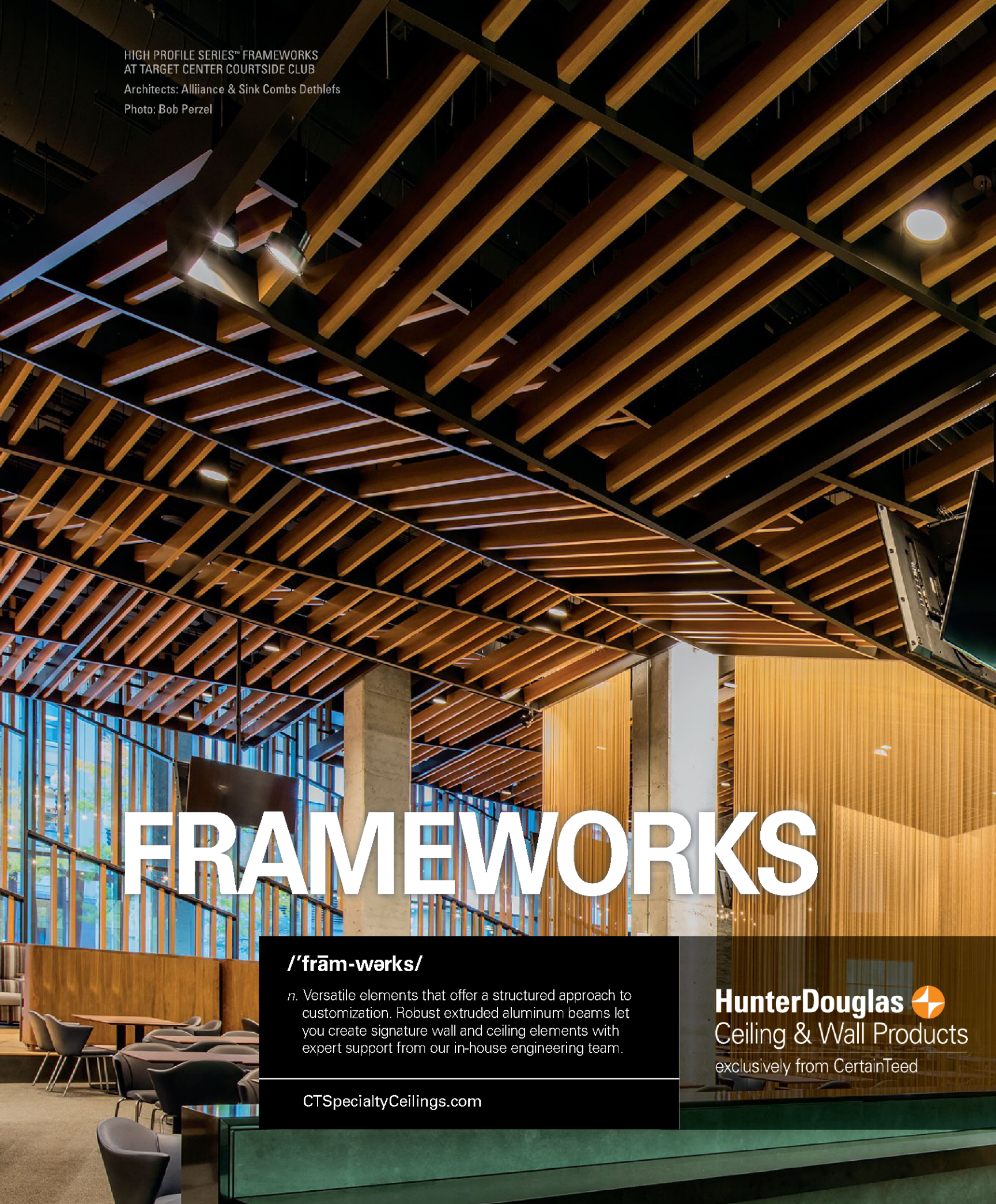

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in more than a third of the 14,000 McDonald's in the United States. The real attraction, however, is the dining area, an epic, light-filled room beneath a 27-foot-high wood ceiling. Visible outside through the windows is a branch of the Rainforest Café with a giant frog on the roof, and a Hard Rock Cafe designed by Stanley Tigerman, FAIA, in high 1980s PoMo style, with a sign in the shape of a monster-sized, illuminated electric guitar. Nevertheless, as I ate my Filet-O-Fish, I felt as though I'd been transported from the American Midwest to Scandinavia. All around me were elemental-looking modern chairs and tables. Some longer tables were lined with lovely minimalist stools that have wire-frame legs and upholstered plywood seats. (The furnishings are mostly from a Landini design package known in-house as "Ray," for McDonald's founder Ray Kroc.)

The space struck me as remarkably generous. It was also uncommonly quiet on the day I visited. The ambient music was so soft that I could hear a gentle murmur of voices. I later learned that the low volume of the music was an accident, a sound system malfunction. Still, my fellow customers seemed to be on best behavior (no intrusive cellphone monologues), as if they were in a library or a shrine. The effect was magical.

As I savored my fries and Diet Coke, I considered the question of what this building represents. Or, as I scribbled in my notebook: "Like who is this for?"

Building on a Chicago Connection

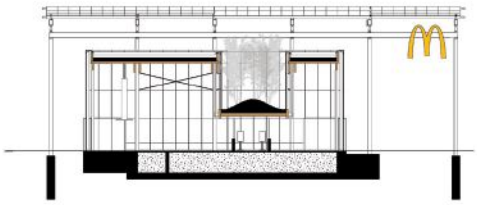
At the Ross Barney offices, on the top floor of a building that formerly housed the firm of legendary Chicago architect Harry Weese, I asked architect Max Carmona, AIA, the McDonald's senior director of global design and development, what the company expected from its new flagship. "There's a couple of things," he said. "One is that it had to be impactful. It had to speak to the future of our brand."

"While we're really proud of our history," Carmona continued, "we've got to evolve. We've always talked about not being Howard Johnson's," he said, referencing the nearly extinct restaurant chain that once dominated American highway rest stops.

The building is also intended to reaffirm the brand's connection to Chicago. McDonald's drive-in restaurants first appeared in Southern California in the late 1940s, but the corporate empire was launched in Chicago in the 1950s by Kroc, who aggressively franchised the limited menu/speedy service concept. In 1971, McDonald's relocated its headquarters to suburban Oak Brook, Ill. Now, like many American corporations looking to attract a younger workforce

Section A–A1

Section B–B1



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The redesigned site downplays the prominence of the golden arches

and rejuvenate the office culture, McDonald's has returned to the city. Earlier this year it moved into a newly constructed office building in Chicago, on the former site of Oprah Winfrey's Harpo Studios. The headquarters has a restaurant on the ground floor, open to the general public, which features McDonald's menu items from other countries.

Carmona points out that the corporation could have made a lot of money selling the Rock 'n' Roll site, which is in a neighborhood teaming with new luxury rental and condo towers. Instead, McDonald's CEO Steve Easterbrook "felt it was really critical, especially with our new headquarters in Chicago, to make a statement," Carmona explains. "It's the closest flagship restaurant to the global headquarters that we have. It was really important to do it right."

The light-filled dining area features a 27-foot-high ceiling

McDonald's considered hiring John Ronan, FAIA, who designed the luminous Poetry Foundation building in Chicago, or David Woodhouse, FAIA, whose Robert Crown Community Center in Evanston, Ill., contains the most photogenic gymnasium imaginable. "They interviewed colleagues of mine that I really respect," says Carol Ross Barney, FAIA, best known for her work on the Chicago Riverwalk. "But we competed and we won."

The firm was on a tight schedule. The building was designed and built within the space of a year. The original Rock 'n' Roll outpost, constructed here in 1983, had sported a red mansard roof; a more recent model, which was built in 2005 and demolished last year, represented what Ross Barney describes as the "supersized era." It was a 1950s-style McDonald's pumped up to epic proportions, demarcated by 60-foot-tall golden arches.

McDonald's made a conscious decision to turn its back on kitsch, however, and embrace a set of principles that are curiously new age. The corporate players on the design team crafted a set of goals, including "pure simplicity," which is defined as "a functional, restrained, quiet use of shape, form, and color that allows the experience to shine." They also were looking for "enduring authenticity," "inviting warmth," "surprising delight," and "genuine informality."

The corporation plans to update all of its U.S. stores, some in the techno-chic style of the outposts in Hong Kong and Sydney. The Times Square McDonald's in New York, for instance, will reopen in December with a version of the "Ray" look. In Chicago, the flagship reflects this newly dialed-down approach to branding. Relatively dainty golden arches are mounted high on the Clark Street corners of the restaurant's shade structure, a massive pergola supported by steel columns. A white steel colonnade topped by a sawtooth roofline has, in this particular location, usurped the primacy of the arches and become the trademark.

To some extent, Ross Barney took design cues from Landini's cool approach to the brand, but she knew that there needed to be a big gesture. "We still had to hold this block down. It couldn't look abandoned in the middle of the city." The shade structure, she contends, "gives it an urban footprint which you appreciate when you see it compete with the frog and the guitar."

Ross Barney's experience designing public space clearly colored her approach to the project. The firm conducted a study of green space in River North and realized that there wasn't much of it. The architects

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determined that the best thing a new McDonald's could do was to provide a bit of greenery in a rapidly redeveloping neighborhood that's short on parks. They planted additional trees in and around the parking lot (which is covered with permeable pavers) and created a grassy outdoor

A 1955 prototype McDonald's, which inspired the 2005 version below

The Rock 'n' Roll McDonald's that was demolished last year

play area. The shade structure covers part of an adjacent "park," where diners can sit at a giant communal picnic table (which might double as a stage). And, working with a local green roof expert, the firm installed a quartet of birch trees in a glass box above the digital kiosks, planted apple trees, broccoli, and Swiss chard elsewhere on the roof, and used a hanging green "tapestry" to symbolically divide the big room. Including the roof, the site now boasts more than 10,000 plants. It's an exaggeration to call the outdoor space a park, but it aspires to be one.

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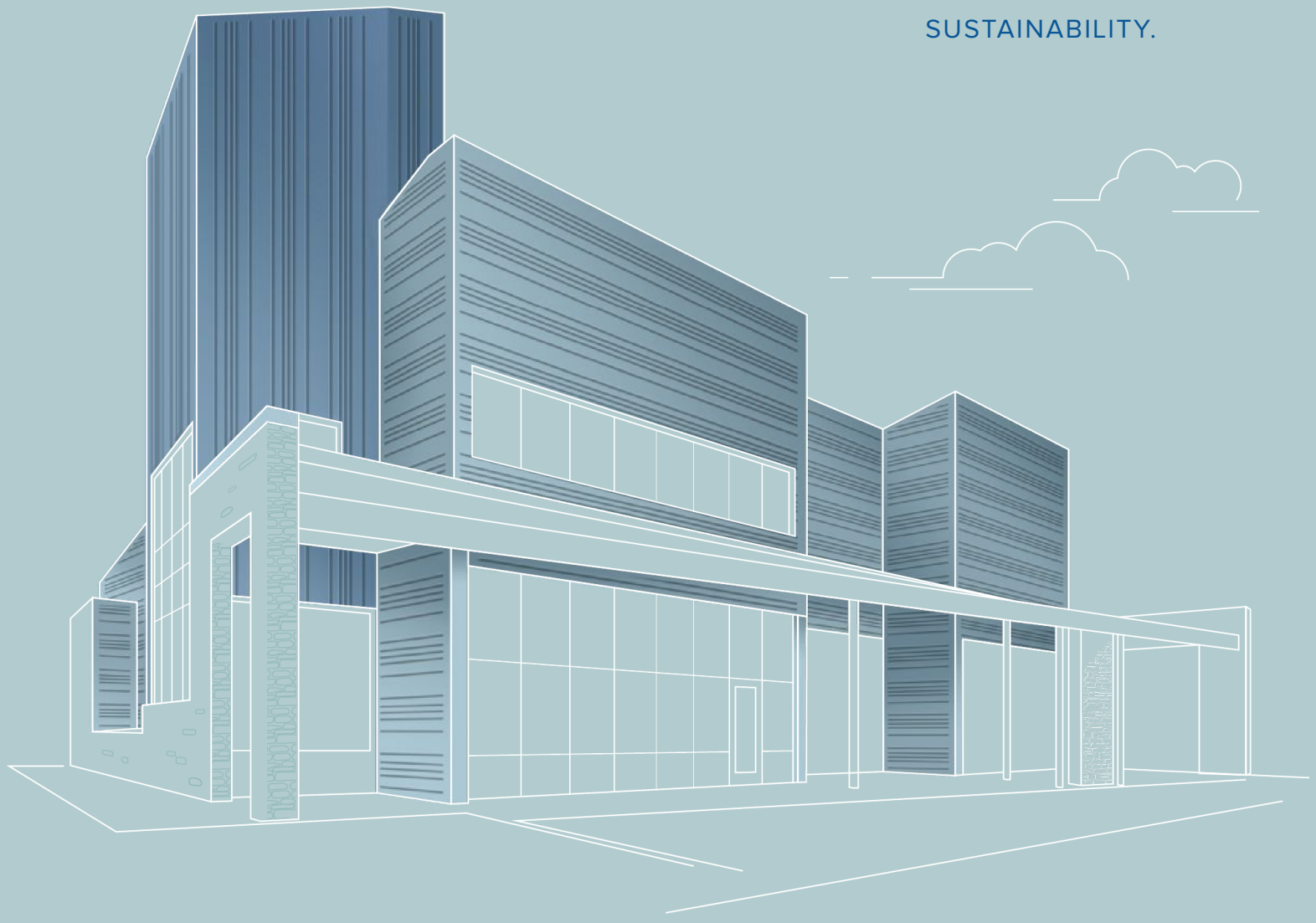

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More than Just a Glass Box

In its critique of the new flagship, *Chicago* magazine likened it to the city's other glass box du jour, the Foster+Partners-designed Apple Store (Ross Barney also played a role in that project),

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and lamented what was lost in the redesign: "The Rock 'n' Roll McDonald's kitschiness once fit perfectly into its stretch of River North."

But the new building wants to be more than just a glass box. It's a jumbo sci-fi energy-saving machine, a physical manifestation of the corporation's best intentions. Despite the fact that methane emissions from cattle are a major contributor to climate change, or maybe precisely because it's in the hamburger business, McDonald's has lately become very serious about sustainability. The company is a convener, for example, of the "NextGen Cup Consortium and

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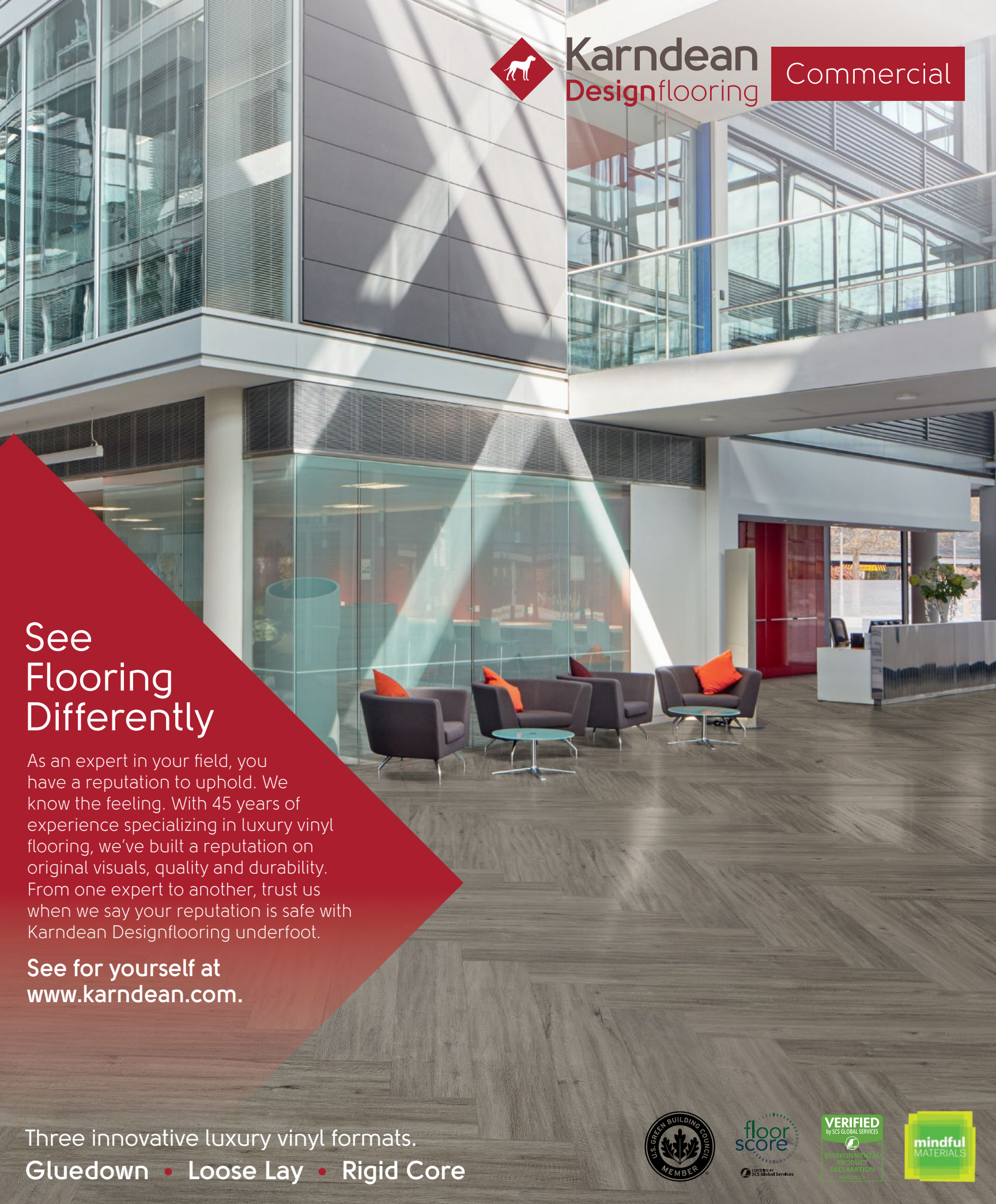

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With the flagship project, Ross Barney worked hard to specify materials that reduce the building's

For all the site's sustainable features, it still includes a drive thru

carbon footprint. The ceiling, for example, is made of cross-laminated timber. "It's sort of like plywood on steroids," she says. The firm also used "carbon capture cement" in the project, a substance that sequesters CO_2. The pergola holds enough solar panels to furnish 60 percent of the restaurant's electricity. And the new vegetation serves a dual purpose: "It's beautiful to have trees but it also helps mitigate the urban heat island effect," says Ross Barney, "so it will be cooler on this site than it was in the past."

Yet, for all the eco-friendly touches, the corporation still hasn't yet jettisoned its car-centric clientele: The parking lot and drive thru lanes remain. As much as the resultant building may elegantly embody our highest ideals, it still enables our worst habits. My fish sandwich may have been "sourced from sustainable fisheries," and there may now be an Egg White Delight on the menu, a low-cholesterol version of the standard McMuffin (Ross Barney's favorite), but this is still the house that the Big Mac built. In the big, beautiful room—one where I could happily spend an entire day with my computer and, say, a McCafé Iced Latte (made from "Rainforest Alliance Certified Espresso")—I can't help but be conscious of the contradictions.

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“We can’t forget that housing is a human right. Houses are not just for sale. Houses are for people, and we have to think of them first.”

A House is Not Just a House by Tatiana Bilbao

The following essay has been excerpted from Tatiana Bilbao's A House is Not Just a House: Projects on Housing*, ed. Isabelle Kirkham-Lewitt (New York: Columbia Books on Architecture and the City, 2018). The book is the second in the series "Transcripts on Housing," organized by Hilary Sample, as part of the Columbia University Graduate School of Architecture, Planning and Preservation's Housing Studio.*

I want to start with a little history of Mexico City, because I became more political and interested in participating in the topic of housing once I learned and understood it. It seems the government has always been trying to catch up with housing demand. The 1940s marked the start of the massive construction of social housing in Mexico. Obviously, the '40s was a supermodern moment, influenced completely by the International Style. One of the first large social-housing units in Mexico City was the Unidad Miguel Alemán by Mario Pani, built in 1947. A later project of his, the Centro Urbano Nonoalco Tlatelolco, which was built in 1958, is representative of the type of government housing being built during the period. Obviously, Modernism had its problems and multifamily housing at this scale reflected them, but right now I must say that many of these complexes are not bad places to live. They are in the middle of the city. Tlatelolco is right along Avenue Reforma–the city's most important thoroughfare, lined with skyscrapers due to its development potential.

In the middle of the 20th century, there were really interesting experimentations happening with different materials, expressions, and building types, like Unidad Santa Fe, also built by Pani (in 1957), which featured a wide variety of unit sizes catering to different family structures. Others were experimenting with the way organizations were set up to provide housing. Normally the government would finance, construct, and allocate these buildings—they would give or sell houses to the people for a very cheap price, to be paid in small payments. But suddenly, as was the case with architect Teodoro González de León in Guadalajara in 1959, collaborations began with factory owners to create housing for employees. This was a different and new typology of social housing in Mexico; and simultaneously, many architects were actively thinking about public space and public environments. Unidad Independencia by José María Gutiérrez Trujillo, from the 1960s, incorporated incredible cultural programs, like a theater, a library, and so on. A lot of architects, well-renowned practitioners, were working through and building serious social housing at this time.

Things started to really change in the 1980s. I think the evolution of housing into what we know it to be today is the result of many things, but there were a few key moments. First, in 1985, there was a big earthquake—many of these multifamily buildings in Tlatelolco and Juárez fell down, prompting people to flee the city to escape these conditions. The government, faced with an even greater need for housing on top of the already overdue demand for it, realized they needed to create a new system to build more houses every year. Then, in 1992, President Carlos Salinas de Gortari decided to squash the *ejido*, which was the traditional communal way of owning land, and let people start selling their shares. For the first time, the *ejidos* were privatized and opened up to the market. This created an incredible business for people who shared ownership in these types of

Mario Pani's Centro Urbano Nonoalco Tlatelolco

Housing in Ixtapaluca, State of Mexico, Mexico, 2009

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properties, mostly agricultural land in the outskirts of the city, and initiated a system that involved private developers in the creation of social housing for the government. And the thing is that the combination of cheap land that could now be bought from these former *ejidos*, and the incentives or subsidies by the government to privatize and develop them, created new models of housing. This, I think, was the moment when things got really bad. It ushered in a mentality of mass-produced housing. Market-rate housing for low- to middle-income populations became big business. Overnight, developments like the one in Ixtapaluca—projects with 20,000 identical houses—started to sprout up all over suburban areas in Mexico. They were supposedly a good model because they fulfilled demand. By 2000, the new government under President Vicente Fox announced that they would create 2 million more houses for Mexico. And they did: 2.5 million houses were built over the course of six years. The only way the possibility of building this became a reality was by allowing developers to engage in questionable practices.

Obviously, this was largely inspired by the American model of suburbia from the 1940s and 1950s that sold an idyllic image of domestic life outside the city. Developers in Mexico justified these projects by saying, "Who doesn't want a house with a pitched roof, a parking space in the front, and a little garden and yard to create the perfect little family?" Of course, this model has been powerful in shaping the way we live in the world—it's been copied all over—but we didn't really suffer from the effects of it in Mexico until the 1990s. Importing Levittown did a lot of damage here. It introduced a new middle-class model. The problem is when you apply this Levittown car-centric model to a lower-middle-class demographic that does not have access to opportunities for upward mobility. You need infrastructure, roads, and schools. And when you don't have those things, you end up producing places like Ixtapaluca: repetitive houses in the middle of nowhere, far away from the city centers, with no infrastructure, no roads, no cars, no schools, no health services, no jobs. Living here becomes a nightmare. You can paint them in bright, lively colors, but the situation underneath is just as bleak and horrible.

This exists all over the country. Developers can hardly resist the opportunity of buying cheap land—it doesn't matter where or how far from the existing city. You can sell the story of these little dream houses near the mountains, but in reality, life is very harsh there. Sometimes the city grows enough to integrate these developments. But when it does not, these places pose a real urban-planning problem. Once 20,000 units are built, services have to arrive, because at that point, with 60,000 people living there, it is the size of a medium-size town. So, infrastructure eventually arrives, but in a poorly planned, haphazard way. The city, which was not planning to support these places, now has to bear the burden. If it didn't, there would be no roads to and from these developments. There would be no livelihood. Still, these new suburban places end up in areas and municipalities with very little money. These environments are a consequence of Mexican political divisions where taxes are not distributed by the need or number of people in a municipality, but through a federal distribution—so it's incredibly uneven and entirely political, on who curried whose favor. As a result, these municipalities seldom have the resources for proper infrastructural maintenance. And I am not talking about landscaping or sidewalks. They do not have money for electricity or a proper police force; they do not have money for sewage. These are blighted islands.

The worst part of living in places like this is how identity and individuality are continually denigrated and negated. In such an identically reproduced environment, families are slotted and rendered visible to the state like an array of bricks, products in a store, or numbers in a developer's bottom line. We have to regain the idea that housing is for people. I understand that "business" might be necessary to produce the amount of housing that we need in the world, but we can't forget that housing is a human right. Houses are not just for sale. Houses are for people, and we have to think of them first and last. That is why landscape—by which I mean everything found in and around the sites where we build—is so primary in my practice. Architecture is always immersed in its surroundings—it impacts everything around it and, in turn, is impacted by everything around it. I think architects are always building the city even if we're only focused on architecture itself. I do not completely see a separation between architects, landscape architects, urban designers, or urban planners. The context surrounding a house becomes part of the house immediately. A house cannot survive on its own. This is a responsibility sometimes forgotten by us architects.

"You're Doing Everything Wrong"

So, I got really political about the state of housing in Mexico. I was shocked that for almost 25 years there were no architects tackling the problem of housing at that scale. There were only developers. Of course, these developers had their in-house architects working with them, but in general, there were few

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architects here in the profession and in academia engaging in a productive, critical discussion—the focus was instead on remaking Mexico's image as a nation coming into newfound wealth, a successful and aspiring neoliberal economy. It was important for me to regain a certain sense of empowerment and to begin to create a new dialogue.

Almost instinctively, my first reaction was to go to Infonavit, the federally owned bank that grants massive housing loans and funds the construction of many of these new units. And I basically told them, "You're doing everything wrong." Of course, they shut the door in my face. They were building 3 million houses per year and thought they were doing good work. But the government was beginning to lose money as people started to abandon their homes and realize that these places were desolate frontiers—hardly proper places to live. These developments are now almost 30 percent abandoned. So, there were 15 million units built and only 11 million are still occupied. Very quickly, the government started holding all this bad credit—unpaid mortgages—and developers were losing money because the units stopped selling. There was too much empty inventory. Even as it became clear that the government could not build these developments anymore, there were, and still continue to be, lots of people living in these places. The question became, how do you integrate these places back into the city? In places like Monterrey, the General Zuazua housing estate is over an hour away from the city by highway. The city as we know it would have to extend and grow an unimaginable amount or develop in unsustainable low-density patterns to reach these new suburbs.

I started talking to other architects, and we started having group meetings to discuss and get closer to the real problematic here: how to start reconvening new city centers and creating satellite urban environments instead of isolated neighborhoods. This is when we began to work with Infonavit—not only discussing and being political about it, but truly collaborating, which is something I really wanted. Of course, there are many ways that architects can approach the problem of housing politically, both from within and outside systemic constraints, and projects that are well thought out have an important role in the practice. But in Mexico, faced with such a dire situation, we had to find ways to make a positive change, and for us that meant to build—and to work with institutional partners in situations we were not always at ease with.

At the time, Infonavit was only invested in the house as a unit. The only rules that existed for developers were related to designing pretty much

The author's master plan for the Angangueo Sustainable Community in Michoacán, Mexico

Housing in the Angangueo Sustainable Community

just the house. Each house had to be 43 square meters (460 square feet), which is not a lot of space. When you are unable to do something bigger due to financial constraints, you have to start thinking of the environment. I always use the same argument about New York. People in the city will pay millions of dollars for a tiny studio in a horrible building. Why? Because of the jobs, the infrastructure, the culture, et cetera, that is around you. But when you build a 43-square-meter house in the middle of nowhere with nothing available, things become very bad, even if the house is incredibly well designed.

With this argument, we were hired by SEDESOL, the government department responsible for development efforts in Mexico, to work on a 600-unit development for families displaced by a catastrophic mudslide in Angangueo, Michoacán. When we arrived at the project, there was already a local architect on board and a proposed design scheme for an array of identical boxes lined along flat, straight roads. SEDESOL said that we could start reimagining the place, doing the master plan, but that we couldn't rethink the design of the house. We said, "Okay, we can work with that." The house was not very well

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designed, but for us it was way more important to understand the place and to start talking about the topography, the geology, the weather, and so on. Because, I mean, with these developments, developers really just spot a site on Google Maps, arrive with the same plan they use for every other place in the country, cut out the limits of the site, and go ahead with production. Instead, we analyzed the site as we do with any other project. The goal was to design the neighborhood more like a little town or city with a center and different densities. We were allowed to use the house as a unit—to stack it, densify it, and multiply it. This was very important to us. One of our main arguments against an identical array of houses was that people would live there for two years and then, as soon as they could, go back to the hills where they were living before. Sooner or later, another mudslide would wipe out their houses again. Residents cherished the beautiful homes they had, homes with views in the middle of this incredible landscape that they really cared about. Nobody will stay if you put them in a little repetitive box.

So, we used different configurations of the houses, working with the natural topography to create a situation that is a little bit more organic and even a little bit more urban. In some cases, we had a dense four-unit building; other times, a less dense, shared two-unit duplex or a one-unit house. And incredibly enough, this really became home for many of the occupants. Now people not only want to live there, but the houses have an incredible resale value, unlike those in other developments. Normally, people that acquire a house in one of these developments will spend all their savings or get deductions from their monthly salary to pay for it. And then they cannot resell it because the value is pretty much zero. Nobody wants to buy these houses. But in this case, in our project, the houses are being sold for almost double what people got in representational value, because they got them due to this disaster. So, this is a good sign, no? The bigger question is how we start to design value into housing. While financial models and resale prices might be the indicator of value right now, we can imagine a better system in which value is actually determined by the quality of life in these homes. Even though the houses here are not incredibly well designed, and they're not what we would have loved to do, creating a new urban setting or semiurban setting really helped.

Houses for $8K

In Mexico, what we call social housing is actually for people that have a formal job, which doesn't even come close to covering the full spectrum of people in dire need of housing across the country. There is a government program in Mexico that certifies a kind of affordable housing for the poorest people in the most rural areas of the country—people with no formal income or access to credit and who cannot afford a house in one of the other massive social housing developments I touched on earlier. These programs are not part of Infonavit but part of other governmental organizations that provide subsidies for the construction of housing, such as CONAVI and FONHAPO, as well as some other socially conscious private-sector financial creditors committed to advancing the public interest by minimizing their profits.

The need for housing like this in lower-class populations is incredible, and so the program has been subsidizing the development of new houses that could be built for $8,000. This is not a price we can build with in the U.S., but we can build with that money in Mexico. It's not a lot, but we can do it. Many different companies, contractors, et cetera have been working with the government to develop new models of houses, because in Mexico all of this is privatized. There are almost 100 models on the market, and they are being built all over the country. They are all archetypal houses, you know, like with pitched roofs—all super compact, 43 square meters, and not flexible enough to allow for any kind of growth. The program places a lot of restrictions on what the house can be.

Illustrations of various uses of the author's Sustainable House

We were hired by a financial institution to design another model. And when the commission arrived at our office, I thought that if we were going to do something at all, we really needed to give the possibility of adaptability—more flexibility, more space, and more growth. Because the problem is that these houses are built the same way in Chihuahua, which is in the north of Mexico, in the desert as they are in the tropical jungle in the south of the country.

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There is no adaptability to weather conditions or respect for cultural traditions. I thought that it was important for the office to focus on trying to change that. In the beginning we said, "Okay, we're going to do a house that has a flat roof, that moves, grows, opens, continues, blah, blah, blah." For three months, more or less, we discussed these various options in the office. And one day I realized that we were really only designing for our own thoughts, for how we think people live or for what we think people want.

We started to conduct interviews in the field with potential clients. We did almost 2,000 interviews—very quick interviews, simple and graphic, in order to understand what local people wanted. And one incredible conclusion we found is that everyone really did want a house that looked like a house, which is indicative of how deep this image of the archetypal house has permeated into Mexican society and become a part of it. I found this super interesting, because in Mexico, when people build their own houses, they traditionally build them with flat roofs and leave the steel bars sticking out of the top. The landscape of the whole country is covered with construction like this. In the past, the steel bars have really been a symbol of hope—a way of saying, "I'm going to do the second floor when I have more money." It was a statement and promise of future growth.

However, when the second floor wasn't built, and usually it wasn't, the steel bars became a representation of failure—the failure to grow. So nowadays, nobody wants a house that does not have the appearance of being finished. So, yes, while all of the models for low-income housing are this archetypal house, the reason was much less about an ideal than it was related to the fact that it represented a finished product.

The problem became how to design a house that looks finished but that actually has the possibility of expansion. And we, in fact, already had a design for a modular house that we did in Ordos in China. Instead of searching for months and months for a new model, we decided to use one we had in our books. For us, in this project, modularity was the way to create a new, more adaptable model. And we discovered that it was a great starting point. The modularity meant that we could divide the house into parts and volumes with different material variations—we could use bricks or more formal, stronger materials in some modules, and more temporary, lighter materials in others. This way, the house could be expandable; it could be transformable. It was important to show the many possibilities for this house, that it can continue to be flexible and accommodate different living conditions

Opposite: Wood-panel prototype of a Sustainable House in Chiapas, Mexico

Below: Sustainable Housing in Cuidad Acuña, Coahuila, Mexico, 2015

TOP: COURTESY TATIANA BILBAO ESTUDIO; BOTTOM: IWAN BAAN

and family situations—because, for example, the "normal" two-child family is not necessarily representative of how the majority of Mexicans live today. People use their homes for many things: to work, to sell things, to make their livelihood. Even though the government regulates the possibilities of these houses—it says that you have to have two bedrooms, a kitchen, et cetera, with these minimum

Interior of Sustainable Housing in Ciudad Acuña

sizes—we are trying to understand ways to navigate around these laws to design more flexible and open spaces. In the office we find ourselves asking a series of questions, like, how can we use exterior conditions to integrate more possibilities into the house and the other way around? How can you transform interior living spaces into more communal, shared spaces? What about shared kitchens? What helps the community also helps your own space. So how can we incorporate these ideas into the unit of the house and propose more organic ways of expansion?

We first built two prototypes: one in Chiapas from adobe bricks, and one from wood panels. Then we built the prototype again at the 2015 Chicago Biennial.

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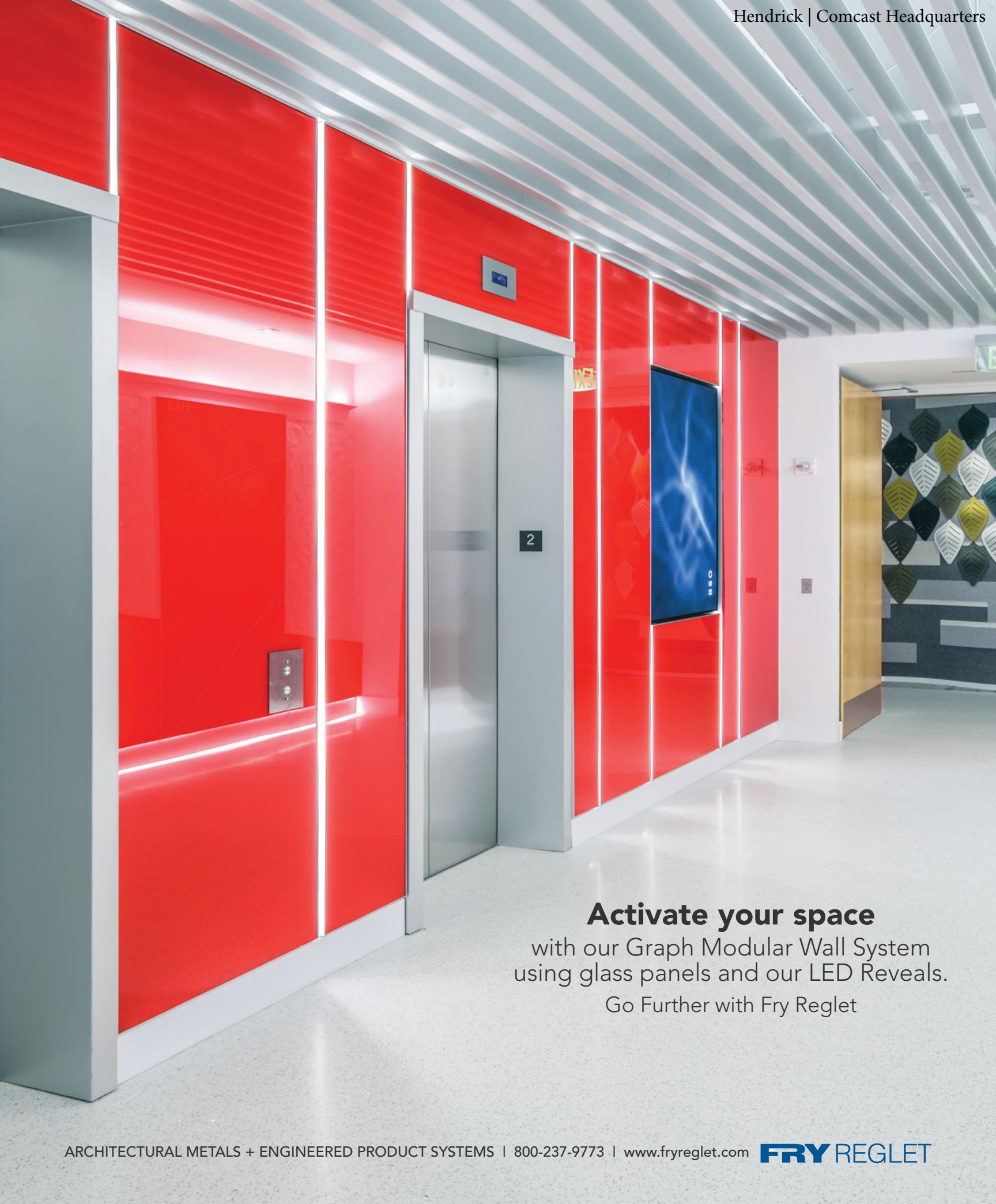
It was incredibly important for us to show the house adapted to different environments and contexts. For example, in Chiapas they use outside kitchens with an open stove and an exterior bathroom with a dry toilet. The plan has to change to accommodate these differences. We also explored the possibility of getting and using local material: wood pallets, compacted-earth bricks, concrete bricks, regular bricks, depending on the availability of the material in each place. Temporary materials, like pallets, let us play with what is open and usable space—for example, for grain storage, et cetera.

I should say that even though the house has the possibility for change, we do really consider it to be site specific: specifically designed for Mexico. We were asked again by Infonavit to test and build 23 of our houses in a development in this little town on the border with Texas called Acuña. The town was hit by a tornado that damaged 580 houses and completely destroyed 23 of them. And we agreed, because it gave us the chance to see how adaptable our model was in a new context. This time we had to use only concrete and concrete blocks because these people needed a house that was really, really strong—temporary materials would not be able to stand up against future tornadoes. The material was crucial to thinking about the future longevity of these houses.

The interesting tension for me was that our units were built alongside the other 580 units from the 1990s—all built with the same amount of money, same square meters, same lot, same everything. The new units would have double the interior space, with the possibility of growth. I thought that this was going to create a huge social problem. But surprisingly, and fortunately, it has not, because these houses were the ones that were completely destroyed in the first place. The rest of the community was relieved and thinking, "Well, at least we did not completely lose our house like they did."

People are already starting to adapt their houses, painting them, building small rooms, adding exterior terraces. What is exciting is that literally after moving in, people started to invade and take ownership of their houses, and really transform them. And that for me was an incredible opportunity to understand whether or not the house worked. What I understand right now is that architecture needs to be way more informed by the organic manner of building processes, by people who understand how to build their own spaces. I think we, as architects, need to incorporate this knowledge more and more, and really intuit the way people already build and intervene in their environments.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Obviously, it would be ideal to rework the systemic shortcomings that enable these housing crises to happen and to ensure that everyone has access to decent affordable housing by, for example, setting a quota of mandated units or regulating industry profits to reduce reckless speculation. This is why we find it important to develop experimental "passion projects," even if they have little chance of coming to fruition.

However, as it stands, there is not only an incredible need but some really interesting work conditions that can be improved right now. So, you do have to be a bit Janus-faced about your modus operandi. I do not mean conforming to institutional standards and simply throwing a new coat of paint on the houses within these blighted islands and calling it a day. These places require inventive interventions and sometimes downright crazy-sounding solutions. But you never know: institutions like Infonavit have in some cases really opened up to listen. Sometimes these far-off schemes do actually get built.

A living room as walk-up bodega in Sustainable Housing in Ciudad Acuña

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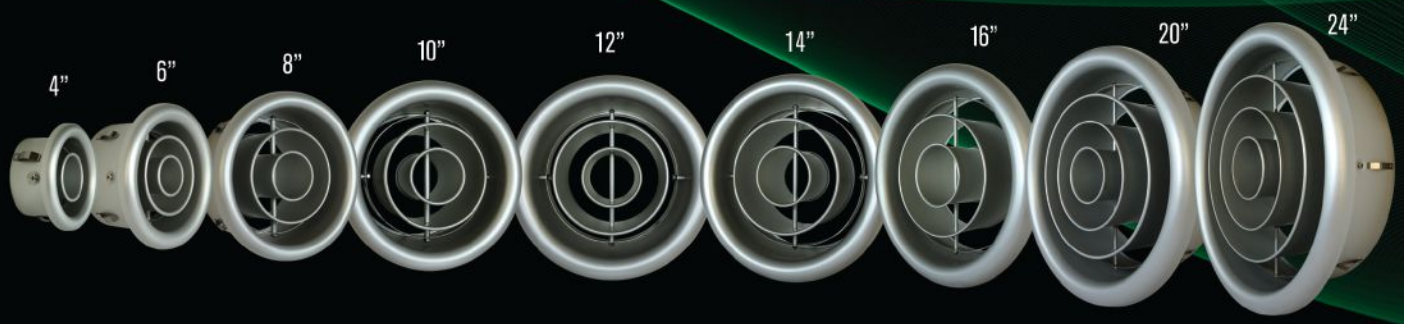

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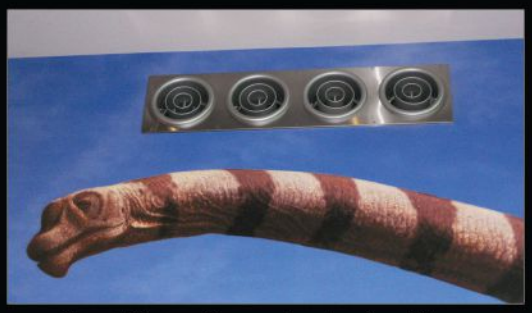

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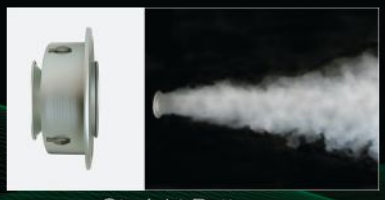

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Magnolia Montessori For All
Austin, Texas
Page

A public charter school overcame a tight budget and a tough site to make Montessori education more accessible.

TEXT BY KATIE GERFEN
PHOTOS BY ALBERT VECERKA/ESTO

Before 2014, there were more than 20 Montessori schools in Austin, Texas—most private, and all on the more affluent, western side of I-35, which for generations has split the city geographically, racially, and economically. That year, Sara Cotner and Sarah Kirby Tepera launched Magnolia Montessori For All, the city's first public charter Montessori school. In January, they moved into a purpose-built campus east of I-35 designed by the Austin office of Page.

"Montessori For All (MFA) tries to build a more just and peaceful world by cultivating future leaders who find purpose and joy in their own lives and advocate for others to do the same," Cotner says. "To do that, we need to dramatically increase the number of public Montessori schools in diverse cities across the United States."

Magnolia, MFA's first school, has 500 students ranging from infants to sixth-graders, but it doesn't have a typical institutional structure: "We believe that schools can catalyze human potential, and to do that, you want to create the most nurturing environment possible," Cotner says. So for the new campus, "we tried to create what feels like a second family." As such, Magnolia is residentially scaled, with one- or two-classroom buildings clustered around three open play areas—one each for young children and lower and upper elementary ages. Students in every classroom are paired with one teacher, and they stay in that space for the duration of the day. The three-classroom clusters are connected by a sloped pathway through the campus, and surrounded by yet more play areas and outdoor recreation spaces, including a central covered plaza where the whole school can gather.

Cotner and Kirby Tepera paid relatively little for the East Austin site. "They didn't realize why at the time," says project architect Shelby Blessing, AIA. The 9-acre property drops 30 feet in elevation from the western to the eastern edge, and the soil is an expansive clay that required each classroom to be built on a structured foundation on void forms with 25-foot piers. "There's a lot of money underground," Blessing says, which put pressure on an already tight $11.67 million budget.

But what may have helped the budget most was what Page didn't build: Magnolia's clusters of small buildings contain 40,000 square feet of educational space, but they do not include a cafeteria, gym, or long hallways and circulation, saving money both up front and over time. The firm commissioned independent benchmarking, which discovered that this campus "has 45 percent less square footage than the trend for most schools, which translates to a savings of $26 million in owner avoidance over the next 30 years," project manager Chad Johnson says. The villagelike form of the school was also budget friendly: "It worked well for a startup school and their fundraising, because they were able to release the start of construction on different buildings in phases," Johnson says.

As for the design above grade, "the major architectural moves don't come from an expensive materials palette—it's very simple—but from a refined treatment of details," Blessing says. That reductive palette includes Allura fiber cement lap and board-and-batten siding, shingled roofs, and exposed wood rafters. In addition to answering budget needs, the focus on an "honesty of materials" fits with the Montessori ideology, Johnson says.

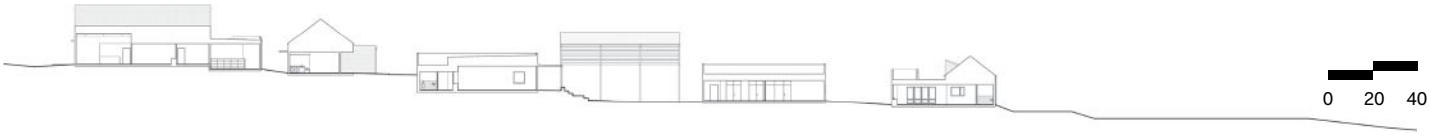
Each classroom is accessed via a covered front porch. Inside, the white-walled spaces are filled with windows that maximize both daylight and cross breezes. While most ceiling heights are 9 feet, they drop to 8 feet in the younger children's classrooms to "make it a little cozier," Blessing says.

Teachers worked with the design team to ensure that the rooms were optimized for each grade level. Millwork changes from classroom to classroom to accommodate growing bodies—for example, with 20-inch-tall sinks in the young children's classrooms and larger-scaled shared cubbies in the upper elementary rooms—but it is always made out of birch plywood that matches the standard Montessori furniture throughout. Each classroom also has a covered back porch that can be used by the students for their individually focused and self-driven lessons.

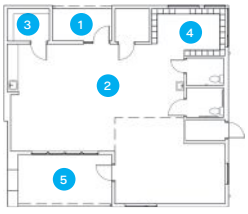
MFA's goal is to create one showcase school in each district it enters, which can serve as an example for others who want to do the same. "We are not trying to compete with the local districts," Cotner says. "We want to be a resource within each city to help the develop or strengthen their own Montessori program." Already, MFA has opened a school in San Antonio based on the example set at Magnolia.

As for the impact in Austin, in addition to the 500 students currently enrolled, there are 500 kids on a waiting list. The breakdown of the current 500 students reflects the makeup of the city around it: 64 percent are minorities, and 50 percent qualify for free or reduced-cost school lunch programs. The choice to open Magnolia on the city's east side was an important one to Cotner and Kirby Tepera because "families who can afford it choose a neighborhood that is zoned to a high-performing school," Cotner says, but a public charter school is "one of the few mechanisms that enables families in low-income neighborhoods to have the same kind of choice. We seek to build a racially, culturally, and socio-economically diverse community."

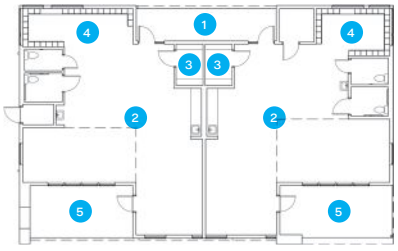
Section A–A₁



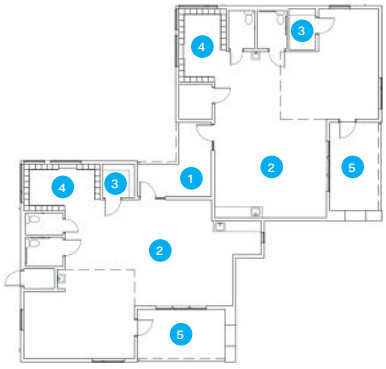
Single-Classroom Plan

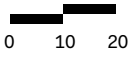


Side-by-Side Classroom Plan

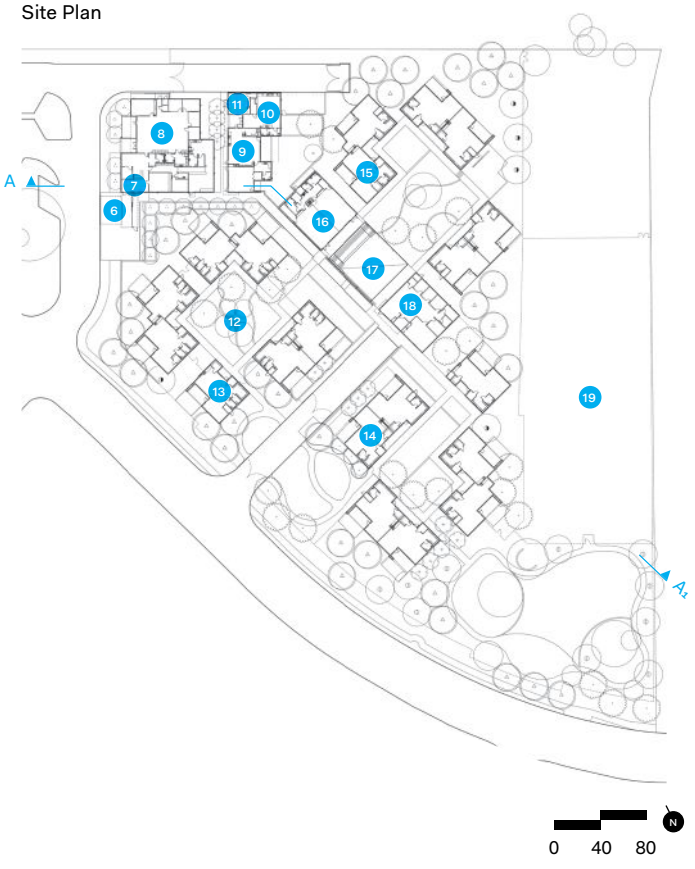


L-Shaped Classroom Plan





Site Plan



1. Entry porch
2. Classroom
3. Storage
4. Cubbies
5. Back porch
6. Campus entry
7. Administration
8. Montessori For All headquarters
9. Infant/toddler classroom
10. Food prep
11. Laundry
12. Play area
13. Children's house classroom
14. Lower elementary classroom
15. Upper elementary classroom
16. Multipurpose room
17. Pavilion
18. Student services
19. Detention pond/open play area

Previous Spread: Upper elementary classroom, with view to covered back porch at left

Above: Aerial view of campus from northwest

Top: Courtyard play area outside younger children's classrooms, looking south

Above: Upper elementary courtyard, looking northeast

Top: Lower elementary courtyard, looking northeast

Above: Courtyard play area outside younger children's classrooms, looking north

Covered gathering space
at center of campus


16

Lower elementary classroom with diamond-polished concrete floors and view to classroom garden at right

Project Credits

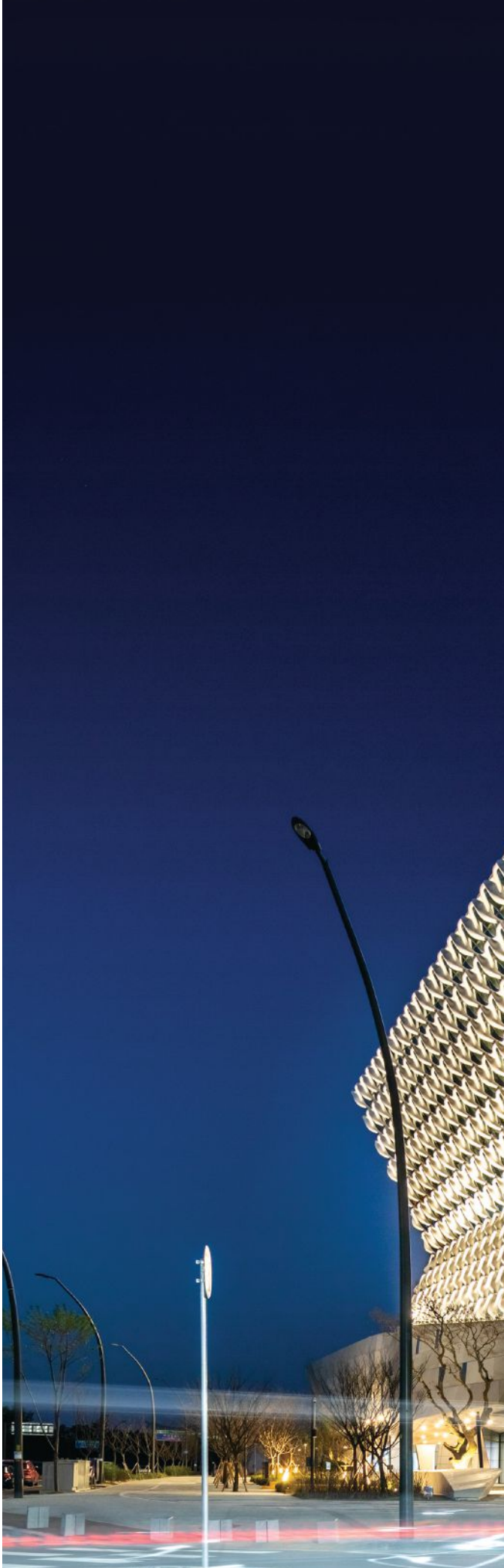
Project: Magnolia Montessori For All, Austin, Texas
Client: Montessori For All
Architect/Interior Designer: Page, Austin, Texas · Larry Speck, FAIA, Robert Burke, ASSOC. AIA, Daniel Brooks, AIA, Chad Johnson, Shelby Blessing, AIA, Jim Brady, FAIA, Jonathan Schwartz, AIA, Meredith Contello, Alan Lampert, Michael Henry, Kathy McPhail (project team)
Structural Engineer: Architectural Engineers Collaborative
M/E/P Engineer: MEP Engineering
Civil Engineer: Urban Design Group
Geotechnical Engineer: Terracon Consultants
General Contractor: Rogers-O'Brien Construction
Landscape: Coleman & Associates
Technology/Security/Audiovisual Consultant: True North Consulting Group
Size: 40,000 square feet, with additional 10,000 square feet of outdoor amenities
Cost: $11.67 million

Kolon One & Only Tower
Seoul, South Korea
Morphosis

Morphosis crafted a layered façade-shading strategy for a new research and development hub, using the client's own products.

TEXT BY CLAY RISEN

PHOTOS BY JASMINE PARK COURTESY MORPHOSIS

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At over 820,000 square feet, the Kolon One & Only Tower is more than just a centerpiece of a new high-tech hub outside Seoul. Designed by Morphosis for Kolon Industries, one of South Korea's largest manufacturers, the research-and-development facility is also a showcase for using high-performance fabrics in architecture—in this case, fabrics made by Kolon itself.

While Kolon produces a wide variety of products, it is perhaps best known for cutting-edge textiles that go into everything from sports gear to automobiles. "The airbag in your car probably comes from them," says Morphosis founding principal Thom Mayne, FAIA. So when the client asked for a design that brought in maximum sunlight while reducing solar gain, it didn't take long for both sides to realize that the solution was already in hand.

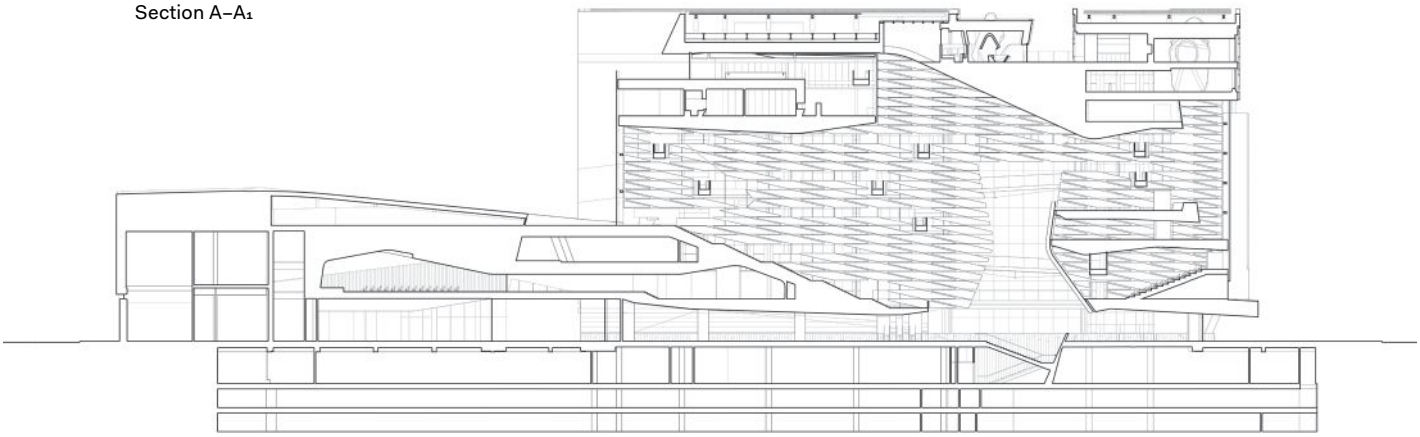
The building is split between back-office research wings—which make up 85 percent of the floor plan—and the public-facing atrium, which connects the research wings and acts as the building's front door. By creating 400 diamond-shaped liner panels using 8-meter-long swatches of Kolon fabrics in varying degrees of thickness and opacity, and placing them in vertical layers through the 30-meter-tall atrium, Morphosis was able to shade and diffuse the strong western sunlight, add light as needed with embedded LEDs, and help control acoustics in the cavernous space. The "stretchers," as the firm calls the fabric pieces, can also be swapped out, making them a rotating product showcase as well as a shading system.

The project uses 10 different Kolon fabrics, both inside and outside the building. The exterior was a particular challenge. Morphosis employed a brise-soleil system of exterior polymer panels that work with the stretchers inside in a tiered shading strategy—akin to the layers in the high-performance sportswear that often uses Kolon's products. "We treated the façade as a jacket," says principal Eui-Sung Yi.

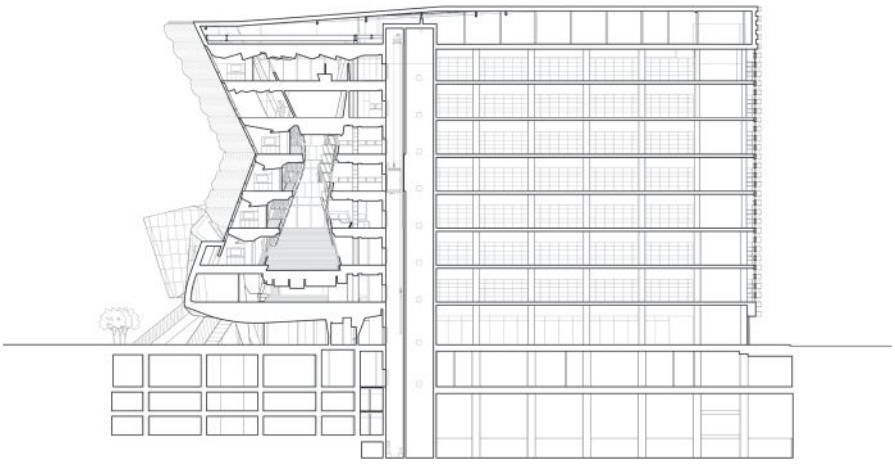
But this part of South Korea has high winds and dramatic annual temperature swings, and the client insisted that the brise-soleil panels have as few connection points as possible, so as not to mar the view. "One of the client's mandates was for the panels to look as good from the inside as they did from the outside," Yi says.

The solution was aramid, a material that has five times the tensile strength of iron. Kolon uses it in applications such as bulletproof helmets. Used as an added layer in the composite mix to strengthen the glass fiber-reinforced polymer, it allowed the architects to achieve a graceful organic form with minimal connections to the building. "With aramid," Mayne says, "we were free to develop our own language that wasn't limited to the shape of the material."

Section A–A₁



Section B–B₁



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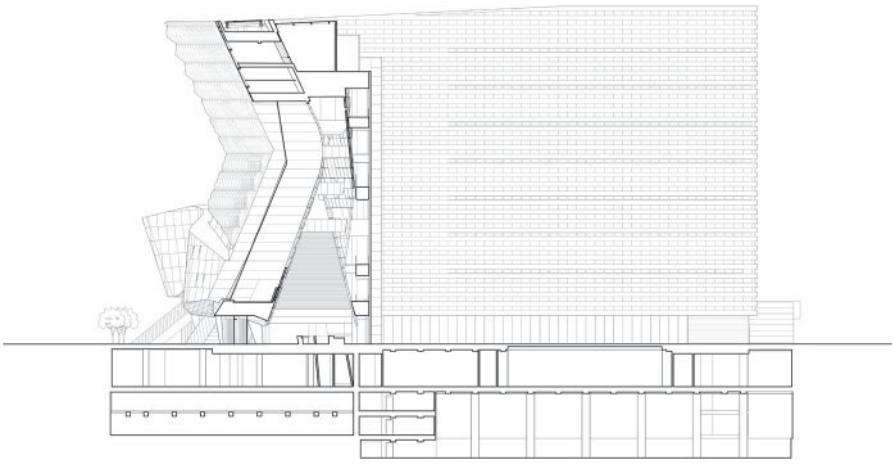
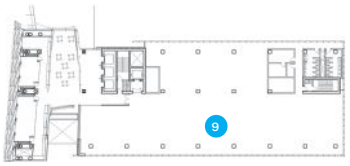


Previous Spread: View from southwest at dusk, showing south end of atrium expressed on façade

Opposite: West façade, covered in brise-soleil made from glass fiber–reinforced polymer panels reinforced with Kolon Industries aramid fiber

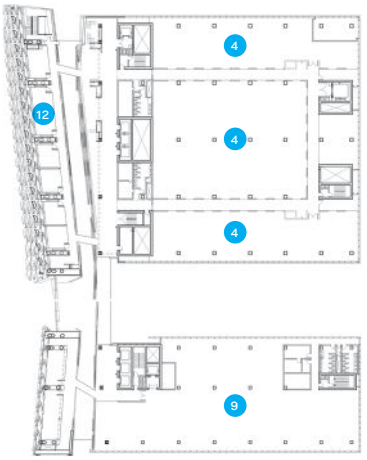
0 25 50

Fifth-Floor Plan

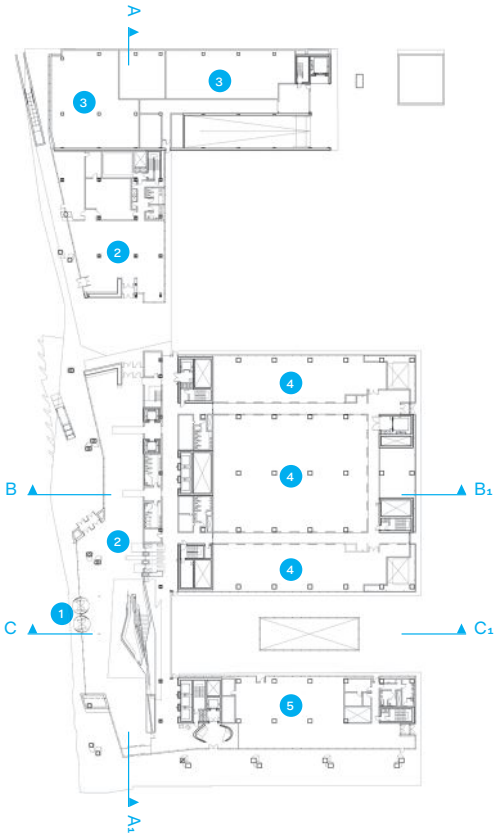


Sixth-Floor Plan

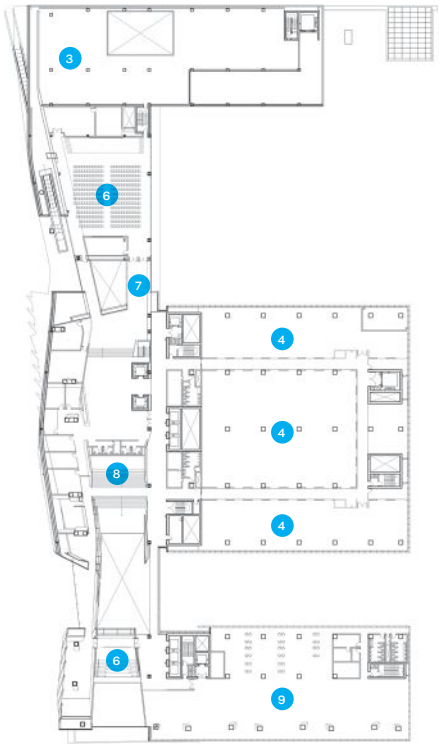
Seventh-Floor Plan



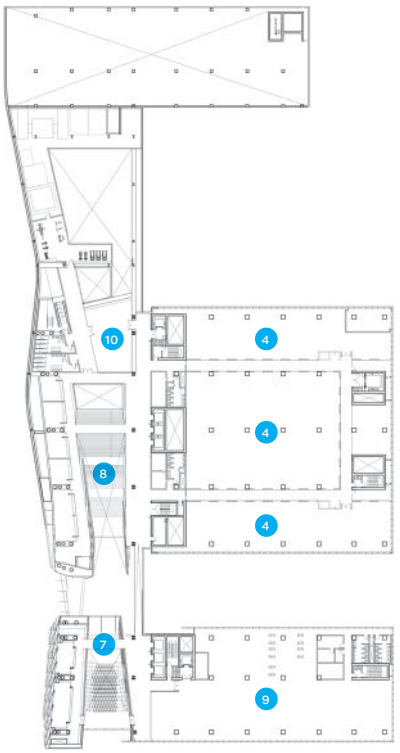
Ground-Floor Plan



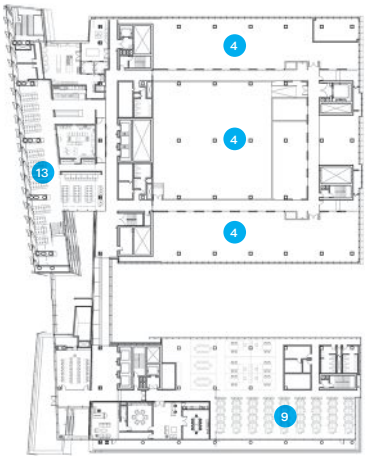
Second-Floor Plan



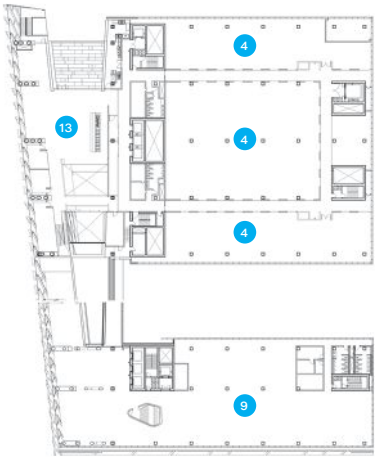
Third-Floor Plan



Eighth-Floor Plan

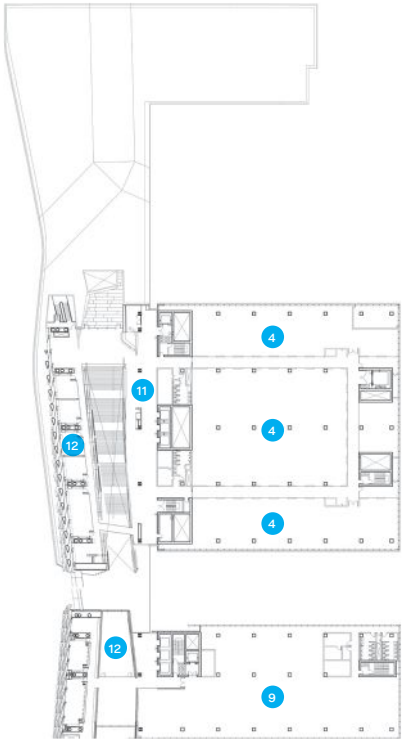


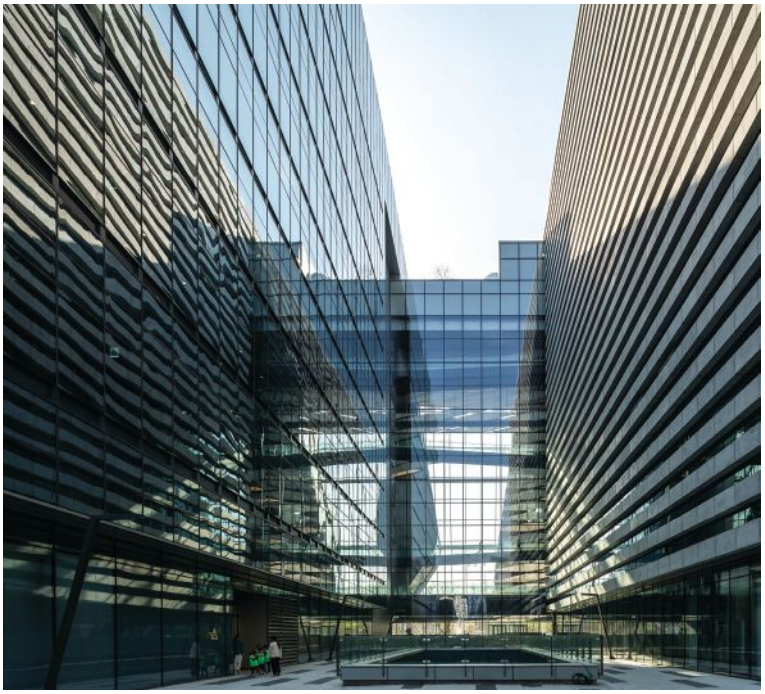
Ninth-Floor Plan



1. Entry
2. Lobby
3. Specialized research
4. Research lab
5. Daycare
6. Lecture hall
7. Bridge
8. Grand stair
9. Office
10. Gym
11. Idea room
12. Conference room
13. Cafeteria

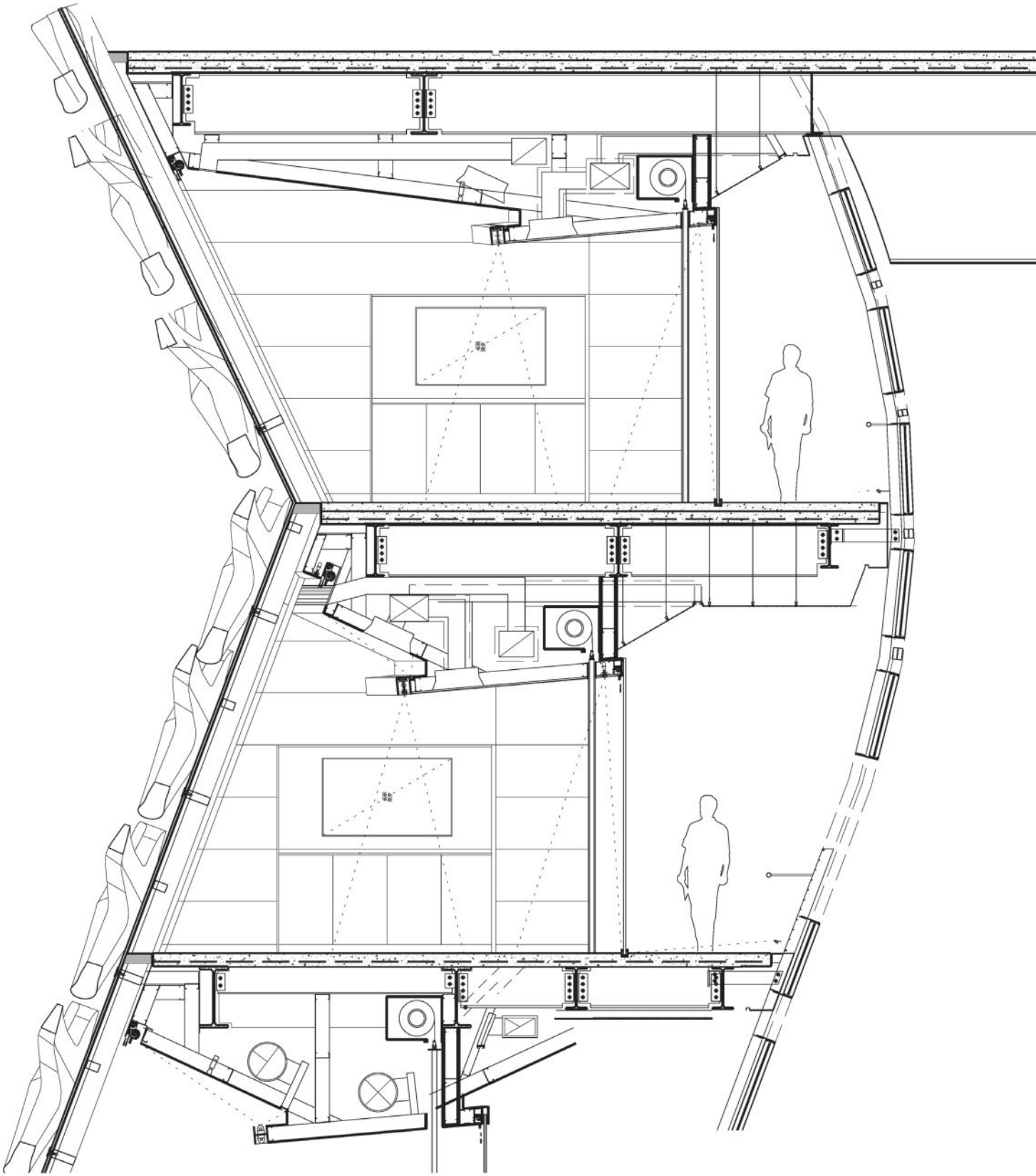
Fourth-Floor Plan

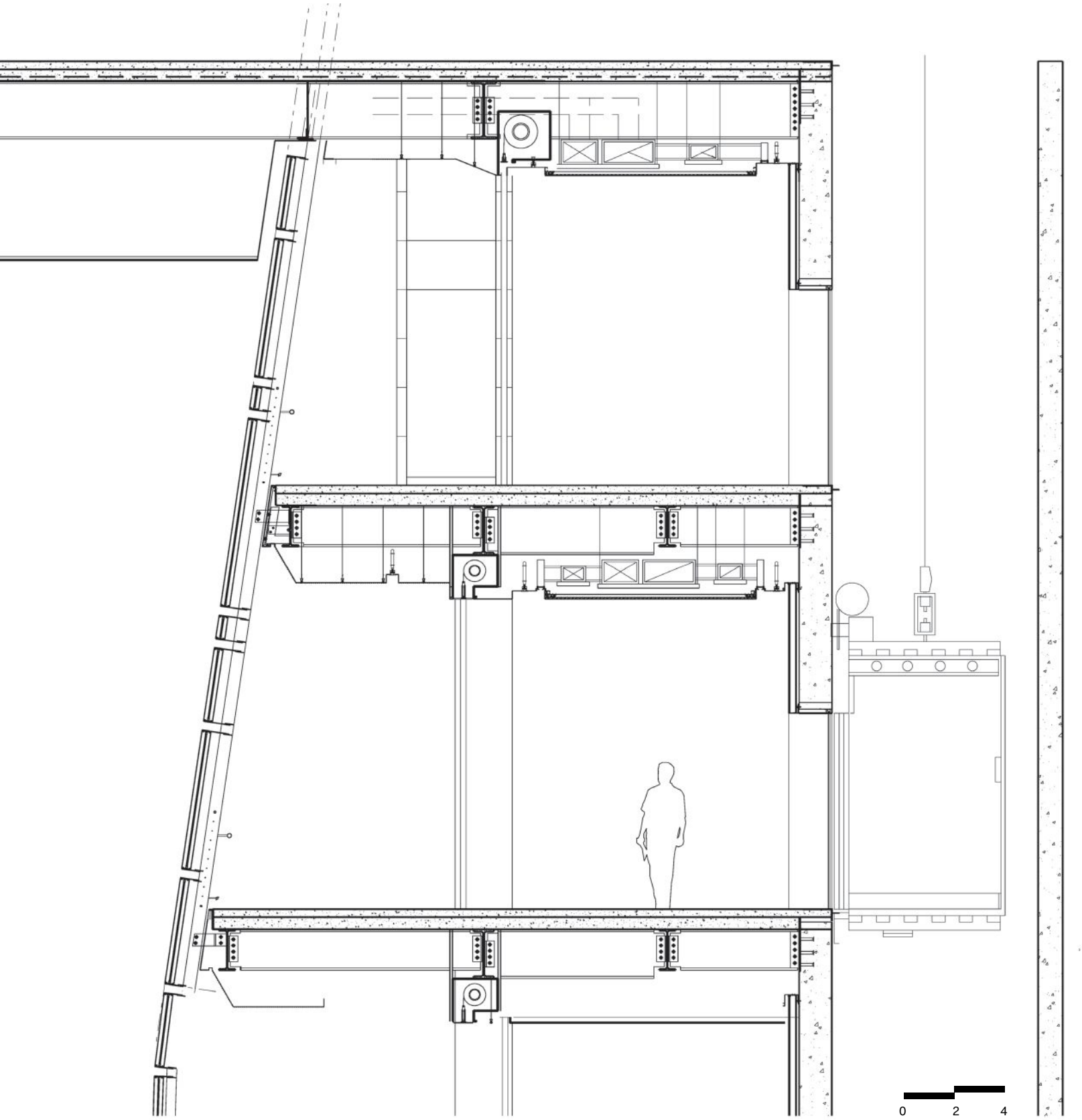




Central open-air courtyard, looking west through full-height atrium

Typical Section Detail Through Atrium

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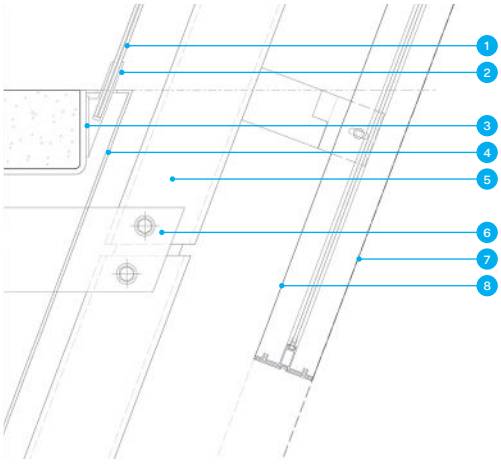
Opposite: Main stair in atrium, lined with 400 light panels made from Kolon material

Above: Walkways behind light panels lead to conference rooms and research labs

Detail Section Through Atrium Liner

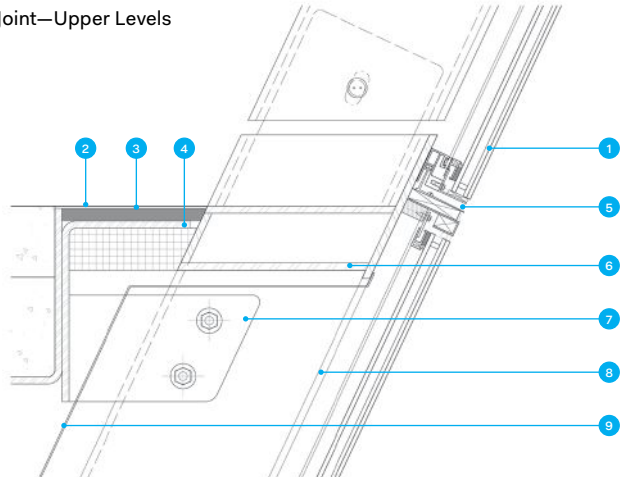


1. Glass guardrail
2. Guardrail support
3. Anchor plate at slab
4. Painted metal cover plate
5. Steel support structure
6. Outrigger arm
7. Front liner textile
8. Back liner textile

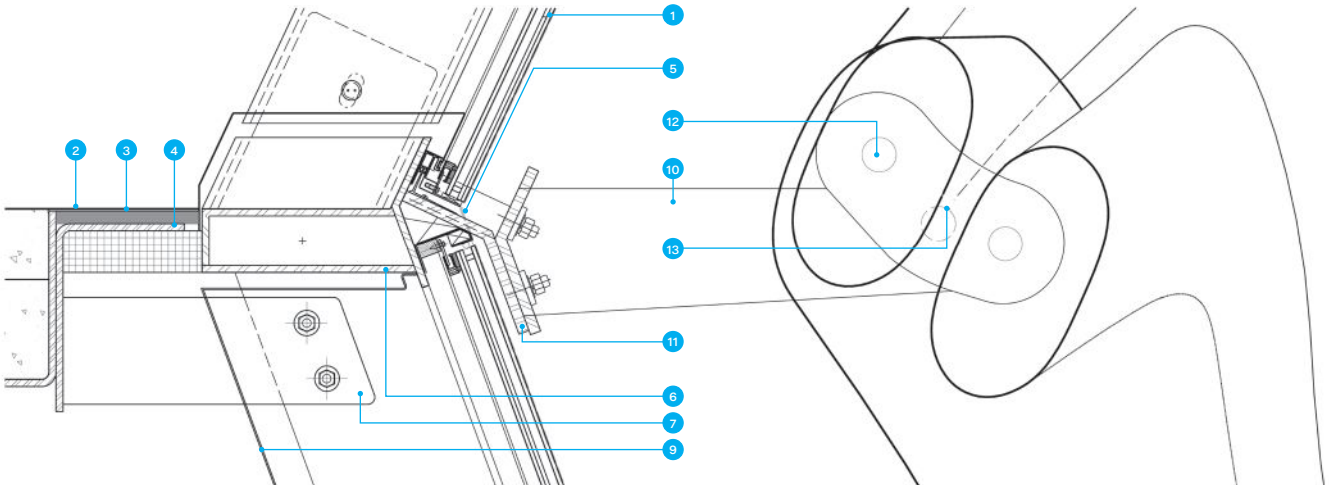
0 3" 6"

The aramid-reinforced brise-soleil modules, as seen from interior, with view out to Seoul's emerging Magok innovation district

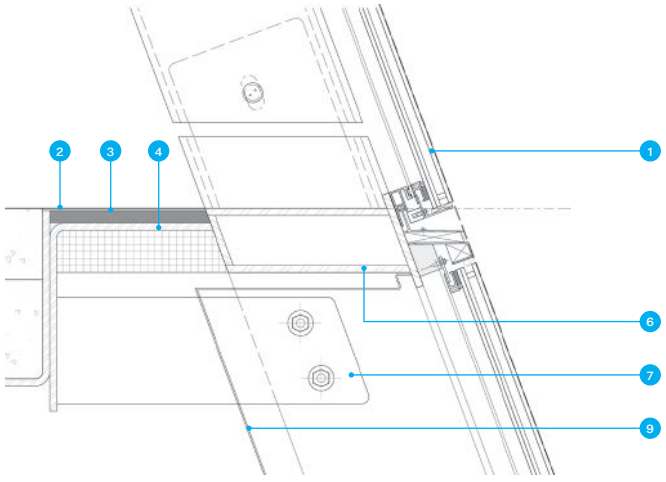
Typical Façade System Stack Joint—Upper Levels



Typical Stack Joint at Façade Fold



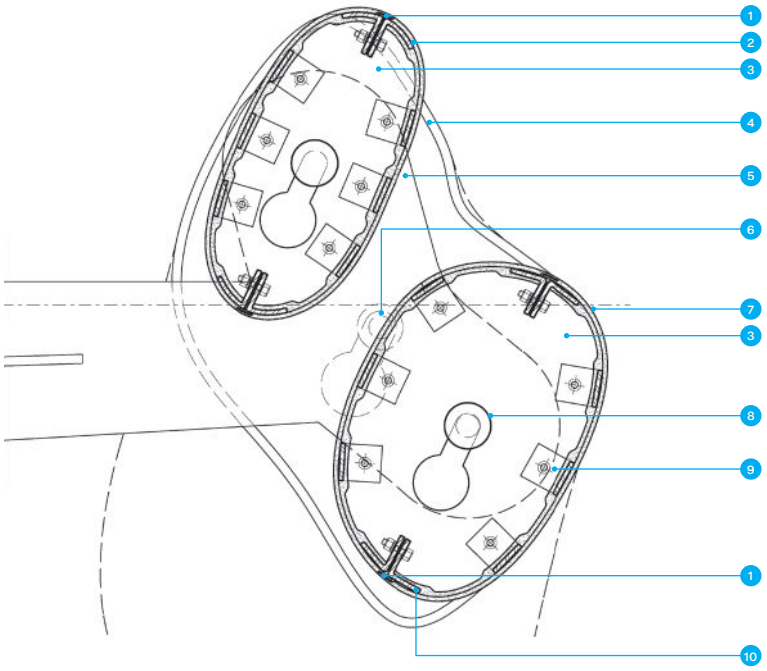
Typical Façade System Stack Joint—Lower Levels



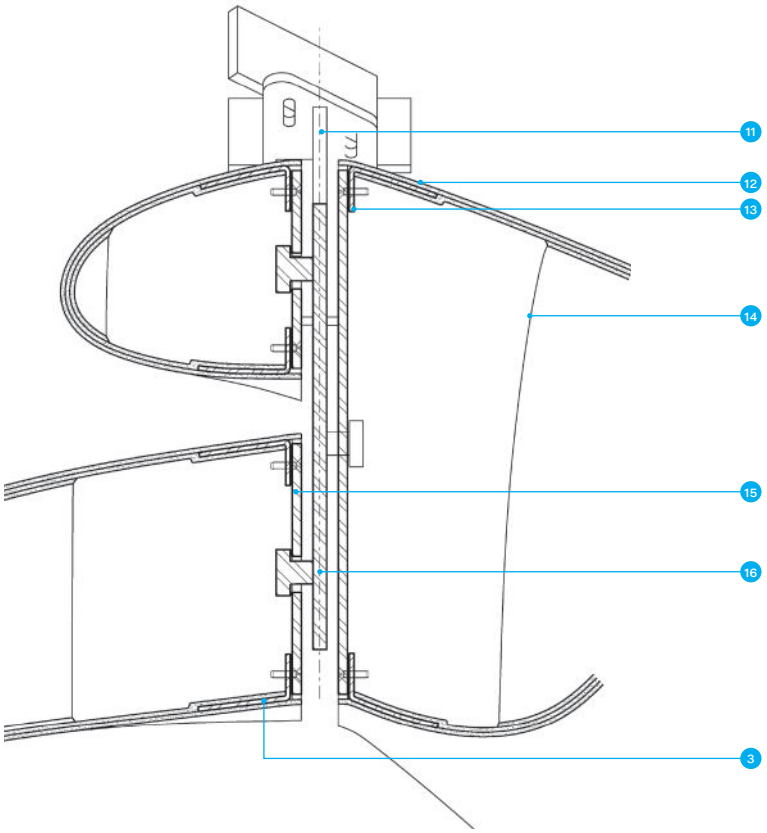
1. Insulating glass unit
2. Stainless steel closure plate
3. Smoke sealant
4. Firestopping
5. 3D geometry workpoint
6. Powdercoated steel horizontal mullion
7. Curtainwall anchor
8. Powdercoated steel vertical mullion
9. Painted aluminum closure panel
10. Stainless steel strut
11. Powdercoated stainless steel strut base plate
12. Glass fiber-reinforced polymer (GFRP) module connection pin
13. GFRP workpoint

0 3" 6"

Section at GFRP Connection



Plan at GFRP Connection



Opposite: Brise-soleil modules shade curtainwall beyond, limiting heat gain

1. Concealed panel split edge
2. GFRP panel tail
3. Stainless steel panel anchor with integral hook laminated inside GFRP panel arm
4. GFRP panel head beyond
5. Stainless steel strut
6. GFRP workpoint
7. GFRP panel arm
8. Stainless steel pin
9. Steel bracket laminated with FRP body
10. Steel bracket for mechanical fixing between halves
11. Strut
12. GFRP panel
13. Steel bracket laminated with FRP body
14. Line of overlap aramid and glass fibers
15. Stainless steel panel anchor with integral hook laminated inside FRP body
16. Stainless steel plate panel strut with welded pins

0 3" 6"

Project Credits
Project: Kolon One & Only Tower, Seoul, South Korea
Client: Kolon Industries
Design Architect: Morphosis, Los Angeles
Local Architect: Haeahn Architecture
Structural Engineer: Buro Happold Engineering; SSEN
M/E/P Engineer: Arup; HiMec; Nara
Sustainability/LEED: Arup Group; Transsolar; HiMec; Eco-Lead
Façade: Arup Group; FACO
Lighting: Horton Lees Brogden Lighting Design; Alto
Civil Engineer: ACE ALL
Fire: Arup Group; KF UBIS
BIM: Morphosis Architects; Gehry Technologies; DTCON
Landscape/Signage/Graphics: Morphosis Architects; Haeahn Architecture
Interiors: Morphosis Architects; Haeahn Architecture; Kidea
Code/Life Safety: Haeahn Architecture
Construction Management/General Contractor: Kolon Global
Façade Construction: Korea Carbon (GFRP); Korea Tech-Wall (GFRC); Han Glass (curtainwall); Steel Life (interior liner)
Size: 76,300 gross square meters (821,286 gross square feet)
Cost: Withheld

The Accelerator at Highlander
Omaha, Neb.
El Dorado

El Dorado and nonprofit Seventy Five North reinvent the community center on a former public housing site.

PHOTOS BY MIKE SINCLAIR

What was the Highlander neighborhood like when you started work there, and how did you approach its revitalization?

Othello Meadows, president and CEO, Seventy Five North Revitalization Corp.: Highlander is on the near north side of Omaha, and for a long time it's been an epicenter of public housing. You had three large housing projects and a highway that went through the neighborhood in the early '80s with eminent domain. In 2008 or 2009, the [Omaha] Housing Authority demolished the housing projects, and those 23 acres of land sat vacant. So the neighborhood as we found it had not much density and a lot of decay.

We wanted to re-densify the neighborhood and to bring people back to this community that has been down for a really long time. The Sherwood Foundation [a local social justice organization] and I were discussing ways to be impactful in Highlander and having a bunch of meetings with people in the community and going to see other developments. I was tipped-off about one in Atlanta that was done by Purpose Built Communities, and the idea for this holistic neighborhood redevelopment came about as a result of learning more about what was going on there.

What do Purpose Built Communities entail?

OM: The model is really focused on three things. The first is creating a cradle-to-college educational pipeline. The next is mixed-income housing—we built 101 apartments and townhouses. The final component is community health, and the Accelerator plays a big part with community programming, education, enrichment, entertainment, and entrepreneurship.

Josh Shelton, AIA, principal, El Dorado: What was really interesting about the process was that Seventy Five North and [development partner] Brinshore brought in us, Landon Bone Baker, and Alley Poyner Macchietto, and they didn't hand the keys over to one firm to make a master plan. Rather, they asked us to all develop one collaboratively before we got to work on the specific parts that we were to design as architects. So it was a really thoughtful, really comprehensive approach that allowed full engagement across the board.

What did you want from the design for the Accelerator?

OM: We wanted to make an announcement that things were different and that things were happening in this neighborhood. When somebody drives down 30th Street and they see this building, I want them to want to stop and turn in. One of the challenges we have is bringing people to this neighborhood and making people want to stay.

How did El Dorado approach the design of the Accelerator?

JS: The site was challenging, because it slopes more than 40 feet, so the building becomes almost a retaining element. We were able to elevate one part of the site and create an open green space. The lower portion of the site, the other side of the "retaining wall," became something more light industrial where cars and deliveries are happening, but it's no less public.

The complex holds educational institutions, offices, an event space, a food hall, incubator spaces, and even aquaponics. How did you curate these tenants?

OM: A big part of it was: "Who is bringing something that doesn't currently exist here?" We didn't want to create a social services campus, we wanted to create an enrichment campus, where people had access to things that didn't previously exist in this neighborhood. Everybody brings something that helps to elevate people in terms of living up to their potential. We ran everything through that filter. Is it aspirational? Is this going to help people live better lives?

It holds a lot of organizations but makes each space distinct. How did you design for that?

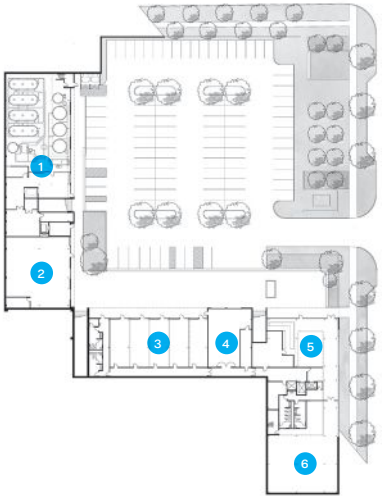
JS: When the design started to really unfold, we had a building with no back door because there were so many programmatic opportunities that every inch and every façade seemed to evolve toward opening up in a unique way for the tenants' potential program. But the building can't be all just front door. I think of the Accelerator as this kind of walk-up facility where you can have access to all these different tenants in a very immediate way. We avoided the use of long corridors to connect tenant spaces and really tried to use the generosity of the site dimensions to allow easy access to each space from the parking lot or street.

We wanted to create a material palette that was economical and durable, but there was a desire for the building to be something "more" in the most general sense of that definition of that word. We were interested in how these simple materials could promote a dynamic presence, but also enhance performance.

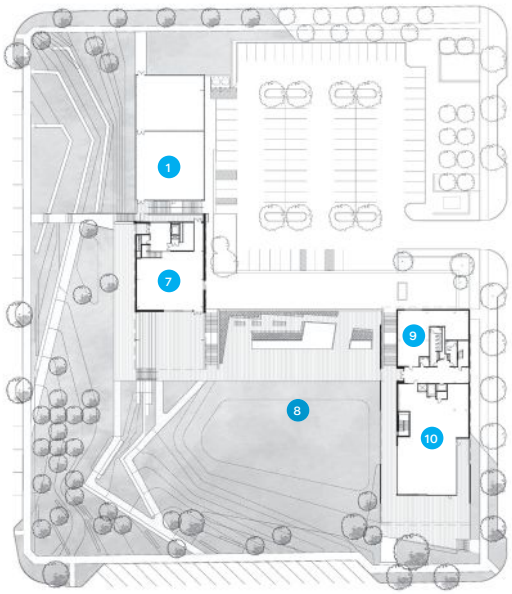
Now that the Accelerator and other parts of the plan are open, how has the community responded?

OM: We told people we were going to do X, Y, and Z, and people trust you if you deliver. I'm seeing people come to the event space three or four times a week. People want to stay in the neighborhood and celebrate life in this place. I think in neighborhoods like ours, where so many promises have been broken, keeping your word goes a long way.

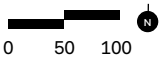
Ground-Floor Plan



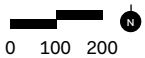
Second-Floor Plan



Third-Floor Plan



Site Plan



1. Whispering Roots aquaponics
2. Code School
3. Business incubator space
4. Loading dock
5. Hardy Coffee Co.
6. Creighton University
7. Event hall
8. Community lawn
9. Seventy Five North
10. Food hall
11. Metropolitan Community College
12. The Accelerator at Highlander
13. Live-work units
14. Multifamily housing
15. Townhomes
16. Senior housing
17. Attached rental units
18. Single-family housing

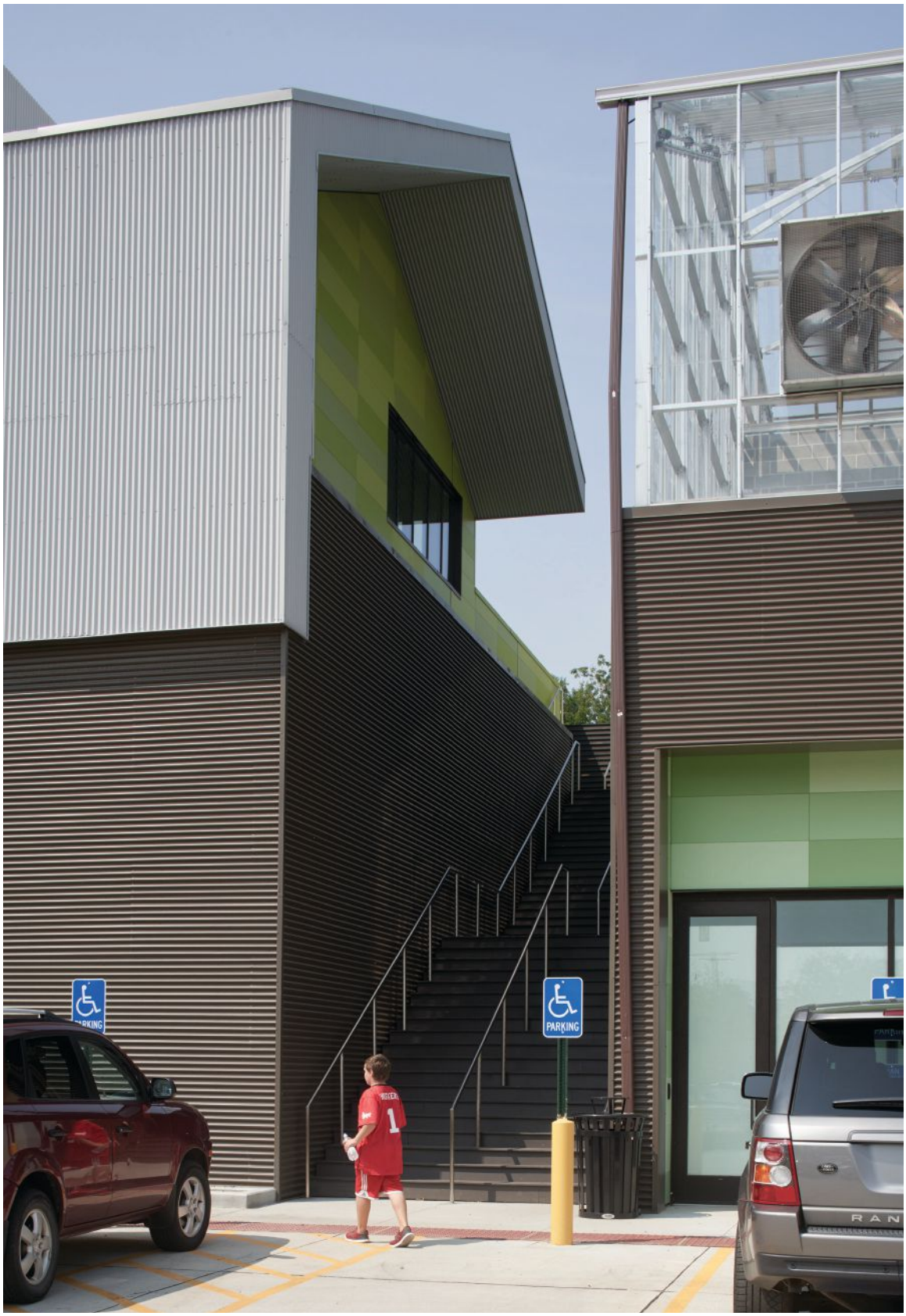
Previous Spread: The event space (at left), which is used for everything from weddings to farmers markets, opens onto a central lawn. The green also covers a field of geothermal wells.

The east building is clad in perforated aluminum. A stair from the parking lot leads to a second-floor food hall, which will serve as an incubator for local restaurateurs and the new home of an enduring local soul-food staple: Big Mama's Kitchen.

Top: Incubator spaces on the north face.

Bottom: Whispering Roots will run a community-supported agriculture venture out of the greenhouse.

Opposite: There are several points of access to each building, such as this staircase between the greenhouse and events space.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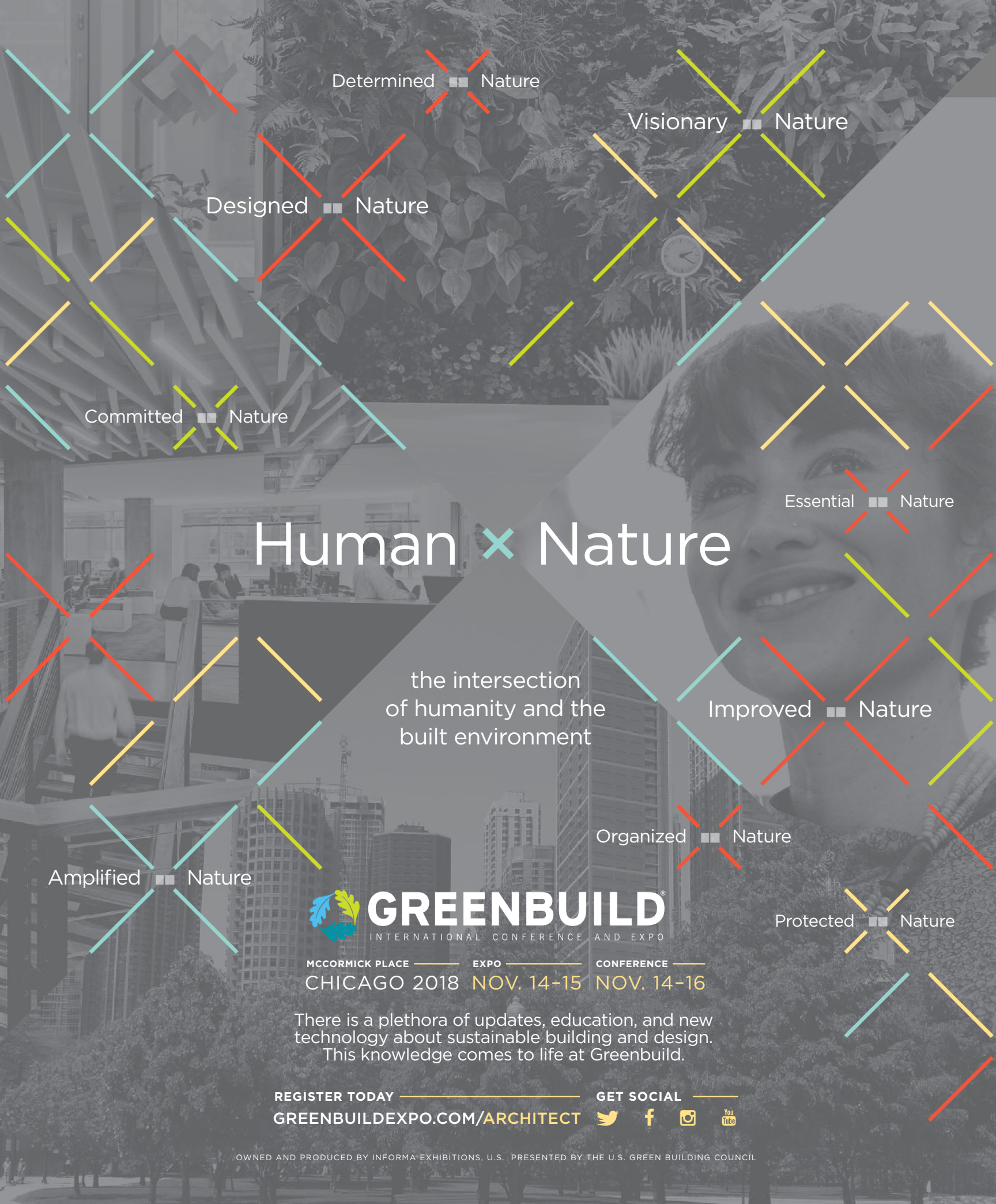
Opposite: Metropolitan Community College was the first anchor tenant and is part of the cradle-to-college pipeline. Area residents can come to this facility to take classes for college credit or to get their GED.

Above: Hardy Coffee Co. provides a ground-floor gathering space for area residents, tenants, and students from the adjacent Creighton University satellite, which is focusing on community health initiatives.

Project Credits
Project: The Accelerator at Highlander, Omaha, Neb.
Development Partnership: Brinshore Development · Richard Sciortino (principal), Todd Lieberman (executive vice president); Seventy Five North · Othello Meadows (principal and CEO), Cydney Franklin (senior project director)
Owners Representative: Project Solutions
Architect: El Dorado, Kansas City, Mo. · Josh Shelton, AIA (principal-in-charge); Sean Slattery, AIA (associate principal); Grace Broeder, Mark Horne, AIA (project architects)
Master Plan: El Dorado; Landon Bone Baker Architects, Chicago, Ill.; Alley Poyner Macchietto Architecture, Omaha, Neb.
Structural Engineer: Bob D Campbell & Co.
M/E/P Engineer: PKMR Engineers
Civil Engineer: Ehrhart Griffin and Associates
Landscape Architect: Site Design Group
Lighting Design: Derek Porter Studio
Greenhouse and Hydroponics Design: Rough Brothers
Aquaculture Design: HTH AquaMetrics
Life Safety and Codes: Code Consultant Services
Size: 73,300 square feet
Cost: Withheld

Flexible outdoor spaces are a central part of the area's redevelopment plan. "We really wanted to create an environment that encourages you to be active, to be outside, to get to know your neighbors, to view your neighborhood as a campus as opposed to 'This is my house, and this is where I stay, and that's it,'" Othello Meadows says.



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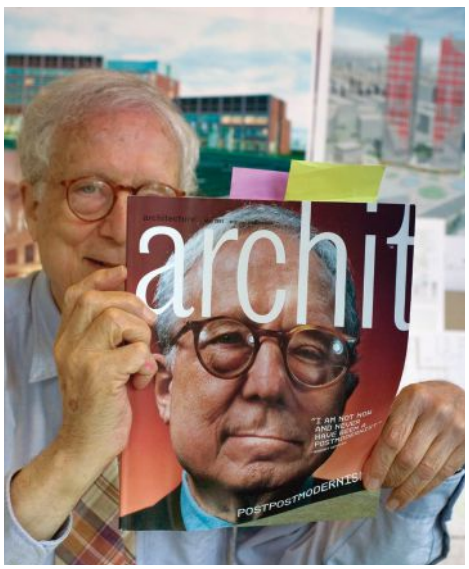
Editorial: When Someone Great Is Gone

TEXT BY NED CRAMER

There's an intense moment in Joseph L. Mankiewicz's 1963 epic *Cleopatra*, when Octavian, played by Roddy McDowall, reacts to the news that his mortal enemy, Marc Antony, has died: "Is that how one says it? As simply as that. 'Mark Antony is dead. Lord Antony is dead.' 'The soup is hot; the soup is cold.' 'Antony is living; Antony is dead.' Shake with terror when such words pass your lips," Octavian tells the messenger, "for fear they be untrue and Antony'd cut out your tongue for the lie! And if true, for your lifetime boast that you were honored to speak his name even in death. The dying of such a man must be shouted, screamed! It must echo back from the corners of the universe. 'Antony is dead! Mark Antony of Rome lives no more!'"

Architect Robert Venturi was my hero, not my enemy, and it's difficult to picture him cutting out anybody's tongue, at least not literally. Still, McDowall's soliloquy came immediately to mind when word of Venturi's death on Sept. 18 arrived. While I am generally suspicious of hagiography or cults of personality, Octavian's lines in this case seem fitting. We have lost a titan. The farewell began some time ago. Venturi was 93 when he died, and had retired from practice and the public eye years before. His equally eminent partner and spouse, Denise Scott Brown, HON. FAIA, survives him, as does their son, James, along with, it seems fair to say, legions of architects and designophiles.



Venturi has been called the father of Postmodernism (a legacy he rejected, in an essay I commissioned him to write for *Architecture* magazine back in May 2001, titled "I Am Not Now and Never Have Been a Postmodernist"). Certainly his influence extends far beyond the style, to touch most *everything* that succeeded the modern movement. His *Complexity and Contradiction in Architecture* (The Museum of Modern Art, 1966) upset the prevailing orthodoxy in architecture; *Learning From Las Vegas* (MIT Press, 1972), which he wrote with Scott Brown and Steven Izenour, did the same in urbanism. With both his writing and his buildings, Venturi reconciled architecture with its preindustrial past and its capacity to convey meaning (alongside Charles Moore, Stanley Tigerman, FAIA, et al.) and set the stage for sympathetic later figures such as Rem Koolhaas, HON. FAIA, Bjarke Ingels, and Jacques Herzog, HON. FAIA, and Pierre de Meuron, HON. FAIA.

Venturi's rebellion freed architects to pursue interests that not only diverged from the modernist canon, but from his own semiotic approach as well. The post-Euclidean geometries of Frank Gehry, FAIA, and Zaha Hadid, for instance, exhibit little obvious relation to the studied mannerism of Venturi, Scott Brown and Associates (VSBA), but the debt exists nonetheless. Even those data-driven champions of sustainability, the name partners at KieranTimberlake, once worked for the couple.

The changes Venturi instigated in collaboration with Scott Brown and Izenour were nothing less than epochal. As too often happens, their collective reputation waned in Venturi's lifetime, only to be revived recently by a cohort of Millennials. I hope they and subsequent generations benefit from his example, not by simply copying the marvelous VSBA aesthetic, but by emulating in their own ways the man's passion, wit, intellectual rigor, and profound skepticism.

VLADIMIR PAPERNY

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