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Contents

Volume 107, number 10. October 2019.
On the cover: The Reach in Washington, D.C., by Steven Holl Architects; photo by Richard Barnes

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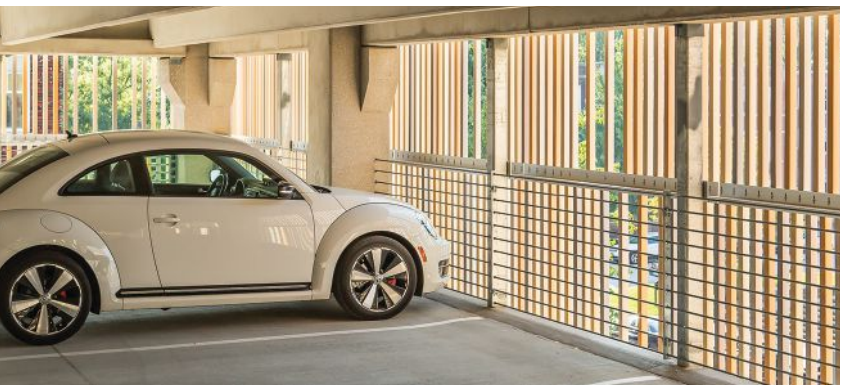

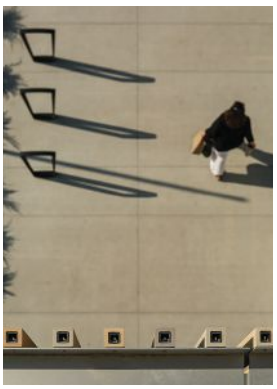

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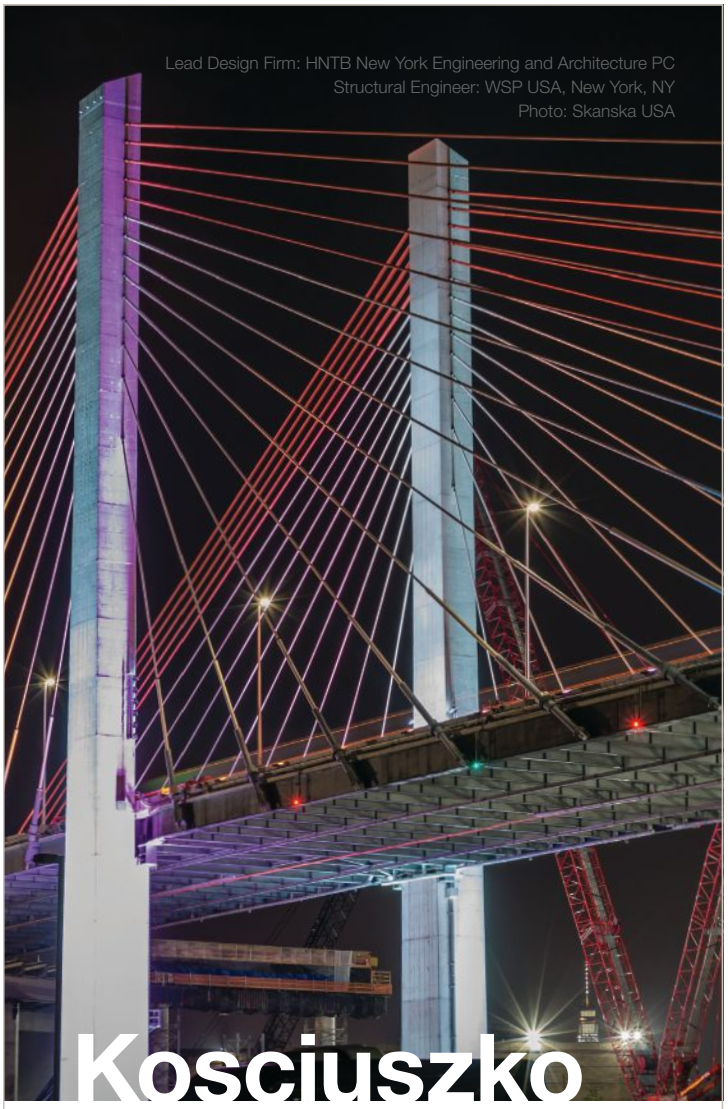

Lead Design Firm: HNTB New York Engineering and Architecture PC
Structural Engineer: WSP USA, New York, NY
Photo: Skanska USA

Kosciuszko à Gogo

The design of urban infrastructure affects city life as much as the design of its buildings. That's why replacing the **Kosciuszko Bridge**—a notorious pinch point in traffic between Brooklyn and Queens—was a high priority for Governor Cuomo. With heavy lifting from **HNTB**, **WSP USA**, and **Skanska**, a striking cable-stayed span has risen where the outdated bridge once stood, ensuring New Yorkers may still have trouble saying its name, but they never have trouble getting home. Read more about it in **Metals in Construction** online.

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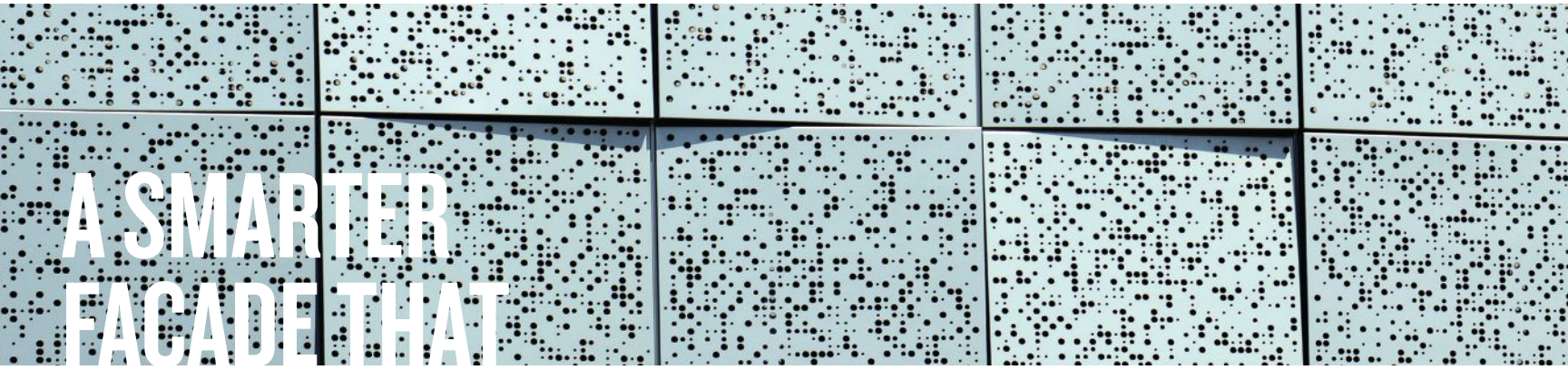

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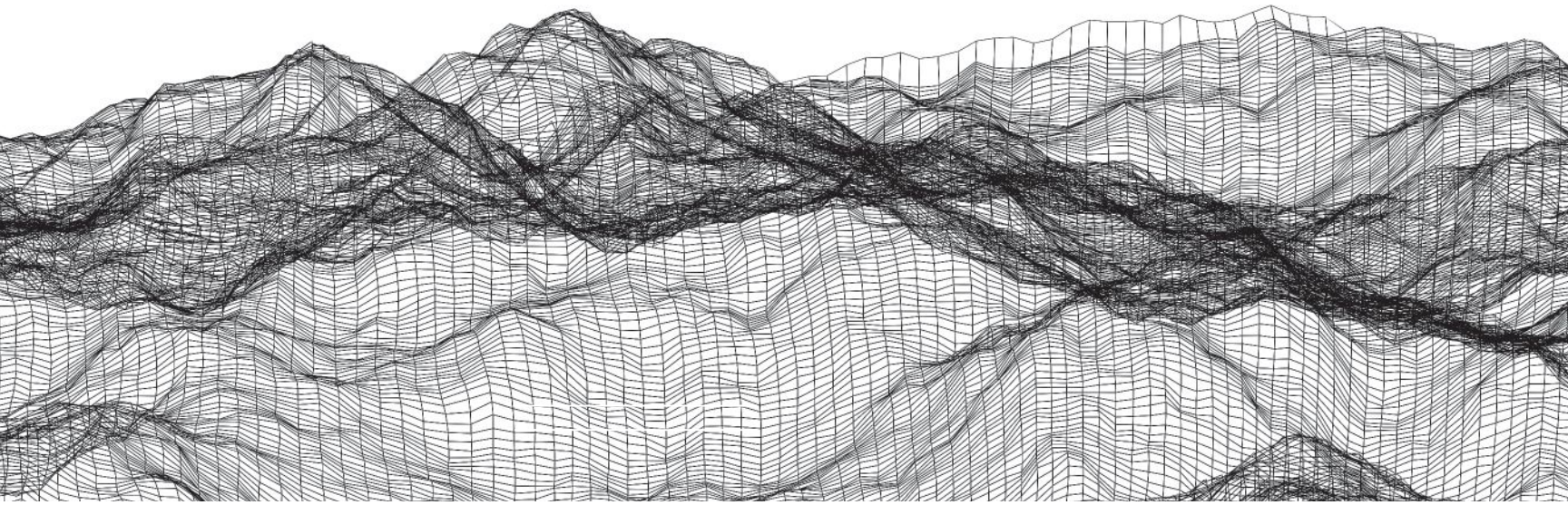


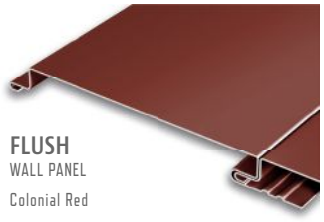
WOW Factor

AISD Performing Arts Center, Austin, TX Owner: Austin Independent School District Architect: Pfluger Architects
General contractor: American Constructors Installing contractor: Texas Roofing Co. Photographer: Tom Coplen
Profiles: Flush Panels, M-42 Panel Colors: Burgundy, Colonial Red, Terra Cotta, Galvalume

"We thought the metal would give us the 'wow' factor from a distance. We first considered using just a single color but the consensus was that we needed something that stood out even more. That's why we went with the nice three-color combination."

-Jessica Molter, AIA, LEED AP BD+C, Principal, Pfluger Architects

FLUSH
WALL PANEL
Burgundy



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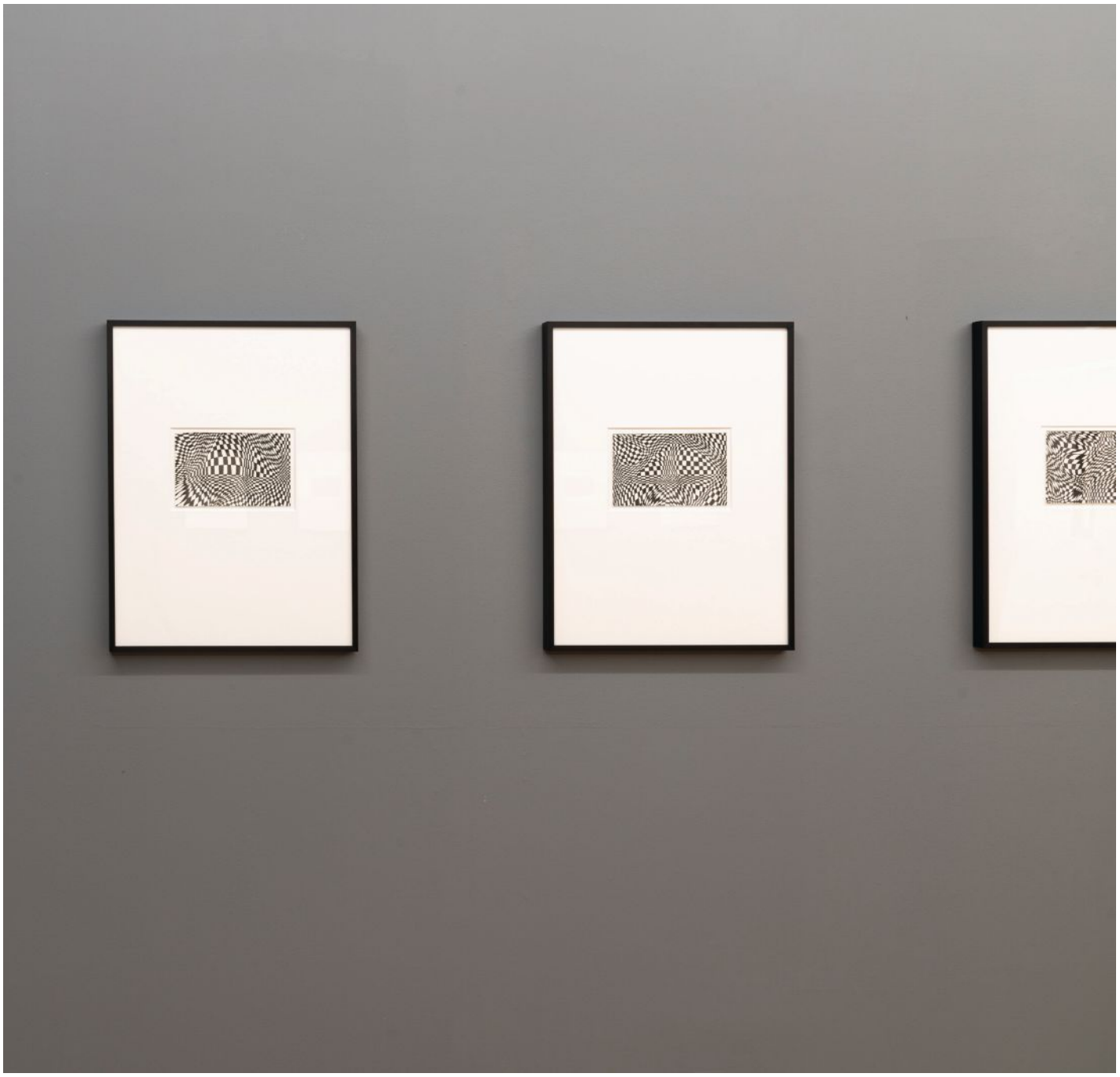

STANLEY TIGERMAN; COURTESY VOLUME GALLERY

The Final Works of a Chicago Master

With the third Chicago Architecture Biennial underway, the city's institutions are staging a host of concurrent architecture and design events. Most poignant among them may be a drawing exhibition at Volume Gallery in the East Village, a neighborhood northwest of the Loop. The exhibition, *Tigerman Rides Again*, brings together 28 drawings that Stanley Tigerman produced starting in January 2019, during the last months of his life. The Op Art–inflected works, black-and-white ink drawings from a Moleskine notebook, hark back to the lessons of Tigerman's professor at Yale, artist Josef Albers. On view through Nov. 2.

> *For more information about the exhibition, visit wvvolumes.com.*

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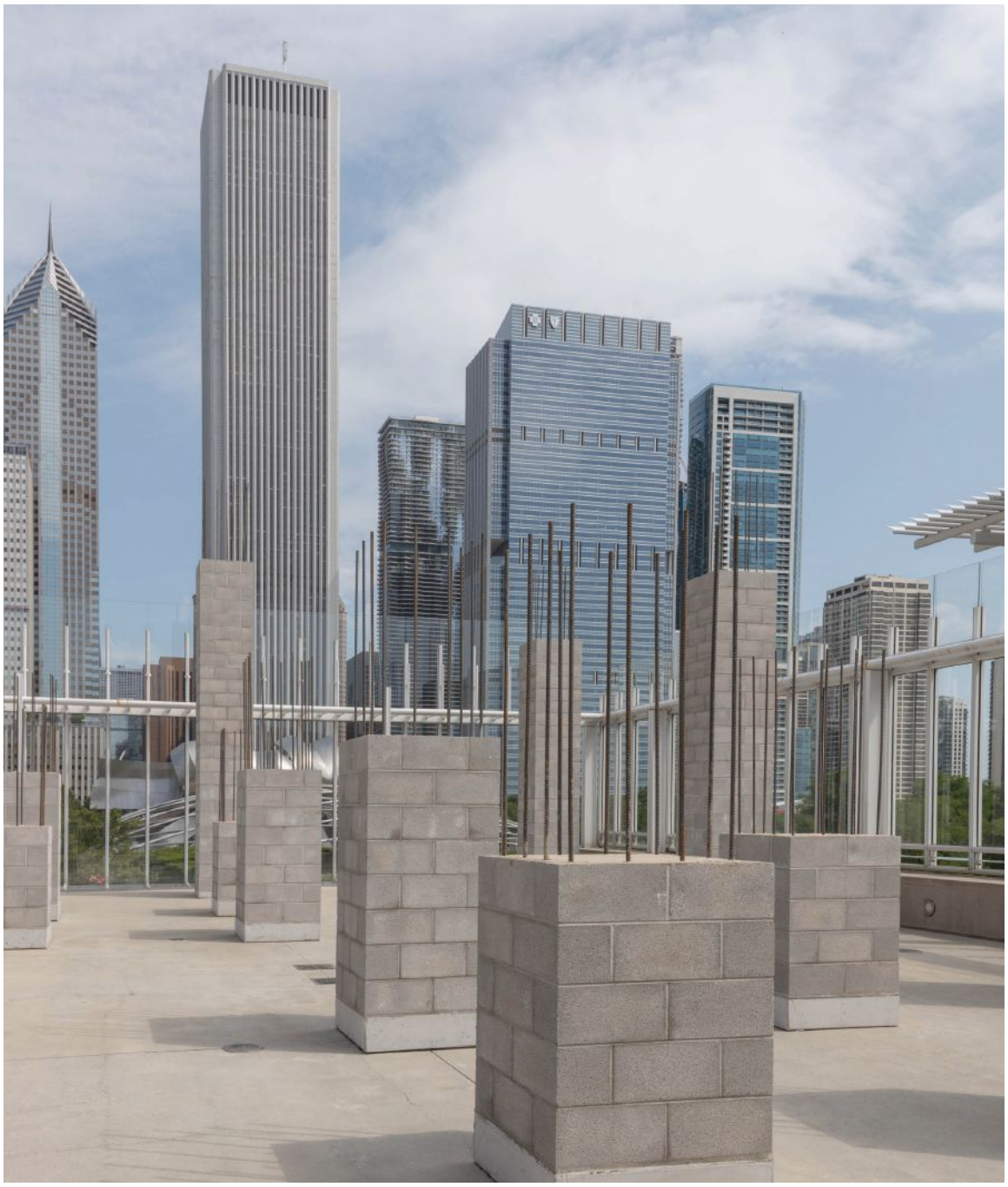

COURTESY THE ART INSTITUTE OF CHICAGO

Monument to the Unknown Worker

A terrace at the venerable Art Institute of Chicago has been transformed by the hands of Cristóbal Martínez and Kade L. Twist of the collective Postcommodity. Moved by the issue of refugee migration to the United States, Martínez and Twist erected a reminder of Latin American immigrants' role in shaping contemporary society, culture, the economy, and architecture north of the border. A grid of cinder block piers, topped with rebar, recalls a building site. Whether the construction remains underway, or has been abandoned, is left to the viewer's imagination. *With Each Incentive* is on view through April 26, 2020.

> *To learn more about Postcommodity and the installation, visit artic.edu.*

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NATHAN KEAY; COURTESY MCA CHICAGO

Not My Utopia

The Museum of Contemporary Art Chicago is complementing the biennial with *The Shape of the Future*, curated by Nina Wexelblatt. Her assemblage of works from the MCA's collection—by Yto Barrada, Günther Förg, Buckminster Fuller, Bodys Isek Kingelez, Richard Misrach, Jack Pierson, and others—offers a critique of Modern architecture's utopian, universalist pretensions. A case in point: artist Mary Brogger's 2000 sculpture *Earthwork* (above), which is a scale model of Ludwig Mies van der Rohe's Farnsworth House in Plano, Ill., filled with birdseed. On view Oct. 19, 2019, through April 5, 2020.

> *To see more works from the exhibition, visit mcachicago.org.*

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TATIANA BILBAO ESTUDIO; COURTESY GRAHAM FOUNDATION

Experiments in Living

Through Jan. 11, 2020, Mexican architect Tatiana Bilbao will occupy the Graham Foundation's magnificent Prairie School mansion with an installation focused on new forms of collective living. The show will be punctuated by workshops and other events, staged with local nonprofit Archeworks, pottery group Colectivo 1050°, artists' website Cultural ReProducers, arts presenter Fieldwork Collaborative Projects, architect Stefan Gruber, Nance Klehm of Social Ecologies, Lurie Garden, MAS Context, Midewin National Tallgrass Prairie, Sweet Water Foundation, The Weaving Mill textile studio, and performance artist Anna Martine Whitehead.

> *Go to grahamfoundation.org for more information about* Tatiana Bilbao Estudio: Unraveling Modern Living*, and a schedule of events.*

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ERIC ALLIX ROGERS

Two Days in October

On Saturday, Oct. 19, and Sunday the 20th, the Chicago Architecture Center and its remarkable cohort of volunteer docents will be facilitating access to more than 350 buildings in the city and the surrounding area, many of them typically closed to the public. The organizers of Open House Chicago recruited venues ranging from the quirky—a 36,000-square-foot prop shop, one of the city's last active Masonic Temples (above)—to the iconic—Louis Sullivan's Krause Music Store, Harry Weese's Seventeenth Church of Christ, Scientist. Lovers of sacred spaces, in particular, should rejoice. Some 90 religious buildings will be welcoming visitors that weekend.

> *For a full list of destinations and tour times, visit openhousechicago.org.*

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Best Practices: Integrating VR Into Design Workflows

TEXT BY JEFF LINK

With the availability of low-cost virtual reality headsets, third-party hosting sites, and VR experiences created directly from BIM programs, more firms are leveraging the technology as a design and presentation tool. Here, several designers discuss how to incorporate VR into the design process.

Develop a Strategy

Bryan Chun, a senior associate at Hickok Cole in Washington, D.C., says firms of any size should consider using VR for several reasons. First, these mock-ups can help clients visualize the depth and scale of spaces with greater clarity than with 2D drawings or renderings. These descriptive capabilities were important in guiding one of Chun's clients at 80 M St. SE, a proposed mass timber addition to a seven-story building in the district's Navy Yard neighborhood. By seeing a range of ceiling heights at scale, the client was better able to assess "the value of an additional foot of floor height and make good financial decisions," Chun says.

> "The biggest challenge I would point to is the actual experience people have when they go into VR."
>
> —David Hamel, 3D visualization group manager, Payette

Before launching a VR/AR program, firm leaders should decide where the technology fits into their practice's workflows. Prior to Chun's involvement, Hickok Cole's in-house iLab micro-grant program made the technology available firmwide. Hickok Cole project architect Carlyn Cullen, AIA, and design technology specialist Howard Mack have also developed VR models of the International Spy Museum, also in Washington, to give stakeholders a sense of what visitors would encounter when walking through the museum.

Start Small

Launching a VR program does not require significant investment or hiring costs. Santa Ana, Calif.–based William Hezmalhalch Architects' VR studio began largely as the extension of one designer's passion project, coupled with the purchase of a $400 Oculus Rift headset and a Chaos Group V-Ray renderer. At Hickok Cole, Chun already had the tools he needed in place with access to Trimble SketchUp's modeling software and a $150 monthly subscription to Sentio VR's presentation platform. Clients are charged for the service based on billable hours and VR models delivered, which has created a new revenue stream for the firm.

The ubiquity of affordable technology and products has also allowed large firms like Edmonton, Alberta–based Stantec to forgo a formalized VR department. Because its designers are already well versed in BIM technology, the transition to VR and AR has been an easy jump, says Brendan Mullins, an associate in the firm's Los Angeles office. Though the firm does have a Visualization Group to provide guidance on custom apps and solutions, most VR presentations are realized with the help of in-house guidelines. "A lot of people assume this is very advanced technology," Mullins says. "But it's really about [the robustness of] your BIM models. If you have that, the only thing you have to do is buy a headset and make sure your computer can run it."

Curate the Experience

Perhaps the biggest key to success in implementing VR and AR is making sure clients are comfortable utilizing the technology. David Hamel, the 3D visualization group manager at Boston-based Payette, has witnessed many users get motion sickness in VR. Others simply don't like the sensation of wearing VR goggles. "The biggest challenge I would point to is the actual experience people have when they go into VR," Hamel says. "If this is somebody's first time, we try to be sensitive to that before we put the headset on."

Coaching clients on the least dizzying ways to navigate through space can improve the quality of the experience. Lounges with dedicated hardware and software—such as a 10-foot-square room at Hickok Cole outfitted with VR headsets and a 60-inch monitor for those not in the VR to watch a 2D version of the experience—can also help put users at ease, while making presentations more sociable.

> *For more strategies on integrating VR technology into workflows, visit bit.ly/ARVRWorkflows.*

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Detail: Inkstone House Roof Overhang

TEXT BY TIMOTHY A. SCHULER

The Inkstone House OCT Linpan Cultural Center uses what Shanghai-based Archi-Union Architects founder and principal Philip F. Yuan calls "digital tectonics," or a "collaboration between human design and robotics," to interpret elements of ancient Chinese culture.

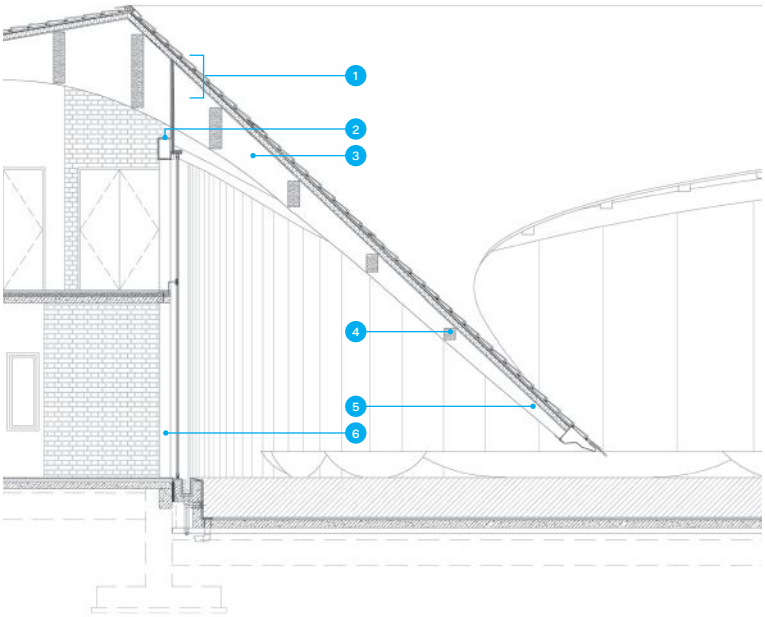
An exhibition hub for the local government and Overseas Chinese Town Enterprises, the two-story, 23,680-square-foot cultural center encircles a glazed-in courtyard with reflecting pools derived from the inkstone used in Chinese calligraphy.

One of the building's most dramatic and complex elements is its swooping shale-tile roof, which banks inward at an angle of 45 degrees toward the courtyard, forming a spout that directs precipitation into the pools. Nearly touching the ground, the overhang becomes the focal point of the space.

From the interior, the roof framing "looks like an all-timber structure," Yuan says, but it is actually a hybrid timber-steel system in which wood boards conceal the majority of the structural steel. Two continuous rectangular steel tubes ring the inner and outer perimeters of the building, supported by steel columns. In turn, the tubes support prefabricated, curved glulam wood-and-steel rafters, braced with glulam purlins of similar depth.

Archi-Union optimized the roof's geometry for cost and structural performance using Rhino and the Grasshopper plug-in Millipede, and by dividing the roof into sections, including the steep swoop, which slopes for nearly 40 feet. The cost and complexities of developing a unique structural strategy for each section was mitigated by the use of digital fabrication, Yuan says.

"The construction industry should be embracing these new technologies," he says. "It's a demonstration of the future."



1. Roof assembly: Shale tile over modified bitumen waterproofing layers, OSB decking, rigid insulation, polyethylene membrane, and OSB decking
2. Steel tube, 400mm × 250mm
3. Glulam rafter, 1.6m to 500mm deep × 270mm wide × 7.2m long maximum
4. Glulam purlin, depth to match rafters × 270mm × 1.23m
5. Steel tube (not shown), curved along eave, 200mm × 200mm × 7.8m
6. Ø220mm steel column (approximately 20' o.c.)

YANG TIANZHOU

> *To read more about the design and realization of Archi-Union's complex roof for the Inkstone House, visit bit.ly/ARauOCT.*

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Next Progressives: Only If

EDITED BY KATHARINE KEANE

Location:
Brooklyn, N.Y.

Year founded:
2013

Firm leadership:

Adam Snow Frampton, AIA, and Karolina Czeczek

Education:
Czeczek: M.Arch., Cracow University of Technology; M.Arch., Yale University
Frampton: B.EnvD., University of Colorado Boulder; M.Arch., Princeton University

Firm size:
Four

Origin of firm name:
"Only if" is a condition rather than a definitive—it is optimistic and open-ended.

Mission:
Only If is engaged in design work at the intersection of architecture and urbanism. We focus on fundamental questions and potentials to create clarity and distill simplicity within often-complex circumstances and constraints. Rather than imposing additional regimes of complexity, we envision simple gestures and forms that impose structure, coherence, and identity.

Favorite project:
Our favorite projects right now are interrelated. First exhibited in the Shenzhen Biennale in 2017, Irregular Development is an ongoing research project that catalogs around 3,600 existing, irregularly shaped, narrow, triangular, and small vacant lots in New York City. In parallel, the Narrow House, now under construction, is located on a 100-foot-by-13-foot lot. The Narrow House demonstrates the potential of one such lot, but is also a prototype for other sites; it will be Only If's first completed ground-up project.

These two projects exemplify our interest and approach to design that engages multiple scales, including architecture, interiors, and urbanism. We're very excited to continue designing affordable housing through the next phases of the Big Ideas for Small Lots competition in New York City, for which we were recently selected as a finalist.

Dream collaborator:
Avant-garde Polish sculptor Katarzyna Kobro (1898–1951)

Special item in your studio space:
Nikita, our Siberian husky

Design tool of choice:
The Pilot G-Tec-C4 black gel pen. Although the computer is crucial to our design process, we do spend a lot of time trying to be analog—i.e., working on paper and with physical models.

Greatest mentor:
Tatiana Bilbao, Karolina's former professor at Yale, is an inspiring architect who recognizes power of creative collaborations and discussions between architects, policymakers, and ordinary people.

Biggest career leap:
Both of us had the opportunity to work at Office for Metropolitan Architecture (OMA), in the Netherlands, after we finished our degrees. The intensity of that environment and the experience of working alongside talented people from different backgrounds were transformative. We both found that the rigor of the design process at OMA, in combination with the role that intuition also plays, was very liberating from our educational experiences.

Recent inspiration:
Kosciuszko Pool in New York City by Miami Modernist Morris Lapidus. Karolina has been researching pools as public space, and this public pool, near where we work, is an incredible artifact from the early 1970s.

Travel destinations for architecture:
Tokyo and São Paulo

SAM NIXON

> *To learn more about Only If and its work, visit bit.ly/AROnlyIf.*

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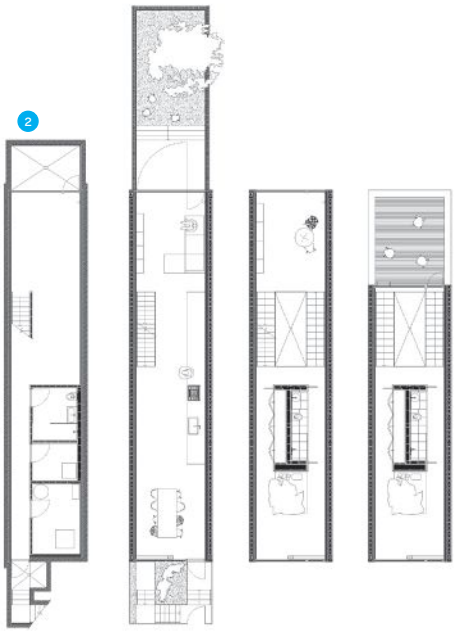
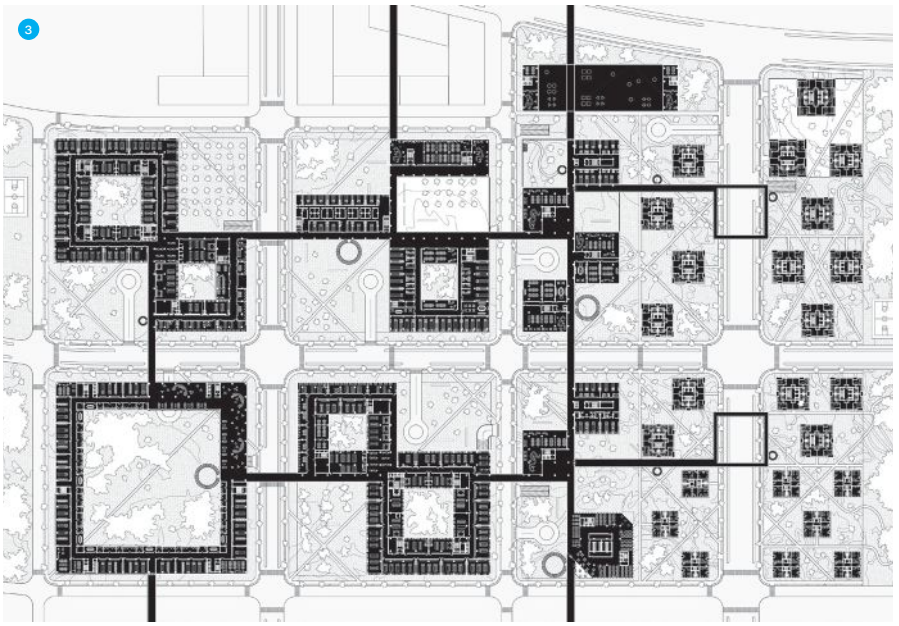
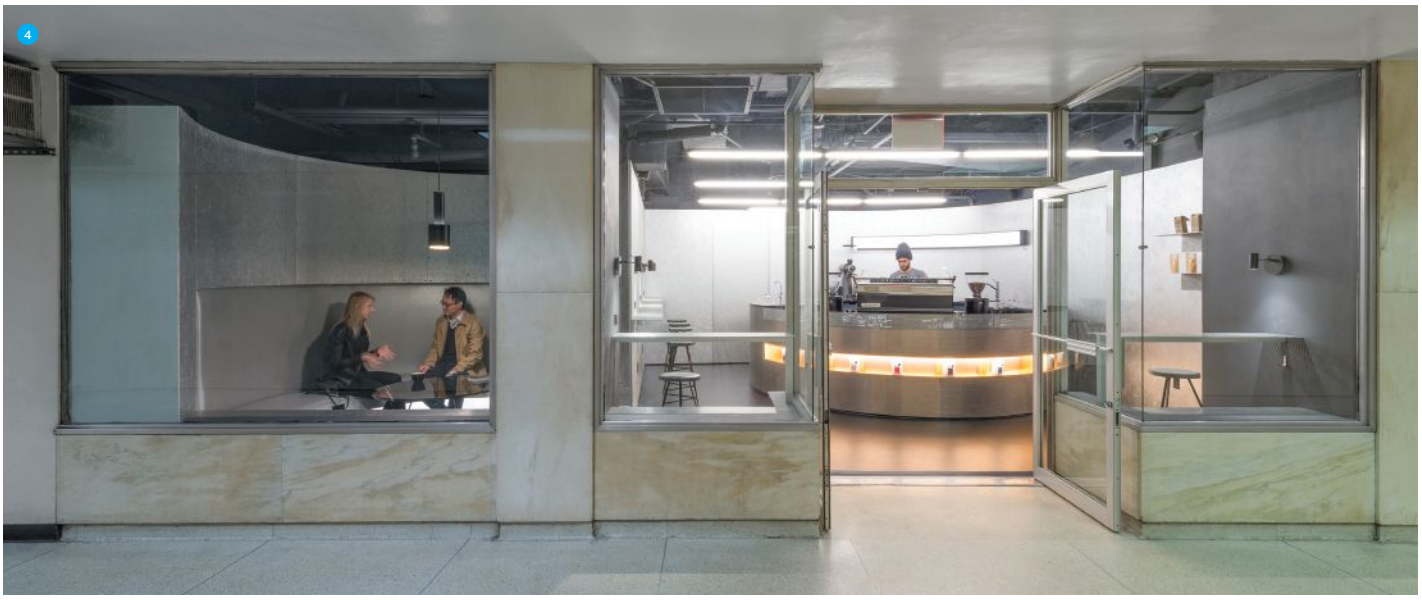
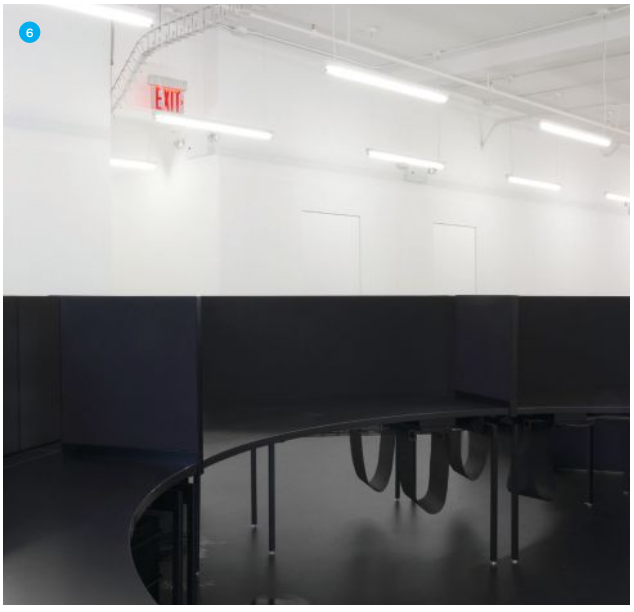
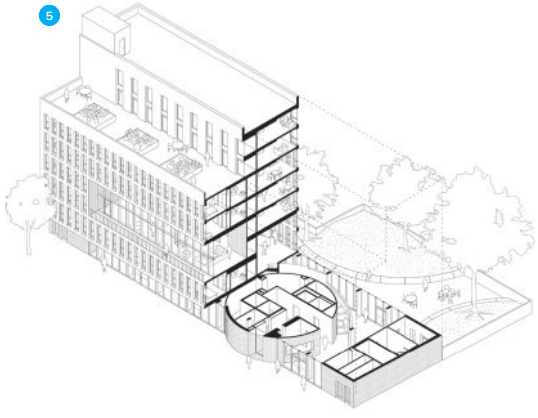




1, 2, 3, 5: COURTESY ONLY IF







1. Only If exhibited a catalog of speculative housing prototypes for irregularly shaped and vacant lots throughout New York City as part of the 2017 Bi-City Biennale of Urbanism\Architecture in Shenzhen, China. **2.** The firm is contending with issues of limited daylight and a slim 13-foot-by-100-foot footprint in the design of the Narrow House, a 2,400-square-foot residence in Brooklyn, N.Y., which the firm views as "a low-cost prototype for how to infill otherwise overlooked parts of the city." **3.** This master plan proposal for the Xi'an Technology Campus in China features a checkerboard of different building types that are connected by a network of elevated pedestrian bridges. **4.** The design for Voyager Espresso in New York City's Financial District is inspired by the café's spacecraft namesake, with a futuristic material palette of perforated aluminum, copper, and black marble. The space is centered around multiple circular elements including a counter for baristas and banquette seating for visitors. **5.** The firm's Brooklyn Senior Affordable Housing project is designed to accommodate 84 rental units with a double-height loggia "living room" to encourage socialization and a sense of community. **6.** Located in New York City, this office accommodates three separate companies and features stark color blocking.

4: MICHAEL VAHRENWALD/ESTO; 6: MIDORI HASUIKE

Products: How to Specify Electrochromic Glass

TEXT BY LINDSEY M. ROBERTS

It's the law of unintended consequences: With greater emphasis on daylight and views comes increased heat and glare inside. Blinds, curtains, and sunshades negate the benefits of expansive glazing, as do higher HVAC costs. In recent years, tinted electrochromic glass—also called smart, smart-tint, dynamic, or switchable glass—has become a more accessible option. Here's how to specify the technology in your projects.

Performance Expectations

Electrochromic windows provide "greater benefit in more cooling-dominated climates because of [their potential to achieve a] very low solar heat gain coefficient (SHGC)," says James Adams, AIA, a senior associate at Corgan's Dallas office. Typical SHGC values for electrochromic glass range from 0.41 to 0.09, where the latter value indicates that 91% of the incoming solar heat is blocked.

For projects in hot climates, look for windows with lower SHGC values, around 0.25, to help reduce cooling loads in the summer. For projects in cold climates, look for products with higher SHGC values, around 0.40 to 0.50, to reduce heating loads in the winter. This highlights one inherent advantage of smart glass: its SHGC can vary with its tint, ideal for a region with a mixed climate.

Common U-factors (the rate of non-solar heat loss) for electrochromic insulated glass units (IGUs) range from 0.07 to 0.40. In hot climates, look for a U-factor of 0.20 to 0.25 for a double-glazed unit. When a lower value is preferred—for example, in an extremely cold climate—a triple-glazed window may be more appropriate.

In the Clear

The visible transmittance (VT) of smart glass can be adjusted based on daylight and glare conditions. The wider the VT range, the more the glass can mimic the performance of shading and the better suited it is for mixed climates.

A product capable of a VT between 28% and 60% can offer clear views, good for when glare is not an issue. A VT of 18% to 21% corresponds to low-level tinting, good in times of overlighting without direct glare. A VT of 6% to 10% indicates a mid-level of tint, which can control some direct glare. Finally, a VT of 1% or less indicates full tint and glare control. Common tint hues include blue, green, and gray, though custom color options are possible.

Somewhere in Between

In-pane zoning works well in curtain wall applications because multiple tint zones can occupy a single pane—up to 5 feet by 10 feet in size—and effectively manage the incoming sunlight since only part of the glazing may be subject to glare at times. In lieu of in-pane zoning, distinct IGUs stacked or butted together can be set to different tints.

Retrofit Alternative

While electrochromic glass is often specified for new construction, existing windows can be reglazed with smart glass as well. A less intrusive option is to apply switchable film to the original glass. While switchable films don't offer smart glazing's broad range of options—acoustical mitigation (from a sound transmission class rating of 35 to 42), fire resistance, and lamination—and may not be appropriate for the application, they can offer a quicker and more economical route.

Center for Natural Sciences, Mathematics, and Nursing at Bowie State University

COURTESY SAGEGLASS

Cost Comparison

Electrochromic glass might cost three times as much as a standard low-E IGU, but the comparison is akin to weighing the benefits of a smartphone against a flip phone. When compared with a low-E IGU plus an automated mechanical shading system, the upfront cost can be surprisingly similar.

> *To learn more about the performance characteristics of smart glass, visit bit.ly/ARh2SG.*

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Opinion: Power Comes in Many Forms

TEXT BY LIZ YORK, FAIA

In 1986, my peers and I began our first-year architecture studio with parallel straightedge bars and triangles in hand. We thought we were prepared for everything. Then we discovered that, though plenty of men's rooms were adjacent to studio, no women's rooms were in sight. The building had been completed in 1952, when the program didn't have any women, so the architects did not include women's rooms.

What did the female students do? We used the men's room. We liberated the space. We refused to let the sign on the wall mandate a longer walk and implicitly discriminate against us. No one intended harm, none was taken, but we redesigned it, de facto, with our actions.

A lot of space has been used in a certain way for years that we as architects can liberate. Why are restrooms overwhelmingly identified as men's or women's? Thinking creatively, we could, as a starting point, name them short-visit and long-visit or Schroeder and Pig-Pen to indicate specific fixtures or neatness expectations.

Later, when I was diagnosed with cancer, architecture, of all things, helped me cope and connect. Situated feet away from strangers in the infusion room, as we waited for chemotherapy drips to make us well, we traded stories, shared hope, and offered support. Anyone could have pulled a curtain around their space, but no one ever did. Through architecture, we didn't have to be alone. This was a welcome paradigm shift in health care design from the private exam room.

What other wounds can design heal? How can we frame or reframe design challenges in ways that facilitate meaningful solutions for today?

Meaningful architecture is created when design teams harness the power of diversity and inclusion. Design solutions are better when firms value differences in all aspects of life. We must go beyond what a person outwardly looks like to whom they are inside and their experiences in life. Inclusion is not a superficial exercise of getting the "right looking" team. It has to be a deep exercise that gives people license to engage, gain acceptance, and develop agency.

I'm often asked how I promote diversity in my office. On day one, each newly hired team member completes a personality inventory that identifies strengths and attitudes that permeate their thinking. Team members share their assessments, and together we discover the ways we approach work differently. Some people focus on creating icons while others are prone to customization, process development, or even the search for higher meaning. The value of bringing multiple perspectives to the table quickly becomes clear.

For example, when brainstorming shorter restroom lines during a design charrette, one team member, strong in empathy, suggested we widen stall doors to facilitate purses and luggage. Another team member, focusing on user efficiency, proposed that the doors swing outward to make it easier to exit the stalls. Someone with a cautious mindset imagined doors flying open and suggested lengthening stall dimensions instead to provide more room to maneuver. We could have designed the stalls the way we've always done it, and we would have gotten exactly what we always had.

We all have a role to play in equity. Design principals and team leaders with positional power must create safe environments and encourage open collaboration. They must build trust so that people allow themselves to be vulnerable, take risks, and speak up.

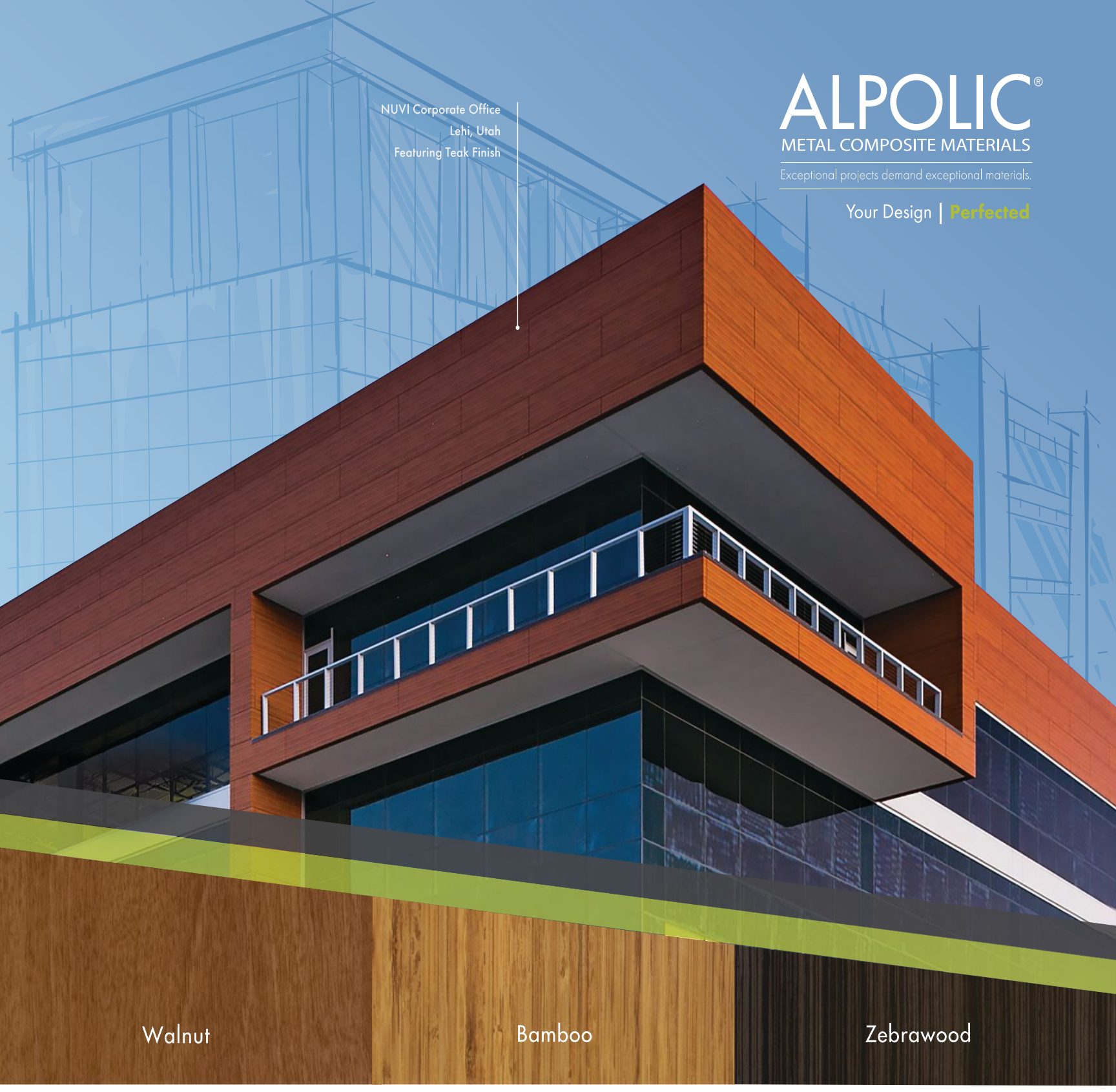
Within these safe environments, everyone, from recent graduates to seasoned designers, must use personal power to assert and speak truth. When teams are empowered to frame design problems in new ways, old wounds—including segregation, discrimination, and bias—can begin to be healed.

By acknowledging the challenges that different people face and liberating space for today's paradigms, we strengthen architecture's relevance and power to heal.

Based in Atlanta, Liz York, FAIA, holds bachelor's and master's degrees in architecture from Georgia Tech.

LAUREN BISHOP/CDC

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



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Architectural Lighting: When Smart Controls Network

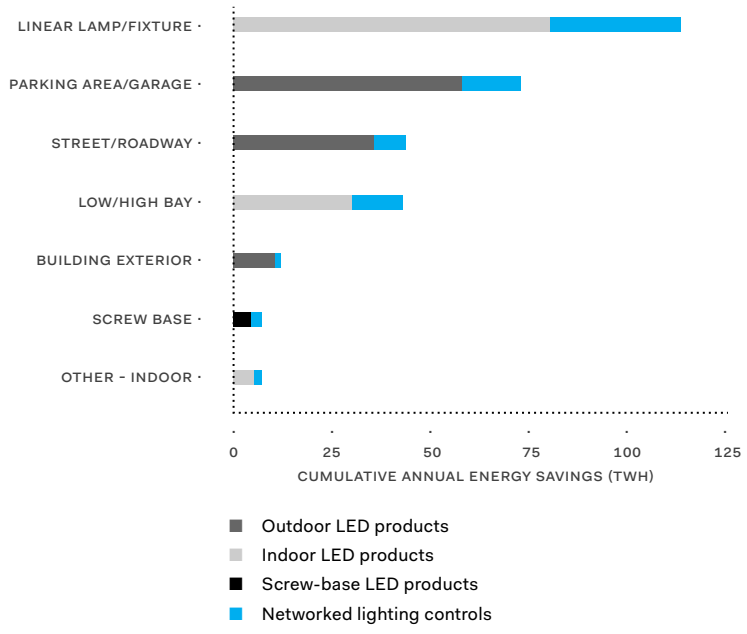
TEXT BY MURRYE BERNARD, AIA

It feels good to be in control. When it comes to the occupant experience in a building, lighting control systems can provide some of that satisfaction with the added benefits of increasing the flexibility of a space and reducing energy consumption.

Though lighting controls have been around for decades, they have recently evolved to become more sophisticated and complex. Networked lighting controls (NLC), in particular, have the potential to reduce energy usage as much as the switch from conventional sources to solid-state lighting, or LEDs.

"Lighting is the 'poster technology' for energy efficiency," says Tina Halfpenny, executive director of the DesignLights Consortium (DLC), a nonprofit organization based in Medford, Mass., that advocates for the adoption of high-performance commercial lighting solutions. "You're in a different scenario when it comes to controls because of the added benefits—and there are many beyond energy efficiency."

U.S. Nonresidential LED Remaining Savings, 2018–2035 (based on U.S. Department of Energy stock estimates and forecasted adoption and efficacy)



SOURCE: "ENERGY SAVINGS POTENTIAL OF DLC COMMERCIAL LIGHTING AND NETWORKED LIGHTING CONTROLS," THE DESIGNLIGHTS CONSORTIUM, JULY 2018

Controls Grow Up

The simplest lighting controls are the on/off switch and dimmer, followed by timers, motion sensors, occupancy sensors, and photosensors. Advances in control technologies include daylight sensors and color tuning, which adjusts the color temperature of white light. Controls can be operated manually, automatically, or both.

NLCs can tie these technologies together to maximize their effectiveness, providing programmable lighting control for a floor, building, or even an entire campus. Wired or wireless, networked components may include luminaires, controls, sensors, drivers, software, and an online or app-based user interface. NLCs can talk to other building systems, such as mechanical, and be managed from a single dashboard as part of an overall building management system. They also allow for programmability, such as the zoning and rezoning of spaces, and can track system performance.

Put simply, NLCs can provide the right amount of light when and where it is needed. As such, they can also help a project comply with energy codes (such as California's Title 24), achieve sustainability certification, and enhance occupant well-being and productivity.

Perhaps the most compelling

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MOI Inc. Baltimore, MD FOX Architects Ron Blunt photography

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argument for NLCs is one based on economics. A 2018 DLC report found that NLCs used with LED fixtures can reduce energy usage by as much as 47%. Improved working environments can increase employee productivity and subsequently a business's operating efficiency and revenue. Furthermore, data collected by a network can reveal insights into a facility that help reduce operating costs and also improve logistics, such as conference room scheduling and equipment tracking in facilities such as hospitals and airports.

Making the Leap

Despite their potential, the adoption of NLCs has been limited. Reasons include their initial cost; complexity to specify, install, and operate; lack of standardization among products (all system components must be able to communicate to each other utilizing compatible protocols); and the task of training operations and maintenance staff. According to the DLC, fewer than 10% of new construction projects and 1% of lighting retrofit projects are estimated to use the technology. However, the U.S. Department of Energy estimates that more than a third of installed luminaires in commercial buildings will have network connectivity by 2035.

First costs, Halfpenny acknowledges, "are still quite high." The challenge, she says, is convincing owners and end users to invest in NLCs during new construction rather than wait until a retrofit, when installing the system will be more expensive.

In order to help specifiers choose the best products, the DLC has created a qualified list of NLC products for interior environments. As a prerequisite to inclusion on the list, each system must incorporate occupancy sensing, zoning, daylight harvesting, high-end trim, and energy monitoring. Daylight harvesting describes the capability to automate the operation of lighting or other equipment based on the amount of daylight or ambient light present. High-end trim is the capability to set the maximum output of an individual luminaire or a group of them to less than the source's maximum state—while still delivering the necessary light levels—at the time of installation or commissioning.

"You can get a view of the different capabilities of qualified systems, and that's what we're finding is speaking to the end user," Halfpenny says. "Non-energy benefits—such as conference room scheduling, improved ambient conditions, and increased flexibility of spatial utilization—can be more motivating for people than energy savings."

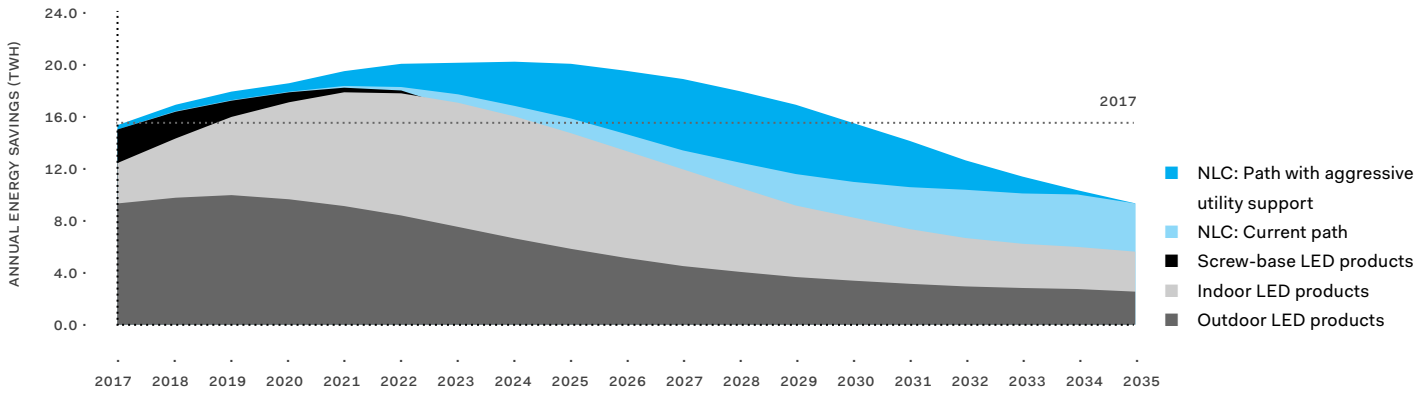
For an architect or lighting designer, knowing the array of product features available may help them find one that appeals to their clients and bolsters the case for implementing NLCs.

Evidence in Numbers

In support of its Total Workplace Initiative, as well as its move toward open floor plans, the U.S. General Services Administration commissioned the DOE's Pacific Northwest National Laboratory to evaluate five different LED systems with advanced lighting controls in 76,000 square feet of mostly open office space at a large GSA office building in Fort Worth, Texas.

In its November 2018 report, PNNL noted a 43% savings in lighting energy from the advanced lighting controls

U.S. Nonresidential Annual Energy Savings Potential (based on DOE stock estimates and forecasted adoption and efficacy)



SOURCE: "ENERGY SAVINGS POTENTIAL OF DLC COMMERCIAL LIGHTING AND NETWORKED LIGHTING CONTROLS," THE DESIGNLIGHTS CONSORTIUM, JULY 2018

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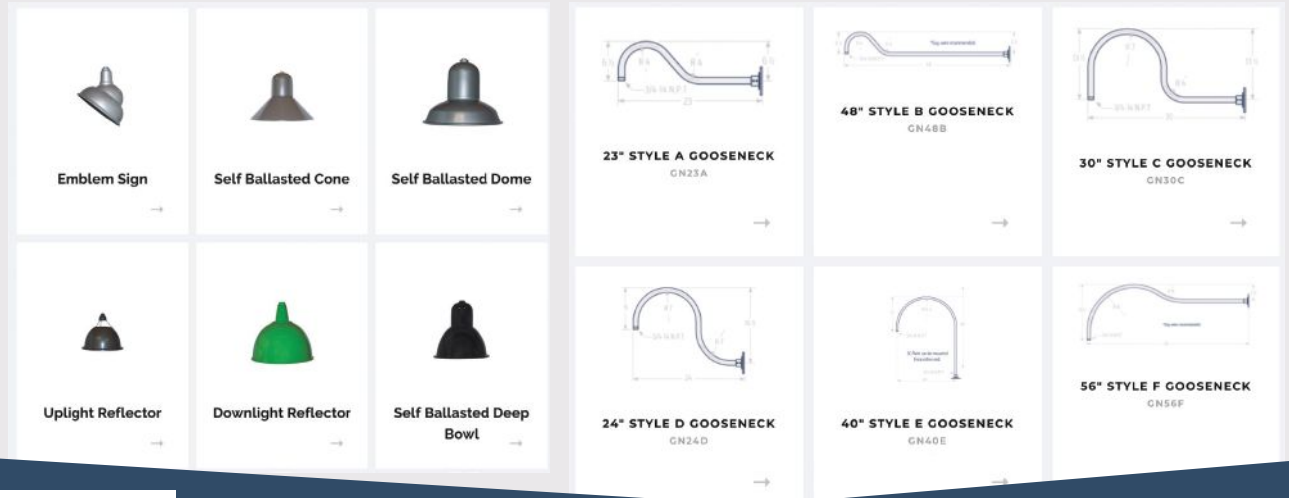

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Architectural Lighting: When Smart Controls Network

on top of the savings achieved by switching from fluorescent fixtures to LEDs. Half of that 43% was attributed to tuning the light levels, and the other half to optimizing the performance of occupancy controls and sensors. NLCs, the PNNL study found, are most likely to be cost-effective in open offices in which occupants engage in different tasks due to the system's ability to sense occupants and tune light levels.

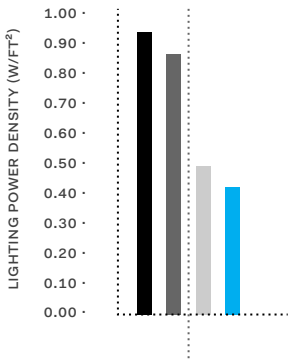
"Without the benefit of lighting controls, many of our tenants found the LEDs to be just too bright," noted Frank Campagna, energy project manager of the GSA Greater Southwest Region, in the report. "Once we tuned the new fixtures, people were much happier."

The controls were also more cost-effective when integrated into the fixture by the original equipment manufacturer rather than retrofitted in the field.

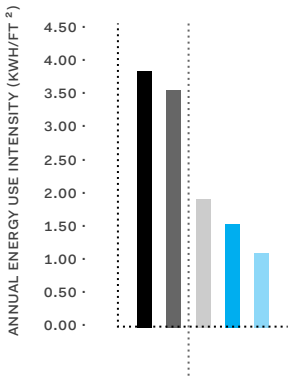
The DLC and the DOE have also completed a series of lighting demonstration projects. At a three-story, 30,500-square-foot medical office in Avon, Conn., fluorescent lighting fixtures were retrofitted with LEDs, wireless controls, and advanced sensor options that allowed light levels to be customized. The switch to LEDs alone saved the site more than 29% of its baseline energy consumption for lighting. With the addition of advanced occupancy sensing and daylighting controls, the savings jumped an additional 33% for a total of 62% savings, equivalent to 69,000 kilowatt-hours (or $8,200) annually. The lighting system, including the fixtures and controls, cost $92,500 total, resulting in a payback period of less than seven years.

And, importantly, 79% of occupants were satisfied with the new light level controls, and 86% were satisfied with the overall lighting.

GSA Fort Worth Case Study: Weighted Average Lighting Power Density



GSA Fort Worth Case Study: Estimated Annual Energy Use Intensity



- Baseline (if all installed lamps work)
- Baseline (actual condition)
- Initial LED fixtures
- Tuned LED
- Tuned LEDs with occupancy sensors
- Drop from baseline partly due to the reduction in total fixture count when lighting systems were switched to LEDs

Next Up for NLCs

In this era of rapid advancements, building owners are justifiably concerned about technology obsolescence. By knowing what lies ahead for NLCs, architects may be able to help address their clients' questions.

Several manufacturers foresee advances in data gathering and analysis to improve the built environment. Javier Carracedo, a Dornbirn, Austria–based segment manager of IoT (internet of things) solutions for Tridonic, expects the sensing capabilities of lighting products to grow and include temperature, air quality, and noise detection. "NLCs also now have the capability to process and analyze harvested data, opening the door to services that both improve building operating expenses and the well-being of its inhabitants," he says.

"The future of NLCs must incorporate control of both electric light and natural light via a dynamic daylight management system," says Matt Ochs, an Allentown, Pa.–based product management director with Lutron Electronics. "Not only will this holistic approach to light control increase energy savings, but it also enhances the occupant experience by providing greater access to views and natural light throughout the space."

Ochs believes that information collected by NLC sensors will also inform mobile apps now in development to give occupants additional control and customization options of their workspaces. "As building owners adopt these apps designed to enhance workforce productivity and engagement, lighting controls will have to integrate seamlessly," he says. "Plug-and-play integration will be the key to broad adoption of any lighting control platform."

SOURCE: "EVALUATION OF ADVANCED LIGHTING CONTROL SYSTEMS IN A WORKING OFFICE ENVIRONMENT," PACIFIC NORTHWEST NATIONAL LABORATORY, NOVEMBER 2018

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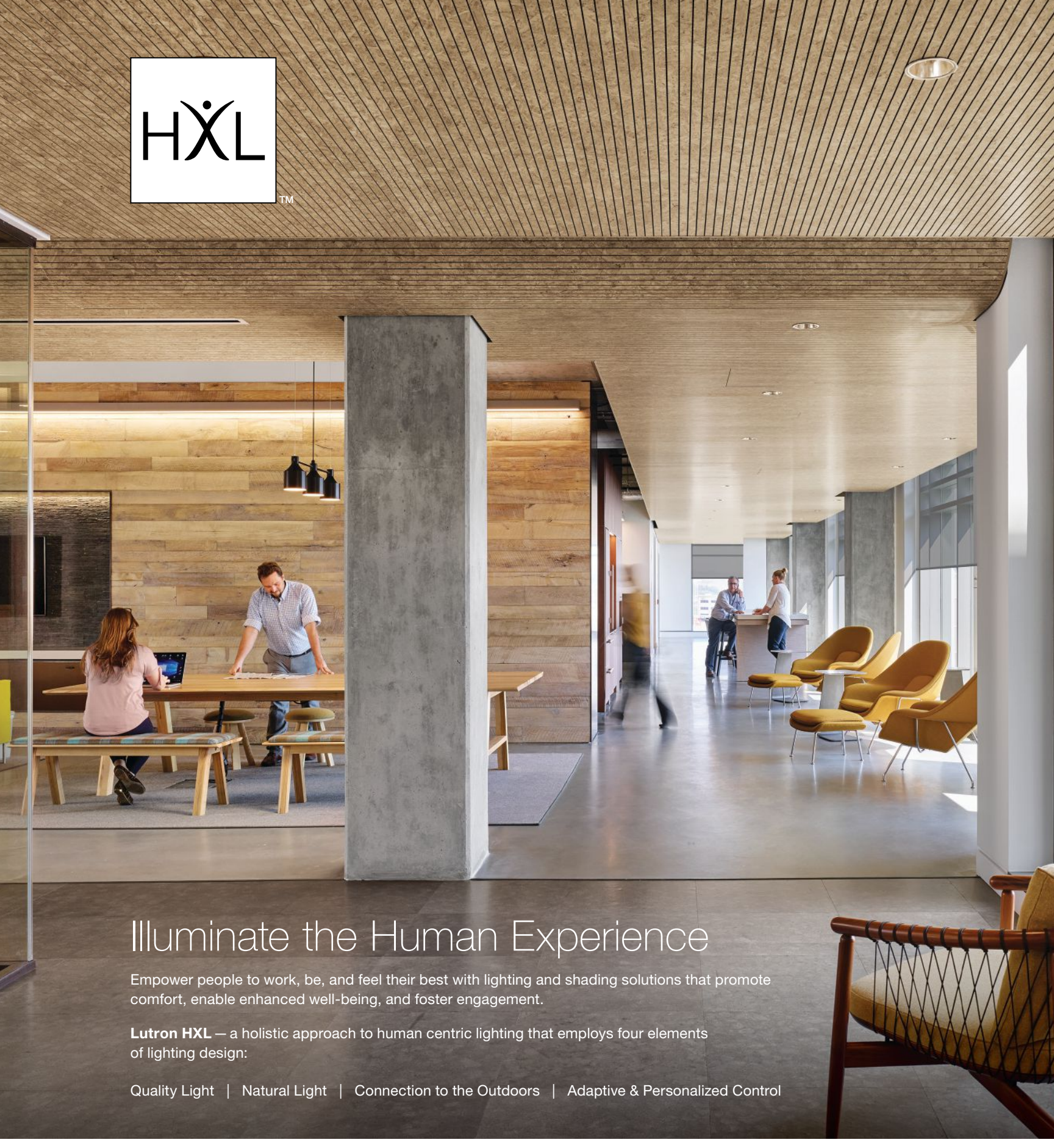

Illuminate the Human Experience

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Lutron HXL — a holistic approach to human centric lighting that employs four elements of lighting design:

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Photo © Casey Dunn Photography

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Elements of Delight

Good lighting design can support workplace happiness — and bottom lines

Lighting – and how it's controlled – can help support the most important asset of a space: its people. Yet its benefits are often overlooked.

The color temperature and intensity of lighting can help people feel calmer — or promote engagement. The use of personal lighting controls, such as remotes, can give occupants a sense of agency. Providing daylight and views has been shown to lead to increased productivity and engagement.

All told, lighting control contributes to an environment that helps people work, feel, and be their best.

A one-size-fits-all philosophy doesn't cut it, observes Carnegie Mellon architecture professor Vivian Loftness.

"There's actually a critical need to rethink the way in which our lighting is much more conducive to the task at hand," she said at a Lutron Electronics-sponsored Human Centric Lighting roundtable last year.

Research supports the value of human centric lighting design. Studies have shown that increased access to daylight and views improves productivity and satisfaction at work; providing personal control of lights and shades also improves satisfaction. And employees value access to daylight and views, and prioritize it over other amenities.

Taken together, good lighting control can contribute to attracting and retaining employees.

There are several elements to good lighting control, including natural light, quality light, exposure to the outdoors, and adaptive and personalized controls. The key to creating optimal spaces is to have lighting design that integrates these elements in a holistic manner.

Lutron calls it the Lutron HXL approach.

For example, one of the oldest elements of lighting control — shades — can make a huge difference. Automated shades use sensors or timeclocks to move up and down, eliminating the need for people to adjust them individually. Contemporary, high-quality shade fabrics can help prevent glare while inviting views, making the workplace more comfortable. And shades maximize daylight, too.

Similarly, Lutron's Ketra solution dynamically shifts in color temperature and intensity through the day to mimic daylight. Ketra's use in such offices as the Delos wellness real estate company and the Bjarke Ingels Group architecture firm have helped those environments align with goals promoting comfort and well-being.

Good lighting control can, of course, help save money on energy costs and rent — the former with such technology as occupancy sensors and LEDs, the latter by helping promote space efficiencies. But holistic solutions like the Lutron HXL approach can also help make spaces more beautiful, create workplaces and residences that are more inviting, and most importantly, support occupant well-being and engagement.

Not only does lighting control save money in the long run — it can help make for happier people.

*See lutron.com/references for more information

Residential: Lorcan O'Herlihy Architects

TEXT BY EDWARD KEEGAN, AIA

The green roof that swoops down to the ground to invite entry has become a bit of cliché in contemporary architecture. But while the move has typically been seen in pricey cultural and institutional projects, it's now trickled down to affordable housing. In South Los Angeles, it helps define the primary entrance to Lorcan O'Herlihy Architects' (LOHA) MLK1101 Supportive Housing, which sits on an infill site along Martin Luther King Jr Boulevard. Located near Exposition Park and about a quarter-mile west of the Los Angeles Coliseum, LOHA principal Lorcan O'Herlihy, FAIA, describes the area as a dense neighborhood with mostly low-scale development, where two-story construction is the norm.

MLK1101 is a 34,000-square-foot complex with 26 affordable studio to three-bedroom apartment units, whose tenants include formerly homeless veterans, chronically homeless individuals, and low-income households. A stair between the green- and gable-roofed hexagonal glass pavilion and the volume of the apartment building proper leads to a second-floor plaza—it sits atop ground-level parking—that serves as a community garden. This shared public space is the heart of the project: Dubbed an outdoor living room by the architects, it includes raised planting beds where the tenants grow edible plants.

Creating community and connecting the residents to the neighborhood is important because they're transitioning from homelessness to a home: "These

Third-floor balcony view over plaza.

Project Credits
Project: MLK1101 Supportive Housing
Client: Clifford Beers Housing
Architect: Lorcan O'Herlihy Architects, Los Angeles . Lorcan O'Herlihy, FAIA (principal); Ian Dickenson (project director); Santiago Tolosa, Brian Adolph, Nick Hopson, Ghazal Khezri, Chris Gassaway, Christopher Lim (project team)
General Contractor: GB Construction
Landscape Architect: LINK Landscape Architecture
Structural Engineer: John Labib & Associates
Civil/MEP Engineer: SY Lee & Associates
Size: 34,000 square feet (with 4,000-square-foot park space)
Cost: Withheld

IWAN BAAN

> *For materials and sources information, visit bit.ly/MLK1101.*

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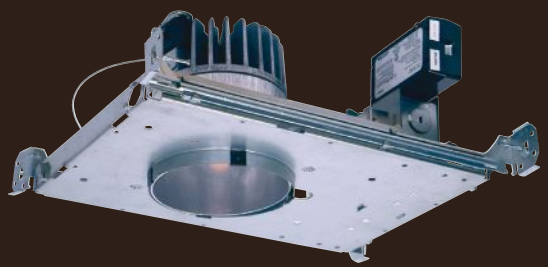

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Residential:
Lorcan O'Herlihy Architects

buildings need to have a connection to the street," O'Herlihy says, which isn't typical of Los Angeles's urban life. "Historically, LA has not recognized the street as a public realm. It doesn't embrace the idea of public green space."

The hexagonal green-roofed structure serves multiple purposes. "On the street level, it's a retail component where we folded the roof down," O'Herlihy says, noting that retail helps integrate the building into the neighborhood, provide employment opportunities for the tenants, and generate income to subsidize the complex. Its second floor opens to the plaza-level courtyard and houses a community room for residents.

Los Angeles's mild climate allows for exterior corridors and open stairs that link the plaza to the second and third floors, and the units to one another; LOHA varied the widths of these spaces to provide more outdoor gathering space while enlivening the building's exterior.

The simple façades are clad in economical white metal panels with vertical fins and painted cement board. The all-white expression is not atypical of LOHA's work, and builds on a substantial body of classic LA architectural history, recalling Rudolph Schindler and Richard Neutra, among others. "The color white plays a great role," O'Herlihy says. "There are so many colors within that color, in how the sun hits it." The shading and

1. The structure is clad in a combination of high-density fiber cement board from James Hardie and perforated, fluted metal panels from Metal Sales, both of which are painted white. **2.** A Hydrotech green roof system covers the retail and community pavilion at the front of the site. **3.** The pavilion is clad in an Acadia storefront system, while the units above feature vinyl windows from VPI Quality Windows.

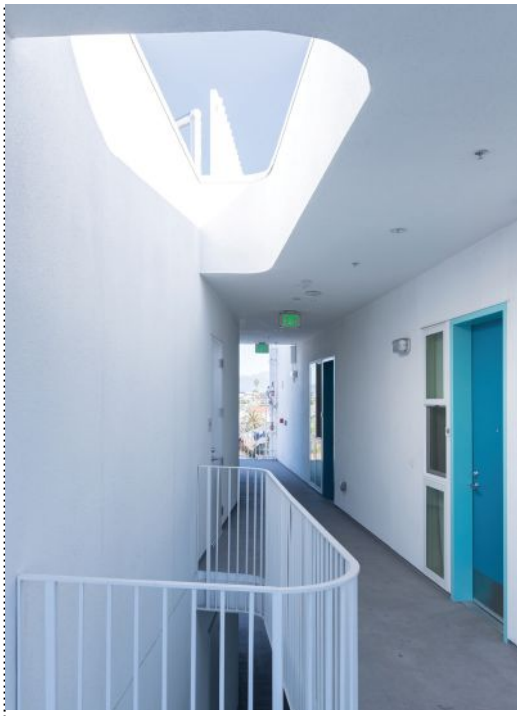
Residential:
Lorcan O'Herlihy Architects

the shadows change over the course of the day, particularly since the architects have modulated the façades with subtle setbacks and chamfers that vary from floor to floor.

The complex's construction is straightforward and economical. The single-story podium is concrete, which provides the required fire separation between the parking garage and the apartments, which are built using conventional wood-frame construction.

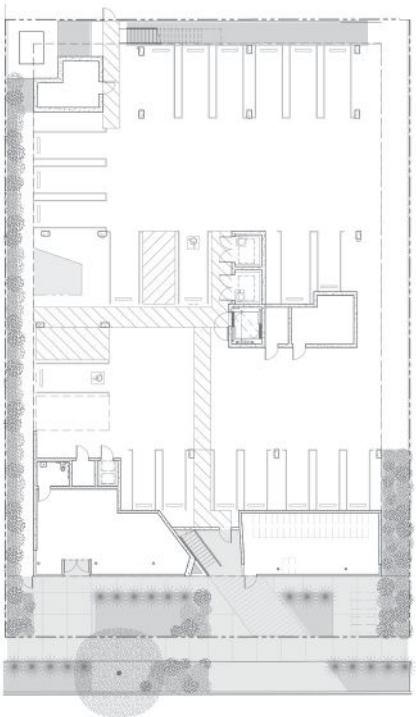
The L-shaped plan allows cross ventilation in each unit, lowering cooling costs while providing abundant fresh air for the tenants. The LEED Gold complex features high-efficiency heating and cooling through individual fan-coil units, a hot-water system that heats water using solar arrays on the roof, on-site storage for bicycles, EV charging stations for cars, and fewer parking spots than usual to promote the use of public transportation.

O'Herlihy notes that LA has long neglected multifamily housing as an important architectural type, preferring to honor the single-family dwelling. "I believe the new paradigm is larger scale infill projects like this," he says. "It's a shift that Los Angeles is experiencing, aided by a better public transportation system." If so, LOHA's MLK1101 proves that the type can be a desirable addition to the city, while helping mitigate homelessness. Those are difficult challenges met with high aspirations and thoughtful execution.

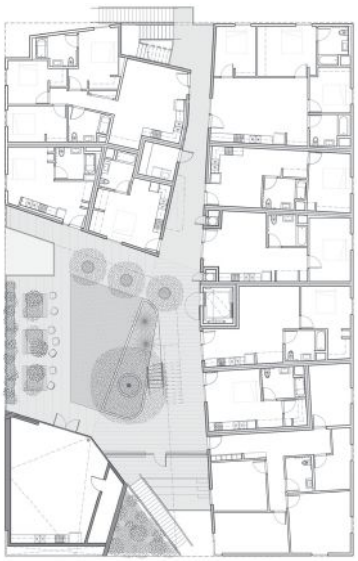


Open hallways receive natural daylight through light wells.

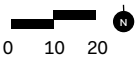
Ground-Floor Plan



Plaza-Level Plan

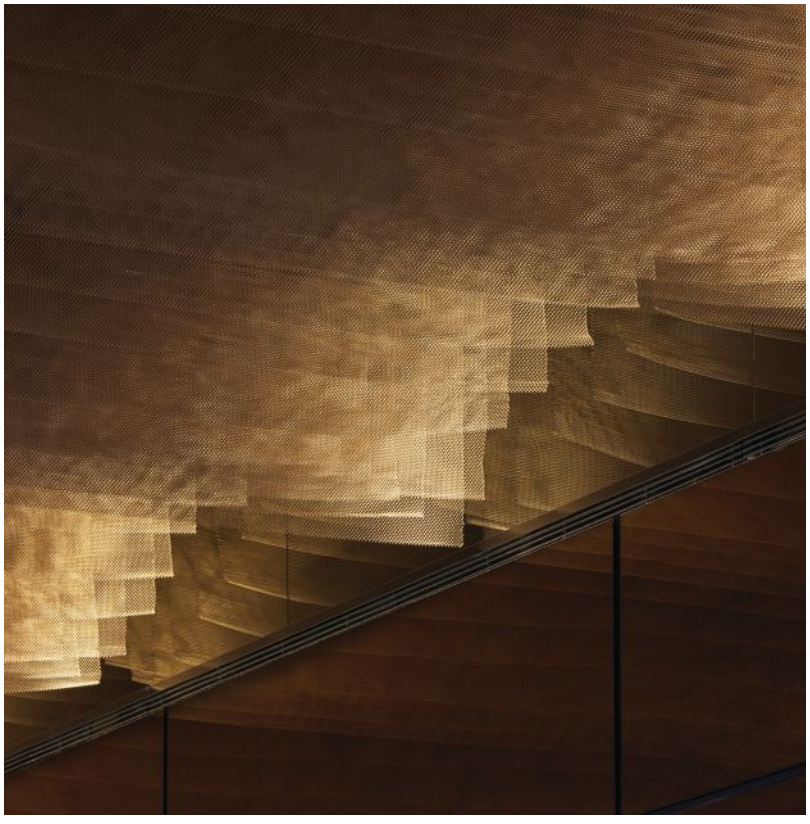


Typical Unit-Level Plan



IWAN BAAN

Collins Square Business and Events Centre Melbourne | Carr Design Studio | Peter Clarke Photography



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Residential:
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1. The white-painted studio to three-bedroom units feature Frigidaire appliances and Cali Bamboo floors. **2.** Exterior hallways in front of the units look down over the plaza, turning the entire façade into occupiable social space. **3.** A community room which opens out onto the communal plaza has DMF Lighting downlights in a ceiling coated in Dunn Edwards paint.

1, 3: PAUL VU; 2: IWAN BAAN

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DESIGNING FOR EMPLOYEE RECRUITMENT, RETENTION, AND PERFORMANCE

Demountable glass walls support new ways of working.

"What would make your workday better?"

In today's hypercompetitive race to recruit and retain top talent, this is a question that employers—and the architects planning and designing their workspaces—must ask and address. After all, the physical space is a key factor in whether employees choose to join or remain with the company, along with the team's performance and, ultimately, the business' success.

Open offices free of cubicles and private offices were seen as a way to create an environment that would foster collaboration and innovation. Research has shown, however, that these layouts dramatically reduce face-to-face interaction, with employees using headphones to block out the noise and relying more on digital communication to combat the lack of privacy. Employees instead prefer an environment that is mostly open but also offers ready access to private meeting places and quiet areas for focused work.

"The physical space must adapt to support new ways of working to maximize rewards for employees and the company,' says Jeff Phillips, general manager of Holoform, an interior demountable wall brand of Oldcastle BuildingEnvelope.

Demountable glass walls can help achieve this, offering the design flexibility and performance needed to create an adaptive environment that reflects a business' brand, engages employees, and provides the various types of workspaces that employees need.

Glass partitions can help establish a modern aesthetic that showcases a company's commitment to creativity and innovation. An array of graphic treatments can be employed to create effective branding opportunities and provide various levels of privacy.

"You can establish an environment that says 'We understand and care about our employees and are providing a great place for them to work—one that makes them feel good about where they are and helps them take pride in what they do,' " Phillips says.

Demountable glass walls offer limitless possibilities for designing flexible spaces that provide necessary separation without compromising connectivity. Visible sight lines help eliminate departmental silos and encourage communication and collaboration. Unique temporary spaces can be established for training, socializing, and other activities. And glass provides excellent sound-blocking properties for creating acoustically private spaces for meetings or quiet, focused work.

Natural light can be directed throughout the entire space; increasing productivity, reducing energy consumption, and enhancing employee wellness.

Phillips also shares several additional benefits of demountable glass walls that business owners will appreciate:

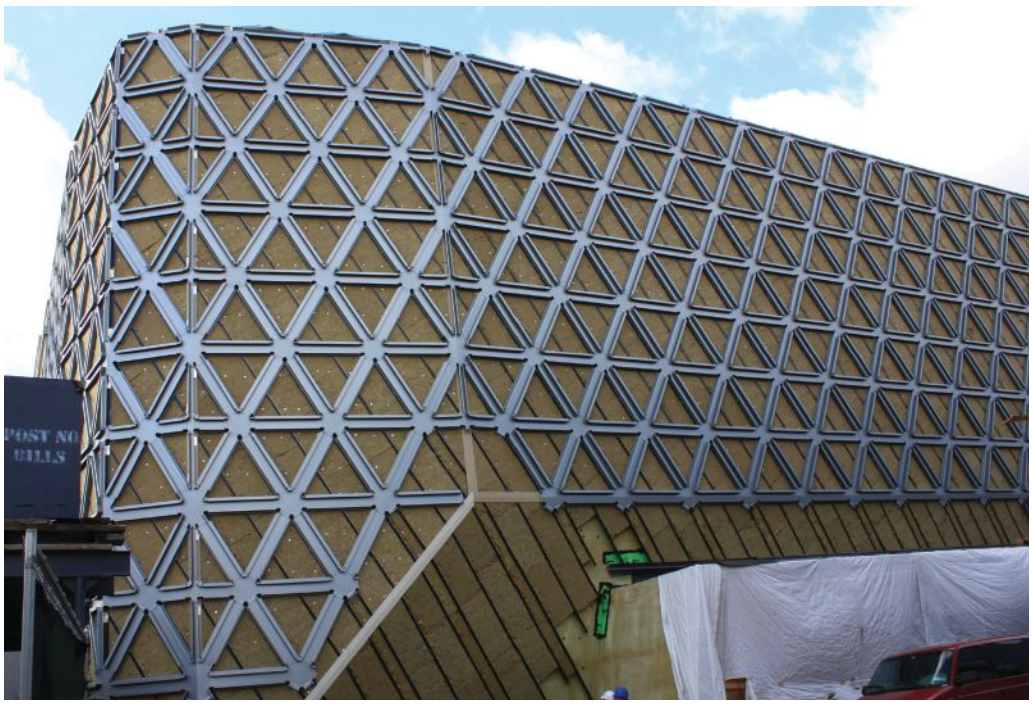
- The open look created by glass means that individual spaces can be slightly smaller without feeling cramped, helping companies maximize compressed office space.
- The walls are reconfigurable, enabling businesses to more easily adapt their spaces in the future as needs change.
- Because the walls are movable, from a tax perspective they are considered personal property. As such, the cost can be depreciated in seven years or less, rather than over the life of the space, which is great for building owners.
- The glass is easy to maintain and clean. The universal cleaners that facilities crews use gets the glass clean and there's no need for constant painting to repair "dings."

Demountable glass walls are an easy way for businesses to make their employees' days, and their bottom lines, better.

To learn more, visit **https://www.holoform.com/**

BENEFITS OF MINERAL WOOL AS CONTINUOUS INSULATION

Presented by:



LEARNING OBJECTIVES

1. Identify the advantages and implications of using continuous insulation in energy efficient exterior wall design and construction.
2. Understand the properties and characteristics of mineral wool continuous insulation as part of exterior wall assemblies.
3. Discuss key life safety and energy code requirements related to the use of continuous insulation.
4. Summarize mineral wool insulation's contributions to environmental responsibility.

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EVOLUTION OF A WALL

The building envelope has been comprised of many materials for thousands of years, from sundried mud brick huts to stone dwellings to wooden structures. What has remained constant for centuries has been the use of one single product in a wall assembly or the use of materials that could withstand minor moisture exposure without damage that also exhibited repeated drying capability. What was missing in most cases was insulation: increasing a wall's ability to prevent heat gain or loss. Over the last century, insulation has been introduced along with new cladding types that respond differently to moisture and fire exposure. As more is demanded of these walls—lower cost, faster construction, more fire resistant, more sustainable materials, and more efficient insulation—today's designers are faced with understanding how to incorporate these materials into an assembly. Likewise, capitalizing on the unique attributes of some of the newer products requires a deeper understanding of materials and how they relate to the other pieces of the assembly.

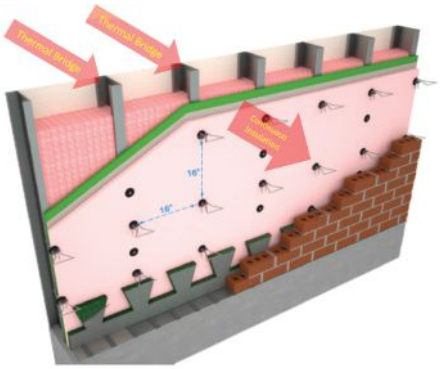
Mineral wool continuous insulation is one such material that designers may not be using to its full potential. While greatly appreciated for its fire performance, this quality should not overshadow its other contributions such as thermal performance, moisture management, versatility in installation, acoustic performance, and environmentally friendly properties. Mineral wool continuous insulation must first be differentiated from other mineral wool products with its unique features and benefits. Additionally, the role of continuous insulation must also first be discussed to understand the demands placed on a continuous insulation material.

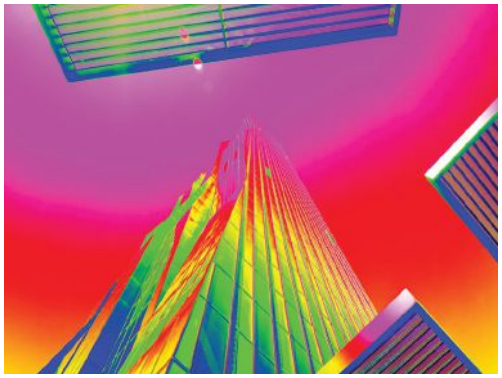
WHAT IS CONTINUOUS INSULATION?

The insulation of choice for decades (since its invention in the 1930s) has been fiberglass batts installed between wall studs; or worse, no insulation at all when constructing concrete masonry unit walls. While batt insulation between stud cavities did provide a level of thermal performance superior to none at all, thermal energy was lost at locations where each stud was continuous between the interior of the wall to the exterior—or more simply put, where insulation was discontinuous.

Since 1999, energy standards have begun to require continuous insulation in the building envelope.

What is continuous insulation, though? The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) defines it as "…insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior, exterior, or is integral to any opaque surface of the building."





Continuous insulation protects against thermal bridging at studs and other conductive materials.

Energy Codes & Standards

Generally state building codes reference either ASHRAE 90.1 or the International Energy Conservation Code (IECC) to address energy performance in the building envelope. Additional requirements or ordinances may also be imposed by federal, state, or local municipalities such as the use of ASHRAE 189.1 for military buildings.

ASHRAE 90.1 *Energy Standard for Buildings Except Low-Rise Residential Buildings* provides guidance based on research of thermal performance throughout different climatic zones. In 1999, this standard required continuous insulation for both residential and non-residential steel-framed walls in zones 3–8, which impacted a larger area of the United States.

Similarly, IECC required continuous insulation by 2012. Since this introduction, continuous insulation and general insulation requirements overall have continued to increase in an effort to reduce energy usage of buildings.

According to the U. S. Department of Energy, "Building energy codes will save U. S. home and business owners an estimated $126 billion and 841 million metric tons of avoided carbon dioxide emissions through 2040."[1]

Paths to Compliance

Designers and builders have three options to comply with building code when meeting energy requirements.

The first and often easier option when using traditional materials and methods is the prescriptive R-value requirement. This method provides charts of assembly types and R-values corresponding to a particular climatic zone. These requirements are based upon research of minimum requirements to conserve minimum energy as identified by a consensus-based standard (such as ASHRAE 90.1).

The second option measures the performance of the overall assembly when materials are combined under project climatic conditions. Designers or their consultants will calculate U-factor, C-factor, or F-factor in this compliance path. C-factor measures the thermal conductance below grade of a homogenous material. F-factors apply to the slab edge and represent a heat loss at the perimeter of the slab. For wall assemblies, U-factor is calculated to meet a minimum requirement. This option requires additional calculations for different types of cladding but may be an ideal strategy when the simplified R-value chart does not accurately represent a wall design.

Finally, the third option for compliance with International Residential Code or International Building Code is the Energy Cost Budget (ECB) Method. This method considers annual operating cost of the total assembly using calculation tools. For IRC, this tool is known as ResCheck[2] and for IBC, it is called ComCheck[3]. More information regarding both tools is available from the U.S. Department of Energy.[4]

Prescriptive R (Minimum) Requirements for Steel Framed Walls, Above Grade

Zone	ASHRAE 90.1-1999*		ASHRAE 90.1-2004		ASHRAE 90.1 2007 & 2010		ASHRAE 90.1 2013		IECC 2012 & 2015		ASHRAE 90.1 2016	
	Non-R	R	Non-R	R	Non-R	R	Non-R	R	Non-R	R	Non-R	R
0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	13	13
1	13	13	13	13	13	13	13	13	13 +5.0	13 + 5.0	13	13
2	13	13	13	13	13	13 + 7.5	13 + 3.8	13 + 7.5	13 + 5.0	13 + 7.5	13 + 3.8	13 + 7.5
3	13	13 + 3.8	13	13 + 3.8	13 + 3.8	13 + 7.5	13 + 5.0	13 + 7.5	13 + 7.5	13 + 7.5	13 + 5	13 + 7.5
4	13	13 + 3.8	13	13 + 7.5	13 + 7.5	13 + 7.5	13 + 7.5	13 + 7.5	13 + 7.5	13 + 7.5	13 + 7.5	13 + 7.5
5	13 + 3.8	13 + 7.5	13 + 3.8	13 + 7.5	13 + 7.5	13 + 7.5	13 + 10.0	13 + 10.0	13 + 7.5	13 + 7.5	13 + 10	13 + 10
6	13 + 3.8	13 + 7.5	13 + 3.8	13 + 7.5	13 + 7.5	13 + 7.5	13 + 12.5	13 + 12.5	13 + 7.5	13 + 7.5	13 + 12.5	13 + 12.5
7	13 + 7.5	13 + 7.5	13 + 7.5	13 + 7.5	13 + 7.5	13 + 15.6	13 + 12.5	13 + 15.6	13 + 7.5	13 + 15.6	13 + 12.5	13 + 15.6
8	13 + 7.5	13 + 18	13 + 7.5	13 + 10	13 + 7.5	13 + 18.8	13 + 18.8	13 + 18.8	13 + 7.5	13 + 17.5	13 + 18.8	13 + 18.8

Continuous insulation has been added to prescriptive codes and standards and continues to increase. Prescriptive R requirements are approximate for illustration purposes only. ASHRAE 90.1-1999 had 26 climate zones. In 2004 and thereafter the number of zones were reduced to 8. Since there is not a direct conversion from 1999 to 2004, the 1999 columns are an approximation based roughly on the boundaries as defined by CDD50 and HDD65 for each region. Zones 0 were added in the latest ASHRAE 90.1.

Continuous Insulation Benefits

When considering traditional batt insulation in stud cavities, every stud and every penetration decreases the wall's thermal performance through thermal bridging. With continuous insulation, studs are usually protected from the exterior under a layer of insulation. When thermal bridging is eliminated, the insulation's effective R-value increases. This in turn increases the wall assembly's overall R-value, or the amount of heat flow the wall can resist.

Installing the wall assembly also becomes less complex by locating the continuous insulation outside of the structure in the exterior wall cavity. Additionally, this method creates fewer obstacles for the air barrier, vapor barrier and weather-resistive barrier, and any other material required to be continuous within the assembly.

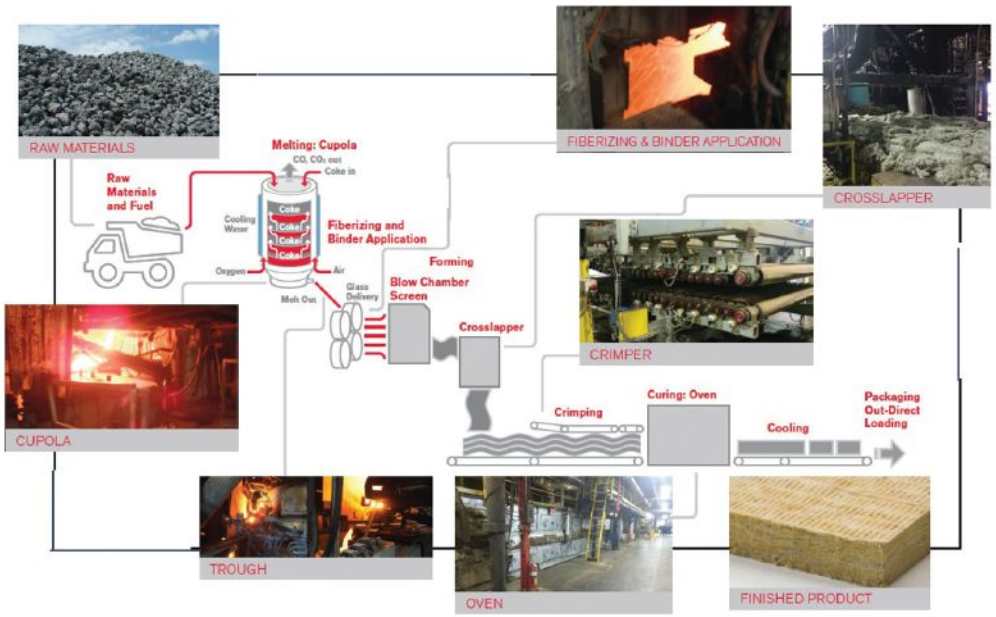
Finally, moisture within the wall is reduced as well. Continuous insulation generally moves the dew point—the point at which condensation occurs as a result of vapor content in the air and temperature in the environment—closer to the outer surface of the wall. This reduces the potential for condensation to occur in undesirable locations such as the interior stud cavity.

CONTINUOUS INSULATION CHOICES

Any continuous insulation product is going to increase thermal performance of a building envelope compared to discontinuous insulation located between studs or structure inside the exterior wall. Because performance needs change from project to project, the designer must carefully evaluate many features to select the perfect insulation material for the specific job. Common rigid board insulation options for continuous insulation applications include:

- **Expanded Polystyrene (EPS)**—a foam plastic product composed of closed-cell beads used mostly in exterior walls like EIFS, above-grade applications, and as geo foam fill. Exhibits less compressive strength and higher moisture absorption than XPS.
- **Extruded Polystyrene (XPS)**—a homogenous closed-cell foam plastic product used in exterior wall applications, but its superior performance characteristics are optimized most in more moisture-rich environments or high compressive strength applications like vegetative roof assemblies, geo foam fill requiring insulative properties, foundations, and under slabs.
- **Polyisocyanurate (Polyiso)**—an open or closed-cellfoam plastic product often with facer attached used mostly in roofing and wall applications. The facer is critical to performance as this product relies upon that material to resist moisture, air, UV, and vapor to reach maximum performance potential.
- **Mineral Wool (stone wool, rock wool, or slag wool)**—Manufactured in different densities, compressive strengths, and moisture resistance abilities for intended applications. Used mostly in above grade walls and low slope roofing.

For the remainder of the article, the focus will be on mineral wool continuous insulation.



The mineral wool manufacturing process melts rock and slag.

MINERAL WOOL OVERVIEW HEADING

Mineral wool is manufactured similar to the previously mentioned fiberglass batt. Raw materials, rock and slag, rather than glass, are combined at very high temperatures in a furnace called a cupola. This temperature is much higher due to the melting point of rock and slag. This molten liquid, which resembles lava, is poured through a machine that spins quickly to distribute small fibers much like cotton candy. A binder is added and the fibers are collected on slow-moving belts, then "baked" to amass a particular density and thickness of material.

The high R-value in mineral wool ci is achieved by densely packed fibers using a specially engineered binder rather than a gaseous blowing agent. Because it is made of inorganic materials, primarily basalt rock and steel slag, it is resistant to mold, fungi, and pests. These materials having high melting points contribute to the fire properties of mineral wool discussed later.

ADVANTAGES OF MINERAL WOOL AS CONTINUOUS INSULATION

Mineral wool continuous insulation is available in one to seven inch thicknesses with R-values ranging from 4.2 to 34.4.

Applications using mineral wool ci include residential walls (under International Residential

GLOSSARY

Thermal Bridge—A location where a higher conductive material provides a direct path for thermal energy between two surfaces, reducing the efficacy of adjacent thermally resistive materials.

R-value—The ability of a material to resist heat flow; the higher the R-value, the higher the thermal resistance.

Sorption—The combination of absorption and adsorption; the volume taken in by a material (absorption) as well as the ability of the material to retain that volume once absorbed (adsorption).

Vapor Retarder Class—A measure of a material or assembly's ability to limit the amount of moisture that passes through that material or assembly. Vapor retarder class shall be defined using the desiccant method with Procedure A of ASTM E96 as follows:

- Class I: 0.1 perm or less
- Class II: 0.1 < perm ≤ 1.0 perm
- Class III: 1.0 < perm ≤ 10 perm

(IBC 2018)

Vapor Permeable—The property of having moisture vapor permeance rating of 5 perms or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E96. A vapor permeable material permits the passage of moisture vapor. (IBC 2018)

Noise Reduction Coefficient (NRC)—The scalar number of a material's ability to absorb sound; the higher the NRC, the higher the noise absorption.

Sound Transmission Class (STC)—The rating of an assembly of materials indicating ability to resist airborne sound; the higher the STC, the higher the noise resistance.

Outdoor-Indoor Transmission Class (OITC)—The rating of an assembly of materials indicating ability to resist airborne sound from outdoor spaces to indoor spaces; the higher the OITC, the higher the noise resistance.

Flashover—A phenomenon during a fire event when all exposed combustibles in a space ignite near simultaneously as temperatures reach the point of ignition; also known as full-room involvement.

Non-Combustible—A material that in the form in which it is used and under the conditions anticipated, will not aid combustion or add appreciable heat to an ambient fire. Materials are classified by NFPA 220 or tested to ASTM E136. (NFPA 220).

Embodied Energy—The total energy required to produce and consume a material; often documented through life cycle assessment.

Code—IRC) and commercial walls (under International Building Code—IBC). Multi-family residential apartment buildings, hotels, hospitals, office buildings, and theaters are a few building types that fall under IBC and use mineral wool ci. The structure of the exterior wall may be steel stud, wood stud, concrete masonry, or cast concrete in some of the most common construction types in the United States.

Designers may choose mineral wool CI for its thermal performance alone, or for its unique attributes. Some of these include:

- Resistance to moisture and organic growth due to its inorganic components.
- Design flexibility due to high vapor permeability.
- Durability when exposed to sun, rain, and snow.
- Ease of handling with multiple installation options.
- Contribution to noise control.
- Inherent fire resistive properties and contribution to fire compliant design.
- Environmentally responsible manufacturing practices and use in the building envelope.

Moisture Resistance

Mineral wool exhibits an impressive ability to repel or absorb water depending on its manufacturing process. In other forms it is used in agricultural applications when engineered to be hydrophilic and absorb as much moisture as possible without degrading or supporting mold, mildew, and algae growth (due to its inorganic components). Yet, for exterior insulation applications, it is engineered to be hydrophobic and repel water that may enter the exterior wall cavity. This demonstrates the versatility of mineral wool in construction applications as it can be used not just for building walls, but for roofing, industrial pipes, firestopping, and even marine applications. This versatility unfortunately causes confusion for those specifiers unfamiliar with mineral wool as a continuous insulation. For mineral wool ci products, ASTM C665 *Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing* lists two moisture-resistance test requirements to demonstrate performance when located in the exterior wall cavity.[5]

This article continues on http://go.hw.net/AR102019-1. Go online to read the rest of the CEU course, complete the corresponding quiz for credit, and receive your certificate of completion.

QUIZ

1. Raw materials in mineral wool ci include:
   A. Rock, slag, and binder
   B. Rock, slag, and blowing agent
   C. Glass, slag, and binder
   D. Plastic and blowing agent

2. Mineral wool ci is commonly available in which thicknesses _____.
   A. 1" (R-4.2 or greater)
   B. 4.2 / 34.4 2" (R-8.4 or greater)
   C. 3.5 / 30.2 7" (R-34.4 or greater)
   D. All of the above

3. For exterior insulation applications, mineral wool ciis engineered to be _____ and repel water that may enter the exterior wall cavity.
   A. Hydrophilic
   B. Hydrothermal
   C. Hydrophobic
   D. Hygroscopic

4. When tested per ASTM C1104 mineral wool ci should demonstrate less than ___ percent sorption.
   A. 0.001
   B. 0.02
   C. 0.1
   D. 0.5

5. Mineral wool ci vapor permeability is between ___ and ___ perms.
   A. 0.01–0.1
   B. 5-10
   C. 35–55
   D. 100-200

6. The acoustic performance of mineral wool ci may be indicated by which testing methods:
   A. ASTM C423 *Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method*
   B. ASTM E90 *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements* identifies predicted performance of a given wall assembly.[17]
   C. ASTM E1332 *Standard Classification for Rating of Outdoor-Indoor Sound Transmission*
   D. All of the above

7. When installing mineral wool ci, which of the following may be used:
   A. Mpaling pins
   B. Pins specialized hanger attachments
   C. Mastic adhesive
   D. All of the above

8. Mineral wool's flame spread and smoke development index according to ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials are:
   A. 10 / 10
   B. 25 /50
   C. 0 / 0
   D. 75 / 450

9. Where is NFPA 285 referenced in International Building Code:
   A. Chapter 7: Fire & Smoke Protection Features—Exterior Wall Coverings
   B. Chapter 14: Exterior Walls—Water Resistive Barriers
   C. Chapter 14: Exterior Walls—Metal Composite Materials
   D. Chapter 15: Roof Assemblies and Rooftop Structures—Mechanical Equipment Screens
   E. Chapter 26: Plastic—Vertical and lateral fire propagation
   F. All of the above

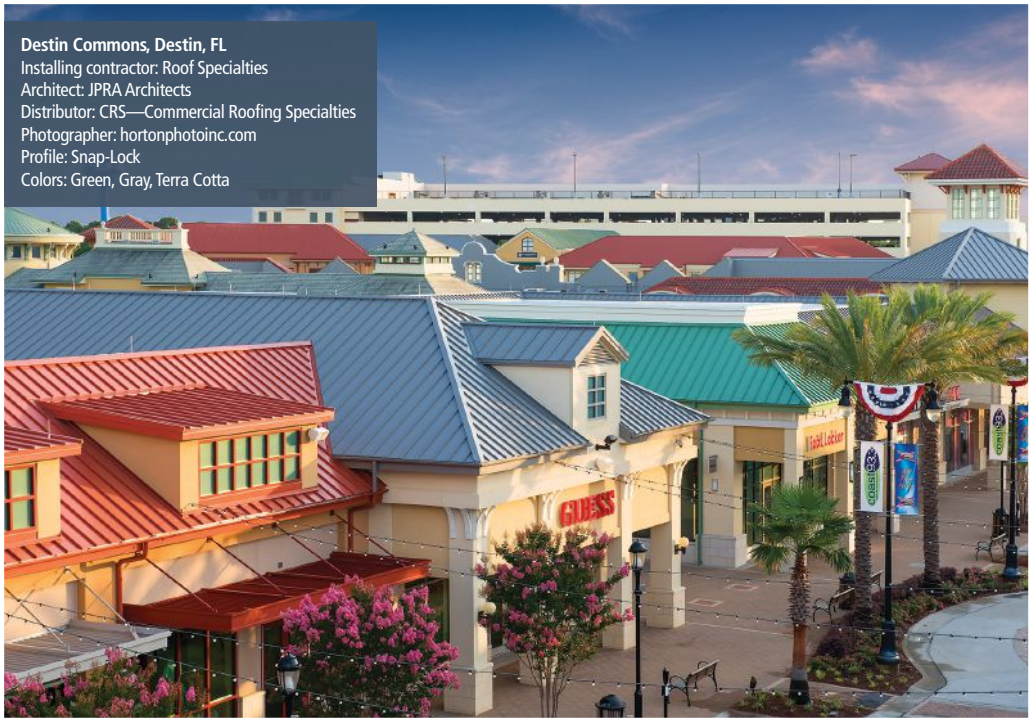
10. Which of the following stages does not belong in the life cycle assessment?
    A. Specification
    B. Raw Materials Acquisition
    C. Manufacturing
    D. Transportation

SPONSOR INFORMATION

TESTING, CERTIFICATION, AND INSTALLATION OF COMMERCIAL ROOFING PRODUCTS THAT MEET THERMAL, FIRE, WIND, AND IMPACT STANDARDS

Presented by:

PAC-CLAD PETERSEN
A CARLISLE COMPANY



Destin Commons, Destin, FL
Installing contractor: Roof Specialties
Architect: JPRA Architects
Distributor: CRS—Commercial Roofing Specialties
Photographer: hortonphotoinc.com
Profile: Snap-Lock
Colors: Green, Gray, Terra Cotta

LEARNING OBJECTIVES

1. Explore how thermal expansion, fire, wind, and hail can negatively affect the performance of an architectural metal roofing system.
2. Identify standards pertaining to safety and performance requirements of commercial roofing.
3. Explain key testing methods and requirements for commercial roofing involving thermal, fire, wind, and impact performance.
4. Understand known installation issues and how they can be solved to ensure roof systems comply with codes and standards.

CONTINUING EDUCATION

AIA CREDIT: 1 LU/HSW
AIA COURSE NUMBER: AR102019-3

AIA Continuing Education Provider

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INTRODUCTION HEADING

The demand for roofing in the U.S. is forecast to increase "1.0% annually to 267.9 million squares in 2021, valued at $19.9 billion. [This is] supported by increases in housing starts and commercial construction spending, a large stock of older structures with roofs that will eventually require replacement, insurers requiring owners to install storm-resistant roofing, and consumer interest in roofing that helps reduce energy consumption and lower utility bills." The need for roofing is continuing to grow, as is the demand for durable, sustainable, energy-efficient solutions.

The Freedonia Group's Roof Trends and Opportunities Report notes that these needs have spurred the development or improvement of roofing materials: "Severe weather events bring a renewed focus on ways to reduce storm-related damage, such as using more

Jekyll Island Ocean Suites, Jekyll Island, GA
Installing contractor: Commercial Sheet Metal Systems
Architect: Cotner and Associates
Distributor: Beacon Roofing Supply DBA Roofing Supply Group
General contractor: W.H. Gross Construction Co.
Photographer: hortonphotoinc.com
Profile: Snap-Lock
Color: Silver

durable roofing materials like laminated asphalt shingles, metal roofing, thicker plastic and rubber membranes, and polymer-modified bituminous membranes."[1]

In an article for LBM Journal, Michael Berger notes that metal roofing systems in particular can meet these needs and have experienced consistent growth for over a decade due to a variety of factors including "'improved look and quality, reduced energy costs, reduced maintenance, reduced cost of ownership, [and] the fact that most metal roofing products are 100% recyclable.'"[2] In addition to the factors mentioned by Berger, it is important to evaluate roofing systems for how they perform under conditions of thermal expansion, fire, wind, and hail.

Metal Roofing: The Basics

Metal roofing systems are generally divided into two categories: structural or architectural (non-structural). Structural roofing systems are used on low-slope roofs, with slopes between ¼:12 and 3:12, and necessitate water-resistant panels. A clip system attaches the panels to the building structure. The roof assembly for a structural metal panel roof system generally includes metal framing and purlins, or, in climates where a high R-value is required, these systems can be installed over solid substrates like plywood, metal decking, or oriented strand-board used alongside insulation.

Architectural, or non-structural, panels are typically used on slopes of at least 3:12; however, some panels have been designed for pitches as low as 2:12. Architectural panels offer weather resistance as well as aesthetics and are designed to be installed over a solid substrate such as metal decking, plywood, or an engineered wood product. Concealed fasteners and clips are typically used to secure the panels to the deck.

The performance of any assembly's panels is dependent upon weather and corrosion resistance, retention of color, and durability. In general, metal roof assemblies have longer lifespans than non-metal products. Most metal roof systems are manufactured from steel or aluminum, which are two of the most recycled materials in the world: 50% of the steel used in the U.S. is produced from a recycled source.[3] Some metal roofs, like aluminum, also have the potential to be one-eighth of the weight of other products, lessening structural loads, as well as transportation costs and installation times. To ensure the quality of roof assemblies and their components, manufacturers utilize third-party testing bodies.

UL and FM Testing

Underwriters Laboratories (UL) provides third-party verification that products meet industry requirements for performance and durability. As a standards-development, non-profit,

Ridley Township Marina, Ridley, PA
Installing contractor: E.P. Donnelly Inc.
Architect: Catania Engineering Associates
General contractor: J.S. McManus Inc.
Photographer: hortonphotoinc.com
Profiles: Snap-Lock, Vented Soffit, Snow Retention System
Color: Copper

GLOSSARY

Architectural/Non-structural Panels—typically used on slopes of at least 3:12; however, some panels have been designed for pitches as low as 2:12. Architectural panels offer weather resistance as well as aesthetics and are designed to be installed over a solid substrate such as metal decking, plywood, or an engineered wood product. Concealed fasteners and clips are typically used to secure the panels to the deck

Aerodynamic Pressure—in terms of wind resistance, building design, and roof systems, the interaction between the wind and the building causes the most uplift at the corners of a roof system, followed by the perimeter; "building irregularities" can create turbulence and cause additional damage to roofs; external pressure coefficients account for such influences and can be found in ASCE 7

Factory Mutual (FM)—an insurance company that has standards written by its in-house engineers; categorizes roof assemblies according to deck type, as well as to specific type of construction—new, tear-off, or retrofit

Metal Roof System—can be structural or non-structural; most are manufactured from steel or aluminum, which are two of the most recycled materials in the world; have the potential to be one-eighth of the weight of other products

Porosity—caused by openings in the building envelope, affects internal pressure

Structural Roofing Systems—used on low-slope roofs, with slopes between 1/4:12 and 3:12, and necessitate water-resistant panels; a clip system attaches the panels to the building structure. The roof assembly for a structural metal panel roof system generally includes metal framing and purlins, or, in climates where a high R-value is required, these systems can be installed over solid substrates like plywood, metal decking, or oriented strand-board used alongside insulation

Thermal Expansion—"refers to a fractional change in size of material in response to change in temperature"

Total Thermal Movement—can be calculated by "extending the material's coefficient of expansion over its length and the anticipated in-service temperature range throughout its service life"

Underwriters Laboratories (UL)—provides third-party verification that products meet industry requirements for performance and durability; "performs[s] accelerated and natural weathering, fire, wind resistance and wind uplift, [and] structural and physical property testing" on roofing products to their own standards, as well as to ASTM International and the National Fire Protection Association (NFPA); also tests to meet local and Energy Star requirements

Wind Uplift—"as a force that occurs when air pressure below the roof assembly is greater than the air pressure above the roof system. As air flows over the roof the pressure directly above the roof decreases and at the same time the air pressure inside the building increases in an attempt to equalize the pressure differential"

non-governmental organization that dates to 1894, it "performs[s] accelerated and natural weathering, fire, wind resistance and wind uplift, [and] structural and physical property testing" on roofing products to their own standards, as well as to ASTM International and the National Fire Protection Association (NFPA).[4] The organization can also test to meet local and Energy Star requirements.

UL tests entire roof assemblies, which includes decks, insulation, and membranes and uses category control numbers (CCN) to designate different product categories. Prepared roof covering materials are listed as TEVT, roof systems as TGFU, and prepared roofing accessories as TGDY; prepared materials are further subdivided into two categories, TFZW and TFXX. Formed or molded metal is listed under TFXX. UL groups roof assemblies according to deck type—combustible or non-combustible—and then further categorizes them according to severity of fire exposure (Class A, B, or C).

Factory Mutual (FM) is also a non-governmental body. Founded in 1886, it is an insurance company that has standards written by its in-house engineers. FM Global categorizes assemblies according to deck type, as well as to specific type of construction—new, tear-off, or retrofit. It annually releases Global Loss Prevention Data Sheets, which can be summarized as engineering guidelines to help reduce the chance of property loss due to fire, weather, and/or failure of mechanical or electrical equipment. FM Global also offers a free resource, RoofNav, that details the most recent FM Approvals as well as provides installation recommendations for professionals.

Figure 1

Metal Type	Coefficient of thermal expansion
Galvanized steel	0.0000067 in./(in.·F)
Steel	0.0000067 in./(in.·F)
Terne	0.0000067 in./(in.·F)
Copper	0.0000094 in./(in.·F)
Stainless steel	0.0000096 in./(in.·F)
Bronze	0.0000101 in./(in.·F)
Brass	0.0000104 in./(in.·F)
Aluminum	0.0000129 in./(in.·F)
Lead	0.0000151 in./(in.·F)
Zinc	0.0000174 in./(in.·F)

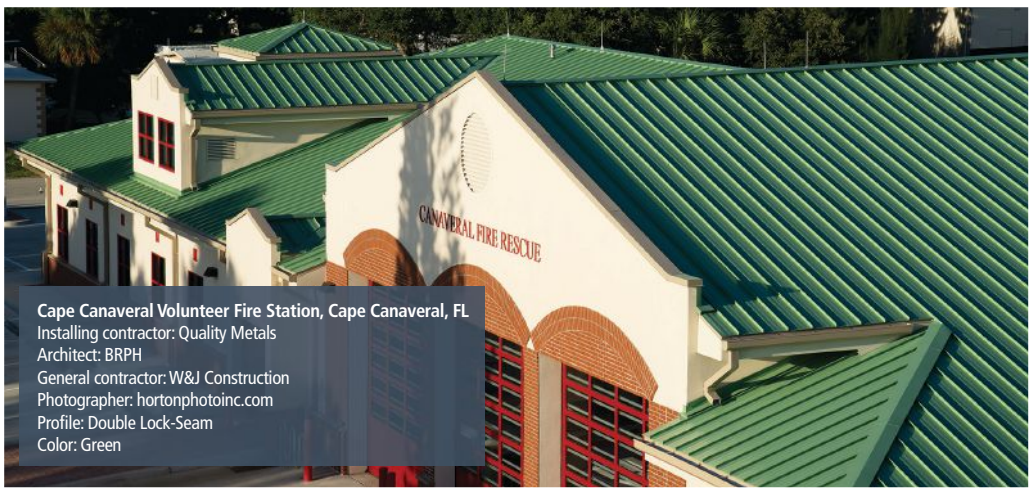
THERMAL EXPANSION AND METAL ROOFING

One of the most important considerations when specifying and installing roofing assemblies is thermal expansion. In general, thermal expansion "refers to a fractional change in size of material in response to change in temperature." Changes of material size can include the following:

- "Changes in length compared to original length
- Changes in area compared to original area
- Changes in volume compared to original volume"

The Physics Hypertextbook notes that "for most materials, over small temperature ranges, these fractional changes are directly proportional to temperature change."[5]

In terms of metal roofing, thermal expansion—or changes in surface temperature—"can affect the integrity of a standing seam metal roofing system if the system is installed without regard" for expansion and contraction.[6] As temperatures rise and fall, metal expands and contracts. With roofing, the longer the panels are, the more they experience thermal movement.



Cape Canaveral Volunteer Fire Station, Cape Canaveral, FL
Installing contractor: Quality Metals
Architect: BRPH
General contractor: W&J Construction
Photographer: hortonphotoinc.com
Profile: Double Lock-Seam
Color: Green

Whether metal is expanding or contracting, it is proportional to the change in temperature. This is called the coefficient of linear expansion (CLE); the chart shown in Figure 1 demonstrates CLEs for the metals most commonly used in roofing.

There are several reasons as to why thermal movement can create stresses in metal roof panel assemblies:

- "materials with different CLEs pushing or pulling against each other at connection points;
- some components are exposed to a greater shift in temperature than others (e.g. exterior panels experience greater temperature range than the interior structure to which they are attached); and
- movement of components occurring in different directions (e.g. panel lengths must accommodate ridge-to-eave movement, while ridge flashing must accommodate horizontal movement)"[8]

Worst-case, or total, thermal movement can be calculated by "extending the material's coefficient of expansion over its length and the anticipated in-service temperature range throughout its service life." It should be kept in mind that the surface temperature of the material is what constitutes such extremes, not the ambient air. The color of the roofing panels and their ability to reflect or absorb light will therefore have an impact on thermal movement.[9]

UL TESTING AND CERTIFICATIONS FOR SOLAR REFLECTANCE, THERMAL EMITTANCE, AND COATING THICKNESS

When roofing materials or coatings are able to both reflect and absorb the sun, they are sometimes referred to as "cool roofs." These roof systems are designed to be energy efficient, saving natural resources by absorbing heat as well as radiating it back to the sky rather than into the building. Solar reflectance and thermal emittance are measured to

determine the effectiveness of a "cool roof." UL tests for solar reflectance of roof covering panels, "which evaluate temperatures and heat flows across surfaces exposed to solar radiation." These tests are generally conducted in accordance with ASTM C1549, and "thermal emittance measurements, which evaluate temperatures, heat flows, and derived thermal resistances of materials" are generally determined in accordance with ASTM C1371. The performance of materials is measured from 0 to 1.0, where 1.0 indicates best performance.[10]

Design Best Practices

Discovery Center in the Discovery Park of America, Union City, TN
Installing contractor: Ralph Jones Sheet Metal Inc.
Architect: Verner Johnson Inc.
General Contractor: Allen Searcy Builder-Contractor Inc.
Photographer: hortonphotoinc.com
Profiles: Lock-Seam, Snap-Seam
Color: Silver

Jefferson County Western Health Center, Midfield, AL
Installing contractor: CSC Roofing
Architect: Birchfield Penuel & Associates
General contractor: M.J. Harris Construction Services
Owner: Jefferson County Department of Health
Photographer: hortonphotoinc.com
Profiles: Lock-Seam Curved
Colors: Red

This article continues on http://go.hw.net/AR102019-3. Go online to read the rest of the CEU course, complete the corresponding quiz for credit, and receive your certificate of completion.

QUIZ

1. The demand for roofing is forecast to increase _____ annually to 267.9 million squares in 2021.
   a. 0.1%
   b. 0.5%
   c. 1%
   d. 1.5%

2. Which of the following is true about metal roof systems?
   a. Can be 1/8 the weight of other roof systems
   b. Many metal roof manufacturers utilize third party testing bodies
   c. Metal roof assemblies have longer lifespans than non-metal products
   d. All of the above

3. Which of the following is a reason as to why thermal movement can create stress in metal roof panel assemblies?
   a. Materials with different CLEs pushing or pulling against each other at connection points
   b. Some components are exposed to a greater shift in temperature than others (e.g. exterior panels experience greater temperature range than the interior structure to which they are attached)
   c. Movement of components occurring in different directions (e.g. panel lengths must accommodate ridge-to-eave movement, while ridge flashing must accommodate horizontal movement)
   d. All of the above

4. The 2018 IBC divides roof assemblies into _____ categories and requires the assemblies to be tested in accordance with ASTM E108 or UL 790.
   a. One
   b. Two
   c. Three
   d. Four

5. UL 580 does not test for which of the following:
   a. Beams, Purlins, and Joists
   b. Roof Deck
   c. Attachment of a Roof Covering
   d. Roof Deck's Attachment to Supports

6. When constructing a roof system for wind resistance, _____ specifically affects internal pressure on the roof system.
   a. Topography
   b. Porosity
   c. Aerodynamic Pressure
   d. Building Height

7. In terms of damage to roof systems, hail most relates to _____.
   a. Impact resistance
   b. Fire resistance
   c. Wind resistance
   d. None of the above

8. ASTM D3746 tests _____ roofing systems.
   a. Metal Seam
   b. Bituminous
   c. Green
   d. All of the Above

9. Which test method uses a steel ball to simulate impact on a roof system?
   a. FM 4474
   b. UL 1897
   c. UL 2218
   d. UL 580

10. When accounting for thermal movement for metal panel roof assemblies, which sliding forces or "drag loads" must be considered?
    a. Panel-to-structure or panel-to-substrate attachment
    b. Panel-to-panel connections and panel-to-flashing junctures
    c. Flashing-to-structure or flashing-to-substrate attachments
    d. All of the above

SPONSOR INFORMATION

PAC-CLAD PETERSEN
A CARLISLE COMPANY

Petersen, a Carlisle company, manufactures PAC-CLAD metal cladding products in multiple gauges of steel and aluminum, including standing seam roof panels, hidden- and exposed-fastener wall panels, flush panels, soffit panels, perforated metal, coil and flat sheet, fascia and coping, composite panels and column covers. All are available in 70% PVDF finish in 45 colors.

SINK SELECTION FOR SUSTAINABILITY AND ACCESSIBILITY

Presented by: SLOAN Water Connects Us

Integrated sinks with sensor faucets, soap dispensers, and hand dryers deliver durability, cleanliness, and low-maintenance options to stand the test of time in high-traffic areas.

LEARNING OBJECTIVES

1. Highlight key considerations for specification of sink systems that are sustainable and accessible.
2. Evaluate sink materials, styles, and components, including the faucet, soap dispenser, and hand dryer, that can contribute to water efficiency, energy efficiency, and improved hygiene.
3. Review ADA criteria to consider when planning commercial restroom sink/lavatory design.
4. Examine LEED credits and WELL building criteria for commercial restroom design.

CONTINUING EDUCATION

AIA COURSE NUMBER: AR102019-2
AIA CREDIT: 1 LU/HSW
GBCI CREDIT: 1 CE
IDCEC CREDIT: .1 CEU
ASPE CREDIT: 0.10 CEU

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DESIGNING RESTROOMS THAT ARE SUSTAINABLE AND ACCESSIBLE

The restroom could quite possibly be the most important room in a commercial building. Everyone visits restrooms throughout the day with the expectation that they will be clean, safe, and easy for all occupants to use. Designers and building owners are focusing more on the experience users have when they are in a commercial restroom and how to best design for this space. Designing for user experience helps facility owners, maintenance teams, and restroom users by improving safety, accessibility, and occupant comfort.

Designing accessible spaces empowers users with special needs and provides an easy-to-use restroom for all, including children, those of shorter stature, and the elderly. Adding sustainable design into the mix serves to further improve the health and well-being of occupants while also conserving resources. Commercial restrooms designed with sustainability and accessibility in mind bridge the gap between practicality and physical, mental, and emotional well-being.

KEY ASPECTS OF RESTROOM DESIGN

The key aspects of designing a commercial restroom are aesthetics that tie to the rest of the building and ease of movement for the user, which includes accessibility, traffic patterns, and getting users in and out quickly. This is especially important in large venues such as casinos and stadiums. Other specification considerations when designing commercial restrooms are layout, ventilation, materials, sustainability, installation, maintenance, and overall cost and timeline for the renovation or build-out.

Design Considerations

When beginning a restroom design, you should consider the following:

- How to lay out the restroom most efficiently

  - What layout will serve the most users and comply with regulations?
- Whether to automate the restroom or not
  - Automating faucets, soap dispensers, and hand dryers can be more hygienic and save energy and maintenance costs.
- Which varieties of products to use
  - Restroom components such as sinks, faucets, soap dispensers, and hand dryers can be coordinated by style and finish.
- How environmentally-friendly to make the restroom
  - What is the water usage of fixtures and the power usage of accessories such as hand dryers?
- What materials to use
  - Materials should be stain-, chemical-, scratch-, and impact-resistant to stand up to demanding commercial environments.
- What products are most cost effective
  - Some products may cost more up front but result in lower costs over the lifetime of the product

Sinks are the most visible of the functional elements in a commercial restroom. Floors, walls, and mirrors may set the tone, but sinks pull together the designer or architect's vision.

INTRODUCTION TO SINK OPTIONS

Sinks are the most visible of the functional elements in a commercial restroom. Floors, walls, and mirrors may set the tone, but sinks pull together the designer or architect's vision. From high-end hotels to government buildings, sleek offices to hospitals, there is a sink design for every setting. The most common sink materials are solid surface, quartz, stainless steel, and bio-based materials. After selecting a sink material and color, enhance that vision by pairing the design with the manufacturer's faucets, soap dispensers, and hand dryers.

A designer's first decision is if the sink will be molded or fabricated:

Material Choice

Molded
Pros: No seams for ease of cleaning, lower cost per station, and shortened lead time

Cons: No customization, fewer color and material options

Materials that can be molded: Solid Surface, Quartz, and Vitreous China

Fabricated
Pros: Monolithic look, customizable design, increased number of colors and finishes (ex. Corian® solid surface, Corian® Quartz, Silestone®, Caesarstone®, etc.)

Cons: Typically a longer lead time and increased cost per station

Materials that can be fabricated: Solid Surface, Quartz, Bio-Based Materials, and Stainless Steel

After choosing molded or fabricated, the next decision is material type:

MOLDED SINKS

Molding a sink involves pouring a liquid material into a pre-built mold and baking it until it becomes solid. The sink is then lightly finished with sandpaper and other tools to smooth the edges and remove excess material.

Molded solid surface sinks are a lower cost option and do not contain adhesives or sealants. These sinks have non-porous, seamless molded basins, making the surfaces more hygienic and easier to clean. Many designs are engineered to be vandal-resistant and to have simple installation and maintenance. Molded solid surface sinks are less flexible when it comes to customizing the size of the sink and typically have fewer color options, but they often fit the aesthetics and mid-tier budgets for schools, healthcare facilities, class B & C office buildings, and shopping malls.

Another benefit to a solid surface sink is that it is repairable. Solid surface is resistant to scratching, staining, burns, and chips, but clean breaks or small chips that do occur can easily be repaired to look brand new. This makes these sinks ideal for high-vandalism-risk applications such as schools.

Solid surface is a hygienic, non-toxic, and non-allergenic material that is easily cleaned with soap and water or water and an ammonia-based bathroom cleaner. Unlike natural stone, solid surface is non-porous and doesn't require a sealant. Stains, salts, and corrosion can't penetrate the non-porous surface, and it will not harbor the growth of mold or mildew.

Molded quartz products contain a percentage of quartzite material in their mixture. Compared to fabricated quartz, the percentage of quartzite is lower to allow for molding. Because of this, the material performs very similar to a standard molded solid surface product.

VITREOUS CHINA

Vitreous China sinks come in a variety of style options and historically have been very popular in commercial restroom design. Vitreous china sinks are available for wall-hung or countertop installation. They are perfect for any application—from executive washrooms to schools, entertainment venues, transportation centers, or government buildings. Options include a backsplash, wheelchair access, and 4", 8", or single-hole centerset punching. You can also add a ceramic shroud under the sink for a sleek, clean appearance. Vitreous china sinks can be paired with a wall- or deck-mounted faucet and matching soap dispenser.

Fabricated sinks come in over 100 colors, so they can match virtually any restroom color scheme.

FABRICATED SINKS

Fabricated sinks can be made of several different materials, the most common being solid surface and quartz. The fabrication process involves flat sheets of material that are cut and adhered together to form unique designs.

Fabricated solid surface sinks can be manufactured from materials such as DuPont™ Corian® or LG HI-MACS® solid surface. A fabricated solid surface sink has a comparable level of quality to a molded solid surface sink.

However, compared to molded sinks, fabricated solid surface sinks have numerous customization and color options. Because these solid surface sinks are fabricated, they can be customized to any size and outfitted for any faucet or soap dispenser. Fabricated sinks come in over 100 colors to match virtually any restroom color scheme.

One of the main advantages of acrylic-polyester-based solid surface is the ability to create a continuous surface that can incorporate washbasins or bowls. The surface will appear to have no distracting seams, creating a smooth, continuous design for a monolithic aesthetic. This is particularly advantageous for larger sinks.

Fabricated sinks typically ship in multiple pieces if they are over 120" or 10', but once they are seamed together, the sink will appear as one seamless unit.

For LEED projects, specify fabricated solid surface materials that contain recycled content. We will discuss LEED later in the presentation.

Fabricated Solid Surface Applications

Fabricated solid surface sinks offer an economic solution with pleasing aesthetics and design flexibility without compromising quality. The vertical markets where solid surface sinks are most often seen include class A & B office buildings, restaurants, airports and other transportation facilities, education, and hospitality, plus many other commercial projects.

FABRICATED QUARTZ SINKS

Fabricated quartz sinks are cut and adhered together to achieve their final designs. They are known for their sheen, durability, and high-end appeal. They are a luxury design solution for project types such as Class A office buildings, high-end restaurants, high-end shopping centers, and hospitality. Quartz sinks can be made with varying levels of durability and sheen depending on the material composition. A higher concentration of quartzite in the mixture provides more scratch and stain resistance.

Fabricated quartz sinks are a luxury design solution for project types such as Class A office buildings, high-end restaurants, high-end shopping centers, and hospitality.

GLOSSARY

Continuous Trough with 3-in-1 Technology
Trough style sink with an easy-to-clean surface deck that is durable, resistant to staining, and allows for a deck-mounted faucet, soap dispenser, and hand dryer.

Open Front Basin Sink
Sink with a front that is open to the user, making them more accessible to those in wheelchairs and children because the faucet is easier to reach due to the lower, open front edge.

Multi-Level Sink
Fabricated sink constructed in a waterfall shape with one sink higher and the next sink stepping down to provide lower access for children or those in a wheelchair.

Stainless Steel Surgical Scrub Sink
Pre-plumbed and pre-assembled sink with a square type basin and integrated hand washing sensors located on the front of the sink, making them the perfect solution for medical professionals who need to do an extended wash.

Electronic Sensing Technologies
Electronic plumbing fittings that offer sanitary, touch-free operation, while conserving water and energy in that they only dispense water when the sensor detects a user and can also limit water delivery duration.

PVD Finish
Physical Vapor Disposition ensures a longer-lasting finish because the PVD process bonds the finish at the molecular level and enhances resistance to the chemicals and abrasion that commercial restroom fixtures face from daily cleaning.

Electronic Soap Dispenser
A touch-free soap dispenser that automatically dispenses a pre-measured amount of liquid soap or foam soap with every push.

Deck-Mounted Hand Dryer
A hand dryer coupled with a fabricated sink that has an air dam designed to “capture” the high volume of air, preventing water or soap in the sink from exiting.

HEPA Air Filter
A hand dryer filtration system that removes 99.97% of potentially present bacteria at 0.3 microns from the air.

Americans with Disabilities Act (ADA)
Signed into law on July 26, 1990, the ADA is one of America's most comprehensive pieces of civil rights legislation that prohibits discrimination and guarantees that people with disabilities have the same opportunities as everyone else to participate in the mainstream of American life.[1]

For example, DuPont™ Corian® Quartz is 93% quartz and so is extremely durable. Some popular brands of quartz are Silestone®, Caeserstone®, and Cambria®.

Note that while quartz is more resistant to scratches, stains, and heat, it is not repairable if damaged. The product will maintain its beauty for a long time, but is not ideal for applications where restroom vandalism is a concern. If a customer is concerned with vandalism (ex. a school), they should choose fabricated solid surface because it is repairable. Also, the seam of a quartz sink will be visible, so designers may want to choose a solid surface material when designing larger sinks.

FABRICATED BIO-BASED SINK MATERIALS

Eco-friendly and naturally functional, bio-based sink materials are a renewable alternative comprised of soy-based fillers (rather than petroleum-based) and ground-up corn cobs or other bio-based materials. This is the ideal material for projects that want to visually emphasize environmentally conscious commercial construction.

The layout is typically a one-piece surface with counter space between each of the bowls. Sensor-activated faucets and soap dispensers can be integrated into the surface for even more sustainability. Bio-based sinks are available in one- and two-station configurations and four natural colors.

FABRICATED STAINLESS STEEL SINKS

Stainless steel sinks are very hygienic because the material resists the growth of bacteria. They are also resistant to heat and dents. Hands-free faucets and soap dispensers can be integrated into stainless steel sinks, which is important for healthcare and food service industries where the highest level of hand-washing hygiene is required. Single-, double-, and triple-station configurations accommodate different types of medical/surgical centers or food service applications. A lift-out front access panel enables easy access for maintenance.

Some of these sinks utilize sensors on the faucets and soap dispensers, similar to standard commercial sinks. Others have sensors located on the front of the sinks that act as "body sensors." These are especially critical in scrub sinks so that surgeons can easily complete a continuous full hand wash without needing to keep their hand in front of the faucet.

QUIZ

1. Which type of sink material is customizable and has the most finish and color options?
   a. Molded solid surface
   b. Fabricated solid surface
   c. Bio-based material
   d. Stainless steel

2. Which of the following is a benefit of solid surface sinks?
   a. Hygienic
   b. Repairable
   c. Scratch resistant
   d. Non-porous
   e. All of the above

3. Which molded sink style has limited exterior corners and is the perfect choice for restrooms primarily used by children, such as those in education settings or shopping malls?
   a. Continuous trough
   b. Open basin
   c. Rounded front
   d. Pedestal

4. Which sink style allows for a deck-mounted hand dryer?
   a. Continuous trough with 3-in-1 technology
   b. Individual basin
   c. Fabricated continuous trough
   d. Open basin

5. Which of the following is an advantage of commercial grade electronic faucets?
   a. ADA compliance
   b. Efficiency
   c. Vandal resistance
   d. Hygiene
   e. All of the above

6. Faucets account for more than _____ gallons of water use per year across the US.
   a. 1 million
   b. 1 trillion
   c. 1 billion
   d. None of the above

7. _____ soap dispensers are ideal for accessibility due to their positioning.
   a. Wall-mounted
   b. Deck-mounted
   c. Both A and B
   d. None of the above

8. Newer, high-speed and super-energy-efficient hand dryers can dry hands in 8 to 15 seconds, saving _____% more energy than traditional hand dryers and saving _____% in paper towels costs.
   a. 50, 50
   b. 60, 80
   c. 70, 90
   d. 80, 90

9. The 2010 ADA Standard (section 606.3 Height) states the sink rim and counter surface should be mounted so as not to exceed a _____maximum from the finished floor.
   a. 20-inch
   b. 24-inch
   c. 30-inch
   d. 34-inch

10. The intent of LEED v4's W.E. Credit 2 - Indoor Water Use Reduction is to reduce indoor water consumption by greater that _____ % above the baseline.
    a. 10
    b. 15
    c. 20
    d. 25

This article continues on http://go.hw.net/AR102019-2. Go online to read the rest of the CEU course, complete the corresponding quiz for credit, and receive your certificate of completion.

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AIAVoices

CREDIT: STEVIE ROTELLA

Creating Place, Sustainably

Sustainable design means that buildings evolve with their communities.

Rico Quirindongo, AIA, has dedicated his career to creating social change. After 17 years of working with Donald King, FAIA, at DKA Architecture in Seattle, the firm closed because of the Great Recession, and Quirindongo found himself starting over again at DLR Group. Six years later, he's re-earned the title of principal and leads the firm in growing its civic presence. At the same time, he's embraced the idea of sustainable design as it pertains to reuse and renovation: taking what already exists and making it better.

As told to Steve Cimino

I grew up in an affluent white neighborhood in Washington. My parents moved from Seattle to the suburbs to provide us with a college-track education that they otherwise could not afford. That meant I did not grow up, culturally, within a community of people like me. As a young adult, I did not see myself, nor the culture of my family or community, reflected in the built environment around me.

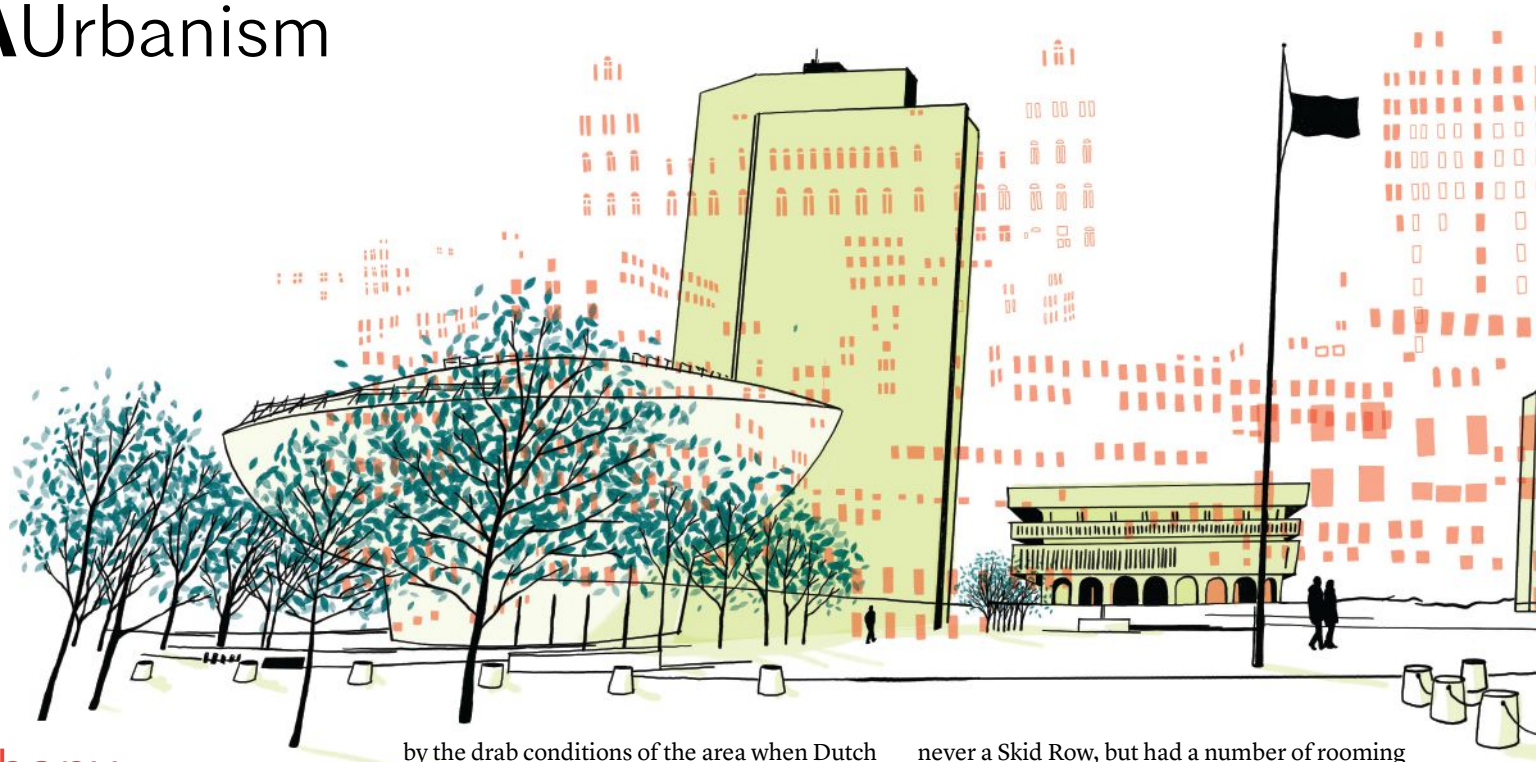
At our small black-owned firm [DKA Architecture], a lot of our clients were not-for-profits providing social services. As such, we often worked on existing, underutilized buildings in neighborhoods of need. This contributed to an increased focus on adaptive reuse and preservation as vehicles for sustainable design; we were trying to help those groups take their existing building stock and make the most out of it.

Of course, it's about more than that. Considering the embodied energy from existing buildings, and the amount of energy and waste that goes into demolition and construction, saving and restoring buildings is the most sustainable thing we can do. Getting to the level of efficiency that we're aiming for is going to come from smart renovations, not just ground-up projects.

We also must consider the idea of placemaking. Taking an existing building and reinterpreting it means breathing new life into what was forgotten while maintaining the fabric of communal history. It brings hope; it allows residents to say, "This transformation is happening for this building. It is restored, and it is beautiful. This is an example of what my life, my community, can be." It stands in the face of gentrification and displacement.

We can maintain the elements of cultural value in existing buildings, elevate them, and then provide new programming for a new occupant. Preservation for the sake of preservation is not the point. What matters is that communities evolve over time, and buildings must evolve along with them and reflect the surrounding spaces. Our lives and our communities are made richer by capturing and celebrating the history of where we live and work and play; that is what creates sustainable place. AIA

AIA Urbanism



In Albany, the Cost of a "Modern" Plaza

A new space was supposed to revitalize this 19th-century city. The reality is a bit trickier.

By Ben Schulman

In 1985, *The New York Times* reported a story about a shoeshine man who defaced eight modern paintings in the underground concourse of the Empire State Plaza, New York State's Modernist-tangoes-with-Brutalist government complex in the heart of Albany.

In 2010, the *Albany Times-Union* reported teenage arrests related to graffiti at the Empire State Plaza. And again, in 2018, the *Times-Union* reported four people charged with tagging The Egg, the Harrison & Abramovitz–designed performing arts center that juts out of the plaza like a sawed-off spaceship, frozen in concrete, more pan than egg.

What begs abuse, Empire State? The answer manifests not only in the hardscape spaces that invite unwanted improvisation and interaction, but also in the narratives embedded in the landscape—in the place that was lost to create the Empire State Plaza.

Modern Plans, Modern Government

Popular history states that former New York Governor Nelson A. Rockefeller, embarrassed by the drab conditions of the area when Dutch royalty visited in 1959, envisioned the Empire State Plaza (also referred to as the South Mall) as an antidote to the messiness of the fine-grained urban fabric of Albany's South End, an old part of one of the oldest cities in America.

Rockefeller's government, a bygone form of progressive Republicanism that advocated for education, arts, and health, was busy building a new organizational infrastructure to accommodate the growing state. New York State, not the federal government, would drive this urban renewal plan. (The financing of Empire State Plaza was administered through a complex series of bond sales from Albany County to New York State, orchestrated by Albany mayor Erastus Corning.)

An avid art collector—his mother, Abigail Aldrich Rockefeller, was the leading force behind the creation of the Museum of Modern Art—Rockefeller projected a program of bold Modernism expressed through aesthetics and architecture: a modern plan made for a modern government, and vice versa.

Rockefeller tapped architect Wallace Harrison to oversee and lead design and construction, an association that dated back to Harrison's work on New York City's Rockefeller Center as a member of Associated Architects for Rockefeller's father, John D. "Jr." But to create the South Mall meant to clear out parts of the South End, a diverse neighborhood of African Americans, Italians, Jews, Irish, and others. An economically forlorn pocket of the neighborhood, known as "The Gut," was targeted; the area was dismissed as a slum, but according to State University of New York Albany historian David Hochfelder, "[it] was never a Skid Row, but had a number of rooming houses that served seniors living on fixed incomes."

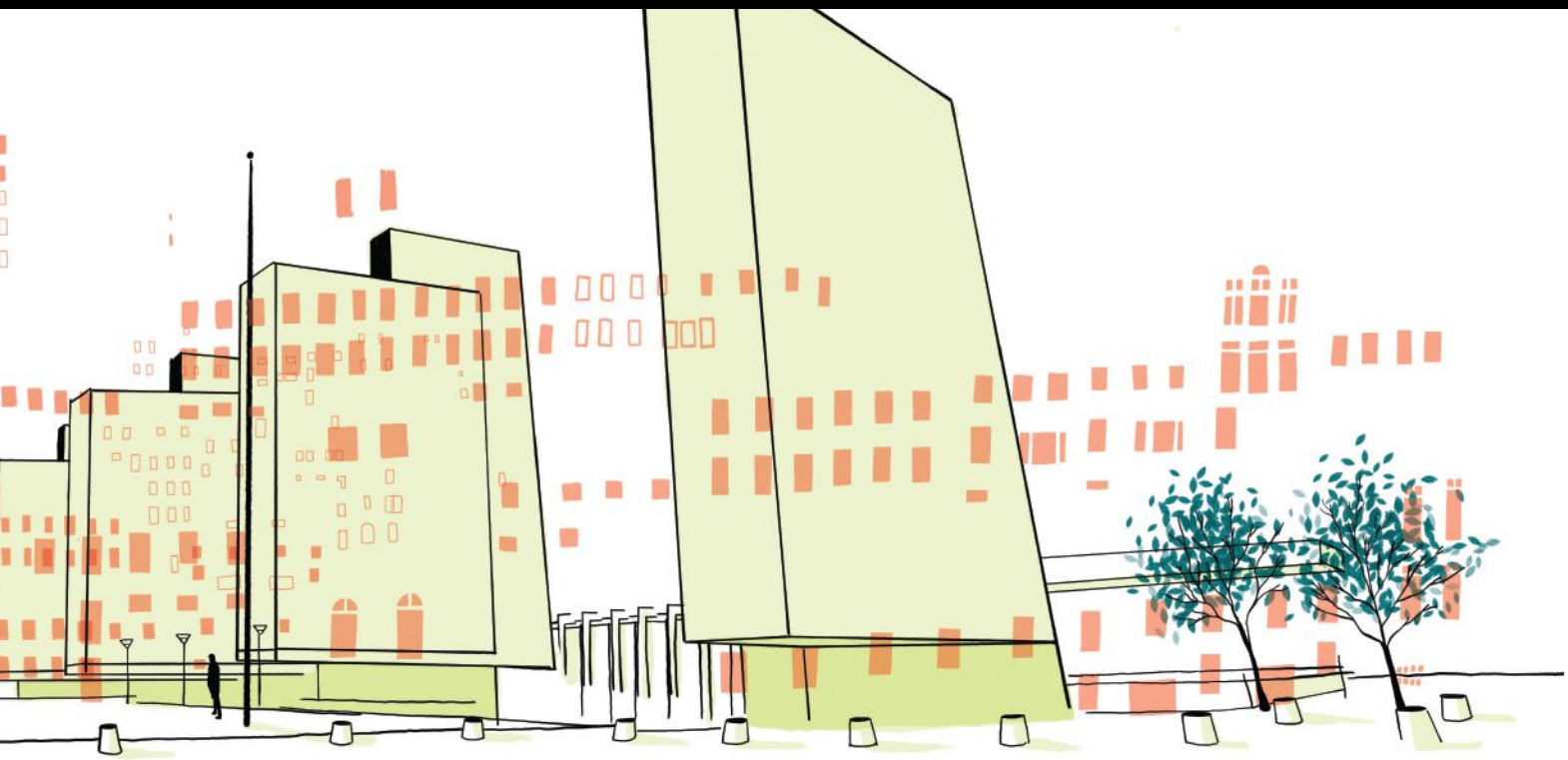
During the demolition and construction of the South Mall, an era that spanned from 1962–1978, the South End neighborhood lost well over 1,100 buildings, and more than 300 businesses, to demolition. Between 7,000 and 9,000 people—upwards of 5% of the city's population—were displaced.

"The entire plan was touted as 'the city was dying' and needed revitalization," says Tony Opalka, Albany city historian. "The loss of population and tax base was huge after the demolition. But the real impact of the Mall was its scale in what was, what still is, a small-size city."

"Empire State Plaza obliterated the streetscape," says Hochfelder. Yet the architectural loss—a Greenwich Village-esque eclecticism mixing colonial and 18th-century urban American styles—was overshadowed by the human toll.

Barry Levine is a retired postal manager who grew up in the South End. His father owned a bar, Dinty's Tavern. "The Egg sits right on top of where the bar building was," he says. "People fought the plans as best they could—they hated it—but there was nothing they could do." Forced out, Levine says, "Dinty's moved from the corner of Hudson and High uptown before its former building was demolished, and most of his customers moved with him."

Biff Pock runs the Blue Note Record Shop on Central Avenue, a short walk from where Dinty's relocated. His father opened the shop in 1948. Though removed from the South End, Pock says once construction was complete on the Mall, the



store never fully recovered its business, even factoring in changes in consumption. "We had lots of customers that would walk over or take the bus," Pock says. "Once the Mall started being built, foot traffic declined. If even a tenth of the people forced from their homes were our customers, it's still a huge loss. There used to be so much life in the city."

For retired geologist Angelo Kontis's family, Albany's urban renewal was like an incision in their story. Kontis's father owned his own home and business, a shoe repair shop, in the South End. He refused to sell to New York State. "It was the last home standing on the block," Kontis says.

Eventually, the home was acquired via eminent domain and demolished. Kontis's father's health began to decline during this period and though the family was compensated, the effect was lasting. "I can't prove it, but I associate [my father's decline] with his world [being] taken out from under him," Kontis says. His father ended up in the Hudson River State Hospital, a psychiatric hospital in Poughkeepsie, N.Y.

98 Acres

These human stories form the core of 98 Acres, a history project started by Hochfelder and historians Ann Pfau and Stacy Sewell. Its name is a reference to the size of the 40-block area that was demolished.

"We came across an archive of photographs [documenting the area] for appraisal purposes," Hochfelder says, "and realized we needed to bring these photographs out of the archives and into the world."

98 Acres' website vivifies the urban renewal period in Albany in visceral and exacting detail—culled from historic images, news clippings, government documents, oral histories, and storytelling. "We started an effort to catalog the images and use the visual record to tell the social history of what happened," Hochfelder says.

The website counters the dominant narrative of Rockefeller's rationale for renewal: slum clearance. As the photographs show, the "slums" to be eradicated were often solid structures representing deep social and familial networks. The group is working on a book to complement the website and has already begun cataloging the stories of other regional places affected by urban renewal. As Hochfedler says, though, "Albany's story is both representative and unique. Hundreds of communities have similar stories. But in Albany, this was a state-funded project with a clear goal—and it got built."

Layers of History

That fact that the Empire State Plaza was built—when so many urban renewal projects did not—is monumental unto itself. Can its place in Albany be recontextualized? Should it?

Nearly 11,000 state workers traverse and work within it every workday. At least two generations of Albanians have come of age with the Empire State Plaza enmeshed in the core of the city. Even its attractiveness as a canvas for vandals evokes some of the playfulness of Lina Bo Bardi's SESC Pompeia, São Paulo's factory-transformed-into-community-center, a sort of Modernism made soft.

The architectural and planning prescriptions that form the Empire State Plaza's identity (it is a mix of International, Brutalist, and Modernist stylings, panned by many critics when it was first conceived and built) offer one of the few complexes in the United States that exist on such a grand scale. The Brutalist-style Cultural Education Center and Legislative Office Building hark back to an age of efficacious governance—despite the fact that many saw the building of the plaza as an overreach.

"The interest in Brutalism is, in part, spurred by its association with an era of progressive civic building," says Erica Avrami, an assistant professor of historic preservation at Columbia Graduate School of Architecture, Planning and Preservation. "These structures hark back to a unique moment of collective action in civic design and construction. While our generation is reckoning with how these large-scale urban projects disrupted communities and built environments, there is nonetheless some nostalgia for the political agency and civic vision that enabled their realization."

Within the Empire State Plaza's 98 acres and the surrounding extant blocks of historic Albany, layers of American urban planning history splay out like a text, fitting for a place that European colonists settled in 1614. To those of a certain mindset, the starkness within the Empire State Plaza nonetheless reveals an authenticity of architectural thought in a way that faux-traditional new development likely never will.

For some though, like Hochfelder, the aesthetic effect of the Empire State Plaza has always been inauthentic. "Albany is a 19th-century city, with Empire State Plaza grafted on," he says. AIA

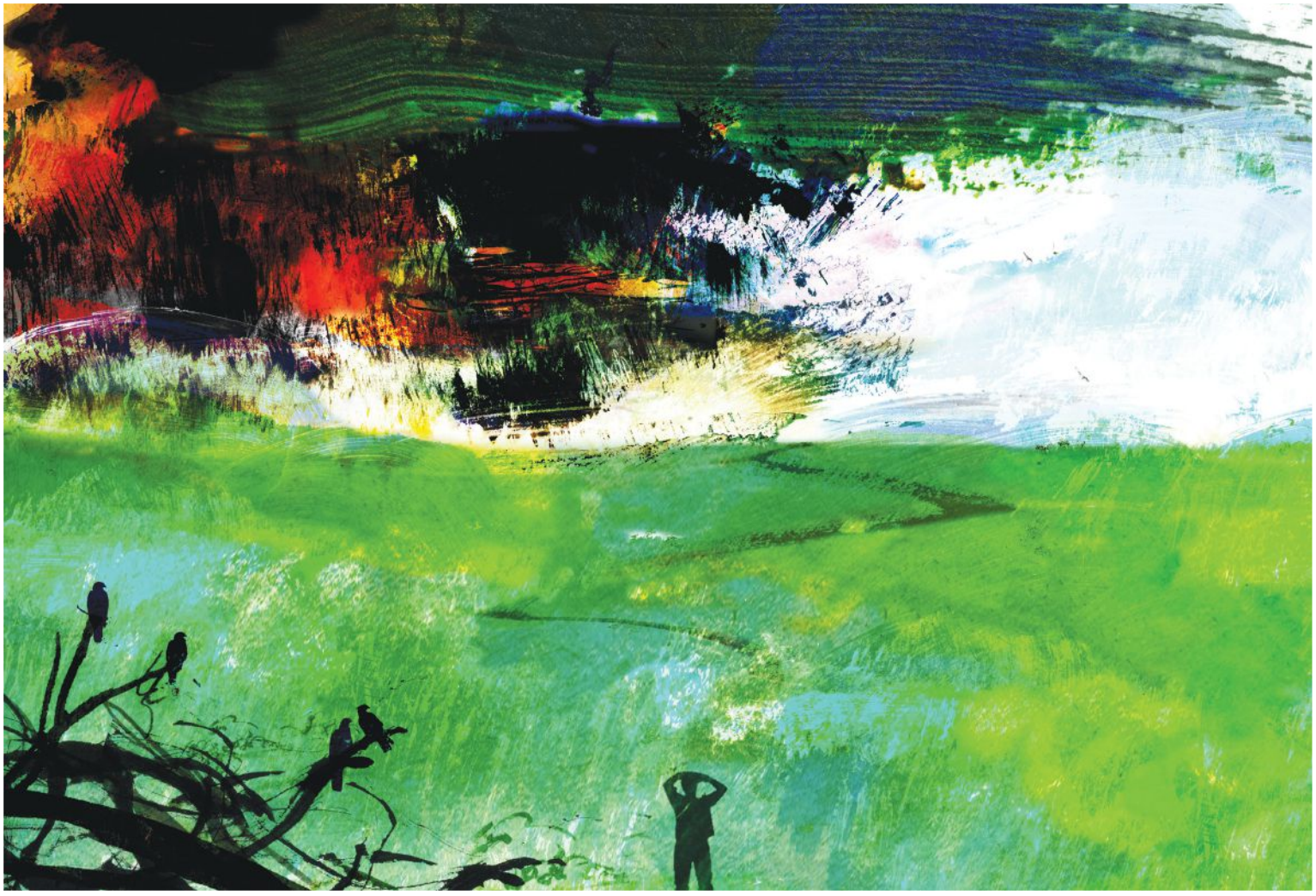
CREDIT: LAUREN NASSEF

AIAFeature

Can Architecture Reach Net Zero by 2050?

The built environment is essential in the fight against climate change, but time is running out.

By Katherine Flynn



CREDIT: SIMON PEMBERTON

In October 2018, the United Nations delivered a verdict on the action needed to reverse the effects of climate change. We—the planet's residents—will need to aim for a goal of reaching net-zero emissions by 2050, the U.N. report stated, or risk a future of devastating extreme weather, rising sea levels, and melting polar ice, the cumulative effects of too much carbon dioxide (and other gases) in the atmosphere. Without swift and decisive action in the next decade, the 2050 goal won't be achievable.

At a U.N. meeting in March of this year, General Assembly President María Fernanda Espinosa Garcés of Ecuador told the chamber, "We are the last generation that can prevent irreparable damage to our planet."

At the Paris Agreement in 2015, the U.S. pledged a 17% to 24% emissions reduction for the country as a whole by 2050, although President Donald Trump later withdrew from the accord in 2017. Nevertheless, the built environment plays—and will continue to play—a hugely integral part. In the United States alone, the commercial and residential building sector accounts for 39% of CO_2 emissions per year, according to the U.S. Green Building Council, more than any other industry. Additionally, commercial and residential buildings are black holes for electricity usage, accounting for more than 70% of total electricity usage in the United States.

The ultimate goal, as set forward by AIA and partners like Architecture 2030, is net-zero emissions in the building sector by 2050—with incremental goals for net-zero carbon energy use and 50% less embodied carbon by 2030.

"In terms of our emissions reductions, [we're] doing really well," says Ed Mazria, FAIA, founder and CEO of Architecture 2030. "The building sector is really leading the way, and pulling everything else along." The built environment in the United States is down 4.3% in energy consumption from 2005, and emissions are down 21.4% in the sector globally.

However, each new goal is contingent on the success of the one that precedes it, and it's not clear whether the built environment will continue to stay on track at the rate needed to reach the 2030 and 2050 goals.

Mazria's Architecture 2030, a nonprofit organization, seeks to change the paradigm around the global built environment's emissions and energy consumption. Its 2030 Challenge inspired AIA's 2030 Commitment, which gives firms—from small practices to international organizations—the tools to prioritize energy performance in their practice. Signatories of the 2030 Commitment report annual progress against increasingly stringent targets.

Committing to Sustainability

In 2018, 252 firms (45% of all signatories) reported data to the 2030 Commitment on projects totaling nearly 3 billion square feet across 92 countries.

"We felt that it was important to lend our voice," says Bill Ladley, AIA, senior associate at Beyer Blinder Belle, about why his firm signed on to the 2030 Commitment in 2016. (The other reason was a sustainability ethos that Ladley feels has been intrinsic to the firm from the beginning.) "Part of it is simply power in numbers."

While signatories represent a small cross-section of the industry as a whole, the 2030 Commitment nevertheless represents one of the strongest initiatives in providing accountability and metrics for firms' sustainability practices. A report released in September 2019 illustrates that while the AEC industry knows that buildings matter in the fight against climate change, the program currently isn't seeing the necessary level of participation to improve results.

"The next decade is showtime," says Nathan Kipnis, AIA, principal of Kipnis Architecture+Planning and co-chair of the AIA 2030 Commitment Working Group. "We have a written goal of increasing the number of signatories by 600 firms." Increasing the number of current signatories reporting their data is also an essential part of the solution, he says, citing the current 45% reporting rate. However, many of the largest firms in the country—including Gensler and others—are signed on. A "propel the bell" strategy, which Kipnis and his working group of colleagues are formulating, ideally will motivate firms that are lagging behind to either sign on to the 2030 Commitment, or, if they're already signed on, recommit and track their projects.

"It's been relatively easy to get the

AIA Feature

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progressive, leading-edge firms to join on and report and do great," Kipnis says. "Now we need to get the massive part of that bell, and it's a whole different message strategy—different for large, medium, and small firms. They all have different things that mean something to them." He's optimistic, he says, that single-family housing will be the first building type to reach net zero in aggregate.

While initiatives like the 2030 Commitment are important, the time is coming to tackle the problem on a larger scale. At the Conference on Architecture in Las Vegas in June 2019, AIA's Resolution for Urgent and Sustained Climate Action overwhelmingly passed by 4,860 votes to 312—placing the onus on all firms, not just 2030 Commitment signatories, to tackle the climate issue.

The resolution outlines three actions: declaring an urgent climate imperative for carbon reduction; transforming the day-to-day practice of architects to achieve a zero-carbon, equitable, resilient, and healthy built environment; and leveraging the support of architecture's peers, clients, policymakers, and the public at large.

"It's a significant statement from AIA to have all firms engaged in making a response to this urgent climate situation," says Gwen Fuertes, AIA, an associate at Leddy Maytum Stacy Architects in San Francisco and co-chair of the AIA 2030 Commitment Working Group. "[Commitment] at the board level is a really big message to the industry at large, so I think that's the first thing that people can hear and recognize, coming from AIA."

Groundswell from Grassroots Efforts

Building codes are going to be an essential piece of the emissions reduction puzzle going forward, and architects are leading the charge. In November 2018, Architecture 2030's ZERO Code, a net-zero energy stretch code for new commercial, institutional, and mid-to-high-rise residential buildings, was adopted by the state of Oregon, and members of AIA California (AIA CA) Committee on the Environment are currently lobbying for it to be adopted in their state during the next code cycle, in 2022. This July, the AIA CA board of directors unanimously passed a resolution supporting this initiative, and the AIA CA government advocacy staff is now working to forward the ZERO Code to the California Energy Commission and the governor's office for expedited adoption.

"At a policy level, a lot of people are looking at what California does, because that's going to drive a lot of influence for international policy as well," Fuertes says. "It starts in California and trickles out. We're very encouraged that this got recommended and is raised to the level right now, at the state, where they're really considering turning the lever and saying, 'Okay, now we're all going to be doing net-zero carbon buildings'—and that will be a huge shift. It's just another story of how architects can really make a difference from the ground up."

> "We work at firms that might compete against each other, but we put that aside and just think about the bigger movement, the bigger problem of climate change that we're all in."
> –Gwen Fuertes, AIA

Fuertes says that forming a community around sustainability efforts in the Bay Area has been influential in helping firms build more sustainable practices.

"We have a regional network here of folks that are point people at their firms for doing the 2030 Commitment work, and we meet on a quarterly basis—get together, have snacks and beer, and talk about our progress," she says. "And it's been really great to see that informal, collective gathering. We work at firms that might compete against each other, but we put that aside and think about the bigger movement, the bigger problem of climate change that we're all in, and we collaborate and share resources and ideas."

Providing tools that architects and planners can implement in their own cities is also an essential way of making the fight against climate change horizontal, rather than top-down. "For existing buildings, the key is to have policy road maps that are scalable, so that not every city has to do a custom road map," Mazria says. Key policy intervention strategies for reducing emissions include a building sale, if the new owner is planning a renovation; rebuilding after an event like a flood or fire; or a zoning upgrade or height increase. "You can also, at that point, require the emissions reductions, from that building and any other additions on that site," Mazria says.

Timing Is Everything

There are three crucial dates in the process of reducing carbon emissions, as laid out by the Paris Agreement. After 2020, global carbon emissions must be reduced 50 percent by 2030 in order to meet the target goal of completely phasing out CO_2 emissions by 2050.

"Those three dates are key, and if you miss any of those, then the other dates change," Mazria says. "We need to move faster to get to that 50 percent or greater target by 2030. Otherwise that 2050 date doesn't hold."

Design strategies for new buildings have the greatest impact on building energy use. Starting with architectural solutions, like passive solar design strategies, more efficient building envelopes and mechanical systems—and then adding renewable power generation like rooftop solar—can all add up to decreased energy emissions. Also, about 50 percent of embodied carbon—or carbon emitted during the manufacture, transport, and construction of building materials—comes from steel and concrete. The use of carbon sequestering materials like mass timber and CO_2 injection in concrete will be crucial in reducing the amount of carbon usage in the building sector in the next 10 years. "If architects are designing for mass timber, it puts a little more pressure on concrete and steel to reduce their emissions so that our community will specify it," Mazria says. "To get other industries going as competitors to the established industries, it's important to get the established industries to make changes happen and reduce their emissions."

A Sea Change

Following the resolution passed in Las Vegas by attendees of the 2019 Conference on Architecture, AIA is currently in the process of shaping its next big initiative, the Big Move Toward Environmental Stewardship.

"In the near-term, the board has prioritized three areas—energy, economy, and equitable communities—which are based on the 10 areas of focus laid out by AIA's Committee on the Environment. These areas of focus will shape the Institute's work for the coming decade and beyond," says AIA CEO Robert Ivy, FAIA. "It's an increased—and highly visible—call for urgency at a pivotal time."

"The timing is perfect, because we have to act now," says Mazria of the resolution and AIA's initiatives. "That's what the profession—and the building sector—needs to understand." AIA


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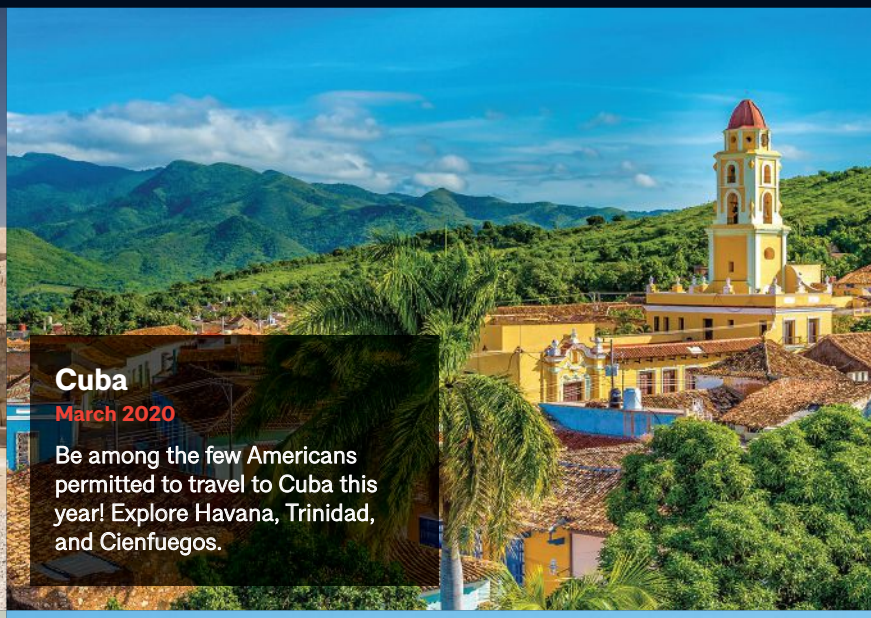

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AIAFuture

CREDIT: PERKINS AND WILL

The newest tower at Oklahoma University Medical Center, designed by Perkins and Will, is a pilot project for resilience-focused certification called RELi.

New Certifications Broaden the Meaning of "Sustainable"

RELi, Fitwel, and others go beyond green building to focus on resilience and health.

By Steve Cimino

In the 21 years since LEED was introduced, certification programs have played a major role in transforming the architecture, engineering, and construction marketplace, largely in the area of sustainability. Take a look at the lobby of any new building or extensive retrofit and you'll likely see a LEED Gold or Platinum plaque adorning the walls.

But the flagship program of the U.S. Green Building Council (USGBC) is not the only game in town. Over the past several years, new certification programs have emerged that go beyond overall green building to focus on more specific areas like resilience and health.

Back in 2012, a team of architects at Perkins and Will were discussing the lack of options to properly benchmark just how resilient a building or community could be. It went beyond the need for a rating system; there was a general unfamiliarity in regard to language and knowledge among designers everywhere.

"We felt a need for broader education in terms of how we talk about resilience," says Jon Penndorf, FAIA, senior associate at Perkins and Will. "It wasn't really part of the public lexicon until Superstorm Sandy came to New York. When one of the largest cities in the world was suddenly hit by a debilitating storm, the design community started to sit up, take notice, and say, 'This is going to impact all parts of the built environment in ways we hadn't previously thought about.'"

The initial plan was not to create a checklist or to bring Perkins and Will into the business of certifying projects. "Our goal was to create something that could be used as a design tool to bring up resilience with clients and help inform the design process," Penndorf says, "and to really fill that gap in understanding how climate risks and disasters were going to continue to impact our buildings."

The initiative was spearheaded by Doug Pierce, AIA, director of the Perkins and Will Resilience Research Lab, and developed by the Institute for Market Transformation to Sustainability. The RELi 1.0 standards were published in 2014. In 2017, the USGBC acquired RELi and added it to their suite of certification products, launching RELi 2.0 in January 2019. But regardless of the umbrella under which it resides, its goals remain the same.

"The bottom line is, if you're already considering the social, environmental, and economic pillars of sustainability, resilience has overlap with all of them," Penndorf says. "A tool like RELi is going to give you the information and the ammo you need to go into a project meeting and help developers and clients understand why it makes sense to design a resilient structure, and to better grasp the growing risks of climate change."

AIAFuture

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For Your Health

When it comes to health-based certifications, Fitwel has quickly become a leader in reinforcing the connections between a building's design and the well-being of its occupants. Created by the Centers for Disease Control and Prevention (CDC) and the General Services Administration (GSA), it was designed to take advantage of the CDC's research and the GSA's stewardship of more than 9,000 buildings by reinforcing practical and implementable design solutions that could be adopted on a broad scale.

"One of the real motivators, as I understand it, was public health researchers seeing the impact and success that LEED was having in terms of market transformation," says Joanna Frank, president and CEO of the Center for Active Design (CfAD).

In 2016, the CfAD was chosen as the operator of Fitwel. "The CDC needed someone to take what they created and bring it to the private sector, continue working with the public sector, and really build and run with it," Frank says. The involvement of architects was paramount; as a former developer who'd studied architecture in college, she also perceived a gap in knowledge that needed filling.

"The researchers all knew that design impacted health; the evidence base there was pretty substantial, even a decade ago," she says. "But there wasn't an understanding on the architect and building side that we were part of the equation."

Fortunately, architects and engineers were quick to embrace the research. This freed up Frank and CfAD to focus on clients and the developer community, building demand for the certainty that Fitwel provides.

"Beyond individual demand among millennials and the like, there is a growing momentum around what's called environmental, social, and governance (ESG) investment trends," she says. "Studies have shown that investors will be putting as much as $20 trillion into companies and real estate that meet these ESG goals. And because Fitwel has been so comprehensively peer reviewed and factors social metrics into its criteria, it can be used in planning ESG investments."

It's big business, and the Center for Active Design is indeed thinking big.

"We are looking to bring about market transformation around health; we are not looking for just one or two fantastic buildings," she says. "We want every building to be optimized for health." AIA

AIAPerspective

CREDIT: GREG POWERS

You May Delay, But Time Will Not

We have to think bigger and act bolder, without delay.

More than 260 years ago, Benjamin Franklin wrote, "You may delay, but time will not." In the context of climate change, those words are even more relevant today. Many of us are doing what we can to fight and to mitigate the impact of a rapidly changing climate on the built world. Through changes in lifestyle and business and professional decisions, both small and large, we are helping to lead the change we seek.

I was proud of the passion and the evident heartfelt commitment to positive change by members at the 2019 Conference on Architecture, where the Resolution for Urgent and Sustained Climate Action overwhelmingly passed by a margin of more than 15-to-1: 4,860 to 312.

The resolution's three areas of action include: 1.) Declaring an urgent climate imperative for carbon reduction; 2.) Transforming the day-to-day practice of architects to achieve a zero-carbon, equitable, resilient, and healthy built environment; 3.) Leveraging the support of architecture's peers, clients, policymakers, and the public at large. These three areas make clear our intent and our resolve to lead on this issue.

Initiatives like the 2030 Commitment are essential to making a lasting and meaningful difference—last year, more than 250 firms, or 45% of all signatories, reported data to the 2030 Commitment on projects totaling nearly 3 billion square feet across 92 countries—but more must be done. The fact is that as important as the 2030 Commitment and other initiatives like it continue to be, we have to think bigger and act bolder, without delay.

Because what we know is that the global scope of climate change and the resulting extreme consequences will alter every aspect of our lives—and the lives of future generations—in ways that we cannot imagine today. The solutions necessary to meet that challenge, and specifically the contribution of our profession, must be comprehensive, focused, sustained, and above all, immediate.

I'm proud of the work that the board, strategic council, and component leaders are doing to move the profession toward greater leadership in efforts to improve the environmental stewardship of the built world. Throughout this year, we have listened to the members, and worked at the board, committee, and staff levels on a vision of how the profession can lead on this issue in a holistic, pragmatic, and inclusive way. In the coming weeks, we will share more details about how we plan to ensure that the architect's voice and expertise are central to how the global society meets the challenges of a rapidly changing climate.

Broadly the goal is, through our collaborative efforts, to enhance and secure the architect's role as trusted partners and advisers to developers, legislators, and business and civic leaders. We hope to do this at all levels, from local to global, as we look for ways to reduce the impact of the built world on the environment, from the planning stage to construction and use.

The time has come for us to assume the leadership role that will lead to solutions for the society we serve. It is time for architects to expand our roles of convener, counsel, and advocate for responsible environmental stewardship and a more sustainable built environment. I have never been prouder to be an architect because so many of my colleagues have seized this leadership moment. I hope more will join us for the good of the society we serve.

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“Hendrickson’s aim is not to bring Wright down a peg but rather to try and understand his peculiar genius in the light of his—to put it mildly—extremely complicated life.”

In Search of Frank Lloyd Wright by Witold Rybczynski, HON. FAIA

Taliesin after it was consumed by fire in 1914

"At the base of every major work of art is a pile of barbarism," the German philosopher and critic Walter Benjamin once wrote. Was he referring to the fact that great art—or great architecture—is underwritten by great wealth, whose origin is often suspect? Or was he making the different point that the failings of great artists are part and parcel of their work? The question of the relation between a work of art and its maker is an old one. But it has assumed new urgency in the #MeToo era, bolstered by what some have called "offence archaeology," which maintains that the failings of the past—even the distant past—should temper our present-day cultural and artistic judgment. In this context, it's an interesting moment for the appearance of a new biographical study of Frank Lloyd Wright.

Few architects had as many well-publicized failings as Wright. Trying to get to the bottom of the mystery of this grand and monumental—and often self-serving and ignoble—figure is the task that Paul Hendrickson has set for himself in *Plagued by Fire: The Dreams and Furies of Frank Lloyd Wright*, published by Knopf in October. First off, this is not a takedown. Hendrickson's aim is not to bring Wright down a peg but rather to try and understand his peculiar genius in the light of his—to put it mildly—extremely complicated life. He is hardly the first to attempt this task. Brendan Gill's *Many Masks: A Life of Frank Lloyd Wright* (Putnam, 1987) is sometimes gossipy but informed by the author's sound eye and the fact that he knew Wright and was close to him; Meryle Secrest's solid contribution, *Frank Lloyd Wright: A Biography* (Knopf, 1992), is the work of a conscientious professional; and Anthony Alofsin, FAIA's *Frank Lloyd Wright—The Lost Years, 1910–1922* (University of Chicago Press, 1994) is a penetrating look at a brief but crucial period in the architect's life.

Hendrickson's approach is different. "This book isn't intended as a Frank Lloyd Wright biography, not in any conventional sense," he writes. "Rather, this book is meant to be a kind of synecdoche, with selected pockets in a life standing for the oceanic whole of that life." Synecdoche? I had to look that one up. According to the dictionary it means "a figure of speech in which a part is made to represent the whole." That makes the book sound abbreviated, although at almost 600 pages it is hardly that.

The "Shoe Leather" Thing

Hendrickson is not an architectural critic, an art historian, or a Wright scholar; he is a writer. His last book, *Hemingway's Boat* (Knopf, 2011), which was a National Book Critics Circle Award finalist, was an exploration of the famous novelist through the lens of his lifelong obsession with the sea. Hendrickson teaches writing at the University of Pennsylvania (full disclosure: I am an emeritus professor there). He is not a lifelong academic, however, having spent more than two decades as a staff writer for *The Washington Post*. In other words, he cut his teeth on newspaper reporting, an experience that colors his book. His research on Wright is not based only on written sources (although there are plenty of those: the bibliography lists more than a hundred titles). Instead, combining journalism and detective work, he calls up people, follows leads, hits the streets, talks to bystanders (the "shoe-leather thing"). The result makes for compelling reading.

For instance, in consulting the records of the University of Wisconsin, Hendrickson learned that Wright's college education, which is sometimes described as an incomplete course in engineering (Wright himself claimed that he almost received a degree), actually consisted of only three classes: French, in which he received no grade, mechanical drawing, and descriptive geometry, both Cs. This is not to criticize Wright's understandable desire to bolster his credentials, but rather to marvel, yet again, at the spectacle of an untutored 19-year-old who, only one year after arriving in Chicago, was working for Louis Sullivan, became his right hand, and only five years later set up his own shop.

The author encounters many dead ends, some of his subject's own making. "The dilemma with Wright is that you have to keep lifting your arm and trying to brush your fingers across the raised surface of the stone monument of his pride, hoping that if you do this lightly enough and well enough you might be

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able to find—what? That essential thing trying to get out. The quality trying to show through from underneath, like pentimento," writes Hendrickson in his characteristically lovely prose.

The author goes about "brushing the surface" not by speculating about Wright, as some novelists have done (T.C. Boyle in *The Women* and Nancy Horan in *Loving Frank*) but by examining the lives of various characters who played roles, big and small, in Wright's life: an early and close architect pal, his clients, his wives (there were three) and children (six), and his father, whom Wright accused of abandoning his mother, although the reverse was actually true. These side excursions occasionally turn up nuggets of new (to me) information—for example, that Wright likely owed his creative genes to his father, a musician. But more often they simply provide a background texture that helps to add nuance and humanity to the book's subject.

Wright really was plagued by fire, as the title suggests. Taliesin, his Wisconsin retreat, was ravaged by fire twice, and almost burned again a third time. His winter home in Arizona likewise suffered a conflagration. And there is more. "It almost seems as if the histories of certain Frank Lloyd Wright houses are trying to reproduce his own history of calamitous fall, improbable comeback, lurid headlines, quiet beauty, incalculable sorrow, financial desperation, sexual intrigue, unsolvable riddle, and, not least, the determination to survive—no, to triumph," writes Hendrickson. The young industrialist who was Wright's client for the famous Robie House ruined the family business, was divorced by his wife, went bankrupt, and was obliged to sell his beautiful home after living in it for only two years. The wife of the owner of the three-story Heller House in Hyde Park, an unusual and groundbreaking 1896 design, was said to have fallen—or jumped—down the elevator shaft. The owner of the Bradley House in Kankakee, Ill., an early proto–Prairie Style house, committed suicide. The wife of the owner of Fallingwater died of an overdose of sleeping pills. And so on.

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The greatest personal tragedy that befell Wright involved the first fire, in 1914, and the murder of his mistress, Mamah Borthwick Cheney, and her two children, as well as four employees, by a servant run amok who also started the blaze that consumed much of Taliesin. *Plagued by Fire* includes a chapter on the background of the killer, Julian Carlton, who was not from Barbados (as Wikipedia still claims) but from Alabama. Carlton, who was black, grew up in a small town during the violent era of lynchings and the Klan. Hendrickson traces his history, visits the town, and talks to distant relatives. He doesn't answer the lingering question of "why," but gives the reader a sense of what might have led to the terrible crime. When Wright returned to Taliesin to confront the tragedy (he had been in Chicago), Hendrickson paints a moving scene: There was a piano in an unburned part of the house, and Wright started playing Bach. "He played the music over and over," he writes. "Supposedly, he played through his crying. No one disturbed him. It went on for a long time."

Self-Inflicted Professional Suicide

Bad things happened to Wright, but some were of his own making. In the spring of 1909 he was 41, had been practicing for 16 years, and had built more than a hundred buildings (and designed twice as many). He had established a strong reputation as a residential architect with an original personal style, building houses of all sizes, including mansions such as the Martin House in Buffalo, N.Y., and the Coonley House in Riverside, Ill. He had also completed two significant nonresidential projects, Unity Temple and the Larkin Building, and a third, Midway Gardens in Chicago, was under construction. He was at the point in any ambitious architect's career when he was ready to take the next step that would elevate him to the national stage—winning a competition for a significant public building such as a courthouse or a city hall, snagging a major federal commission in Washington, D.C., building a skyscraper in the Loop or in Manhattan.

Instead, Wright committed what amounted to professional suicide. He abandoned his family—and his

practice—to run away to Europe with Cheney, the wife of a client. Only three years earlier, Stanford White had been murdered by the husband of a woman whom White had seduced when she was 16. White was a libertine, but his dalliances with actresses and showgirls, even if underage, were tolerated at that distant time. But abandoning a wife and six children, and breaking up another man's marriage—a client, no less—was another matter. Wright was ostracized; during the ceremonial inauguration of Unity Temple, for example, his name was not mentioned. For the establishment, Wright became persona non grata. There were serious consequences: In his long life—there were 50 more years and many more commissions to come—he was never given the opportunity to build an important public building in a major city; his clients tended to be mavericks, outsiders like himself. Wright became America's most famous architect, yet arguably his best-known work is a rich man's weekend house in a remote corner of Pennsylvania.

What was he thinking that fateful spring of 1909? Wright was self-indulgent, but he could also be naive, almost childlike in his enthusiasms—that was part of his charm. It's possible that he was simply unable to foresee the result of his rash decision. Or did he think that society's norms did not apply to him, that he could flaunt them in ways others could not? We cannot know the answers to these questions, nor does this book try to provide them. There is always something slightly appalling about genius, and what Hendrickson achieves is to humanize his subject. He shows that Wright was not immune to remorse and shame, for example, and was much more self-aware than his often outrageous public pronouncements suggest. "I had to make a noise in the world, in order to gain as much of the world's attention as I could," Wright once told Brendan Gill. By humanizing his subject—and without resorting to armchair psychoanalysis—Hendrickson gives us a sense of how the single-mindedness, drive, and sensibility that informed and enabled Wright's work also affected his life. This does not necessarily change our understanding of the work itself; architecture is not biography, there are too many outside forces: clients, builders, budgets, technology.

Let us give the old magus the last word. In a 1935 letter to Isabelle Martin, the recent widow of his close friend and long-suffering client, Darwin D. Martin, Wright wrote: "I only wish I had been less taking and more giving where he was concerned but character is fate and mine got me into heavy going—and no safe harbor yet in sight."

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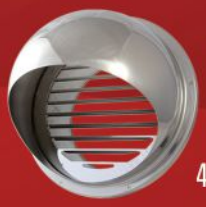

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“If the city’s political, cultural, and civic leadership care at all about Chicago, now is the time to stand up for the South Side, bringing forth bold, visionary, audacious plans.”

The Overlooked Architecture of Chicago’s South Side
Text and Photos by Lee Bey

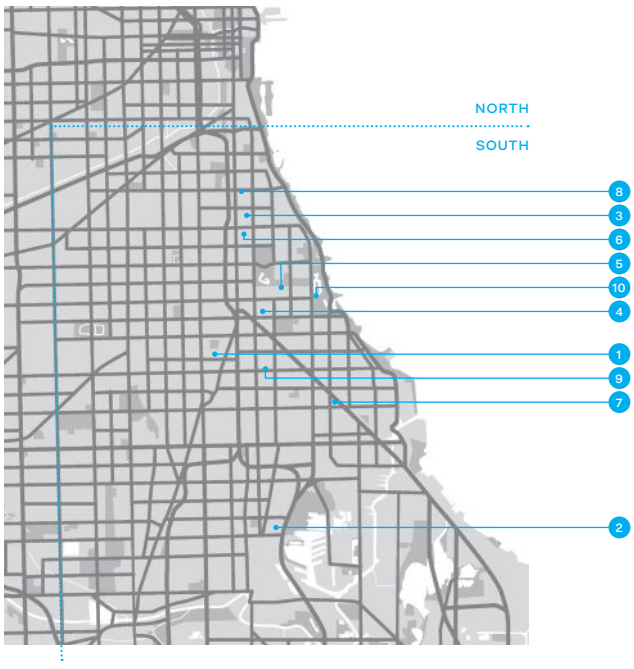
Chicago's architecture is important. Its buildings are the stuff of lore, books, and architecture tours. These days, there is little evidence around town that Chicago ever butchered the world's hogs or stacked the nation's wheat, as poet Carl Sandburg famously wrote in 1914. But more than 140 years' worth of some of the finest buildings in the country are still here and are added onto constantly.

The buildings Chicago honors most are the skyscrapers that line up along Dearborn, LaSalle, and State Streets, Michigan Avenue, and Wacker Drive, designed by titans of architecture such as Holabird & Root, Skidmore, Owings & Merrill, and Ludwig Mies van der Rohe. Buildings such as the Chicago Board of Trade, an Art Deco beauty that sweeps skyward from the foot of the LaSalle Street canyon. Or the dark and brawny Willis Tower (née Sears), once the world's tallest building, that punches its way through the clouds over the West Loop. And there are the 21st-century newcomers, such as Jeanne Gang, FAIA's Aqua Tower, an 82-story structure that looks as much a sculpture as it does a building.

The North Side's architecture is most certainly appreciated, especially the homes and buildings in the mega-monied Gold Coast, Lincoln Park, and Lakeview neighborhoods, and the miles of classy residential towers along North Lake Shore Drive. The South Side, however, has been largely omitted from Chicago's architectural discussion.

Before we get too far along, let's define the South Side's boundaries. We're talking about an area roughly bounded by Cermak Road to the north and 138th Street to the south. The eastern border is Lake Michigan, while its western edge is an uneven and unofficial line marked by Western Avenue to the north and the city's jagged western boundaries. Within the South Side, you'll find the Near South Side, which is closest to downtown; the Southwest Side, which encompasses neighborhoods west of Ashland Avenue; the Southeast Side communities east of Stony Island Avenue; and the Far South Side, which are generally the neighborhoods south of 95th Street. For decades, most of the buildings in that vast area have been flat-out ignored by the architectural press, architecture tours, and lectures—and many Chicagoans themselves. (One bright exception has been the Chicago Architecture Center's yearly Open House Chicago weekend. On a recent tour, about 25 of its 250 architectural treasures were located in predominantly black South Side neighborhoods.)

The South Side of Chicago



1. Lavezzorio Community Center
2. Pullman Colonnade Apartments
3. Welcome Inn Manor Bed & Breakfast
4. Dr. E.J. Ingram House
5. D'Angelo Law Library
6. Anthony Overton Elementary School
7. Chicago Vocational High School
8. First Church of Deliverance
9. Pride Cleaners
10. Obama Presidential Center site

A Legal Theft

Let's make it plain why this most egregious slight is happening: the South Side is dangerous flyover country to most outsiders, seen as a place where people are mostly black, poor, and murderous, living in squalor, disinvestment, abandonment, and violence.

Of those who do come to document the South Side, far too many practice ruin porn. These are photographers who fill their Instagram, websites—and more than a few art galleries—with images of abandoned and half-demolished South Side buildings. Their photographs of these fallen structures and lost places are beautiful and macabre, like the Victorians' post-mortem photographs. Very little of this work bothers to question or challenge the larger and often racist institutional forces and policies that led to the decline of these buildings and neighborhoods. To present these images without that narrative irresponsibly reinforces the notion that the South Side is an architectural wasteland. Nothing could be more untrue.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Above: Studio Gang's Lavezzorio Community Center in Auburn Gresham, which has been overshadowed by the firm's Aqua Tower in downtown Chicago

Opposite: The Pullman Colonnade Apartments, originally designed in 1893 by Solon Beman as part of a former company town where George Pullman manufactured his railroad sleeping cars

Even the South Side neighborhoods of Hyde Park and Beverly—well-planned and mostly white communities with celebrated residential architecture—are affected by this narrative. When I lived in Beverly for the first decade of the 2000s, I noticed one of the major gripes among my neighbors were other Chicagoans, particularly North Siders, repeatedly "discovering" the Southwest Side community—"I didn't know this was here." Beverly has been a Chicago neighborhood since 1890.

The crime and economic woes of the South Side should not be dismissed. But they can't be discussed or addressed without also mentioning how the banking, real estate, and insurance industries have cruelly conspired for decades to value homes and properties in black neighborhoods far less than those in white communities. Nationwide, a house in a black neighborhood is worth 23% less than a home in a white community with similar amenities and features, a Brookings Institute study discovered in November 2018. Brookings found the median value of an owner-occupied house in a black Chicago-area community was $114,000. The same house in a similar white neighborhood in the region would be $151,000.

According to the study, that differential over the years means untold millions of dollars in potential real estate equity—cash that could've been pulled out to send kids to college, fund businesses, climb into or


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A restored 1893 mansion in Bronzeville, which houses the Welcome Inn Manor Bed & Breakfast

above the middle class, save a residential landmark or build a future one—were robbed from property owners on the South and West sides of Chicago. And the theft was done neatly, cleanly, and legally with a balance sheet and a ledger. The South Siders would've stood a better chance against a stick-up man on the street.

Adding deep insult to this injury: the South Side makes up more than half of Chicago's landmass. In other words, most of the city is the South Side, a geographic area that's the size of Philadelphia—twice the size of Brooklyn. More than 750,000 people live on the South Side, a population rivaling that of Boston or Detroit. And yet Chicago has turned its back on it—and its architecture—with relative ease. "It's a North Side city," author and Columbia College Chicago history professor Dominic A. Pacyga told me, describing a prevailing mindset within much of the city and its leadership. "And if you're the South Side, you have two-and-a-half strikes against you already."

But the South Side matters. And its architecture deserves to been seen and protected.

A New Mayor's Opportunity

The new mayor, Lori Lightfoot, will have a huge role in deciding the future of the South Side. Mayor Lightfoot, a black woman from the North Side, was elected to the big chair in April after Rahm Emanuel decided not to run for a third term. Chicago has become two completely different cities, with a rich and well-appointed northern half and an increasingly tattered and disinvested South and West Sides. As mayor, Lightfoot must work—and hard—to bring development to the greater South Side, while pushing back conceptions that the area is too far, too poor, too out there.

Both Emanuel and his predecessor, Richard Daley, were good at scoring base-hits in the South Side. Lightfoot has to swing for the fences and dismiss small-scale urban planning and catch-as-catch-can deals done without a larger plan for the area. The Obama Presidential Center, likely to be built on Lightfoot's watch, could be one of those home runs. At this writing, the Obama apparatus only argues for what it needs to get the center built—things like park space, wider roads, closed-off streets, and room for parking. But the apparatus hasn't rolled up its sleeves or used its clout to push for—or help fund—tangible amenities that would help both the center and the surrounding area.

For instance, the city and the Obamas should be fighting to rebuild the elevated CTA Green Line tracks and stations that once ran down East 63rd Street between Cottage Grove and Stony Island Avenues. In one of city's worst planning blunders, the mile-long leg of track was demolished in 1997. But the rebuilt mile section would bring patrons from downtown to within a short walk of the presidential center. And it would

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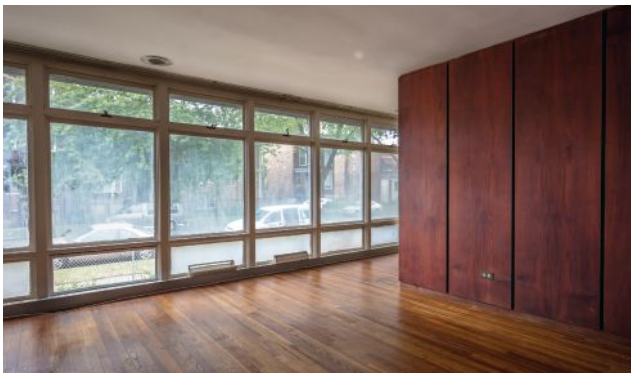

Above and Top Right: The Dr. E.J. Ingram House, designed in 1959 by the African American architect Roger Margerum

Opposite Bottom: Eero Saarinen's 1959 D'Angelo Law Library at the University of Chicago

put back an important transit link for South Side residents while improving redevelopment efforts along 63rd Street.

Object lesson: The Green Line station at 63rd Street and Cottage Grove Avenue was spared demolition, and since 2016, the intersection has come alive with new transit-oriented retail and mixed-use development. This is the kind of action the South Side needs.

The absence of a true plan to embrace and help the South Side has bred a certain cynicism on that side of town. I'd wager it's occurring on the West Side also. There is an open and ongoing discussion among black people that we are no longer welcome in Chicago and that the city's government, civic leaders, and policymakers are purposely chasing black people out of the city by not fully reinvesting in the South and West Sides. And it's playing out to some extent with a historic depopulation that's happening now in the South Side's black neighborhoods. More than 240,000 black people—mostly South Siders—have left Chicago since 2000 and are taking up residence in jobs-rich Northwest Indiana and Southern cities.

The Grand Boulevard neighborhood had a population of 53,000 in 1980. Fewer than 22,000 live there now. On the far edge of the South Side, the Roseland community's population has fallen to about 22,000 from 64,000 in 1980.

The Washington Park neighborhood directly west of the University of Chicago was a largely working-class black community of nearly 60,000 before World War II. Today about 12,000 people live there. Along with the population plunge, demolitions have left this one neighborhood with a mind-boggling 500 parcels of vacant land.

The population free fall puts the South Side's architecture at additional risk, particularly churches and schools that were sized and built during the area's boom years.

As mayor, Lightfoot has to work to reverse this population exodus—or at least stem the flow. That means inventive and sophisticated redevelopment efforts planned at a city scale, and aimed at rebuilding the South Side and retaining and growing its population. And she certainly must correct and keep

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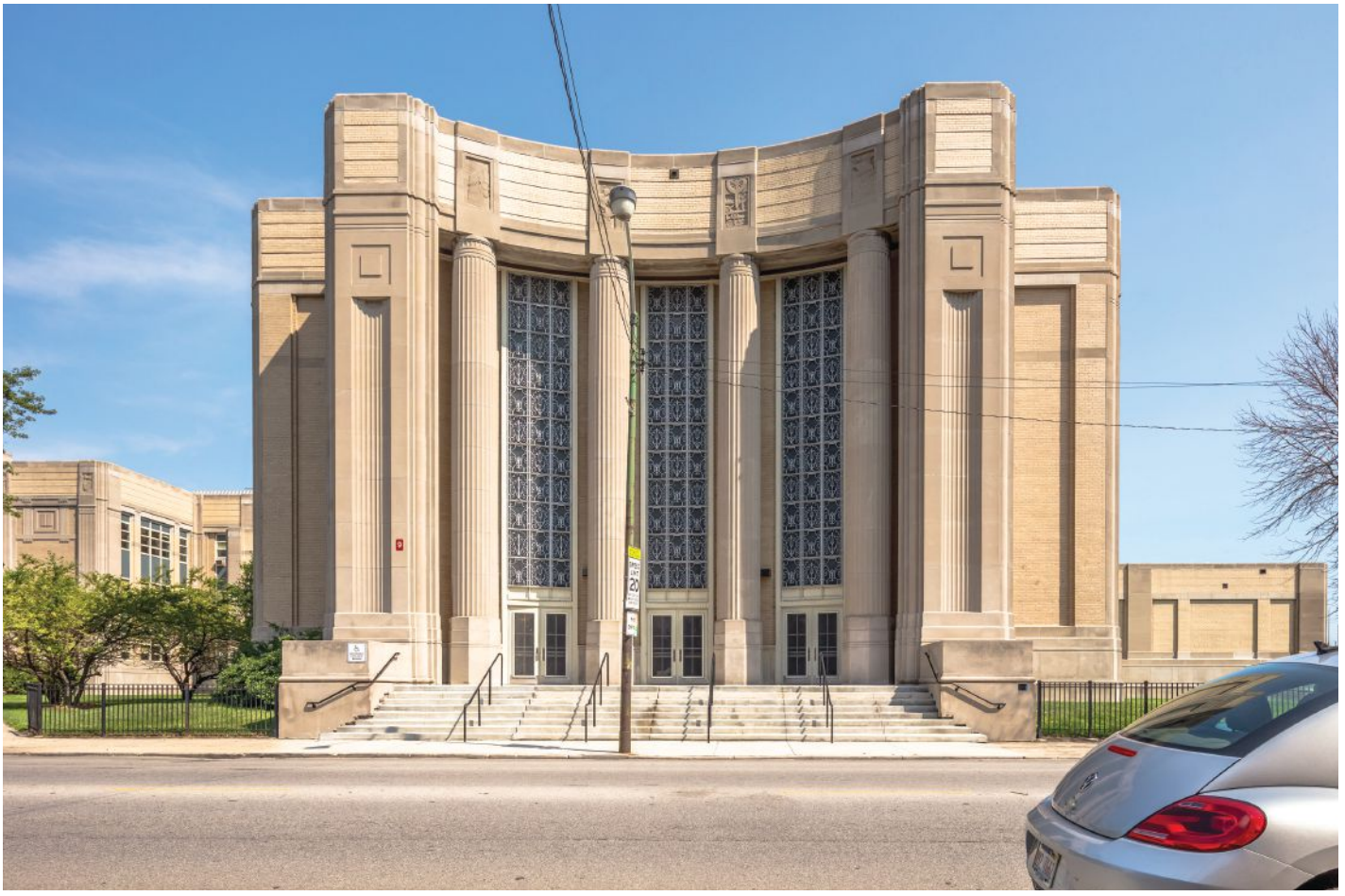
Right: The Anthony Overton Elementary School, designed by Perkins and Will in 1963 and now closed, was recently listed on the National Register of Historic Places

Bottom: The 1941 Chicago Vocational High School, the author's alma mater

Opposite: The First Church of Deliverance, a former hat factory that Walter Thomas Bailey and the black structural engineer Charles Sumner converted into its current use in 1939



clear of the type of corrosive and cavalier policies of her predecessor that led to the mass school closings—with no public discussion beforehand, or clear public benefit afterward.

Granting city landmark status to more South Side buildings also would be a key step, along with creating more landmark districts on the South Side. Such a move would keep away bulldozers and preserve the South Side's trove of good architecture. And for homeowners there are local and state tax incentives and permit-fee waivers designed to help owners restore historic properties. All of these could ease the burden of homeownership and help rebuild communities.

A New Chapter

Black and brown people started coming to the South Side more than a century ago in hopes of finding the first-class citizenship and opportunities that were denied them elsewhere. The decades that followed brought astonishing achievements for many people of color on the South Side. The buildings tell part of that story.

But the buildings and neighborhoods tell another story also: that for black people those 100-plus years were also filled with restrictive housing covenants; racist city policies; the historically brutal ways black neighborhoods have been policed; the economic, social, and cultural disinvestment of the South and West Sides—and now the astonishing wealth and privilege being built and put on display in the form of the new and predominantly white high-rise neighborhoods around the outskirts of downtown. If the city's political, cultural, and civic leadership care at all about Chicago, now is the time to stand up for the South Side and the West Side, bringing forth bold, visionary, audacious plans needed to revive and support these areas, their buildings—and the people who live there.

It's time to write a new chapter for Chicago's South (and West) Side. Let it begin now.

This essay was adapted from Lee Bey's Southern Exposure: The Overlooked Architecture of Chicago's South Side, *published by Northwestern University Press in October.*

Pride Cleaners, designed by architect Gerald Siegwart and completed in 1959—one of many South Side buildings that deserve designation as Chicago Landmarks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“What he doesn’t much object to is how ballparks have turned into ‘upscale bubbles.’ Nor does he argue against the billionaire owners who have squeezed taxpayers for public financing.”

Goldberger on What Makes a Good Ballpark by Eric Wills

Candlestick Park, completed in 1960 on Candlestick Point, a peninsula just south of San Francisco, was a miscalculation in concrete with all the warmth of a Bay Area summer—which is to say, not much. I caught my only ballgame at Candlestick with a few friends in September 1999, and my lasting memory—apart from Barry Bonds, the Giants' steroid-enhanced slugger, blasting two moonshot home runs—was of the swirling bay breezes that turned the afternoon into a perverse test of endurance.

The plummeting wind chill wasn't the only thing that left us cold: The stadium itself, which also hosted football games for the San Francisco 49ers, typified the car-friendly, suburban behemoths of its time. It had no character, no soul—none of the intimacy or charm of Boston's Fenway Park or Chicago's Wrigley Field, none of the eccentricity of the old Polo Grounds in New York, the Giants' home before the team decamped to the West Coast.

Mercifully, in 2000, the Giants moved yet again: to Pacific Bell (now Oracle) Park, an HOK Sport (now Populous)–designed stadium that was everything that Candlestick was not. Built on the edge of the gentrifying South of Market neighborhood in San Francisco, it belonged to a new wave of retro ballparks that brought baseball back to the city. If you worked in the Financial District, you could stroll over to Oracle on a weeknight, order some garlic fries, and watch a few innings in the fading half-glow of a midsummer evening. If the experience conjured more than just a faint whiff of nostalgia for baseball's golden era, well, that's what Oracle was designed to do.

Candlestick Park before it was demolished in 2015

Oracle Park, which brought baseball to downtown San Francisco

LEFT: HISTORIC COLLECTION/ALAMY; RIGHT: JOVANNIG

The Golden Age of Ballpark Design

In the Giants' progression from the Polo Grounds, to Candlestick, and finally to Oracle, one can glimpse a larger story about our country's urban development, from the explosive industrial growth that powered the city's rise in the 19th century, to the suburban flight of the 1950s and '60s, to the urban rebirth that began before the new millennium. For Paul Goldberger, HON. AIA, the Pulitzer Prize–winning architecture critic and a contributing editor at *Vanity Fair*, the ballpark is a compelling lens for these larger themes, "an indicator not only of our architectural taste, but also of our attitudes towards cities and community, our notions of public space, and our changing views about the nature of place."

In his latest book, *Ballpark: Baseball in the American City*, published by Alfred A. Knopf, Goldberger contemplates the evolution of this quintessentially American architectural form and does a (mostly) satisfying job of tracing these larger themes across the centuries. In the mid-1800s, the ballpark came of age in concert with the movements to build urban parks and cemeteries, all those destinations affording blue collar workers the opportunity for some bucolic bliss, a respite from the harsh urbanity of the growing metropolis. But unlike, say, Central Park, which initially prohibited baseball and other sports, the ballpark was not a genteel retreat from the city so much as an exuberant part of it. "The baseball park could offer the chance to satisfy the desire for *rus in urbe* in a different way from the rural cemetery and the Olmstedian park; it allowed visitors to be rambunctious, to be celebratory," Goldberger writes.

Stadiums of that era took shape on the edges of the developing city, where land was cheaper and more available, creating an interdependency with streetcar systems, which delivered fans en masse to the games (trolley owners purchased baseball teams and vice versa). The rise of intercity railroads,

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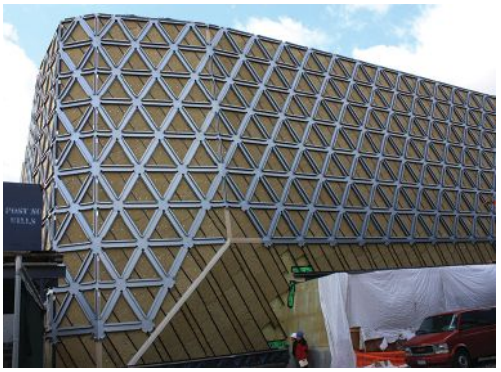

What comes to mind when you see or hear "mineral wool"?

Fire containment? If so, that's understandable. Mineral wool is the long-standing gold standard for fire-resistive building materials. Data from independent tests such as ASTM E2307 and the ASTM E119 time-temperature curve demonstrate there's nothing like it for allowing more time to escape in the event of a fire when seconds count.

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---

1. Most continuous insulation (*ci*) come in a convenient board form made of a variety of materials including mineral wool, extruded polystyrene, and polyisocyanurate. Which of the following attributes does mineral wool *ci* include?

- ☐ A. Fire resistance
- ☐ B. Moisture resistance
- ☐ C. Moisture vapor permeance
- ☐ D. Durability
- ☐ E. UV resistance
- ☐ F. Sound absorption
- ☐ G. All the above

2. True or false: If a wall created using mineral wool *ci* meets NFPA 285, it is compliant for all fire testing required of exterior walls per International Building Code (IBC).

- ☐ True
- ☐ False

3. Why is mineral wool an ideal continuous insulation product, especially for open-joint façade construction?

- ☐ A. Mineral wool repels rainwater
- ☐ B. Mineral wool resists ice, snow, and sleet
- ☐ C. Mineral wool resists intermittent exposure to UV rays indefinitely
- ☐ D. All the above

4. Mineral Wool (per ASTM E84) *ci* has a flame spread index of:

- ☐ A. 0
- ☐ B. 10
- ☐ C. 25
- ☐ D. 75

5. True or false: Mineral Wool *ci* exhibits enough compressive strength to mount cladding attachment systems outboard of the insulation.

- ☐ True
- ☐ False

6. True or false: Mineral wool is spun into fibers from molten basalt rock and slag.

- ☐ True
- ☐ False

7. True or false: All *ci* is created using a chemical blowing agent.

- ☐ True
- ☐ False

8. True or false: Mineral wool exhibits superb Noise Reduction coefficient (NRC) values, helping to create wall assemblies with greater sound transmission class (STC) than other foam plastic materials.

- ☐ True
- ☐ False

9. Continuous insulation products with a higher permeance (perm) rating enable vapor within the wall assembly to dry towards the exterior helping to prevent condensation and moisture in the wall. What is the perm rating of mineral wool *ci*?

- ☐ A. Less than 0.1 at 1" thickness
- ☐ B. 0.5 at 1" thickness
- ☐ C. 25 at 1" thickness
- ☐ D. 50 at 1" thickness

Bonus Question:

Mineral Wool *ci* comes in which standard dimensions:

- ☐ A. 2.5" x 24" x 48"
- ☐ B.2" x 48" x 96"
- ☐ C. 3" x 36" x 60"
- ☐ D. 4" x 16" x 48"
- ☐ E. A, C, and D

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Answer key: 1. G. 2. False; 3. D. 4. A.; 5. True; 6. True; 7. False; 8. True; 9. D.10.E

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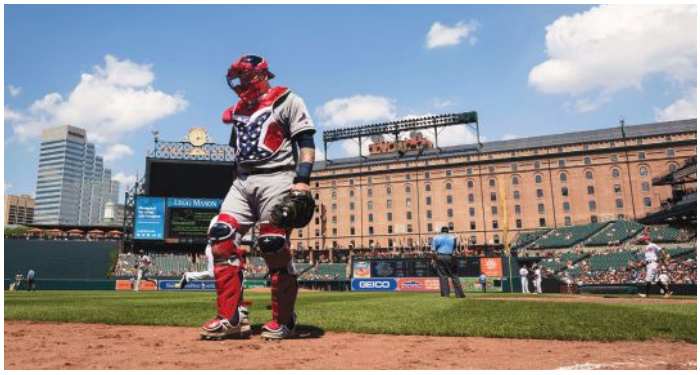
Fenway Park in 1914

Fenway Park today



Camden Yards, the retro ballpark that started a movement

meanwhile, helped baseball become a national sport, with teams constructing ballparks that were ever more architecturally ambitious. If the early 20th century proved to be a golden age—the era of Fenway and Wrigley, of Ebbets Field in Brooklyn and Tiger Stadium in Detroit—the postwar period gave birth to those Brutalist concrete donuts: the Oakland Coliseum; Three Rivers Stadium in Pittsburgh; Veterans Stadium in Philadelphia; Busch Memorial Stadium in St. Louis. At least Busch was located in the city, and Edward Durell Stone, the consulting architect, imbued it with some referential flair: mini arches along the roofline that played off Eero Saarinen's St. Louis Arch. Dodger Stadium in Los Angeles, meanwhile, was one of the few midcentury ballparks to become a beloved icon—the place where, as Goldberger writes, "the spirit of the early ballparks met the age of the automobile, and sought to make common cause with it." By and large, however, these concrete venues inspired a numbing banality. "I stand at the plate in Philadelphia," Richie Hebner, a first baseman for the Pirates, said of Veterans Stadium in 1971, "and I honestly don't know whether I'm in Pittsburgh, Cincinnati, St. Louis, or Philly."

An Unlikely Heroine

And then, finally, came the rebirth, both of the city and the ballpark, as the rise of Postmodernism presaged the arrival, in 1992, of Camden Yards in Baltimore, the original retro ballpark designed by HOK Sport. Baseball was still largely in the thrall of uniformity: Only a few years before, then-commissioner Peter Ueberroth had proposed that the major leagues adopt a standardized stadium design, drawn up by the construction firm Bechtel. But Larry Lucchino, the chief executive of the Orioles who had a fondness for Jane Jacobs, had something else in mind, something revolutionary.

Goldberger discovers an unlikely heroine in the story of Camden Yards: Janet Marie Smith. Unlikely because Lucchino, on a whim, had plucked her résumé out of the slush pile and hired her to be his in-house architect, but not before offending her with his first interview question (Which league has the designated hitter?). Smith made it clear that she knew baseball, and to whatever extent she battled sexism in her subsequent career (Goldberger doesn't say), she has become a leading light in ballpark architecture, renovating both Fenway Park and Dodger Stadium, to dazzling effect. It was Smith who served as the Orioles' liaison with HOK Sport, handling the day-to-day details of the project, and helped persuade the firm to discard its initial design, which resembled a spaceship, and instead pursue something sui generis and sensitive to the site. The most significant decision was to incorporate an old eight-story-tall Baltimore and Ohio Railroad brick warehouse into the project, which, as Goldberger writes, "not only [framed] and visually [enclosed] a portion of the outfield, [but] gave the park a sense of connection to Baltimore's

TOP: JOHN F. RILEY/LIBRARY OF CONGRESS; MIDDLE: PETER CONNER; BOTTOM: CAL SPORT MEDIA

WHAT HAPPENED TO VALUE ENGINEERING?

When the concept of value engineering was first conceived in the 1940s, the aim was to find real value through careful analysis of products and components. This was accomplished by either improving performance without increasing cost or reducing cost without sacrificing performance. It was understood that value could only be created if functionality and durability remained the priority.

University of Montana - Missoula, MT
Architect: StudioForma Architects

Today, value engineering in construction has fallen far from its origins, with products being chosen and changed out simply because they are cheaper, many times sacrificing performance and longevity. This new process is no longer about creating actual value. Acknowledging that budget is always a concern, there must still be a better way.

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architectural history and [enhanced] the tie between ballpark and city."

The retro stadium was now the thing, and HOK Sport emerged as the leading purveyor of this throwback genre. Baseball had returned to the city, with one glaring omission: Manhattan. In the 1990s, when the Yankees and Mets were looking to build new ballparks, they both considered a location just west of Pennsylvania Station. But then the backdoor political maneuvering commenced, and today the site is home to Hudson Yards, that towering monument to gilded excess. Imagine instead the masses flocking there for a Yankee game and consider what was lost in the bargain.

Regrettably, the answer may be less than one might imagine, for the latest iteration of ballparks have actually come to resemble Hudson Yards in all its consumerist glory. Teams are now building small villages around their stadiums—theme parks—both to control the immediate urban experience and, of course, through the attendant restaurants, shops, and condos, shake down the fans for even more money. The Battery

The Battery, a "mallpark" that borders Atlanta's SunTrust Park

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at SunTrust Park in Atlanta (the stadium designed by Populous, the surrounding hotels, cinemas, dining, and retail by local firm Wakefield Beasley & Associates) may be the most prominent example.

"[F]rom the moment visitors enter the project until they reach the new home of the Atlanta Braves, they will be immersed in a comprehensive entertainment experience unlike any other in the Southeast," boasts Wakefield Beasley. Goldberger is far less sanguine: "It is a bubble, and like all such bubbles, it has a superficial appeal, but it is disingenuous to claim that it represents something truly urban: it is just too clean and neat for that. SunTrust is a mallpark as much as it is a ballpark."

An Ode to Organic Locatecture

This, more than anything else, becomes Goldberger's animating theme: That the best ballparks are intimately connected to vibrant, public, urban spaces, with all their diversity and unpredictability. The baseball stadium "contains a garden at its heart, and as such it evokes a tension between the rural and the urban that has existed throughout American history," he writes. "In the ballpark, the two sides of the American character—the Jeffersonian impulse toward open space and rural expanse, and the Hamiltonian belief in the city and in industrial infrastructure—are joined, and cannot be torn apart."

One can read Goldberger's book (in part) as an elegy to the jewel boxes from baseball's golden age, an ode to architecture that prioritizes problem-solving over form-making, contextual subtleties over grand gestures. "Most of the best ballparks … are irregular, opportunistic structures, often altered and adjusted over the years to respond to changing market demands and changing urban conditions," he writes. "[They] are better remembered for the world they made within, their magnificent juxtapositions of soft green playing fields and tough, lyrical steel and concrete structures. Ballpark architecture was never about the gravitas of form."

Consider Fenway Park, a "compromise between Man's Euclidean determinations and Nature's

beguiling irregularities," as John Updike famously described it in *The New Yorker*. It was designed in 1911 by a 37-year-old local architect named James McLaughlin, who, as Goldberger notes, "saw architecture as a matter of meeting functional challenges in an aesthetically pleasing but not intellectually challenging way." The shape of the lot meant that Lansdowne Street impinged on left field, which prompted the construction of a large fence—what would later become the Green Monster, the 37-foot-high wall that looms over left field just 310 feet from home plate. The ballpark wasn't celebrated from the start; it wasn't until the Osborn Engineering Co. renovated it in 1934 that the interior was painted its trademark Dartmouth green, helping to unify the various sections of seating that had been added ad hoc over the years.

Fenway's charm grew over time, and the quirks of the field, like the Green Monster, became an advantage for the Red Sox, whose left fielders mastered the angles at which balls caromed off the wall. The ballpark was of its place, gave fans an intimate perspective of the action, and, not least of all—because it served as a repository for sporting history, the site of dramatic moments and legendary players—grew to become that fabled "lyric little bandbox of a ballpark" that Updike championed.

What Fenway and other classic ballparks represent is a kind of organic locatecture, which stands in sharp contrast to so much of what gets built today—not only the moneyed globe-trotting projects but also the insipid office or condo buildings that have spread across our urban landscapes like a visually dulling plague. One thinks of the anonymous corporate mediocrity of Nationals Park in Washington, D.C.—nothing more than "a machine for baseball and for sucking the money out of the pockets of people," as Philip Kennicott, *The Washington Post*'s art and architecture critic, describes it. Even the hallowed temple of Wrigley Field has been hemmed in by the encroachment of sterile and bland development, including a hotel, the Zachary, named after Zachary Taylor Davis, Wrigley's original architect.

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The Rise of the Upscale Bubble

So much of our affection for ballparks is borne of nostalgia, which envelops baseball like a dense morning fog. At its best, the retro movement produced some of the finest ballparks we have today: Oracle in San Francisco, PNC Park in Pittsburgh. At its worst, it perpetuated a stylized fakery: unlike the Fenways and Wrigleys, whose eclectic dimensions were a direct response to the constraints of their urban sites, some retro parks mimicked these dimensions not out of necessity (the lots were plenty large) but to create instantaneous character—a patina in a bottle. Most egregiously, the retro movement traded on baseball's golden past, when ballparks tended to be democratic strongholds that celebrated the diversity of the masses, the raffish everyman, even as it betrayed that democratic past by catering to the corporate class with an embarrassment of posh amenities. Consider the new Yankee Stadium, which has fewer seats than its predecessor but three times the luxury boxes.

Goldberger, no slave to this nostalgia, has clear affection for Miami's Marlins Park, an aggressively modern and self-assured venue that represents a clean break with the past. Designed by Populous and completed in 2012, it resembles a "huge marshmallow," according to Goldberger—"big and gentle and porous." He has but one objection: When the retractable roof is closed, as it often is in Miami's heat and humidity, fans lose their connection to the city, their sense of place.

What Goldberger doesn't much object to is how ballparks have turned into "upscale bubbles." Nor does he mount an impassioned argument against the billionaire owners who have squeezed taxpayers for public financing to build their stadiums. (The construction of the new $2.3 billion-plus Yankee Stadium included $1.1 billion in public money and tax breaks, including $431 million in federal subsidies, according to a 2016 Brookings Institution report, which finds little to recommend the practice: "Academic studies consistently find no discernible positive relationship between sports facility construction and local economic development, income growth, or job creation.")

Goldberger often tends towards the encyclopedic rather than the critical: His narrative can slow to a trot as he unwinds the backstory of yet another stadium, letting his fellow critics pinch hit instead of taking cuts of his own. And then there's the question of the small typos in *Ballpark*, which wouldn't be worth mentioning except for the one spelling of Willie Mays as "Willy," a howler that only serves to undermine Goldberger's baseball bona fides.

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Marlins Park, an aggressively modern stadium with a retractable roof

Still, the book's premise is clever enough—that the ballpark is a revealing lens through which to consider our architectural and urban moment. Witness the current debate over the Oakland Coliseum, a Skidmore, Owings & Merrill–designed donut completed in 1966, long reviled, that has suddenly inspired a belated appreciation now that it could be replaced by a new Bjarke Ingels Group (BIG)–designed venue. In the same way that Brutalism and Postmodernism have enjoyed a recent rediscovery, so too has a newfound nostalgia helped inspire the recognition of the charms of the Coliseum, that most detested of midcentury monoliths. The fact that BIG, in its initial drawings, has recycled various ideas from its previous projects, and the fact that the ballpark's new location, Howard Terminal, along the waterfront, isn't particularly transit-friendly, only increases that affection. In the end, the Coliseum will assuredly be demolished or redeveloped; to construct the new stadium, the Athletics intend to rely on private funding, but they are also courting public subsidies as part of a deal to land the development rights for the Coliseum site, where they plan to build affordable housing, among other things. Will this be a progressive leap forward or another miscalculation by the bay? The next chapter awaits.

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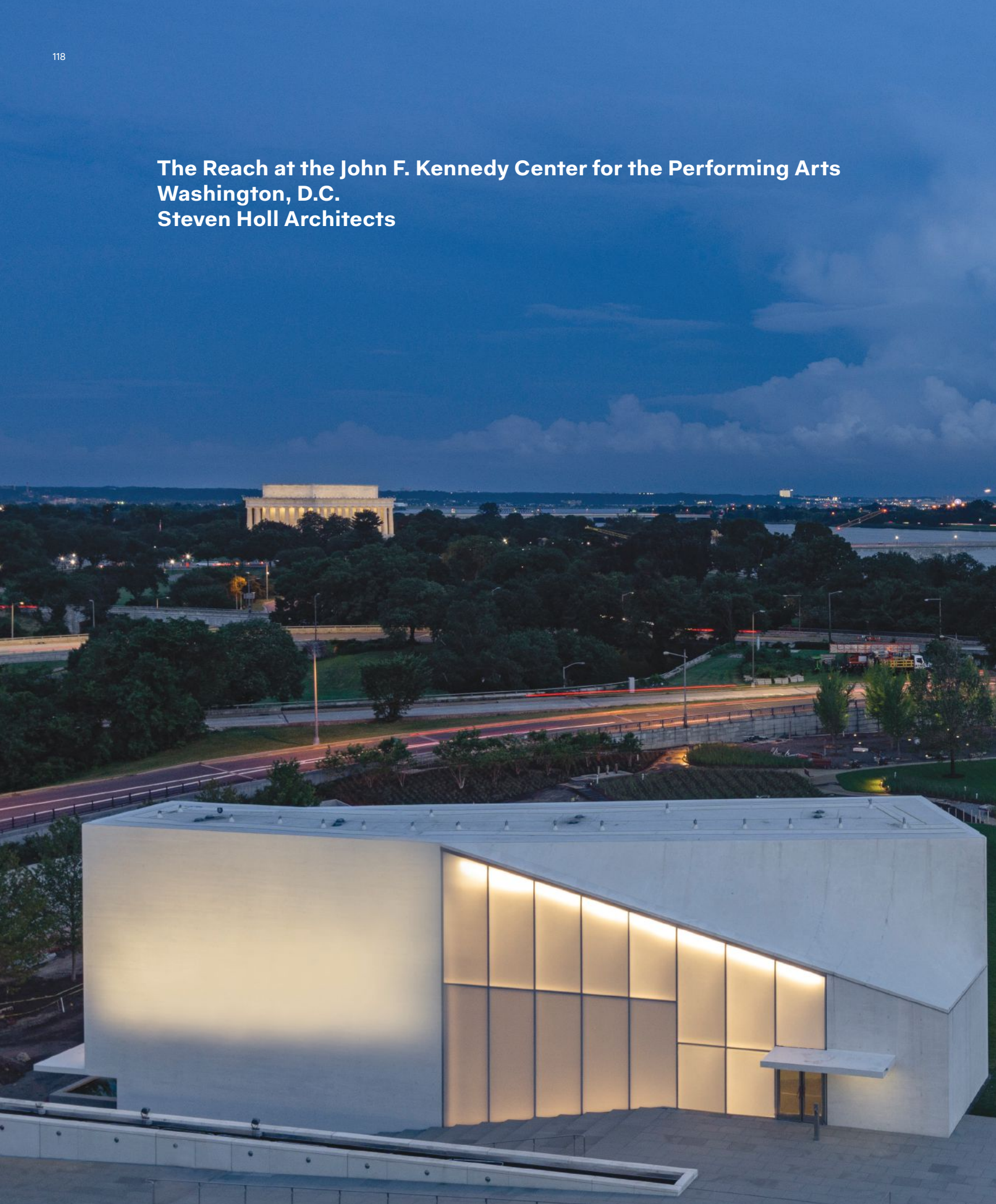
The Reach at the John F. Kennedy Center for the Performing Arts
Washington, D.C.
Steven Holl Architects

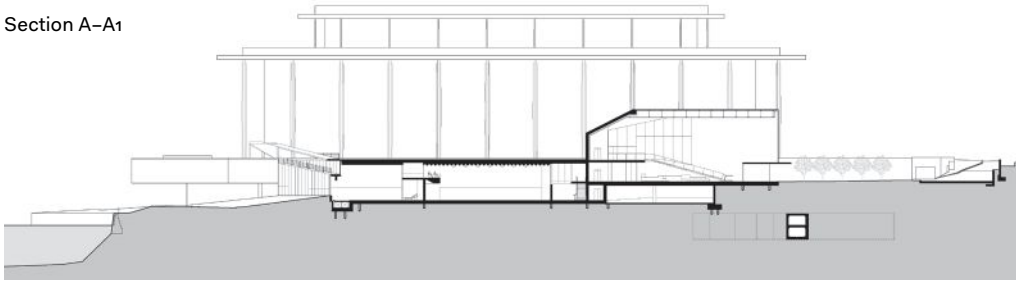


Steven Holl Architects brings Edward Durell Stone's Cold War memorial to the 35th president into the 21st century.

TEXT BY KATIE GERFEN

PHOTOS BY RICHARD BARNES

Section A–A1



There are few architectural commissions as distinctly American, or as distinctly political, as a national presidential memorial in the nation's capital—especially when that memorial is for a personal hero. Steven Holl, FAIA, vividly remembers watching John F. Kennedy's inauguration when he was in junior high, and for him, the opportunity to design The Reach, a 72,000-square-foot expansion of the John F. Kennedy Center for the Performing Arts in Washington, D.C.—which serves not only as a dynamic arts institution, but also as a living memorial to the 35th U.S. president—offered "more than a challenge of architecture," he says. "It's a piece of our history."

The original Kennedy Center was designed by Edward Durell Stone and opened in 1971. The height of New Formalism's Cold War return to classical form and material, it rejected Modernism's industrial steel and glass in favor of bronze and marble (albeit in the form of panels over a steel frame). But the building's formality is not only found in its materials—the experience is one to match.

One does not walk into the Kennedy Center, one processes: From the vehicle drop-off in front of the massive blank façade, visitors move under a dramatically scaled colonnade, through one of two monumental passageways—the Hall of Nations and the Hall of States, both lined with plush red carpet and dozens of flags—and into the 60-foot-tall Grand Foyer, which runs the full breadth of the building. At 630 feet, that's nearly three times longer than the Hall of Mirrors at Versailles. The foyer then funnels people into one of six performance venues.

The only connection with the landscape is through glass doors at the entry and leading from the foyer onto a terrace that overlooks the Potomac River. If there is a feeling that the space evokes in visitors, it is that the space may be grand, but they themselves are all quite small and inconsequential. In political terms, the experience is less democratic than it is imperial.

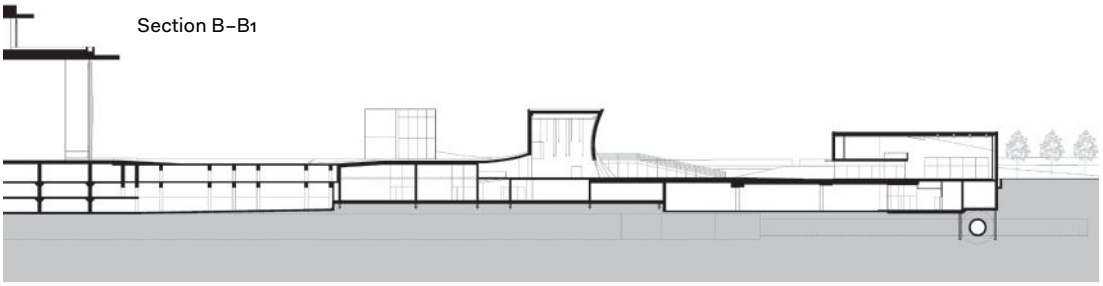
If the original Kennedy Center is a monolith on a hill, The Reach is a series of pavilions in a garden. At first glance, as on approach from Stone's terrace, the annex consists of just three cast-in-place, board-formed concrete shells—forming the Welcome, Skylight, and

Lower-Level Plan

River pavilions—that curve up out of a lawn. The landscape and buildings are so inextricable that the lawn seems to climb the walls with sedum swoops, one of which achieves near verticality on the south wall of the Welcome Pavilion.

"This idea of the landscape turning up is where it started," says Chris McVoy, design architect and partner-in-charge of the project. "It became a whole language of ruled surface geometries, some in landscape, some in white concrete, that echoes across curves to suggest a space." As the pavilions curve toward and away from each other in order to carve out views—a notable sight line between the Welcome and Skylight pavilions to the southeast perfectly

Section B–B1



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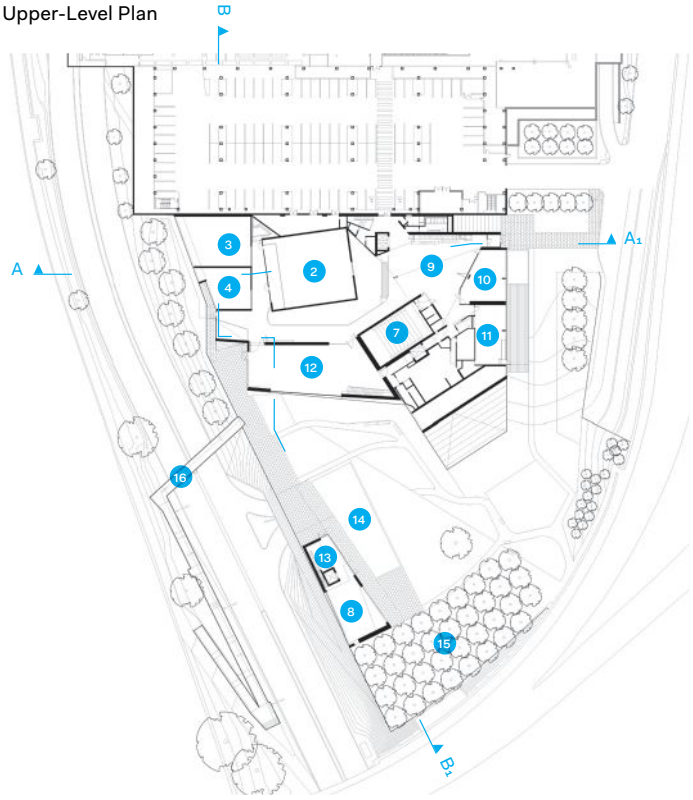
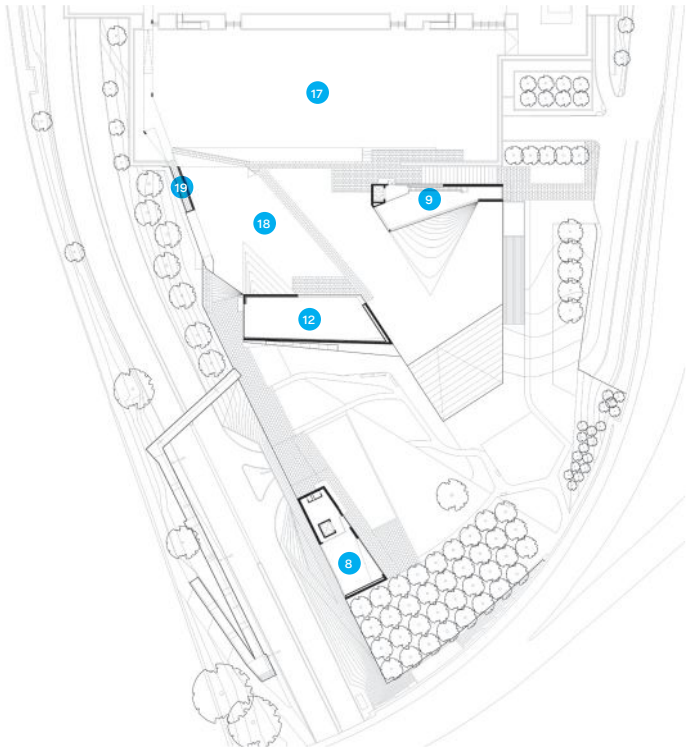
Upper-Level Plan



Terrace-Level Plan



1. Parking entrance
2. Studio K
3. Studio F
4. Studio J
5. Education lounge
6. Studio
7. Justice Forum
8. River Pavilion
9. Welcome Pavilion
10. Boardroom
11. PT-109 classroom
12. Skylight Pavilion
13. Café
14. Reflecting pool
15. Ginkgo grove
16. Pedestrian bridge
17. Upper terrace
18. Simulcast lawn
19. Covered walkway to Stone terrace

0 40 80 N

Previous Spread: The three main pavilions of The Reach as seen from the roof terrace of the Stone building, with the Welcome Pavilion at left, the Skylight Pavilion (with a video projection on its side) at right, and the River Pavilion beyond that. The lawn between the pavilions is actually a green roof that covers additional spaces below.

frames the Washington Monument—the effect is one of an architectural composition formed by intentional absence, rather than volume. "It's a family of forms that are tied to one another," design architect and project architect Garrick Ambrose says. "Each one is unique. They have their own personalities, but they all have the same origins."

It is only when walking down the 4.6-acre slope and looking back, however, that the full scope of the expansion reveals itself: Glazed cuts in the hill offer views into multipurpose performance and rehearsal spaces, classrooms, and lounge areas beneath what turns out to be a 69,000-square-foot green roof. (A further 60,000 square feet of gardens and green space, like the green roof, developed with Hollander Design Landscape Architects, fill out the site, with benches and pathways.) This visual porosity—a direct contrast to Stone's impermeability—is emphasized by at least eight fixed entrances (nine, if one counts the operable window wall connecting the River Pavilion with an adjacent terrace and reflecting pool). Visitors can come and go as they please, at various levels of the site—with or without a ticket to a performance.

What's remarkable about this level of public access is that it almost didn't happen: When it was initially commissioned, The Reach was intended to serve as much-needed rehearsal and back-of-house space, but was not intended to be open to visitors. The arrival of Kennedy Center president Deborah Rutter five years (almost to the day) before the building's opening changed that. "One of the most well-known unfortunate aspects of the Kennedy Center is that we have these monumental marble walls, and when you walk into the building it's as though there's nothing happening here," she says. "Everything already is private and off limits, so why are we creating more of that? We should be working hard to help share our art with more people—not hold them off and away from it."

The combination of porosity and informality is part of an effort to democratize all varieties of the

The new concrete pavilions were cast in place using formwork lined with 4-inch boards. Titanium was added to the concrete mix to help achieve a white that nods to the marble on the Stone building. A grove of 35 ginkgo trees anchors the south end of the site, representing John F. Kennedy as the 35th president of the United States.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Welcome to
the REACH.

Though there are at least seven entrances to The Reach, the main one is at the Welcome Pavilion (top and above), which houses a boardroom and classroom that open to a redwood deck that mimics, in material and length, the PT-109 torpedo patrol boat that Kennedy commanded during World War II. The Welcome Pavilion's double-height main lobby (left) is filled with natural light that diffuses through translucent glass panes above and bounces off the terrazzo floor.

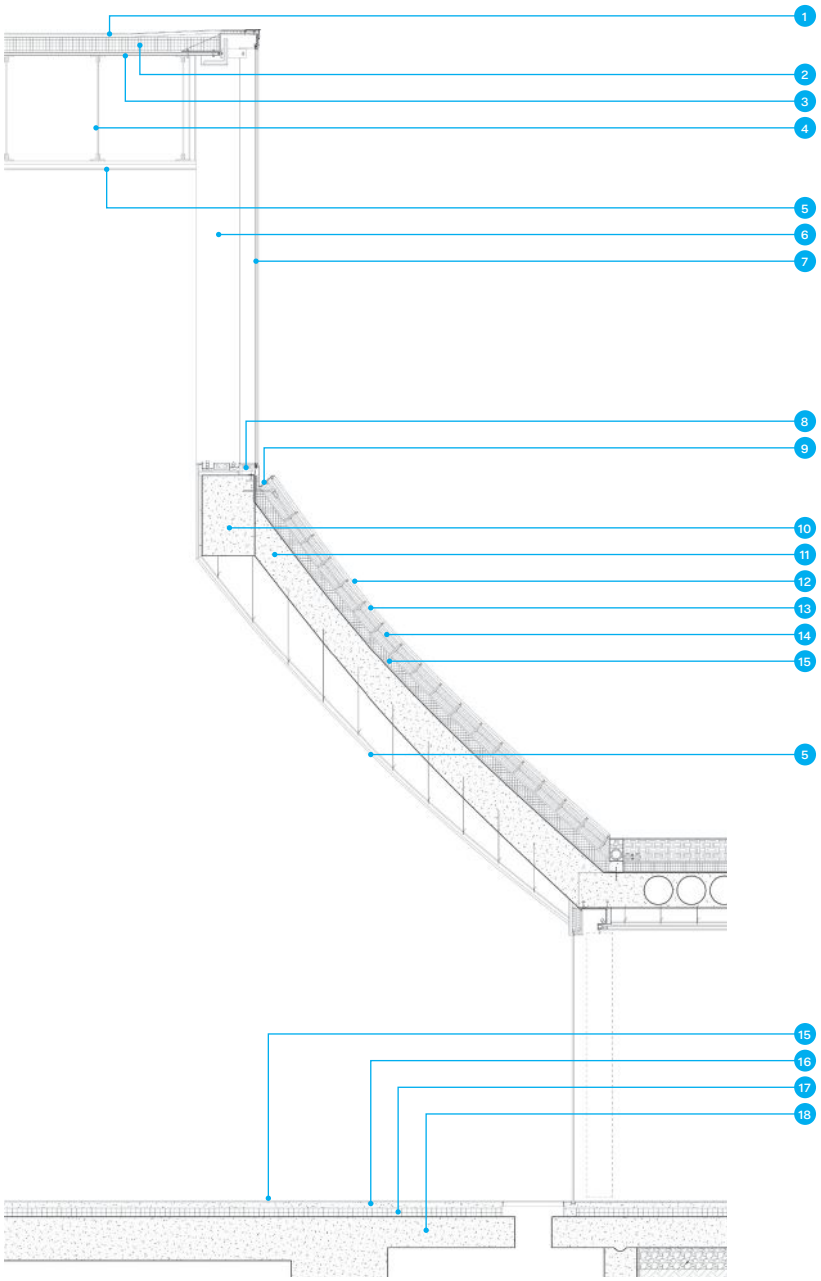
performing arts—and to make them more accessible to a broader, younger audience. The formal venues in the Stone building answer many of the Kennedy Center's needs for large performances, but the facility lacked smaller and more informal venues. Only one theater in The Reach has raked seating, allowing the other five to be more flexible, and making them, in turn, suitable to many different types of performances—from hip-hop shows to dance. "When we were thinking about how to recognize Kennedy's centennial, we focused on what he stood for—the ideals around service, courage, justice, freedom, and gratitude that work so well for us and for artists," Rutter says. "The Reach empowers us to offer the kind of programmatic activity that can really explore this."

The most democratic venue is not inside the building, but upon it: From the lawn, audiences can watch live or recorded video of performances projected onto the side of the Skylight Pavilion. "The idea you can have simulcast projection of the opera on the pavilion and people can see it for free is very democratic," Holl says. "You can charge $500 a seat for those people in the black ties that go to the opera, but this way you can show the public the same event for free. To me, that's what America is about, that's what Kennedy was about, and that's one of the parts of this project that I cherish."

Another contrast with the Stone building is the experience of navigating The Reach at its much more human scale, moving through single-height passages between the pavilions and entering into light-filled double-height spaces within them. "It's the idea of compression and release," Holl says, "and that enhances the spatial feeling as you walk around the building. I think architecture is experienced by the human body moving through the spaces." Despite the fact that so many of The Reach's spaces are technically underground, nearly every space has access to natural

From the south, the glass cuts that reveal the spaces underneath The Reach's green roof become evident. Visitors can access the garden of tall grasses and wildflowers by walking over and down the lawn, developed with Hollander Design Landscape Architects, or by following a path from the Stone building down the west side of the site (at left). From the path, pedestrians can look into lower-level performance and pedestrians rooms.

Welcome Pavilion Wall Section Detail

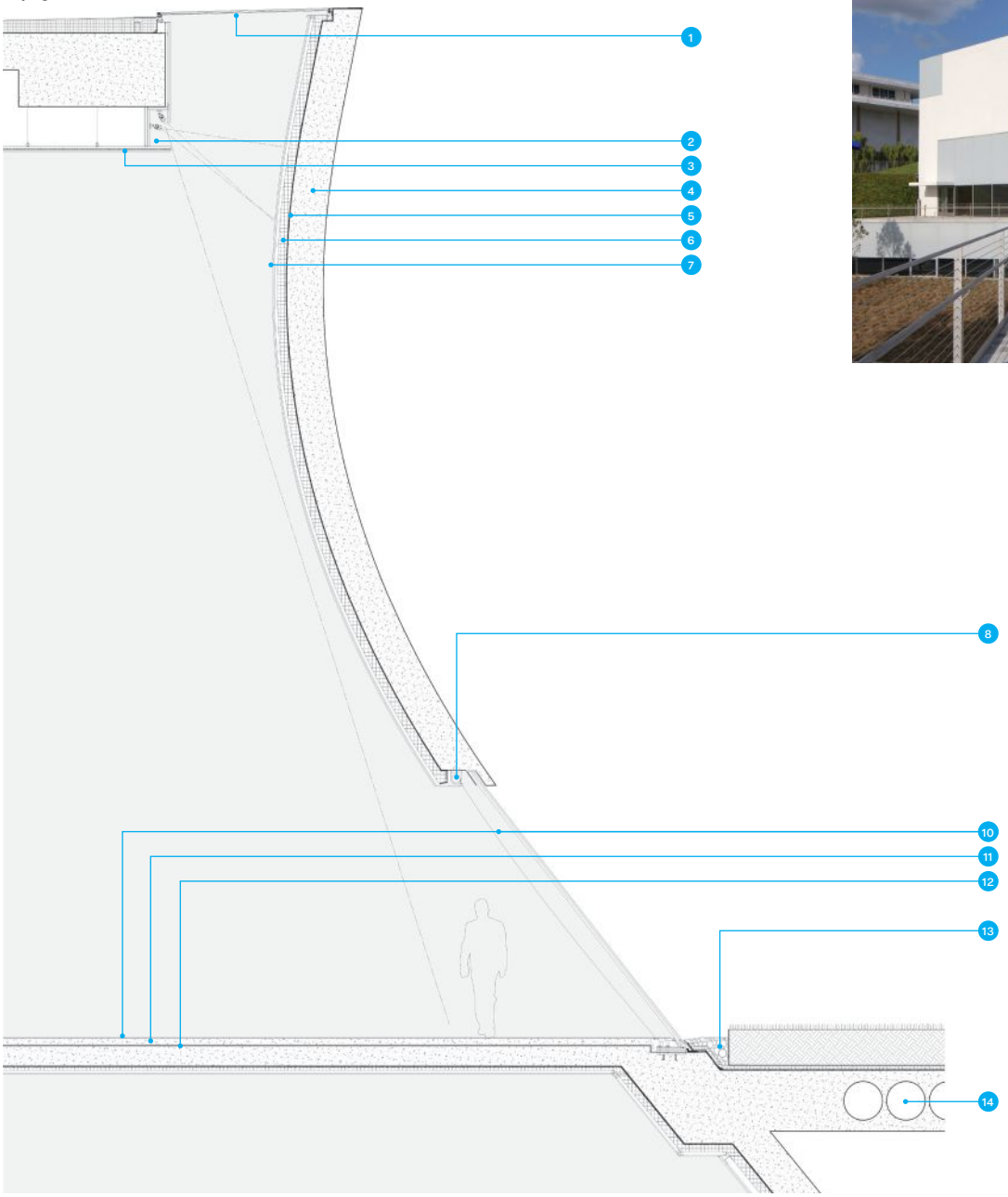


1. TPO roofing membrane
2. Molded-polystyrene holey board
3. Roof deck
4. Steel joists
5. Acoustical plastering system
6. Steel-plate mullion
7. Insulating glass
8. Façade illumination
9. Bead-blasted stainless steel gutter
10. Cast-in-place concrete beam
11. Cast-in-place concrete vault
12. Sedum plant mat
13. Growing media
14. Mineral wool fill
15. Extruded-polystyrene board insulation
16. Thin-set terrazzo
17. Concrete topping slab
18. Cast-in-place concrete slab

0 2 4

On the south face of the Welcome Pavilion, a curving sedum plane carries the lawn up the side of the building, requiring that the plant material be able to grow at a nearly 90-degree vertical.

Skylight Pavilion Wall Section Detail



1. Skylight
2. Light cove for curved wall illumination
3. Acoustical plastering system
4. Cast-in-place board-formed concrete
5. Modified bituminous sheet air barrier
6. Spray polyurethane foam insulation
7. Gypsum veneer plaster
8. Motor-operated shade
9. Insulating laminated glass
10. End-grain cherry flooring
11. Concrete topping slab
12. Hydronic piping
13. Gravel drainage strip
14. Concrete void slab

0 2 4

Most of the glazing in The Reach is achieved with regular insulated glass units. But slumped glass was the only way to achieve the glazing on the double curve of the south wall of the Skylight Pavilion, where the geometry changes so radically that each of the nine panes has a different curve and length.

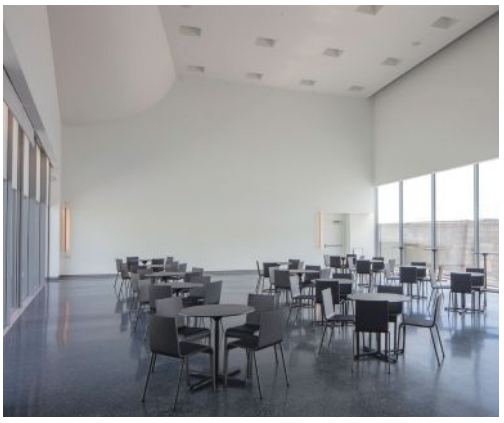
The Skylight Pavilion has an end-grain cherry wood floor under a series of suspended lights that allow it to serve either as a performance venue or as an events space. While the daylight and views are a selling point, custom shades can be deployed to cover all of the glazed surfaces (including the skylight and curved windows) if a performance requires it.

light—via vision glass at ground level or translucent panes above. The framing of views continues deep into the complex as well, with windows in interior rooms that open into other spaces.

Inside the three pavilions, the curves of the structural shells respond to more than just visual aesthetics: While a layer of acoustical plaster over spray-applied insulation does line the surfaces, the geometries of the curves themselves are what tune the sound of the performance spaces. "We've just passed through a period in architecture of Postmodernism and then Deconstruction—neither of those movements paid any attention to structure. My argument is that in architecture, the basic fundamental structure is 20% to 25% of the cost of the building. It ought to play a main role in the meaning of the work."

The Reach also needed to extend the center's cultural mission as a living memorial to Kennedy. "It's about the activities—they have 365 days of activities at the Kennedy Center which are open to the public," Holl says. But the project acts as a living memorial in another way: "Our concept was to merge the architecture with the landscape," he says. "Therefore, it's living again—living on its landscape—and we opened that all out to bring it to the public."

The Kennedy Center's status as a memorial in Washington, D.C., means that it, like Maya Lin's Vietnam Veterans Memorial or Henry Bacon's Lincoln Memorial, embodies Americans' collective cultural memory on a national stage. If Stone's



palatial Cold War fortress was representative of its time, Holl believes that the merging of landscape and architecture speaks to the current one. "One of the great things about the country we live in is the beautiful landscape," he says. "It's central to the American idea of inhabiting the land: The landscape is equal to the architecture."

Despite the inherently political nature of a commission such as The Reach, Holl maintains that the politics of the day shouldn't be the driving force behind design. "Our average building takes eight years from the first sketches until opening—this one took seven," Holl says. "Society changes so many times that all you can hope to do is to raise a building to the ground of experience, of light, of space. Politics will come and go."

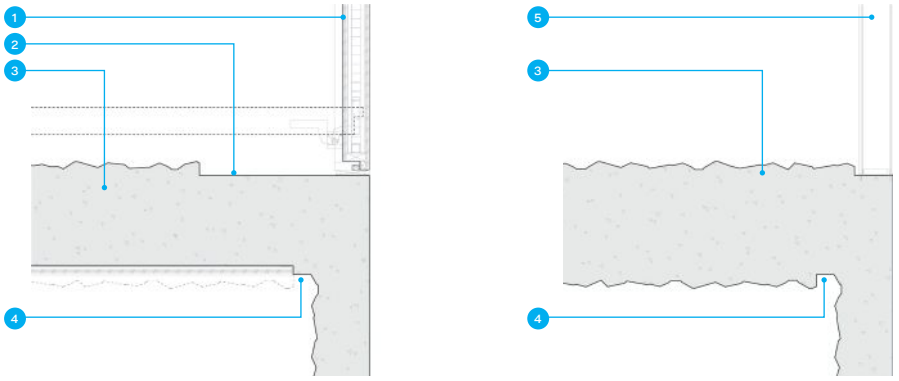
As for how well The Reach will ultimately fulfill the mission to democratize the arts, Holl realizes that it's out of his hands. But he hopes the message of access and integration resonates: "I'm excited about the architectural ideas, but there's another layer of interest and importance. We all should recall how great President Kennedy was and what he had to say about who we are as a culture, who we are as Americans," Holl says. "I think we all need to remember that. I think we are thirsty for positive dimensions, especially the young generations—they have to have something to be hopeful for."

The River Pavilion sits in a landscaped garden at the south end of the site, and houses a café and a performance space (above). An operable window wall can be opened onto a terrace with a reflecting pool that was designed to remain filled through the freeze-thaw cycle.

Studio K is the largest performance space in The Reach. Its dimensions mimic those of the stage of the Opera House in Stone's building, so that the company can rehearse at full scale. The walls are lined with crinkle concrete (a detail appears on the next spread), and the room is topped with a sawtoothed bubble slab, in a vivid blue. An interior window admits daylight from the Welcome Pavilion, to maintain a connection with the outdoors.

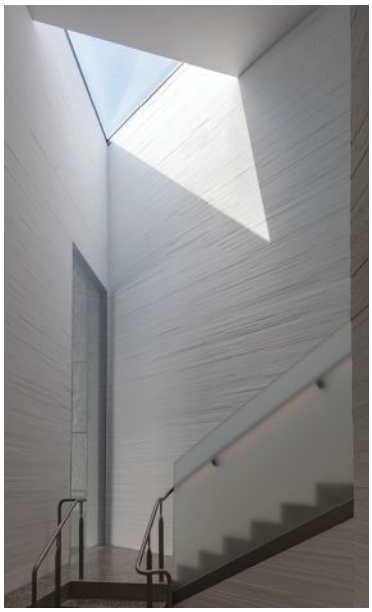
Left: In performance spaces such as the Justice Forum (which is the only space with raked seating), the orthogonal interior walls are covered in what looks like crumpled paper, but is in fact structural concrete with a cast-in texture. Working with an acoustical engineer, the team determined that a varied surface with a 2-inch depth would be optimal. This innovation, dubbed "crinkle concrete," scatters sound waves, tuning the space for a variety of performance types. But because the texture can't meet at right angles like a smooth surface, it required extra corner detailing for the formwork in rooms that feature it on more than one wall.

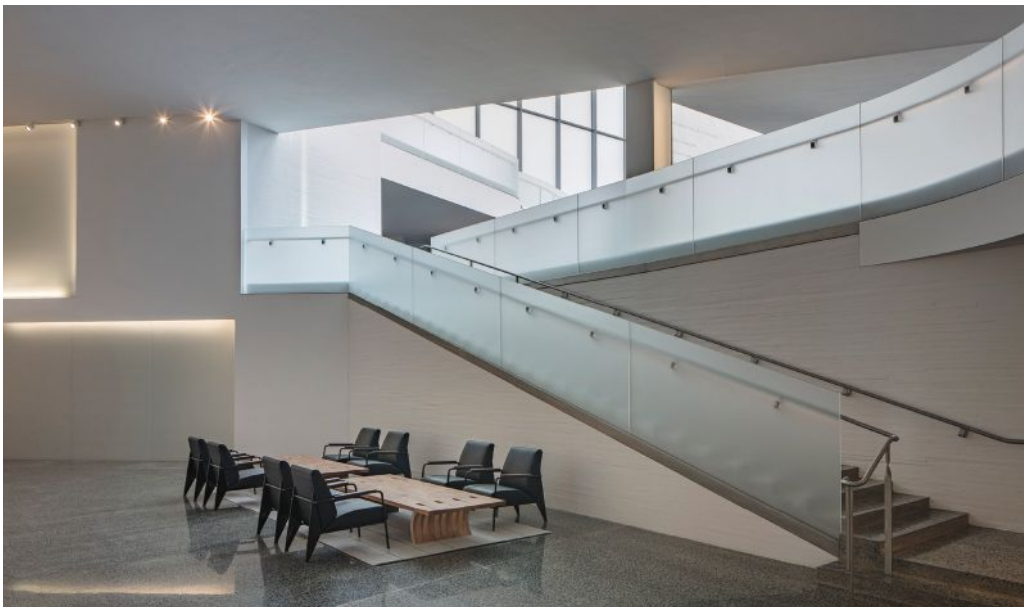
Crinkle Concrete Corner Details



1. Acoustical wood door
2. Board-formed concrete finish
3. Crinkle concrete finish
4. 3" gap for clearance
5. Acoustical glass assembly

Opposite: Crinkle concrete is also used in Studios F, J (shown), and K. To develop the texture, project architect Garrick Ambrose hammered sheets of aluminum in the firm's shop until he crafted one that met the acoustical, and aesthetic, criteria. That single piece was used to create a mold that was repeated across the formwork during construction.

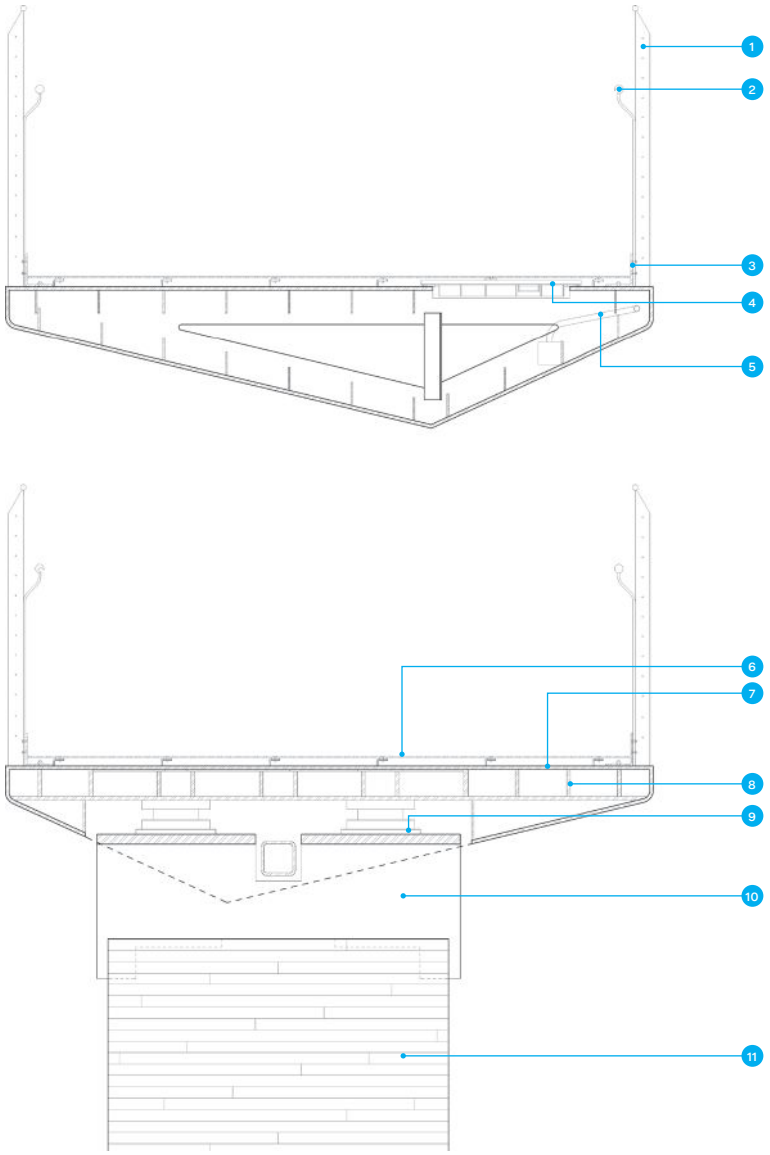




Opposite: The spaces below The Reach's green roof are connected via a series of bridges, hallways, and stairs—like those from the Welcome Pavilion to the lower level (bottom right), and from the upper level to the lower level (bottom left). The latter volume is lit by a skylight embedded in the lawn; the window (at left) opens onto one of the performance spaces. All of the hallways, including the one linking the Welcome and Skylight Pavilions (top), are sized to accommodate the moving of pianos and other instruments for performances.

Left: The architects incorporated informal gathering spaces, such as this lower-level education lounge, wherever possible. Most are outfitted with custom furniture and carpets.

Pedestrian Bridge Section Details



1. Cable rail
2. 1½"-diameter bead-blasted stainless steel illuminated handrail
3. 4" bead-blasted stainless steel toekick
4. 2'-by-2' access hatch
5. Electrical conduit and light ballast
6. ¼"-thick slip-resistant floor plate
7. ⅝"-thick painted bent-steel deck
8. Deck stiffener
9. Guided expansion bearings
10. 4"-thick steel knife plate
11. Board-formed concrete

0 1 2

Project Credits

Project: The Reach, John F. Kennedy Center for the Performing Arts, Washington, D.C.
Client: John F. Kennedy Center for the Performing Arts
Architect: Steven Holl Architects, New York · Steven Holl, FAIA (design architect); Chris McVoy (design architect, partner-in-charge); Garrick Ambrose (design architect, project architect); Magdalena Naydekova, AIA, (assistant project architect); Bell Ying Yi Cai, Kimberley Chew, AIA, J. Leehong Kim, Martin Kropac, Elise Riley, Yun Shi, Dominik Sigg, Jongseo Lee, Alfonso Simelio (project team)
Associate Architects: BNIM
Project Manager: Paratus Group
Construction Manager: The Whiting-Turner Contracting Co.
Structural Engineer: Silman
MEP Engineer: Arup
Civil Engineer: Langan Engineering & Environmental Services
Climate Engineer: Transsolar
Lighting Consultant: L'Observatoire International
Cost Estimator: Stuart Lynn Co.
Code Consultant: Protection Engineering Group
Façade Consultant: Thornton Tomasetti
Landscape Architect: Hollander Design Landscape Architects
Traffic/Parking: Gorove Slade Associates
Food Service Consultant: JGL Food Service Consultants
Regulatory Consultant: Stantec
Acoustic/AV/IT/Security Consultant: Harvey Marshall Berling Associates
Pre-Construction Manager: James G. Davis Construction Corp.
Vertical Transportation Consultant: Vertran
Concrete Consultant: Reg Hough Associates
Size: 72,000 square feet (building); 130,000 square feet (gardens/green space)
Cost: $175 million

A design goal for The Reach was to strengthen the physical connections between the Kennedy Center and the rest of Washington, D.C. A key piece of that is a pedestrian bridge that connects the River Pavilion to the Potomac River, conveying pedestrians safely across the highway to a network of riverside running paths.

An aerial view of The Reach from the west places it in the context of other presidential memorials in Washington, D.C., such as the Washington Monument, the Lincoln Memorial, and the Thomas Jefferson Memorial.

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2. Publication Number: 1055-3444
3. Filing Date: 9/23/19
4. Issue of Frequency: Monthly
5. Number of Issues Published Annually: 12
6. Annual Subscription Price: 59
7. Complete Mailing Address of Known Office of Publication (Not Printer): Hanley Wood Media, Inc., 1152 15th St. NW Suite 750, Washington, DC 20005-1873
8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not Printer): Hanley Wood Media, Inc., 1152 15th St. NW Suite 750, Washington, DC 20005-1873
9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Senior Editor - Publisher: Ron Spink, 1152 15th St. NW Suite 750, Washington, DC 20005-1873; Editor: Ned Cramer, 1152 15th St. NW Suite 750, Washington, DC 20005-1873; Managing Editor: Greig O'Brien, 1152 15th St. NW Suite 750, Washington, DC 20005-1873
10. Owner - Full name: Hanley Wood Media, Inc.;HW Holdco, LLC;,1152 15th St. NW, Suite 750, Washington, DC 20005-1873
11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages or Other Securities: None
13. Publication Title: ARCHITECT
14. Issue Date for Circulation Data Below: September 2019

15. Extent and Nature of Circulation	Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies (Net press run)	81,267	80,970
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(3) Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Paid or Requested Distribution Outside USPS ®	2,493	2,509
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17. Publication of Statement of Ownership for a Requester Publication is required and will be printed in the October 2019 issue of this publication.
18. I certify that all information furnished on this form is true and complete. Signature and title of Editor, Publisher, Business Manager, or Owner - Ron Spink, Executive Vice President, Build/Design Group, 9/23/19

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Editorial: Put This Magazine to Work

Has any other profession embraced sustainability the way architecture has? Since the salad days of the green movement in the 1960s, an ever-growing number of architects has assiduously steered building techniques, public policy, and industry partners such as developers and product manufacturers in a more environmentally healthy direction. A profession long preoccupied with image began dedicating significant resources to enhancing building performance and resilience, and as a result can point to remarkable advances such as net-zero technologies and passive house standards. Now a third imperative is coming to the fore in the effort to mitigate climate change: embodied carbon.

Architects should naturally address all three, whenever possible. Resilience helps communities withstand extreme weather conditions and other calamities that are growing in frequency due to global warming. Improved performance reduces resource consumption as well as carbon emissions from day-to-day building operations, which amount to 28% of total global emissions according to advocacy group Architecture 2030. Embodied carbon, for its part, constitutes the emissions that result from construction and the manufacture of building products, which the nonprofit calculates as 11% of the global total.

Given high levels of development occurring worldwide, particularly in China, Architecture 2030 anticipates that by midcentury, if we carry on as usual, emissions from construction and related manufacturing will have grown to nearly equal those from building operations. The organization's founder, Ed Mazria, FAIA, is determined to prevent that from happening, and sees embodied carbon as the profession's new frontier in climate-change mitigation. In support, ARCHITECT has invited Mazria to guest edit our January 2020 issue and is collaborating with Architecture 2030 on a major conference on embodied carbon this coming March 2–4 in Los Angeles.

AIA clearly signaled its position with the adoption of the Resolution for Urgent and Sustained Climate Action at this year's national conference, and also is issuing a renewed call for firms to join the 2030 Commitment (page 72), testifying before Congress about the need for code reform, and embarking on numerous related efforts. Last month, AIA Large Firm Roundtable joined ARCHITECT and Architecture 2030 in hosting a leadership summit in Chicago, where Mazria and others made the case for tackling embodied carbon. I used my allotted time at the podium to ask attendees how the magazine can help moving forward.

Now I'm asking you as well. It seems imperative that ARCHITECT—by which I mean not only the print publication but also the newsletters, website, in-person events, continuing education offerings, and social media accounts—do everything possible to support the profession as it combats climate change. But what does that look like? More specifically, what do you need? Project case studies? Product comparisons? A peer-to-peer discussion forum? (We're also eager to know what other issues you prioritize: Equity? Business growth? New technology?) To that end, in the coming months, we'll invite you to take one or more surveys about our editorial future. Please make the time to participate, and help steer ARCHITECT in the best direction for you, the profession, society, and the planet.

STEPHEN VOSS

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