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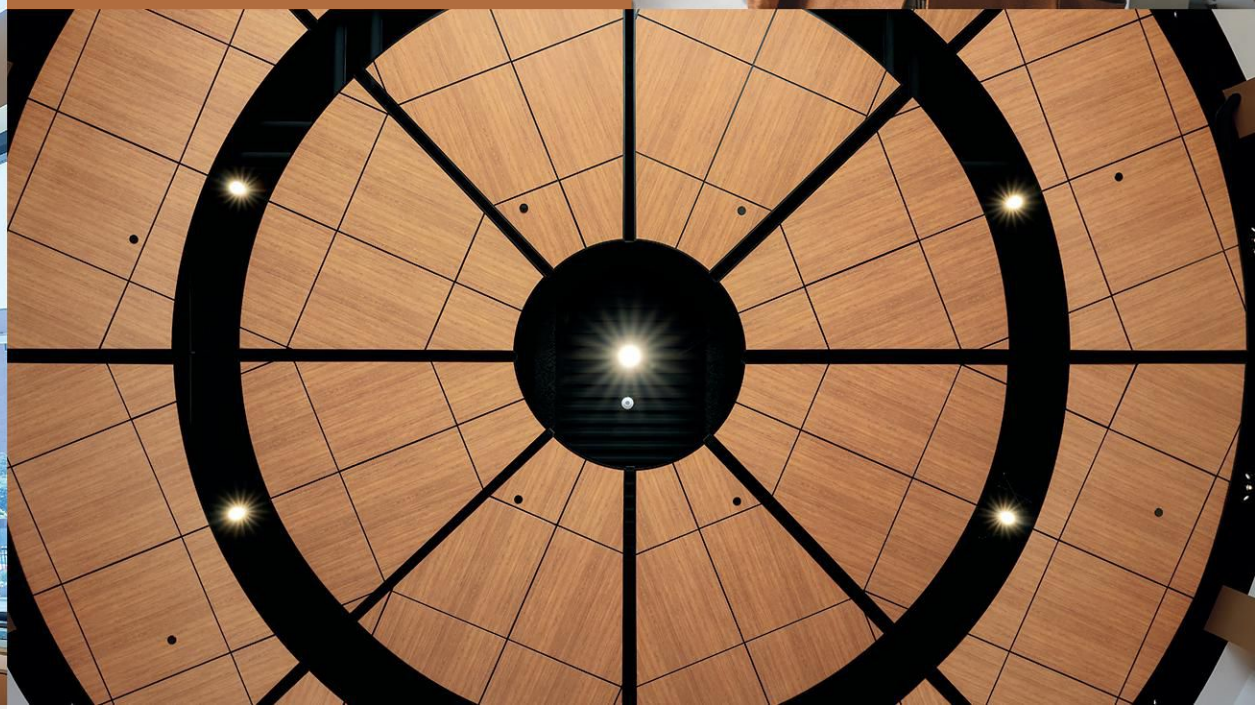

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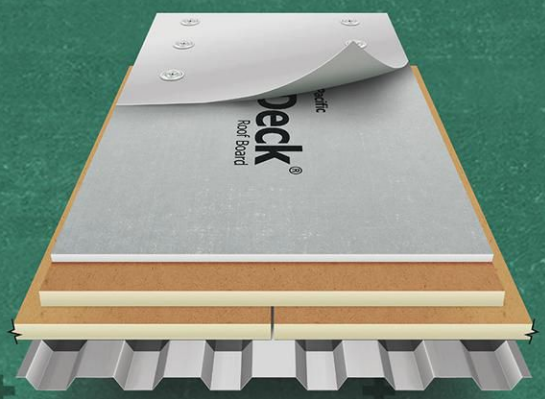

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Georgia-Pacific DensDeck® Roof Board
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HD ISO

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✓ **Per ASTM E136**	**NONCOMBUSTIBLE** Noncombustible materials are more fire resistant.	✗
✓ **DensDeck® StormX™ Prime Roof Board**	**FM APPROVED FOR VERY SEVERE HAIL (VSH)** VSH starts at 2 inches but may exceed 4 inches in diameter.	✗

All you need is to glance at the comparison chart to see how DensDeck® Roof Boards outperform riskier options like HD ISO. HD ISO has it's place—it's made from high-density foam insulation, so it's lightweight, easy to handle, and has a good R-value. But if a resilient rooftop that's meant to last is part of your design intent, HD ISO can't provide the rigid cover board protection you need.

MORE SUPPORT FOR HEAVY EQUIPMENT INSTALLATIONS

Today, nearly all commercial rooftops have some sort of equipment installed, from HVAC units to solar equipment. Looking forward, the U.S. solar industry is expected to triple in size by 2028.[1] The weight of these installations, plus the threat of dropped tools and heavy foot traffic during maintenance, can damage a roof without adequate support. And, if the roof and the solar panels have a similar lifespan, you'll help building owners avoid the cost of panel removal and reinstallation during re-roof jobs.

DensDeck Roof Boards provide a rigid substrate for weighty rooftop installations and offer enhanced puncture resistance. They have 8 to 11 times greater compressive strength than HD ISO. The higher flexural strength of DensDeck Roof Boards can also increase flute-span capability while guarding against punctures and insulation compression. Both benefits can help extend the life of your commercial roof.

BETTER PROTECTION FROM EXTREME WEATHER

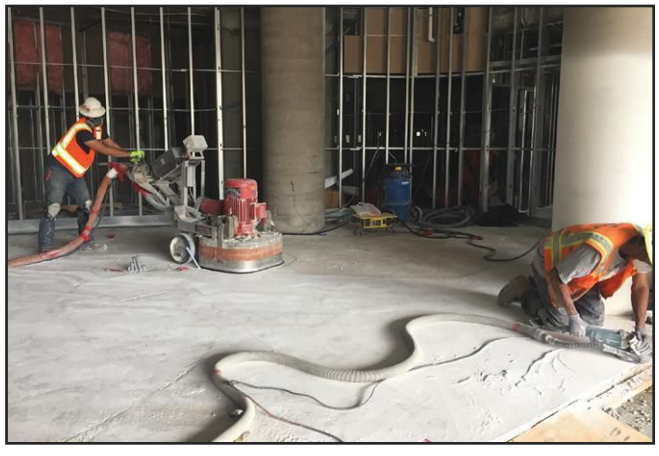
One of the most unpredictable risks to roofing systems is the increase in severe weather events across the country. DensDeck Roof Boards have enhanced strength and a superior bonding surface to help protect against wind uplift during rough weather. This can help guard against membrane delamination and fastener withdrawal. HD ISO's lightweight foam can't provide the same level of flexural strength and wind uplift resistance.

For even more protection against extreme weather, DensDeck® StormX™ Prime Roof Board has increased density and is FM classified for Very Severe Hail (VSH) in approved single-ply assemblies.[2] HD ISO is not approved for VSH.

GREATER FIRE RESISTANCE

Fire is always a risk to commercial low-slope rooftops. It can spread quickly from nearby buildings or vegetation—it just takes one burning ember and the right conditions. If your rooftop could have solar panels installed, there also is an increased fire risk from the electricity they produce. That's why it's smart to choose fire-resistant materials. DensDeck Roof Boards are noncombustible per ASTM E136. Their gypsum core and fiberglass mat facers help to mitigate the risk of rooftop fire damage from every direction. HD ISO is combustible—it's made of foam insulation that will smolder and burn under certain conditions. Make sure you're specifying the right materials for your design intent. See how the two cover boards compare in fire tests at DensDeck.com/Risky.

[1] https://www.seia.org/research-resources/solar-market-insight-report-q2-2023#:~:text=Over%20the%20course%20of%20ourof%20year%2Dend%202022
[2] Consult RoofNav for FM-approved and VSH assemblies with DensDeck StormX Prime Roof Board.



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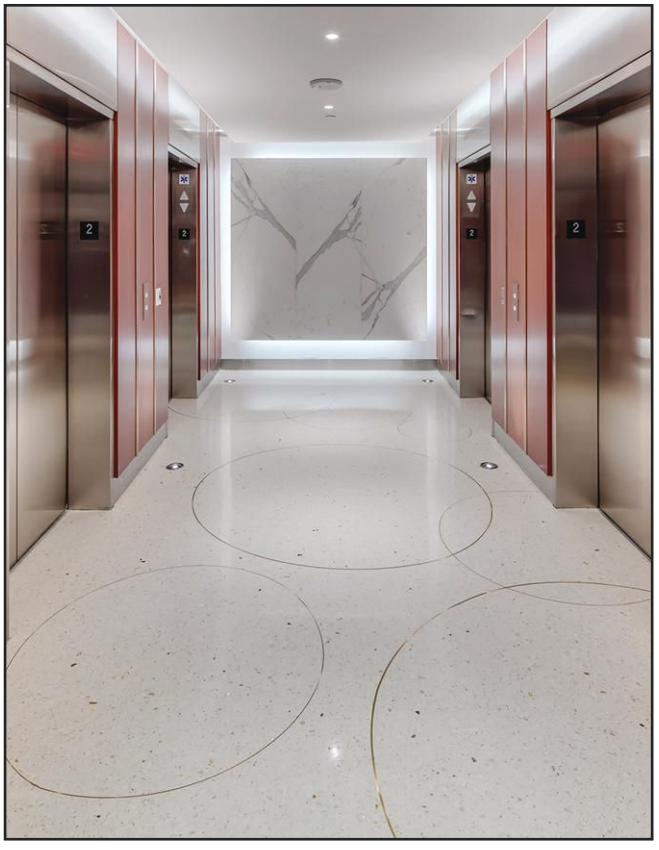

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San Diego
California

Architect
Kohn Pedersen Fox
Associates PC
New York, NY

Photographer
Nathan Padilla Bowen

General Contractor/ Owner
Bosa Development
California, Inc.
San Diego, CA

Architectural Record

EDITOR IN CHIEF	Josephine Minutillo, *minutilloj@bnpmedia.com*
DEPUTY EDITOR	Joann Gonchar, FAIA, LEED AP, *goncharj@bnpmedia.com*
MANAGING EDITOR	Leopoldo Villardi, *villardil@bnpmedia.com*
SENIOR NEWS/DIGITAL EDITOR	Matt Hickman, *hickmanm@bnpmedia.com*
SPECIAL SECTIONS EDITOR	Matthew Marani, *maranim@bnpmedia.com*
ASSISTANT EDITOR	Pansy Schulman, *schulmanp@bnpmedia.com*
COPY EDITOR	Anna Shapiro
ART DIRECTOR	Michael T. Powell, *powellm@bnpmedia.com*
ASSISTANT ART DIRECTOR	Sarah Wojno, *wojnos@bnpmedia.com*
CONTRIBUTING ILLUSTRATOR, PRESENTATION DRAWINGS	Peter Coe
EDITOR AT LARGE	Molly Heintz, *heintzm@bnpmedia.com*
CONTRIBUTING EDITORS	Sarah Amelar, Beth Broome, James Gauer, Blair Kamin, Izzy Kornblatt, Katharine Logan, Cathleen McGuigan, Clifford A. Pearson, Naomi Pollock, FAIA, James Russell, FAIA Emeritus, David Sokol, Suzanne Stephens
INTERNATIONAL CORRESPONDENTS	Tim Abrahams, Andrew Ayers, Aric Chen, David Cohn, Chris Foges
CONTRIBUTING PHOTOGRAPHERS	Iwan Baan, Roland Halbe

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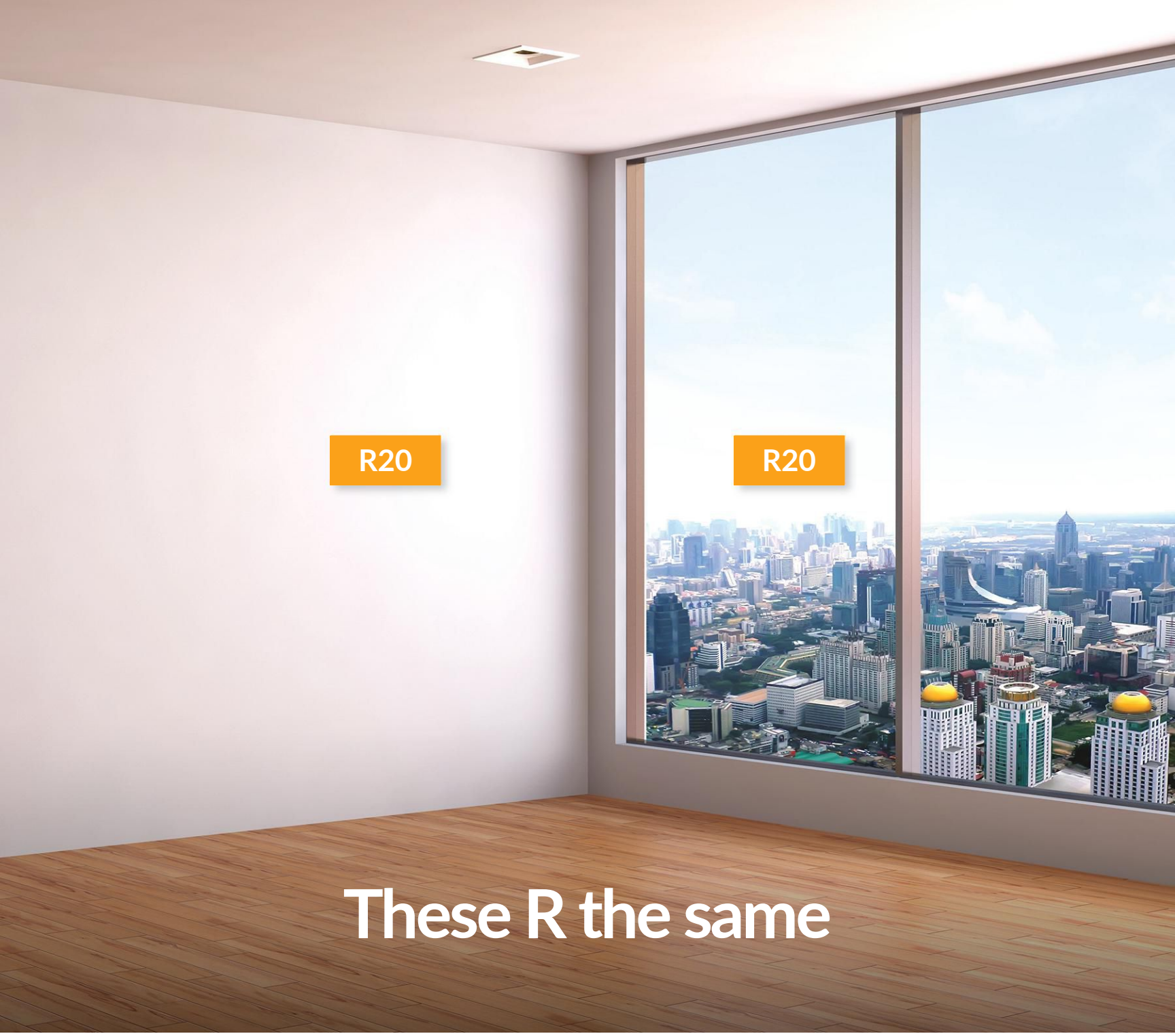

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Joseph Sosnowski
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(503) 200-9280, *bryce@maddenandassociates.net*
WI, MN, IA, IL, MO, MS, NE, FL, GA, SC, AL, KS, INTERNATIONAL:
Chris Wilson
(248) 819-0751, *wilsonc@bnpmedia.com*

WORKFORCE/RECRUITMENT: Diane Soister
(646) 849-7137, Fax: (248) 502-2046, *soisterd@bnpmedia.com*

PRODUCTION MANAGER: Kristen Carpenter
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CONTINUING EDUCATION
CONTINUING-EDUCATION GROUP MANAGER
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GROWTH MARKETING
HEAD OF GROWTH MARKETING
Brandon Decker, *deckerb@bnpmedia.com*
ASSOCIATE DIRECTOR, SUBSCRIBER RETENTION & MONETIZATION
Teresa Owens, *owenst@bnpmedia.com*
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OPERATIONS MANAGER
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FOR THIS ISSUE, which coincides with RECORD's annual Innovation Conference, we included a little bit of everything—a museum, an airport, an aquarium, a housing project, a house, an office building, a collection of schools, and a pair of performance spaces. Needless to say, designing for such a rich variety of building types presents architects with countless challenges but also invites opportunity for inventive solutions, in many cases awe-inspiring ones.

Yet, so often these days, the completed building is met with a certain skepticism rather than congratulations, from both within the profession and those outside of it. Was the building necessary, socially and economically? What is its carbon footprint? Is it accessible? Does it equitably serve its users and the public? Is the architect still a person admired as a role model? In questioning the worth of a building, at times we lose an appreciation of architecture itself.

RECORD has celebrated architecture for 133 years, and we're not about to stop. Let's face it: despite the construction industry's heavy carbon footprint, people won't stop building, either. So, as RECORD always has, we highlight the achievement of architects who deal with the intense complexity of getting something built and getting it done right. And, sometimes, we point out where things could have gone better.

Our cover project this month, the expansion of the main terminal at Portland, Oregon's international airport by ZGF, sets the standard for a different kind of travel experience. Sunbeams filter through expansive skylights to grace PDX's warm, tree-filled wood interiors. The airport invites those frantically moving through it to stop for a moment and take in its grand spaces, unexpected and unprecedented as they are in the U.S., but also so connected to its place. PDX heralds a new era for civic-scale mass-timber construction, as managing editor Leopoldo Villardi, who flew in and out of that Pacific Northwest hub this summer, aptly points out.

Innovation does not only happen at a large scale. A slight twist can completely change the experience of even a small space. In our House of the Month in Toronto, by 2022 Design Vanguard firm JA Architecture Studio, an angled staircase transforms the structure's long, narrow floor plan from a series of boxes into "something special," as its architect says. Moreover, the city's recently legalized "laneway suite" typology, of which this combined townhouse and ADU is part, gestures at a larger discourse in planning and urban design, with the potential to transform that Canadian metropolis's low-rise residential neighborhoods, as Alex Bozikovic, architecture critic for *The Globe and Mail*, writes.

That Toronto's *Globe and Mail* still has an architecture critic is a thing to be praised, as fewer and fewer newspapers, in the United States especially, retain one. In Chicago, that most architecture-friendly of cities, a critic who retired from the *Chicago Tribune*, Blair Kamin, whose post was left vacant for several years, recently established a three-year grant for a freelance architectural columnist, Edward Keegan, to continue at the newspaper. It was made possible through a fiscal sponsor, the Journalism Funding Partners in Sacramento. This is the first architecture critic the nonprofit organization has supported. While it provides an example for others to follow, it's unfortunate that a philanthropic measure was needed to maintain discussions about architecture and planning in newsprint. RECORD's reach to a mainly professional audience implies that our readers already have a great love of architecture. But if the general public were to engage more with architecture and the discourse around it, they too would learn to appreciate the beauty, complexity, history, and innovation that make up the built environment.

Josephine Minutillo, Editor in Chief

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A COMBINED TOWNHOUSE AND ADU, WEST OF TORONTO'S DOWNTOWN, RECAST THE VICTORIAN VERNACULAR. **BY ALEX BOZIKOVIC**

THE "BAY-AND-GABLE" house is a staple of Toronto architecture. The city's 19th-century neighborhoods are filled with such dwellings—long and skinny, often joined into pairs or rows—whose fronts are gussied up with polygonal bay windows and steep, Gothic-style gables.

JA Architecture Studio, which occupies an old house in the city's Queen West neighborhood, has drawn on this tradition to build a series of nearby house-and-accessory-dwelling-unit combinations that blend parametrically inspired formal explorations with Victorian frippery. The 2022 Design Vanguard firm recently completed 44 Foxley, a three-story house, with a basement suite and ADU facing a back alley, that continues this dialogue.

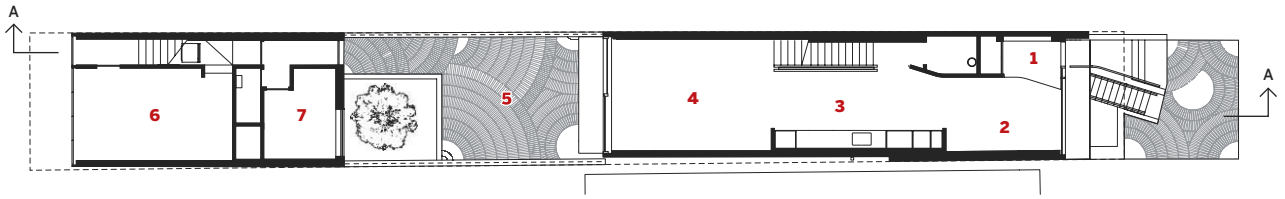
Designed on spec for a builder client, 44 Foxley supports a variety of family or rental arrangements, says JA principal and landscape designer Behnaz Assadi. The main house, less than 16 feet wide, forms part of a row. Atop its south-facing front facade, clad in striated courses of concrete brick, a rectangular bay window transitions as it rises into an arched dormer. Below, a stair descends leftward to a basement studio apartment. To the right, a wedge-shaped stoop ascends to a triple sliding door that lets light deep into an all-white enfilade of dining, kitchen, and living rooms. The interior employs a simple palette of white drywall and white oak flooring, materials that don't distract from the house's spatial qualities.

PHOTOGRAPHY: © FÉLIX MICHAUD

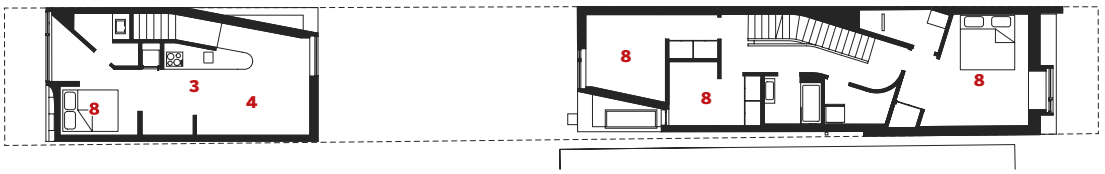
Here, in the middle of the plan, comes a crucial twist: the stair leading up to the second and third floors, rather than running lengthwise, is twisted 15 degrees off axis. "The engine behind the form of the house is right there, in that strange angle," says JA principal Nima Javidi, who leads the firm alongside Assadi. "That protruding volume transforms the whole space from a series of boxes into something special."

Curvilinear geometries appear outside, as with the arched dormer (above), and inside, with vaulted ceilings (left).

At 44 Foxley, a measured approach extends the spatial logic of the bay-and-gable, where narrow rooms typically form a tight circle around a central stair and lightwell. In JA's variation, three bedrooms and two bathrooms, typical ingredients, are twisted out of shape on the second floor by the diagonal stair. An en suite bathroom occupies the wedge between the stair and the party wall. At the opposite corner, a similarly shaped void introduces light while offering views of the courtyard.

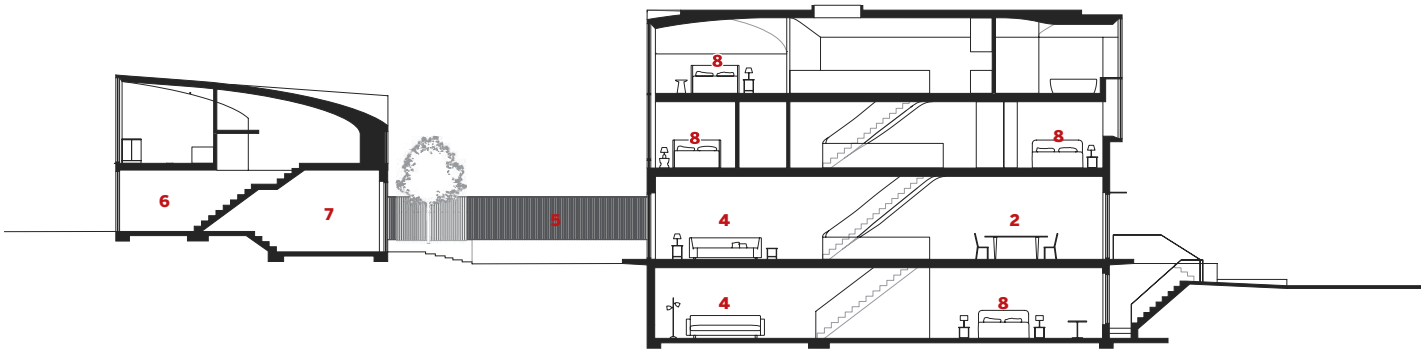


GROUND-FLOOR PLAN



SECOND-FLOOR PLAN

1 ENTRY
2 DINING
3 KITCHEN
4 LIVING
5 COURT
6 GARAGE
7 STUDY
8 BEDROOM



SECTION A - A

All the geometric exertion pays off on the third floor, home to the primary-bedroom suite. Here, the stair creates a diagonal axis through the plan, connecting the arched bay window at the front southwest corner to a wider vaulted ceiling that tops the back bedroom. Diagonal sight lines stretch the space out to the horizon, skylights above open up the room to the heavens, and the modestly scaled room vibrates with possibility.

For JA, this moment is exemplary. "Playing with form in architecture can change the relationship between rooms in a meaningful way," Javidi says. "How you shave something, how you slightly tilt something, makes an impact on the experience of space." Here Javidi acknowledges the influence of Preston Scott Cohen, a studio instructor of his.

From the back of the house, the half-circle of the main house's barrel vault is echoed in a quarter-round window on the accessory building, which extends backward into a tapered roof. "There is a common formal language across the entire project," Javidi says, "but it is not about one figure in itself; it is about the relationships."

In a way, the project gestures at a larger discourse in planning and urban design. Toronto, like several other North American cities, is exploring modest possibilities for intensifying its low-rise residential neighborhoods. The secondary dwelling at 44 Foxley is an expression of this recently legalized "laneway suite" typology.

The space in between, however, is not a backyard but a courtyard. Here Assadi has arranged gray concrete bricks (the same ones used on the facades) as pavers laid in a pattern of intersecting circles. The gaps between the stones are filled in with green stripes of groundcover. Neither hard nor soft but something in between, this ground plane gestures at new urban relationships that Victorian Toronto could not have imagined.

Alex Bozikovic is the architecture critic for The Globe and Mail *and author of* Toronto Architecture: A City Guide.

Credits

ARCHITECT: JA Architecture Studio — Nima Javidi, Behnaz Assadi, partners; Kyle O'Brien, Kaveh Taherizadeh, Shamim Khedri, Quping Li, Larissa Ho, project team

ENGINEERS: Sepco (structural); Eden (shoring)

CONSULTANT: Enocan (HVAC)

GENERAL CONTRACTOR: Houyan Homes and Graystone Development

CLIENT: Houyan Homes

SIZE: 3,095 square feet

COST: $2.5 million

COMPLETION DATE: January 2023

Sources

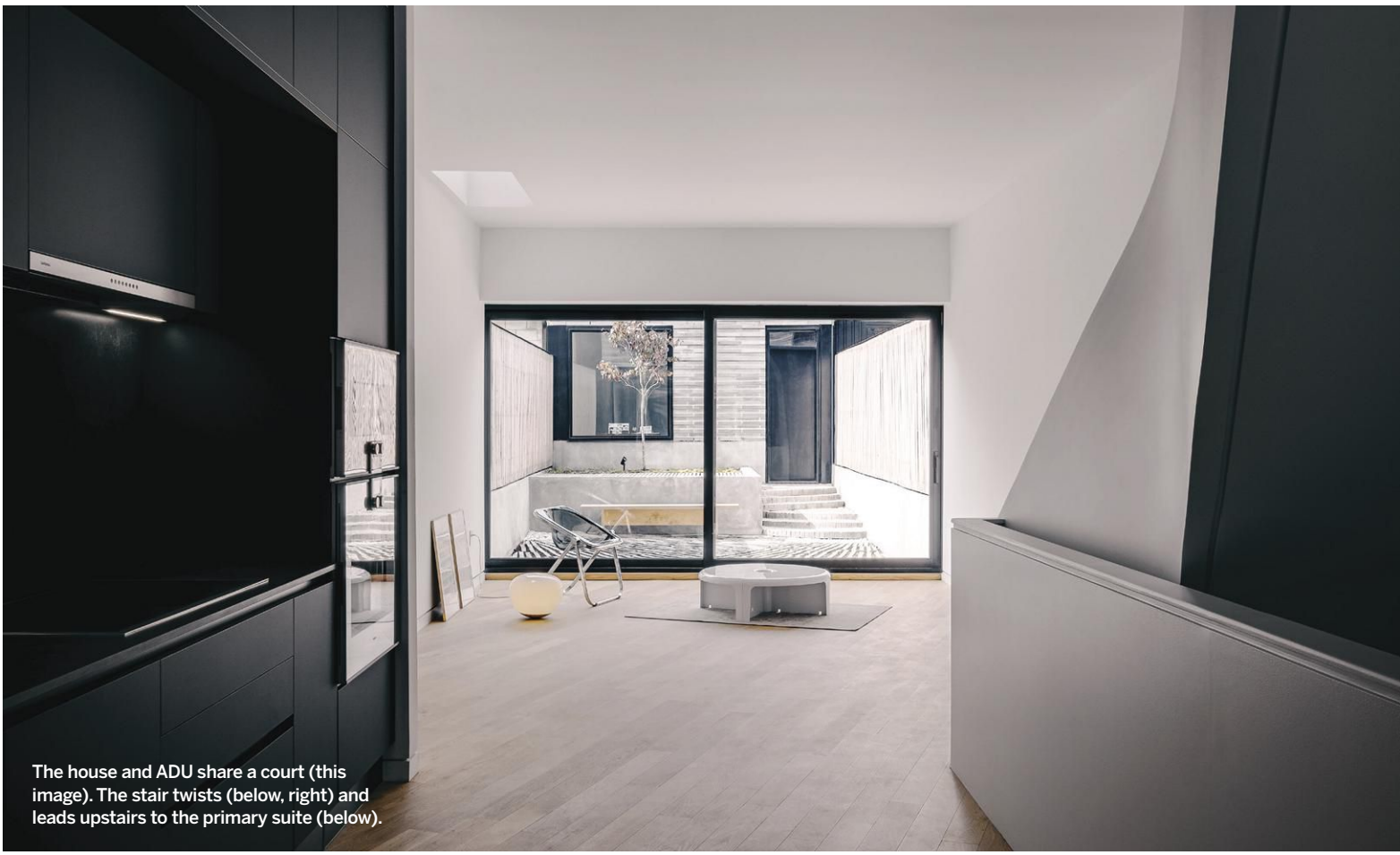
CLADDING: Shouldice (brick); Agway (metal)

GLAZING: Kingshore, Ph Tech (windows); Velux (skylights)

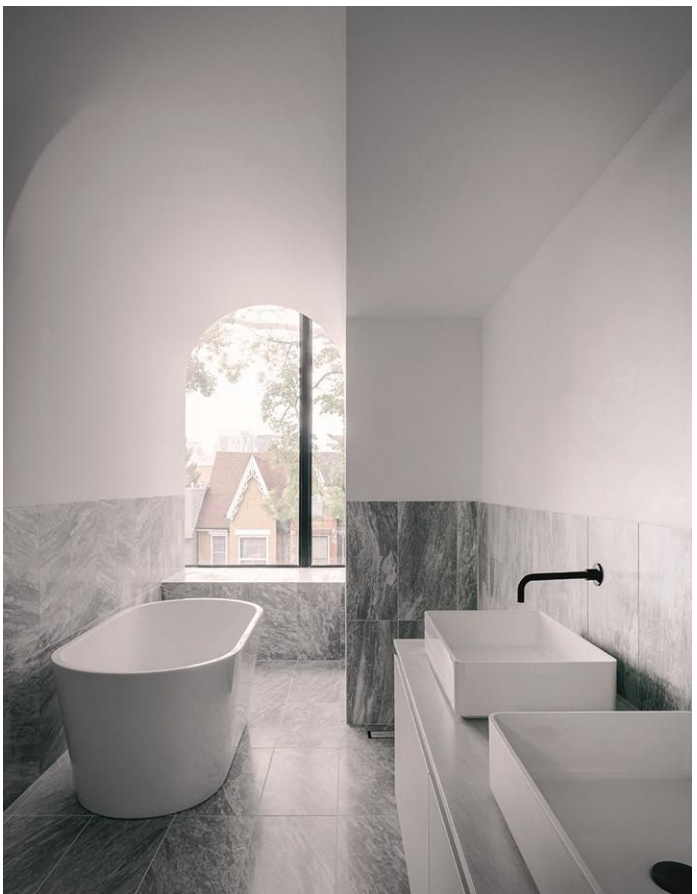
LIGHTING: Sistemalux

MILLWORK: Forma Fine Cabinetry

KITCHEN: Scavolini



The house and ADU share a court (this image). The stair twists (below, right) and leads upstairs to the primary suite (below).



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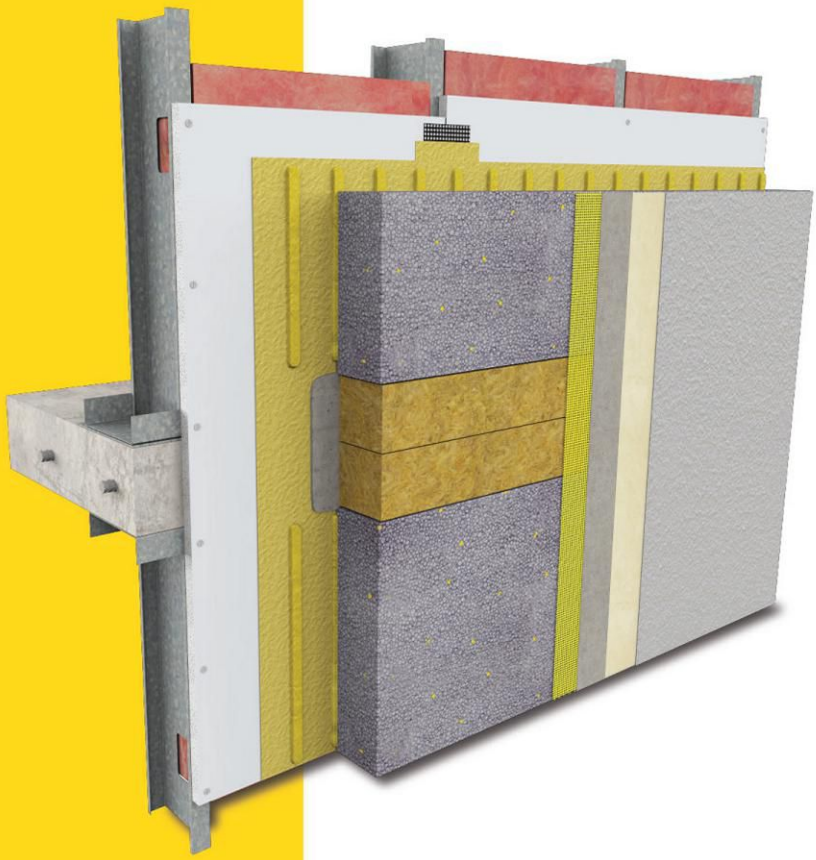

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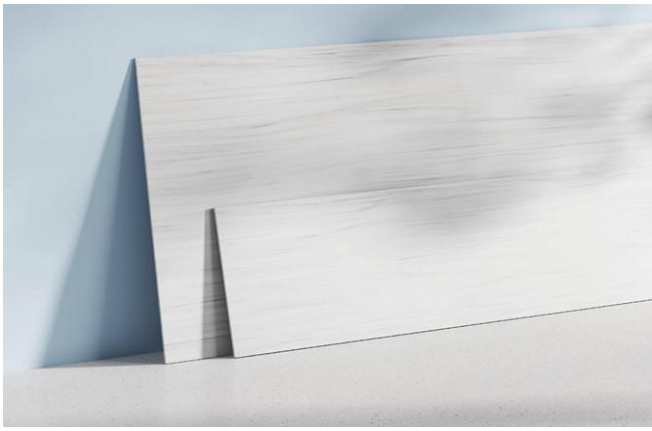
Decoustics Impressions

This ceiling- and wall-product line released by CertainTeed offers, with the help of digital printing technology, 10 woodlike, nonrepetitive finishes. It is straightforward to install and easy to maintain, and, with panel sizes reaching up to 48"× 96", is suitable for a wide range of interior applications.
Certainteed.com



Durasein Wide Sheets

Durasein's solid surfacing, built of natural minerals and acrylic resin and pigments, mirrors the look of natural stone. The company is now offering its panels at significantly larger dimensions, measuring ½" × 60" × 144", or approximately 60 square feet per sheet. The sheets are available in dozens of colors and finishes and can be delivered on a made-to-order basis, with sufficient lead time.
Durasein.com

Vela Cladding System

De Castelli's latest interior-cladding system and stand-alone wall partitions, designed by Gnosis Progetti, are composed of modular metal panels fabricated to resemble fabric blowing in the wind. That rippling form also benefits acoustic performance, and the modules, with their thin profiles, can be flexibly arranged.
Decastelli.com

MONARC

This new product launched by 3A Composites, maker of ALUCOBOND cladding, is the company's first foray into interior-wall applications. The aluminum-composite panels are available in 19 different designs, categorized into three themed collections: Urbanesque, Quarry, and Woodland. Each panel is built of two ⅛" sheets, bonded to a fire-resistant mineral core, all of which is recyclable.
3acompositesusa.com

Hyper Rhythm Collection

Kirei's new acoustic wall-and-ceiling collection, developed in collaboration with Carnegie Acoustic Solutions, is offered in over 35 colors and three product lines (Contour Tile is pictured). Each item of the collection is made from 60% recycled post-consumer plastics and can be custom printed by an in-house team with any graphic provided by the client. Class A fire-rated, the product qualifies for LEED and WELL rating credits.
Kireiusa.com

Darkened Metals Collection

This new collection launched by Chemetal consists of 10 black and darkened-metal hues. The panels are composed of aluminum and, with the help of printing technology, provide textured walling solutions for interior commercial applications.
Chemetal.com

Ultima Templok

Recently launched by Armstrong, these ceiling panels can potentially reduce operational-energy consumption by up to 15%. The panels, fabricated by integrating phase-change material technology with mineral fiber, passively store and release heat in real time. Furthermore, they offer enhanced acoustical performance across a variety of building programs.
Armstrongceilings.com

Sugi Unoiled

Nakamoto Forestry, the provider of the centuries-old material, *yakisugi*, has released Sugi Unoiled, a ceiling and cladding product. Made from milled sugi wood, the panels are offered with knots or as premium clear grade and, left unoiled, develop a patina over time.
Nakamotoforestry.com

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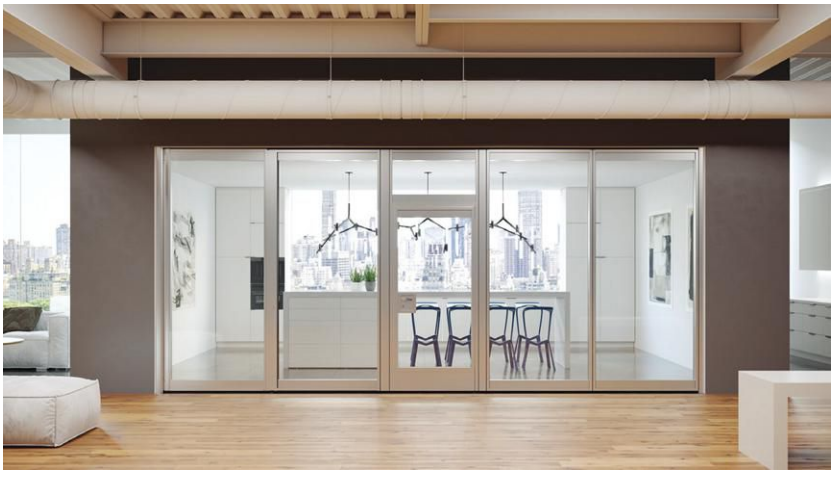

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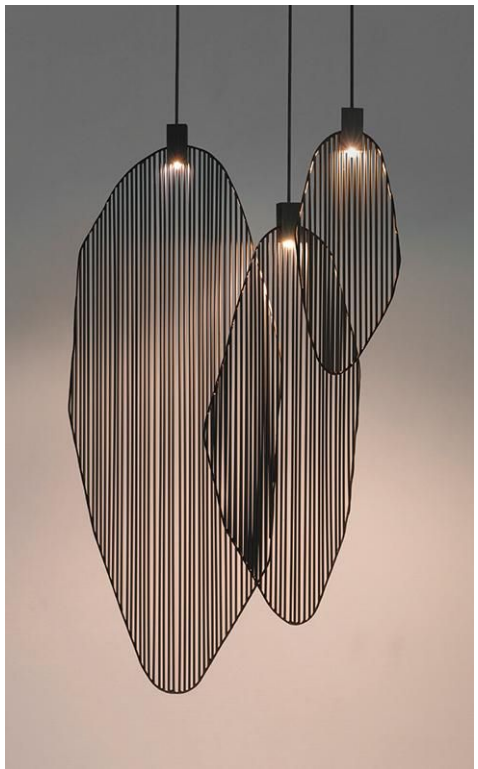
Lámina 45

In 2018, Antoni Arola conceived Lámina, a series of pendant lamps. The collection has now expanded to include table, floor, and wall versions, offered in white and gold finishes. For each, an integrated dimmable-LED source projects onto a metallic shade that reflects light back in multiple directions, resulting in indirect illumination, which provides high visual comfort.
santacole.com

Array

Designer Umut Yamac explored the potential of thread to create lightweight and dynamic light sculptures. Composed of an array of fine threads pulled taut between two rings, the collection presents a variety of conical and cylindrical silhouettes—the largest of which is over 6' tall and 49" in diameter—that can be combined to form striking installations.
vibia.com



Harpe

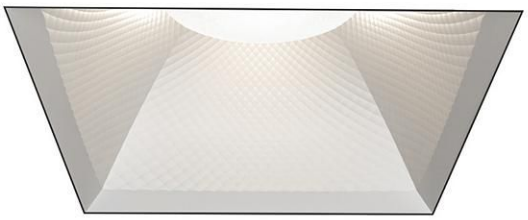
Inspired by a break in the sky that allowed bright sunlight to come streaming down in rays reminiscent of a harp, designer Christian Lava created this hanging fixture to produce a similar effect. Made of metal, and available in matte-nickel or matte-black finishes, Harpe comes in three different shapes and sizes and can be assembled in countless combinations.
terzani.com

Fragile

Designed by Jaume Ramírez, Fragile is a new twist on the archetypal table lamp. A cone and a sphere are arranged to hold a cylinder that emits ambient light from below. The blown-glass shade and methacrylate base, available in untinted and amber versions, house the dimmable-LED light source.
marset.com

D2

Lutron's Ketra and Rania downlights are now available in a smaller 2" aperture. The result of many engineering breakthroughs to deliver the same light quality in a smaller form factor, the ultraslim housings are ideal for maximizing ceiling heights and offer greater flexibility for installation. Ketra and Rania work seamlessly with Lutron's lighting controls and shades to create personalized spaces.
lutron.com



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professional.flos.com

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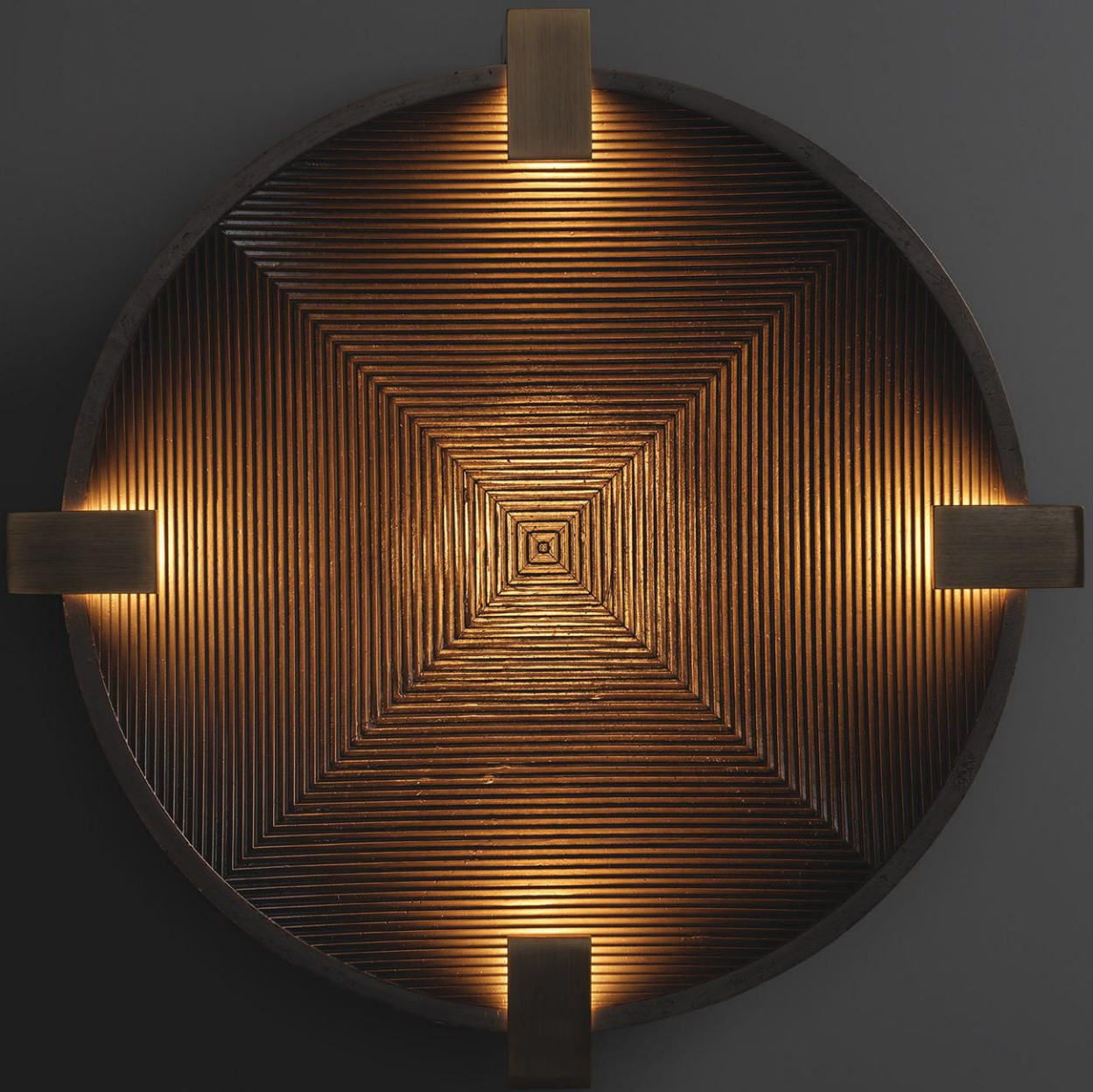


boydlighting.com

Under the Big Sky

An intimate and elemental concert shelter by Arup opens at Tippet Rise, in Montana.

BY JOANN GONCHAR, FAIA

PHOTOGRAPHY: © 2024 TIPPET RISE ART CENTER, JAMES FLORIO

A PHOTO, by Robert Doisneau, of cellist Maurice Baquet performing on a mountaintop in Chamonix, France, was the inspiration for the Geode, the newest outdoor-performance space at Tippet Rise, the visual arts and music center on a working sheep and cattle ranch in Fishtail, Montana. There is no building in the 1957 image, just the musician with his instrument, surrounded by the drama of nature, says Peter Halstead, who, with his wife Cathy Halstead, is founder of Tippet Rise through the couple's Sidney E. Frank Foundation.

Located roughly between Billings and Bozeman, Tippet Rise, opened in 2016, has a number of performance venues, both indoors and out, but the Geode is its most intimate (intended for an audience of up to 40 people) and its most remote, sited on a ridge a 10-minute van trip on gravel roads or a five-mile hike or mountain-bike ride on trails from the heart of the art center's 12,500-acre campus (for context, Manhattan is about 14,500 acres).

Designed by the engineering firm Arup, which has been involved in many of the buildings and installations at Tippet Rise, the Geode is an assemblage of four triangular pyramids—one for the performers and three for the audience members—providing protection from the sun and wind but permeable to its environs. The elemental shelter seems well suited to its surroundings and the nearly treeless, undulating terrain in the shadow of the Beartooth Mountains—a primordial landscape that Cathy describes as "raw" and "a bit terrifying," where "everything is bigger than you ever expect it to be."

The brief called for a venue that could accommodate a range of performances, from solo musicians to octets. But, above all, the Halsteads desired that the Geode would work without amplification. So, with the help of parametric modeling tools, and its SoundLab simulation space, Arup manipulated the geometry and materials to optimally direct sound and its reverberations. The four structures, the tallest of which is 18 feet high, have frames of weathering steel touching the ground at a total of 26 points. On each pyramid, one face has been left open, with the other two clad in two layers of Douglas fir boards. While the outer layer is left unfinished so that it develops a patina over time with exposure to the elements, the inner one has been charred using the traditional Japanese *yakisugi* technique, enhancing its resistance to pests, fungi, and fire (a particular concern in the often-parched landscape). As part of the treatment process, the inner boards have been scraped with a wire brush, creating subtle grooves in the wood surface. The texture helps scatter higher-frequency

The Geode touches the ground lightly (above), tied to the earth via micropiles. Arlen Hlusko performs at the Geode in August (left).

sound waves, mellowing and "taking the edge off," explains Raj Patel, Arup's project director and global leader of the firm's acoustics, audiovisual, and theater consulting practice.

The scheme takes into account the path of the sun, with the structures oriented so that the performers' shelter is to the north and the three others to the south, creating shade for the musicians and the audience throughout the summer season during the hours that concerts are expected to take place, from the early morning to late afternoon. While providing shelter from the wind, the Geode's cladding is lifted off the earth, decreasing lateral loads on the structures, allowing them to be less hefty than they would be otherwise. In addition, the approach meant that the Geode could be tied to the ground with a series of micropiles rather than a continuous foundation. This "light-touch" thinking extends to the Geode's overall siting strategy, with its location selected to avoid extensive

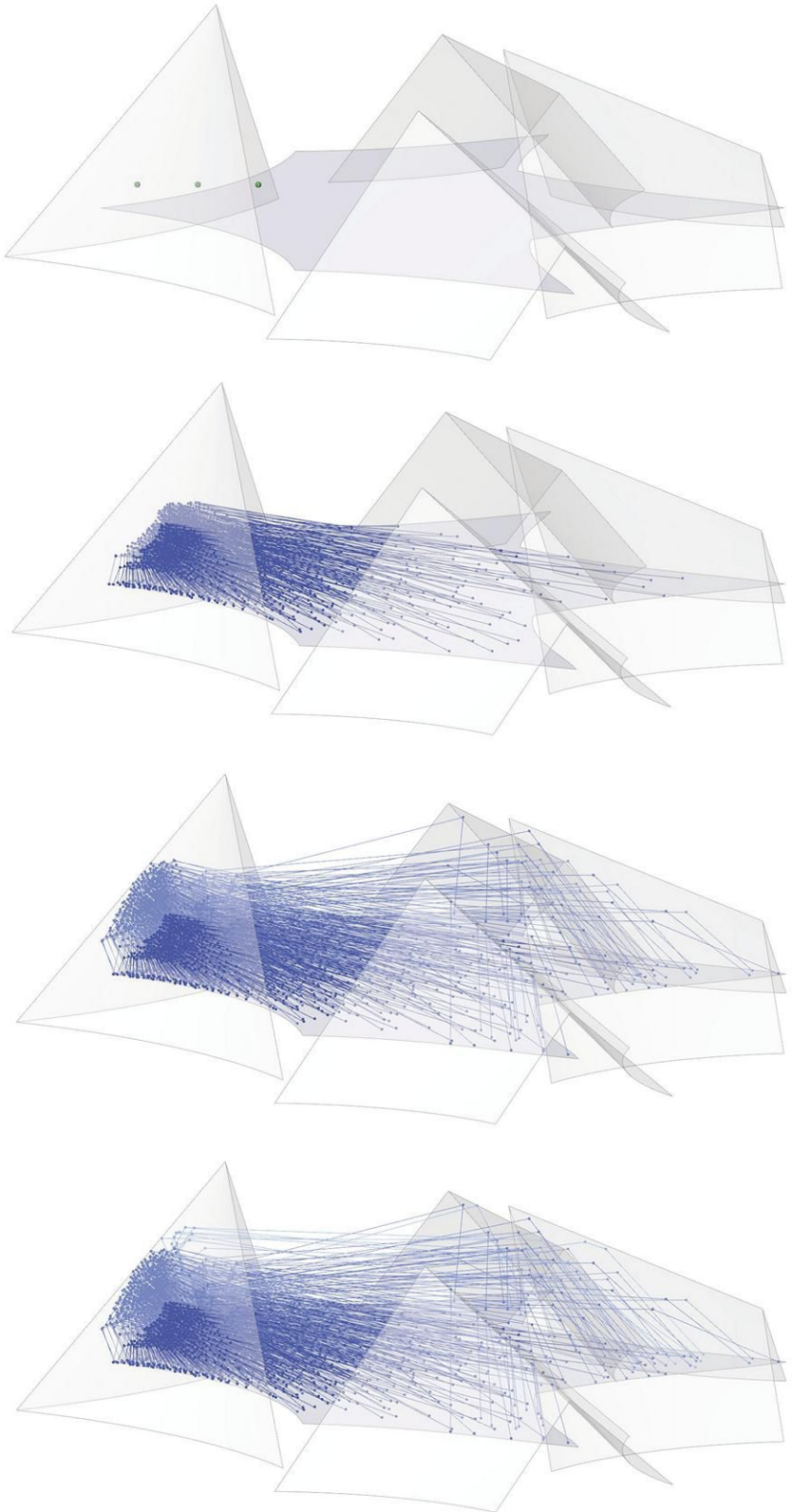
excavation or construction of new roads, despite its distance from the main part of campus.

Fittingly, given the photo that served as inspiration, the inaugural concert at the Geode was a cellist. On August 17, Grammy-winning musician Arlen Hlusko performed a varied program that included Bach as well as new works. Specifically commissioned for the event was *Àkweks Katyes* (*The Eagle Flies*), by composer Dawn Avery, who is of Mohawk descent. As intended, the sound within the Geode was clear, rich, and enveloping.

Hlusko's performance is part of an annual Tippet Rise music festival that this year extended over five weekends, starting in mid-August, encompassing classical and contemporary chamber concerts performed by artists invited from all over the world. But, beyond music, Tippet Rise is known for its large-scale sculpture, with works by Mark di Suvero, Alexander Calder, and Ai Weiwei, among others. The property is home to several site-specific pieces, some by architects, such as the three monumental concrete structures (RECORD, August 2016) by Madrid- and Boston-based Ensamble Studio, whose poured-in-place forms were literally shaped by the earth on which they sit. Not far from the main indoor-performance space, the Olivier Music Barn, is a pavilion (RECORD, August 2019) by Pritzker Prize–winner Francis Kéré with a roof of bundled ponderosa and lodgepole pine logs.

Earlier this year, the Halsteads added two new pieces to the Tippet Rise landscape: a 1990 work by Richard Serra of 8-inch-thick steel plates arranged at 90-degree angles, and *The Soil You See . . .* , a sculpture by Wendy Red Star, a Native American raised on the nearby Apsáalooke reservation. The piece, which grapples with the legacy of U.S. treaties with Indigenous tribes, was recently displayed on the National Mall in Washington, D.C.

The Halsteads continue to contemplate other new works. About a year ago, they acquired *Fifth Season*, an immersive piece by Sara Sze first shown at Storm King, in Orange County, New York. At more than 50 feet long and comprising painted surfaces, photos, and projections, it is intended for an indoor environment and therefore requires some sort of shelter in which to house it. The couple and Sze are now discussing how and where it will be displayed. "We are just at the beginning of that conversation," says Cathy. With luck, visitors will soon be able to enjoy not only Sze's piece, but also a new intervention in the vast landscape. ■



SOUND REFLECTION DIAGRAMS

To optimize acoustics for both performers and the audience, Arup studied the sequence of sound reflections within the assemblage of pyramidal structures.

IMAGES: © 2024 TIPPET RISE ART CENTER; ARUP; JAMES FLORIO (OPPOSITE, TOP); KEVIN KINZLEY (OPPOSITE, BOTTOM)

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A Star Is Reborn

An old movie palace makes a dramatic comeback as a symphony hall.

BY CLIFFORD A. PEARSON
PHOTOGRAPHY BY RICHARD BARNES

BURIED WITHIN a soulless 1980s office-and-hotel complex in downtown San Diego lies the indefatigable spirit of an old-time Hollywood star. After a multimillion-dollar renovation, the faded interiors of a 1929 movie theater are ready for their close-up once again, this time as the home of the San Diego Symphony Orchestra. Restoring the glamour of the former Fox Theater while adapting it to meet the demands of a world-class symphony was the challenge facing the architects at HGA and acousticians at Akustiks.

The project's backstory begins with a deal made with the devil when, in 1989, the San Diego Symphony moved into the theater. In the mid-1980s, a large developer had bought the Fox and erected an office tower on one side of it, a hotel tower on the other, and a parking garage above, concealing the theater within a concrete-glass-and-steel complex whose public face revealed nary a trace of the 2,250-seat Neo–Spanish Baroque jewel inside. After a simple renovation, they named it Copley Hall. For the next three decades, the symphony dealt with the compromised acoustics and sight lines that came with the aging movie venue.

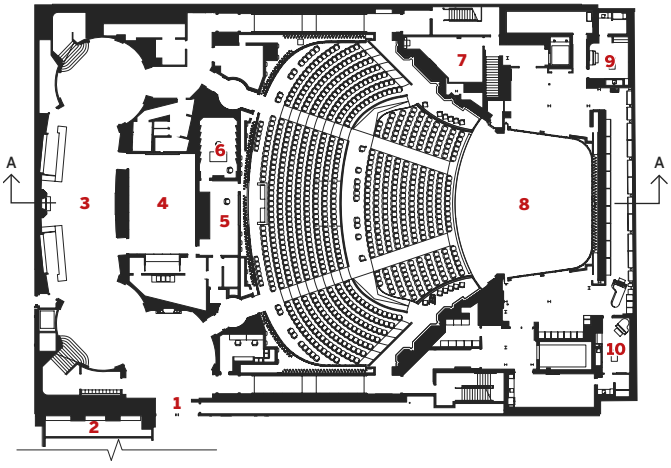
In 2014 the symphony hired Martha Gilmer as chief executive officer and empowered her to develop an ambitious vision that included luring an internationally recognized conductor to lead the orchestra, expanding the organization's summer concert series into a year-round presence in a park overlooking San Diego Bay, and renovating Copley Hall. In 2019, Gilmer hired Rafael Payare, a dynamic young conductor from Venezuela, as the orchestra's 13th music director. In 2021, she opened the Rady Shell, a spiraling steel-and-PTFE-fabric bandshell that sits on Port of San Diego land and serves as the stage for concerts that can be attended by as many as 10,000 people.

Transforming Copley Hall into a world-class symphony space began in 2022 and would cost $125 million, a large portion of which came from Joan and Irwin Jacobs, whose generosity earned them naming rights. Jacobs is a cofounder of Qualcomm, the semiconductor and software giant based in San Diego. The symphony had worked with Paul Scarbrough and his firm Akustiks in the past, and he recommended a few architecture firms to tackle the project. The symphony selected HGA, in part because of "its enthusiasm for the historic fabric" of the old movie palace, says Gilmer. When asked if the organization had considered moving out of Copley and building a new home, she replies, "Yes—for a nanosecond. There's just too

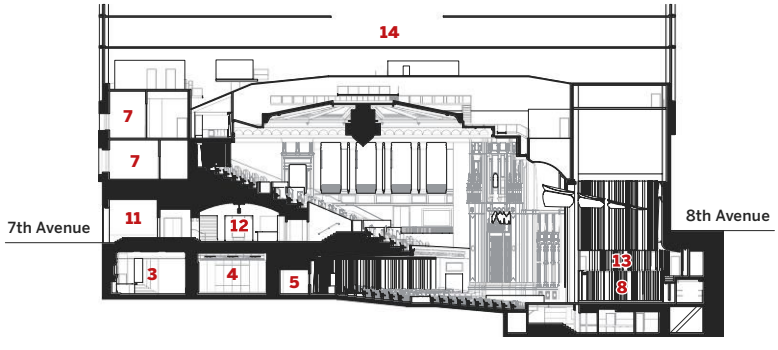
New seats, a calmer color scheme, and improved acoustics work within the historic interiors.

A choral terrace offers seating behind the orchestra (left). The exteriors of the old Fox Theater (above) were removed in the 1980s. New acoustic reflectors are suspended above the stage (opposite).

1 B STREET ENTRY
2 BOX OFFICE
3 LOWER LOBBY
4 LOUNGE
5 CONTROL ROOM
6 RECORDING ROOM
7 OFFICE
8 STAGE
9 MUSIC DIRECTOR'S SUITE
10 GUEST ARTIST'S SUITE
11 SEVENTH AVENUE ENTRY
12 UPPER LOBBY
13 CHORAL TERRACE
14 PARKING



LEVEL-ONE PLAN



SECTION A - A

much richness here," she adds, motioning around the renovated hall.

With its grand proscenium arch over the stage, sweeping balcony, and elaborate ornamentation, Copley Hall always looked fabulous. But its acoustics were troubled. Music sounded different depending on where you were—onstage, in the orchestra seats under the balcony, or on the balcony itself. Designed for movies with monodirectional sound, it didn't properly carry the music of a symphony orchestra to the audience or even the performers. One problem was a large horizontal valance below the proscenium arch, which interfered with the flow of sound and often made it hard for musicians to hear each other. HGA and Akustiks removed the valance, opening the proscenium both visually and acoustically. To create a place for singers behind the orchestra, they deepened the stage and added a raised choral terrace that can be used for audience seating when singers aren't needed. This involved removing two columns in the rear of the hall supporting the sidewalk outside and replacing them with a new concrete-and-carbon-fiber transfer beam.

The designers also removed nine rows of seats and brought the rear of the seating section closer to the stage, creating a more intimate house that gets close to the 2-to-3 "shoebox" proportions often considered ideal. The new area between the back of the seating section and the lobby provides space for a state-of-the-art recording studio and a control room. To improve sight lines, the new seats are now arranged in curving rows pointing toward the

PHOTOGRAPHY: COURTESY SAN DIEGO SYMPHONY ARCHIVES (RIGHT)

stage. A new cross aisle eases access to seats for patrons in wheelchairs as well as those on foot.

Another critical strategy was erecting a proper acoustical shell to direct sound from the stage throughout the hall. This meant building walls on three sides of the stage and behind seating areas on the orchestra and balcony levels that act as acoustical tuning chambers, with spaces for drapes and sliding panels to adjust the sound, depending on the type of performance. The public-facing surface of these walls is a mesh of copper and stainless-steel wire that undulates with a repeating series of profiles. The wavy surface disperses sound and serves as a modern counterpart to the lush ornamentation from the 1920s.

Suspended above the stage, a set of 20 tunable acoustic reflectors optimize sound distribution. Imprinted on the surface of the curved reflectors are subtle patterns taken from the hall's original decoration—a sinuous floral element here, a tragedy mask there.

One of the most ingenious aspects of HGA's design was the way it "found" 15,000 square feet of space between the concert hall and the 1980s structures built around it. By moving interior walls and capturing underutilized areas, the architects were able to install a new elevator and create a music library, offices, storage spaces, new restrooms, and other support facilities. After discovering that the stage was (barely) supported by a wood structure rather than concrete, they excavated below it to create a basement level with a lounge for the musicians, practice rooms, and dressing rooms. Another critical change was removing the HVAC system from the basement, where its noise and vibration interfered with the experience of musicians and audience members in the hall above it. The mechanical system is now suspended from the concrete parking structure above the hall and is acoustically separated, so its hum won't infiltrate the notes of Mahler, Beethoven, and Prokofiev.

The architects restored the venue's wood and plaster ornamentation, much of which was in good condition, while replacing the deep-red seats and carpeting with new ones dressed in a sea-green and light-blue color scheme. Improved lighting, along with the calmer material palette, brings out the colors of original decorative elements such as painted cameos and the rosette ceiling. HGA also restored a secondary entrance on Seventh Street, repairing a plaster frieze, a pair of chandeliers, and terrazzo flooring. Now, if only the main entry on B Street somehow acknowledged the presence of a major concert hall with more than just letters on a simple canopy.

"We kept everything that was original and changed only elements that had already been modified," say John Frane, the HGA design principal in charge of the project. "The challenge was getting the right balance of old and new without creating a pastiche."

Payare, the music director, marvels at the symphony's new home. "We're in the same location, but it's a completely new hall musically."

Gilmer sees the Jacobs Music Center playing a key role in engaging new audiences and bringing different parts of San Diego together. "A venue like this can unite a community," she says. By combining the hall's Hollywood DNA with modern technology and contemporary aesthetics, the project's architects have given new life to a cultural doyenne that can still lay on the charm. ■

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Out of the Ordinary

A teachers' union headquarters in Toronto changes the narrative of what a standard office building can achieve.

BY MATTHEW MARANI
PHOTOGRAPHY BY SALINA KASSAM

RESILIENT landscaping, and native plantings, surround the OSSTF'S HQ (above). The atrium and surrounding rooms are illuminated by the building's skylight (right).

ONTARIO'S Oak Ridges Moraine, and its hills and river valleys, were formed over 12,000 years ago by the advances and retreats of glacial formations, cutting numerous east–west watercourses that ultimately flow (often through Toronto) into Lake Ontario. Although Toronto's frenzied growth over the last century has hemmed rivers with roadways and a mash-up of residential and commercial development, their most notable tributaries—the Humber, Rouge, and Don—remain distinct agents shaping the city's geographic form. In the wake of extreme weather events and increased rainfall, the city, and architects, are newly embracing this landscape to both capitalize on the verdant attributes of its natural setting and mitigate flood events. The Ontario Secondary School Teachers' Federation Headquarters (OSSTF HQ), designed by Moriyama Teshima Architects, exemplifies this shift in course, and ups the ante with a well-articulated hybrid mass-timber structure and high-performance building systems.

The 124,000-square-foot, three-story office building straddles a bluff atop the Don River and replaces the former headquarters of the OSSTF (built in the 1970s, it would have required enormous capital investment for upgrades to the building envelope and mechanical systems to meet contemporary energy-performance standards or occupant-comfort expectations). The ground-up project also provided the organization an opportunity to construct a home base more evocative of its values. Paramount concerns were financial and environmental sustainability and democratic access to daylight, and those considerations shaped the program and form. "An organization like the OSSTF is a public entity, accountable to its union supporters, and has an obligation, especially in this environment of decreased funding, to promote the health and wellness of its employees and educators, and to


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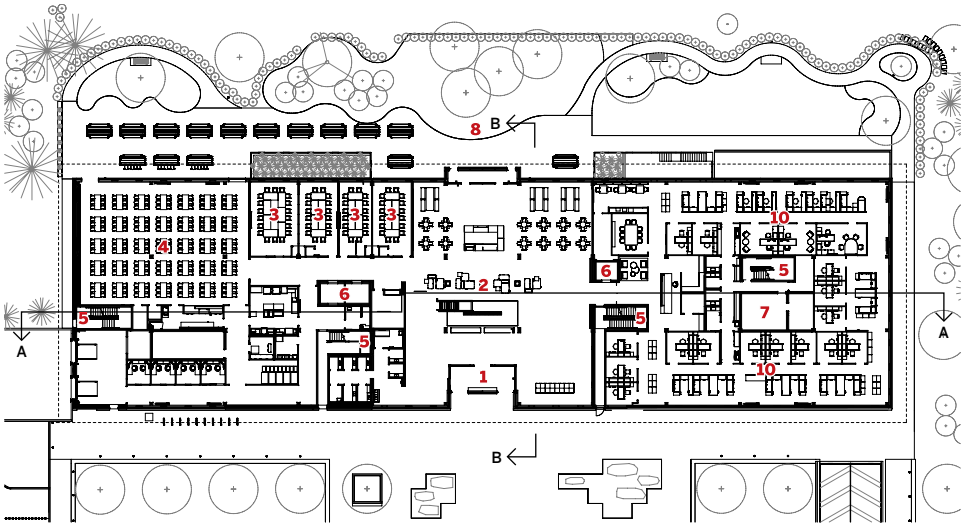
THE BUILDING system includes CLT exterior walls (left), and glulam cross-bracing (opposite, top). Wood acoustic panels and off-white porcelain walling are found within (opposite, bottom left and right).

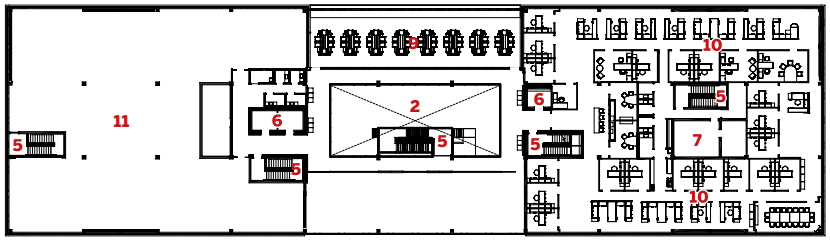
secure the greatest value for money spent," notes Moriyama Teshima principal Carol Phillips. "Here we demonstrated that an 'ordinary' building, without massive risks, can change the narrative on what is achievable."

The primary entrance is located on the east elevation, where the project's rectangular form, accentuated by its wood-clad pagoda-like soffits, comes into view from the parking lot. As you walk through the lobby, the building opens to a full-height atrium, that, drenched in sunlight from a yawning angled skylight, supported by a diagrid of glulam members, reveals the primary structural system of cross-laminated timber (CLT) floor plates, with 2-inch topping slabs and glulam posts-and-beams and cross-bracing. Below grade, in the parking garage, the nine structural bays of the timber system meet the piers of the building's concrete foundation, and steel is used for the building core and stairwells.

Moriyama Teshima, headquartered in Toronto, worked closely with Vancouver-based engineer Fast + Epp to optimize the structural system, reviewing numerous iterations to keep costs in line and reduce the project's environmental impact. "When it came to mass timber, we asked our engineers what the most economical solution is to span a 30-foot bay, and how can we reduce material volume to lower the price?" says principal Phil Silverstein, having already determined that such a span would work well for the office layout. "So Fast + Epp developed 15 different structural options for the bay, and the final iteration allowed us to get down to three-ply

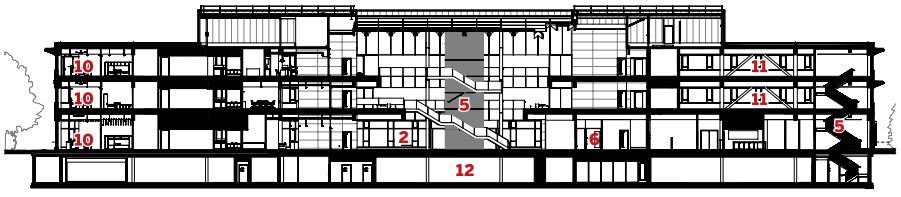


LEVEL-ONE PLAN

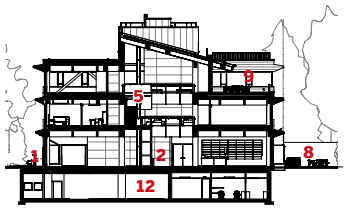


LEVEL-THREE PLAN

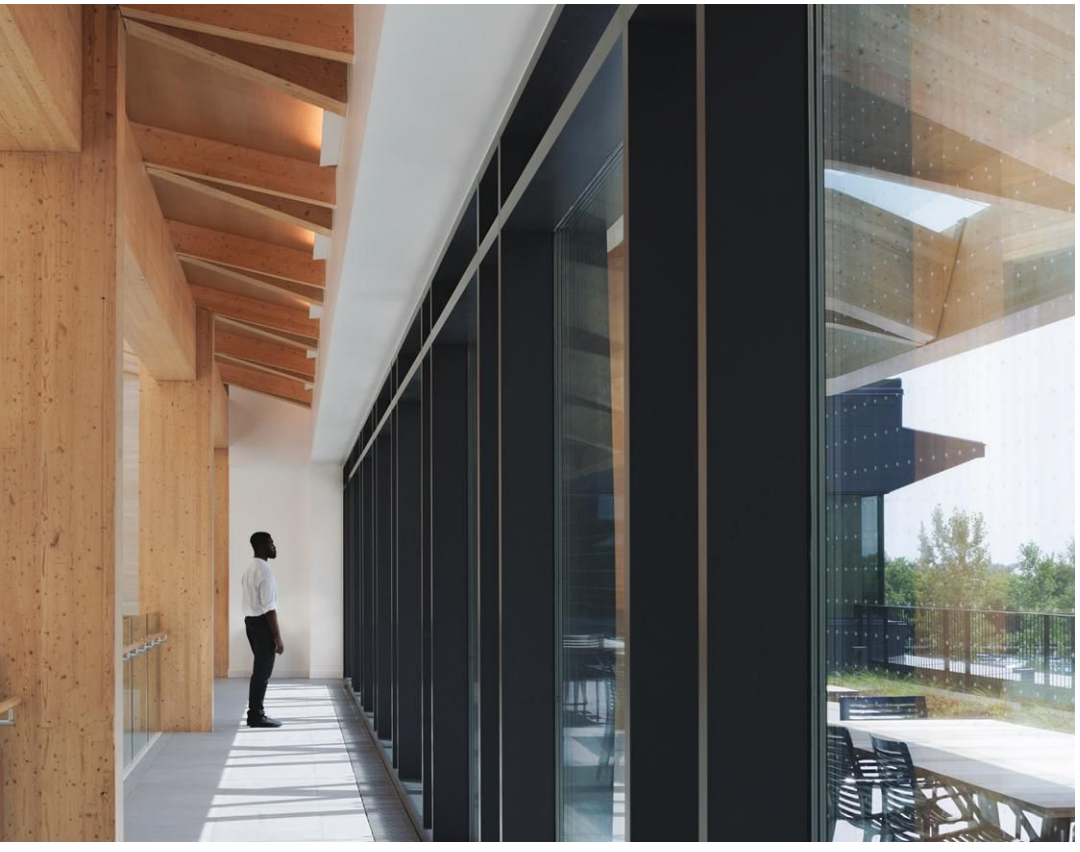
1 ENTRANCE
2 ATRIUM
3 MEETING
4 MULTIPURPOSE
5 STAIRWELL
6 ELEVATOR
7 MECHANICAL
8 GARDEN
9 TERRACE
10 OSSTF OFFICE
11 LEASABLE OFFICE
12 BASEMENT LEVEL



SECTION A - A



SECTION B - B



A BALCONY on the top floor blurs the boundaries between interior and exterior (above and left). The project treads lightly on the abutting river valley (opposite).

CLT for the floor plates, rather than the standard five." The whole building's net embodied carbon comes out to just over 300 kilograms per square meter, well below the construction industry average of 600 kilograms for typical office buildings.

To provide a steady stream of revenue, the OSSTF HQ will occupy just a third of the office space, across all three floors, with the remainder available for lease by commercial tenants. The atrium is the central circulatory route for building occupants—a monumental stair within the space ascends to the top floor—with meeting rooms on each floor shared by all users. The offices are minimally detailed: exposed wood grains and fine-tuned bolt connections between timber elements are the main attraction, and continuous ribbons of triple-glazed windows, shaded in summer by the angled soffits, amply supply daylight throughout the floor plate at each level.

The design team's efforts to reduce operational carbon were guided by environmental consultant Transsolar, and that collaboration

yielded a highly coordinated climate-control scheme. The atrium, with the help of three industrial fans at the summit, doubles as a solar chimney to supplement the building's natural ventilation, and the curtain wall, fitted with automated operable windows, provides additional fresh air, depending on external weather conditions. At the roof level, hundreds of photovoltaic panels supply over 10 percent of the building's electrical demand, and 70 geoexchange wells located under the adjacent parking lot regulate the project's radiant-floor systems. This being Ontario, the design team also had to contend with often severe winter weather, and, to that end, they tucked approximately 6 inches of mineral wool insulation, with a 1-inch air gap, behind the exterior's dark gray steel cladding. Notably, the exterior walls to which the cladding is affixed are five-ply CLT panels, rather than the steel systems more typically used, which are carbon-heavy. That move also offered a continuous surface for the construction team to work with, which simplified installation and drove down costs. Together, these well-calibrated building systems are projected to save approximately 60 percent in total energy use compared to an equivalent reference building, helping put the project on track for LEED Platinum.

The resilient landscape design developed by Toronto-based firm FORREC places flood control and the local habitat front and center. Bioswales and hydrophilic tree plantings dot the grounds surrounding the east-facing elevation, and, to the south, a hewn-armourstone spillway guides, retards, and aerates stormwater on its way to the abutting valley. At the garage level, a stormwater cistern collects that excess water for toilet flushing and water irrigation. The rear, west-facing elevation unfolds onto a terrace of rain gardens overlooking the bluff, where, in late summer, the whine of cicadas and the whistled notes of birdsong echo through the valley's newly planted native trilliums and dense canopies of cedar, maple, and pine; if one listens closely, the quiet murmuring of the Don makes its way through the din. ■

Credits

ARCHITECT: Moriyama Teshima Architects — Carol Phillips, partner in charge; Phil Silverstein, partner, project manager; Gord Doherty, contract administrator; Cathy McMahon, architect

ENGINEERS: Fast + Epp (structural); Introba (mechanical); Matrix Solutions (civil)

CONSULTANTS: FORREC (landscape); Transsolar | KlimaEngineering (sustainability); Morrison Hershfield (building science)

GENERAL CONTRACTOR: Eastern Construction Company

CLIENT: Ontario Secondary School Teachers' Federation

SIZE: 124,000 square feet

COST: withheld

COMPLETION DATE: May 2024

Sources

STRUCTURAL: Nordic Structures (cross-laminated timber and glulam)

EXTERIOR CLADDING: VicWest (metal siding); Kingspan (insulated panels); Alumicor (curtain wall); Tremco, Soprema (moisture barrier); Central Canadian Glass, TGP, Truelite (glazing)

HARDWARE: Assa Abloy, Sargent (locksets, closers, exit devices, pulls, security devices)

INTERIOR FINISHES: USG Ceiling Solutions (acoustical ceilings); Sound Solutions (fabric acoustic panel); Caesarstone (solid surfacing); Forbo, Nora (resilient flooring); Mohawk Group, Interface (carpet)

FURNISHINGS: Landscape Forms (outdoor chairs)

LIGHTING: BEGA, USAI Lighting (exterior)

PLUMBING: Kohler (shower heads); Kohler (basins); Toto (toilets); Elkay EZH20 (water fill station)

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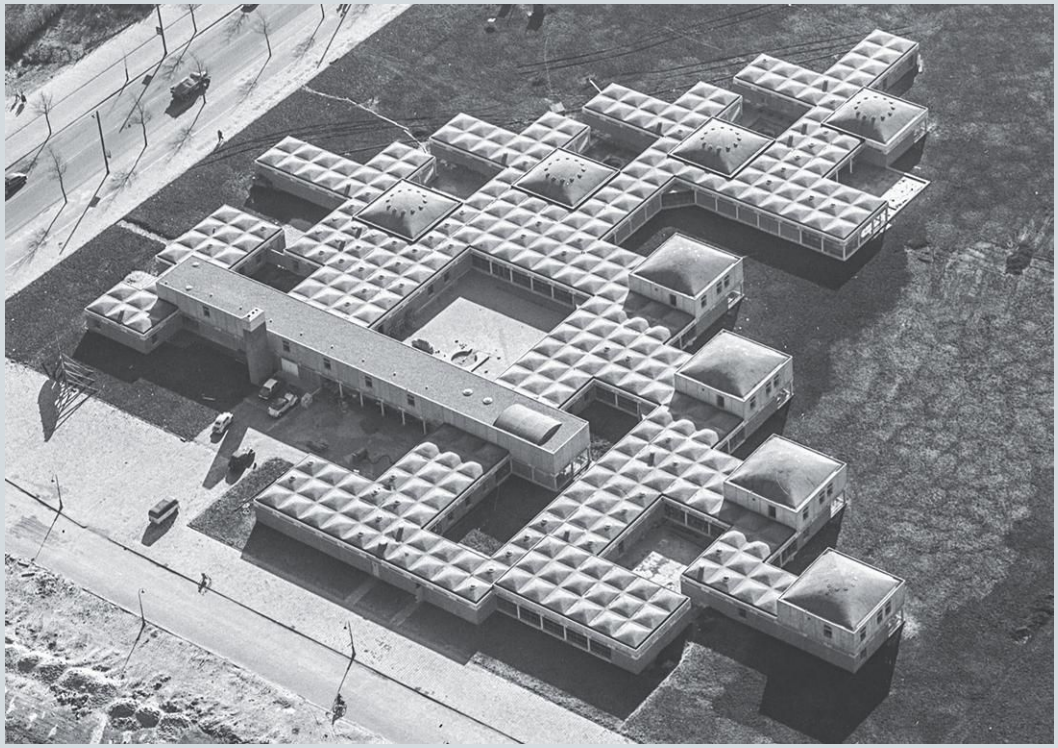

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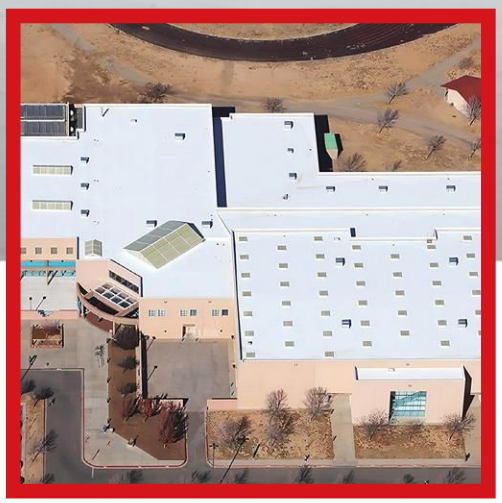

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Writing on the Wall

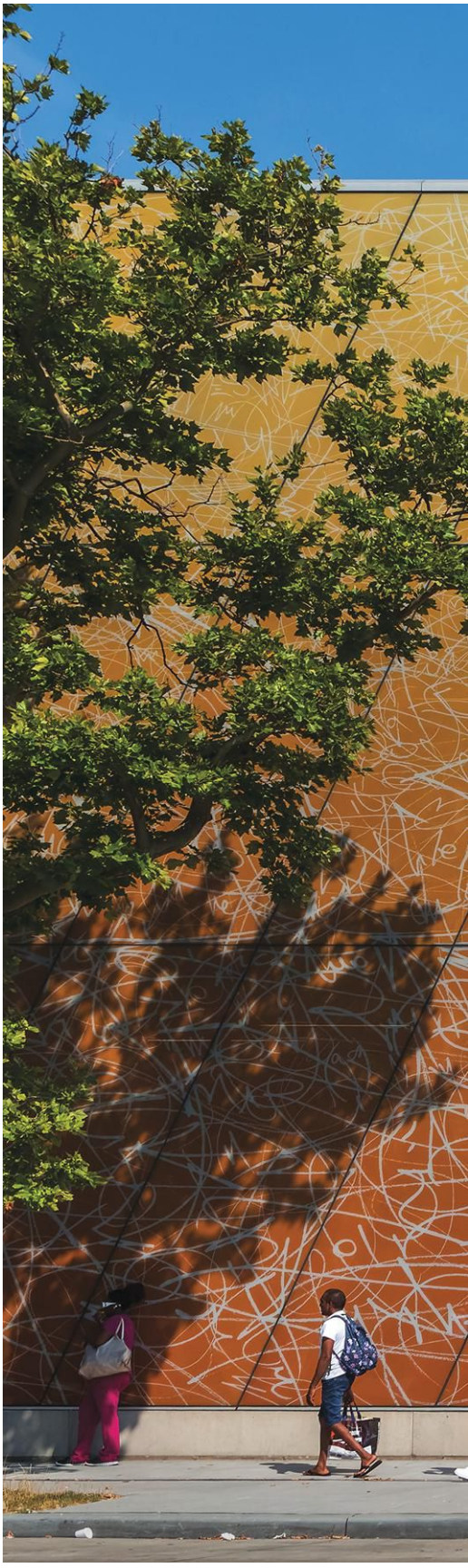
For a neighborhood library in Queens, Snøhetta delivers a geometric mass adorned with stylized graffiti.

BY IAN VOLNER
PHOTOGRAPHY BY JEFF GOLDBERG

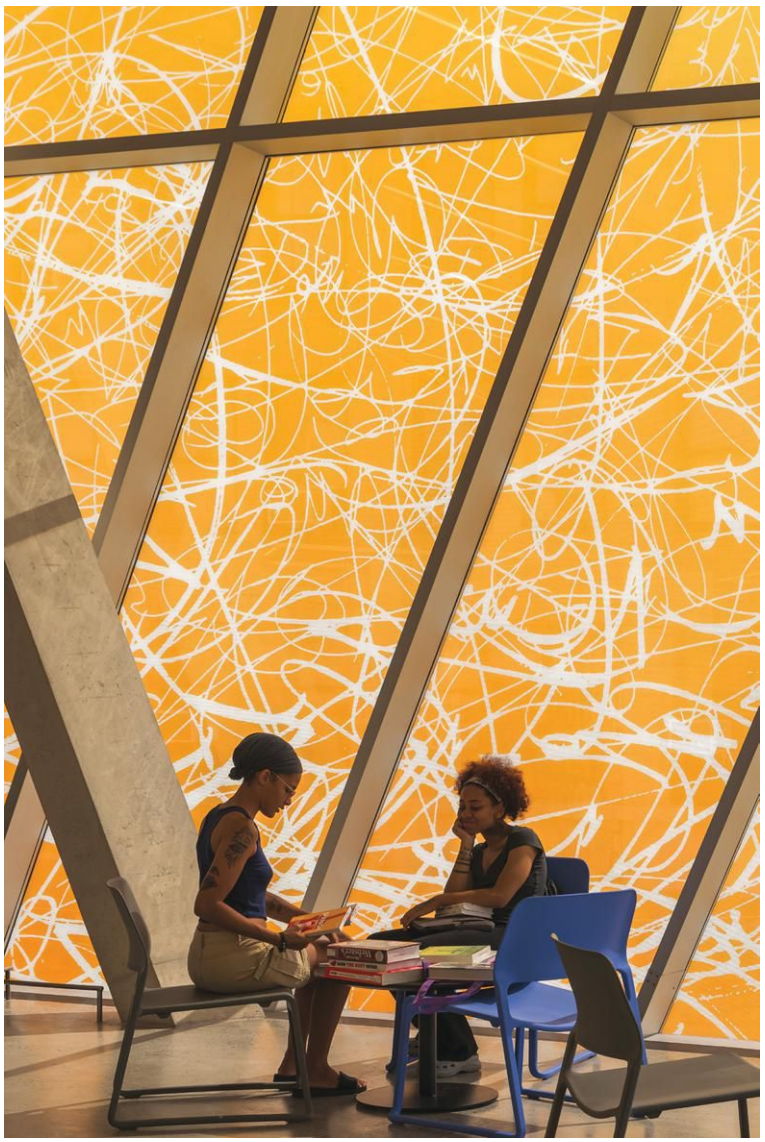
SNØHETTA KNOWS something about libraries. The founding duo behind the Norwegian-American architecture firm—Craig Dykers and Kjetil Thorsen—first came together in 1989 as an impromptu collaborative, submitting a joint bid for the fraught Bibliotheca Alexandrina project in Egypt. They won, and over the ensuing decades have gone on to design libraries for institutions large and small, both in the United States and abroad: the Hunt Library at North Carolina State University, the Calgary Central Library in Alberta, the Beijing City Library in China, to name a few.

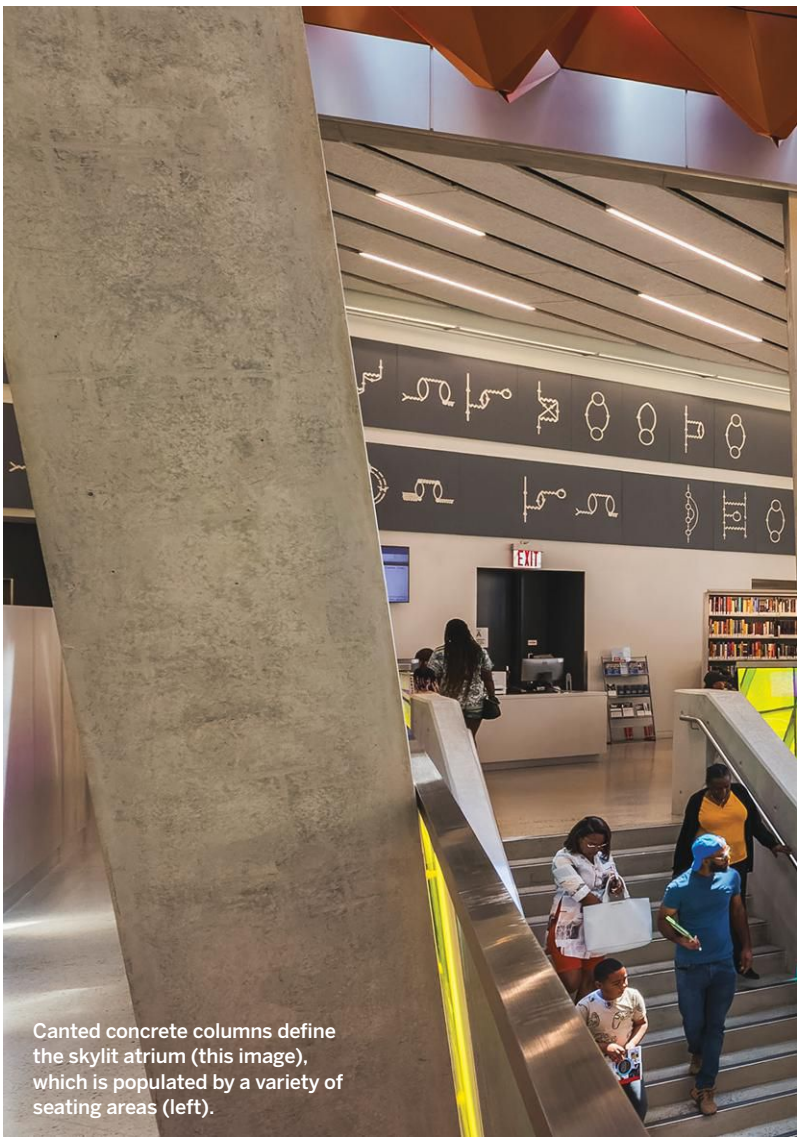
The entire body of work, in Dykers's view, is connected—including the firm's latest pass at the typology, the new Far Rockaway Library in Queens. "You can trace the Rockaway Library right back to Alexandrina," the architect says. The points of correspondence are indeed striking, especially as regards the facade: where the Egyptian proposal featured runic inscriptions across its white granite exterior, a sort of abstract calligraphy, based on designs by artist José Parlá, creeps across the fritted glass of the Queens project, as though the books inside had overrun their pages and splattered onto the walls.

Though not without its own air of romance (see Lawrence Ferlinghetti's poetry collection *A Far Rockaway of the Heart*), the neighborhood on the southeasternmost edge of New York is as dynamic, gritty, and bustling as anything nearer Manhattan. Its challenges are correspondingly dense: in the years after the Second World War, planners like

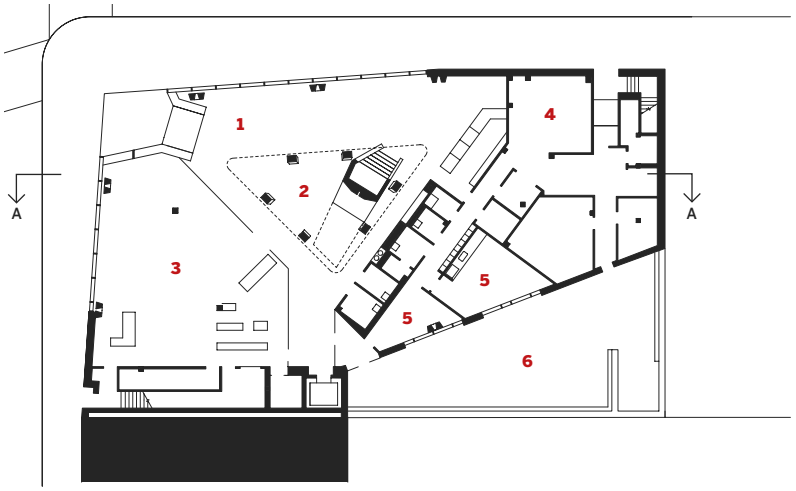


The library's corner-facing entrance (this image) opens to a lively two-story atrium (opposite).

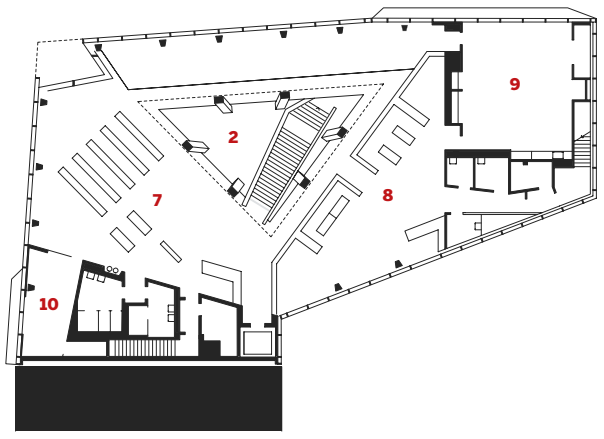




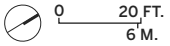
Canted concrete columns define the skylit atrium (this image), which is populated by a variety of seating areas (left).

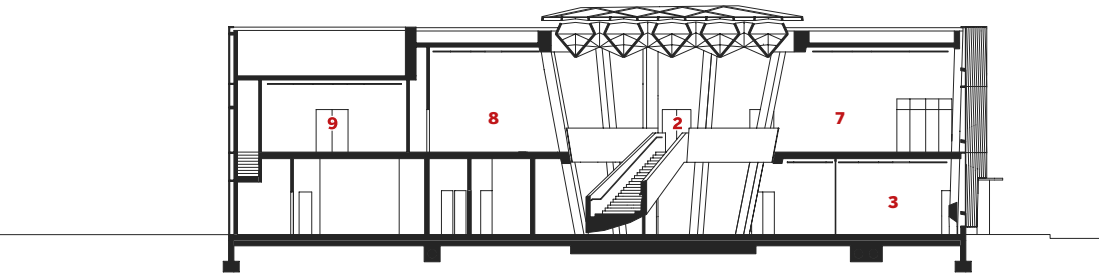


LEVEL-ONE PLAN



LEVEL-TWO PLAN





SECTION A - A

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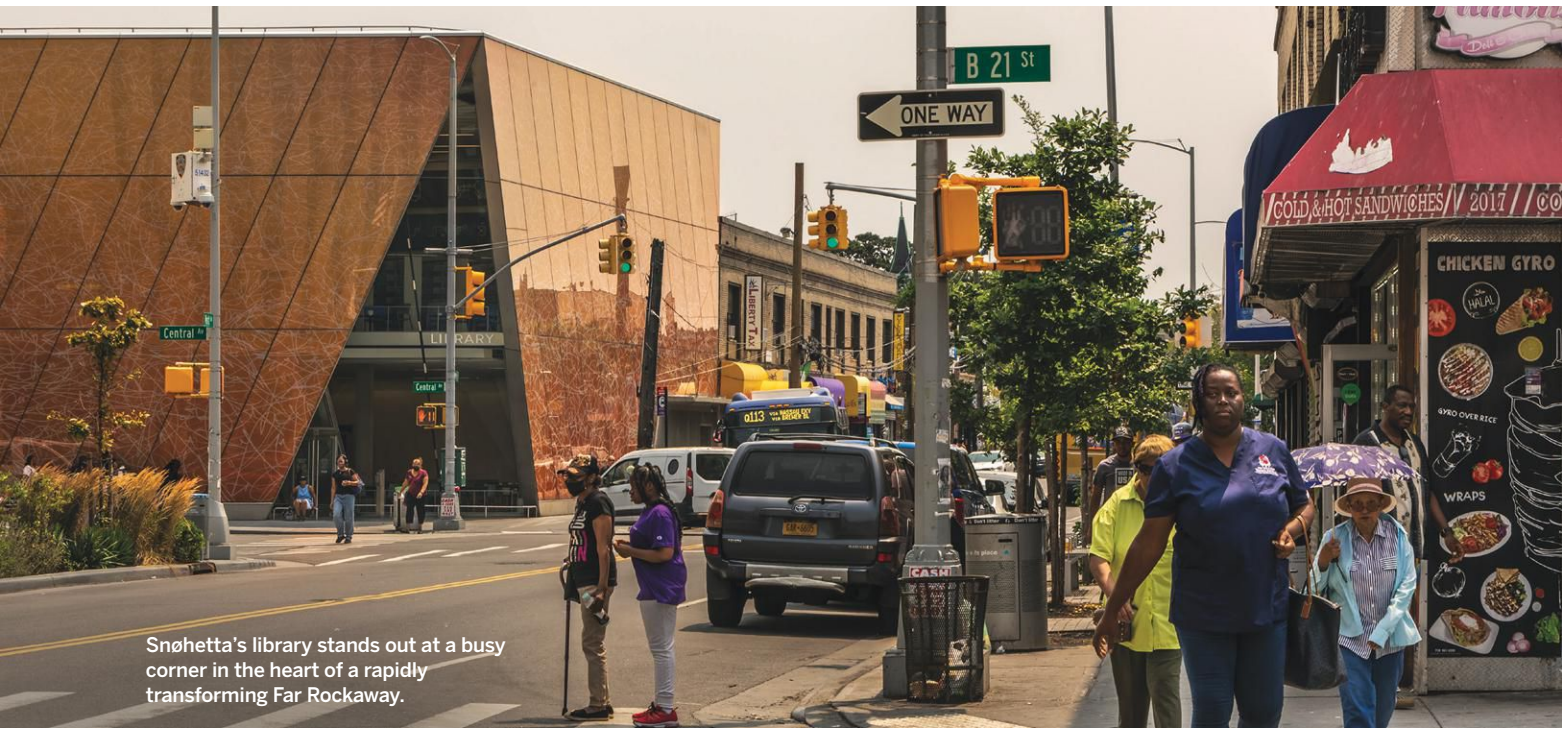
6 M.

1 CIRCULATION AND INFORMATION
2 ATRIUM
3 TEEN AREA
4 WORK AND BIN ROOM
5 STAFF AREA
6 GARDEN
7 ADULT AREA
8 CHILDREN'S AREA
9 MEETING ROOM
10 QUIET ROOM

Robert Moses made the formerly genteel district a dumping ground for poorer citizens displaced by urban renewal. More recently, seasonal storms have ravaged the area's waterfront section, causing still more disruption, but also prompting new public and private investment, including a $145 million resiliency program launched by former mayor Bill de Blasio. "The area has undergone so much change," notes Dykers: large-scale redevelopment, particularly of affordable residential construction, has changed the face of Far Rockaway with remarkable speed, its population increasing 26 percent over the last decade.

All this Dykers discovered on one of his first visits to the area, when he biked there from Brooklyn on an August day in 2009 and arrived somewhat the worse for wear, armed with a camera and curiosity. Although a little



Snøhetta's library stands out at a busy corner in the heart of a rapidly transforming Far Rockaway.

wary of the sweaty stranger, a few locals consented to be filmed while answering some basic questions, and what they said was enlightening: however drab and out of date, the 1969 library that had long stood on the corner of Central and Mott avenues was a beloved social node for the community, even serving as a refuge after Hurricane Sandy. "The main things were that they needed daylight and something that represented people who lived there," Dykers recalls; they also, he says, wanted a garden, the one around the existing building having been long since closed to the public.

Putting locals' priorities at the top of its agenda, the Snøhetta team then went a step further by turning to José Parlá, a friend and fellow traveler of Dykers's since the two first met nearly 20 years ago. "I knew the Alexandrina project," recalls the artist. "I loved the use of language there, the carving into the facade." Little wonder: the Cuban-born painter has long been inspired by graffiti, an influence evident in his previous collaboration with Snøhetta, an oversize mural for the North Carolina library. For the Far Rockaways, Parlá again looked to his street-art roots, this time producing an ecstatic spray of lines and curves that "pays homage to an art form born in the city," as he puts it. Hip-hop culturati might cavil about whether the Far Rockaways has ever been an essential (or even marginal) part of the city's graffiti scene, but the intention is more or less qualified by the result. Transferred onto the glazed panels that clad the slanted two-story structure, Parlá's snaking graphics squirm and waver, making the whole building appear to shimmer like a column of superheated air.

The summery attribute is redoubled by the color of the envelope, a mellow orange that expressly references Far Rockaway's coastal locale. "We took pictures of the sunrise over the Atlantic," says Dykers, "and then we picked a couple of shades from that spectrum." Solar effects are also the primary focus of the interior, where the central atrium—topped by an impressively-coffered skylight—filters sunshine through a series of tinted-glass balustrades, causing it to ricochet around the two wedge-shaped floors and their canted concrete columns in multi-hued spots that vary in tone and shape as the day wears on.

Seen near dusk, washes of soft purple ran across the lower-floor elevator bank and the enclosure of the teen reading room; upstairs, a corner nook was dappled in amber, while the stacks cast long shadows back toward the staircase. Only the rear garden, sheltered from the street, provides a little respite (albeit a somewhat under-landscaped one) from the riot of color. With space on-site for future disaster relief, and a backup generator system designed to operate during emergencies, the building shows how much Snøhetta's conception of libraries has dilated since its first outing all those years ago. ■

Ian Volner has contributed articles on architecture and design to The Wall Street Journal, The New Yorker, *and* The New Republic, *among other publications.*

Credits

ARCHITECT: Snøhetta — Craig Dykers, partner; Nathan McRae, design director; John Oliver, project manager

ENGINEERS: Silman (structural); Thornton Tomasetti (civil)

CONSULTANTS: Atelier Ten (sustainability and lighting); Altieri (m/e/p/fp and AV)

GENERAL CONTRACTOR: EW Howell

CLIENT: New York City, Queens Public Library

SIZE: 18,000 square feet

COST: $33 million

COMPLETION DATE: August 2024

Sources

EXTERIOR CLADDING: Alpolic (metal panels)

CURTAIN WALL AND WINDOWS: Kawneer

GLASS: Cristacurva (printed ceramic frit)

SKYLIGHTS: Skyline Sky-lites

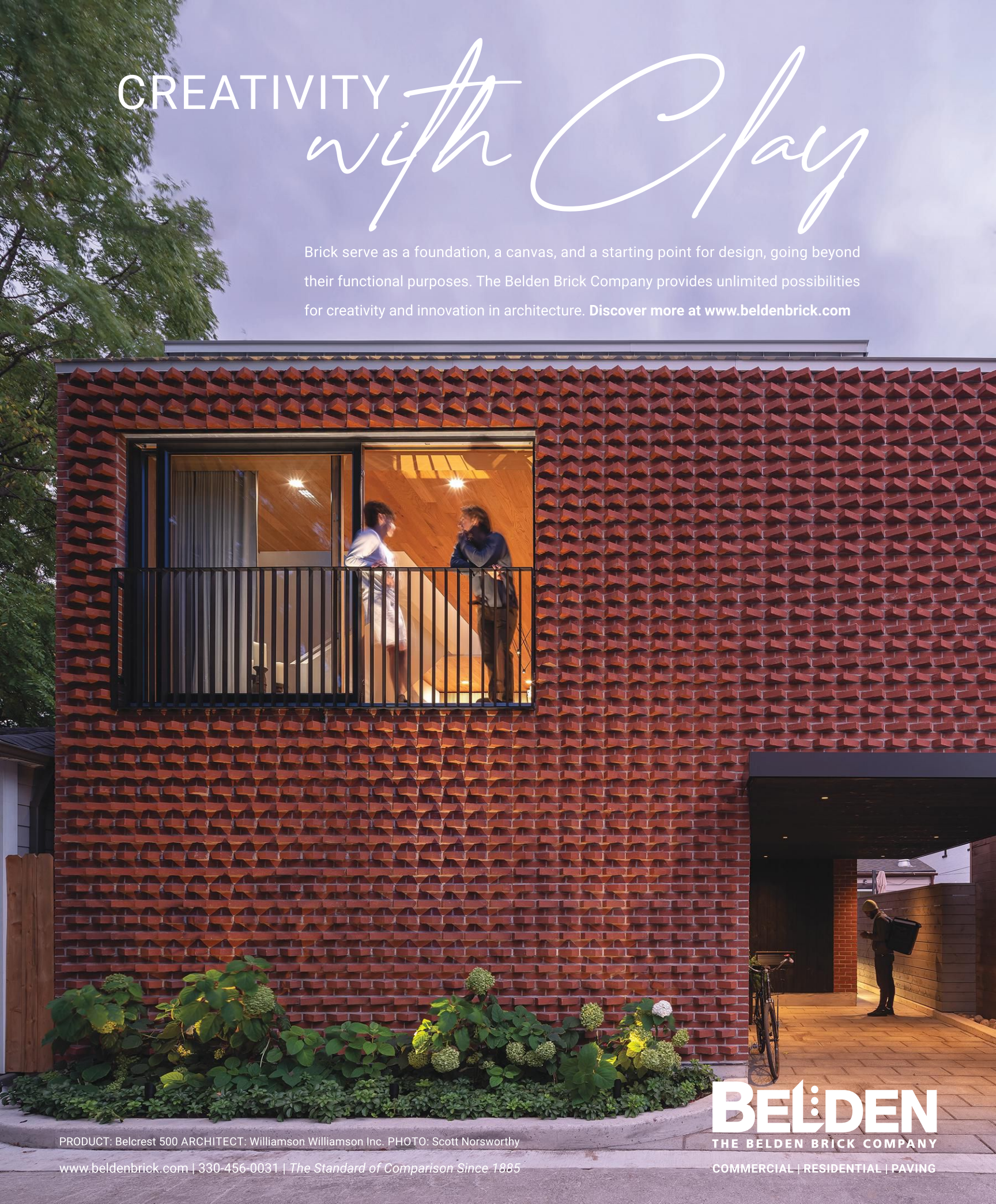
LIGHTING: Axis Lighting, Gotham, Bega; Lutron (controls)

SOLID SURFACING: Corian

HARDWARE: Von Duprin, Stanley, Best

ELEVATOR: Schindler

FLOOR AND WALL TILE: Daltile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Line of Discontent

Enrique Ramirez takes on Saudi Arabia's linear city.

WHEN THE LINE, the infamous 106-mile-long linear city proposed by Saudi Crown Prince Mohammed bin Salman, was announced in 2021, it was quickly derided in architectural circles—despite the reported involvement of such noted figures as Thom Mayne and former Archigram member Peter Cook. The project, if we are to believe the renderings, will appear as a mirrored blade, complete with greenwashed tufts, relentlessly cleaving the desert on the northern shores of the Red Sea. It comes to us as a revenant, as if the gridded ghost of Superstudio's mirrored Continuous Monument (1969–70) appeared unironically, without comment, without consequence. The first thing that came to mind while mulling over its ensemble of excessive linearity was the scene from David Lean's *Lawrence of Arabia* (1962) when T.E. Lawrence, played famously by Peter O'Toole, realized that the best way to overrun the Turkish stronghold at Aqaba was to approach from deep in the desert and attack from behind, because, as the film brilliantly depicts, the giant, building-size cannons are lined up (yes, *lined up*) toward the water on rail mounts and cannot face backward. What is the architectural metaphor that needs unpacking here? Does it have something to do with how, in the middle of the arid landscape, an imposing yet purposeless object serves as a stark reminder of human folly? Or do these imposing, useless cannons, captured in a perpetual forward gaze, remind us of the inability to look backward, which, if you think about it, finds a parallel in The Line's forward march in complete disregard of historical consciousness and reflection.

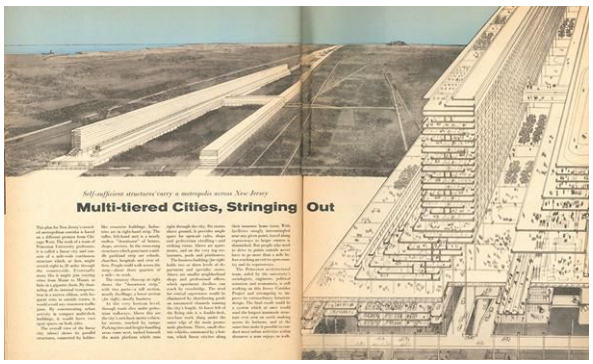
Today, The Line is a fragment of its former self, a 1.5-mile-long segment under construction, with only vague promises of future completion. Some of the architects have bowed out, notably including Mayne. It's certainly a "colossal Wreck" that succumbs to the "lone and level sands," as Shelley reminds us in "Ozymandias," his own paean to useless monuments fading away in the desert. Yet, even in this diminished state, the project continues to incite skepticism. Perhaps this is the fate of any such project. Indeed, we might envision past audiences grappling with Frank Lloyd Wright's Broadacre City or Le Corbusier's Plan Voisin—projects that, well argued or not, were meant to function as critiques of urban design. So what is it about The Line that continues to irk? Is it the project's unimaginable (even if drastically reduced) size? Perhaps it's the project's formal conceit, the way its colossal, mirrored-wide-flange beam slices effortlessly through the desert, an advertisement for half-baked notions of urban life and technology. Or is it the stark reality that such an endeavor could only materialize through the deployment of vast amounts of conscripted labor, extracted resources, and capital investment, and that Saudi Arabia seems willing to crush resistance of any kind?

Perhaps we're witnessing an instance of Marx's famed adage, "the first time as tragedy, the second time as farce," with The Line emerging as a derivative work, an echo of an echo of linear cities of yore. But what does it mean to have something like this arrive on our collective doorstep today, so bereft of any critical reflection, so unknowing of its own origins among the maneuverings of history? The Line's gleaming, sterile renderings seem to confirm how architecture celebrates its Candide-like optimism in technology, a conscious detachment from worldly realities. The rush to draw parallels and connections between The Line and other outlandish schemes from the past is understandable, sometimes requisite. After all, this is a project that reflects some of the worst impulses in contemporary architectural practice and, because of this, it promises to live in our historical consciousness neither as embarrassment, failed scheme, or bad architecture but rather as an exemplar of that most convenient and hence overused category—the dystopia.

This is tempting, problematic, even inaccurate, for dystopia's opposite, utopia, shares many of its characteristics. Utopia too aims for an architecture deliberately removed from the textures of reality, yet utopian projects are hardly spared the imperfections and controversies that inspired them. Perhaps it's more apt to categorize something like The Line as speculation freed from the burden of utopia. An alternative vision is just that—a departure, a willingness to extract a project from the intricate web of social, political,

A 1930 Soviet magazine depicts Ivan Leonidov's linear proposal for Magnitogorsk, an industrial hub in the Ural Mountains.

IMAGE: SOVREMENNAIA ARKHITEKTURA



Peter Eisenman and Michael Graves's 1965 Linear City proposal (right) prefigures the geometries of The Line (opposite).

IMAGE: © LIFE MAGAZINE

and economic contexts that threaten its existence.

The history of architecture is replete with urban proposals characterized by explicit, purposeful linearity, many addressing genuine concerns. Some, like The Line, are marked by a sense of inevitable failure. Consider the Spanish engineer Arturo Soria y Mata's Linear City proposal from 1882—an elongated spine facilitating the expansion of housing and manufacturing zones while minimizing physical and ecological impact. This concept resonated in subsequent schemes, notably Kenzō Tange's 1960 Tokyo Bay project, whose spines extended into the water to accommodate additional housing modules. These proposals blurred the line (so to speak) between architecture and infrastructure, presaging Reyner Banham's 1970s concept of "Megastructure"—inhabitable infrastructure writ large. Linear projects have also often served ideological agendas, particularly in the Soviet Union. Mikhail Okhitovich's "disurbanist" proposals found new life in Nikolay Alexandrovich Milyutin's linear Sotsgorod (1930). Concurrently, Ivan Leonidov, collaborating with the Organization of Contemporary Architects (OSA), developed a formally similar plan for the city of Magnitogorsk in the Urals. All embraced linear organization as a novel spatial response to rapid industrialization. While many remained theoretical, some concepts materialized—the southwestern Russian city of Volgograd's expansive system of infrastructural trunks and branches bears the unmistakable imprint of these Soviet schemes. This rich tapestry of linear urban planning underscores The Line's place in a long-standing architectural tradition, albeit one that in the past grappled more substantively with real-world challenges and ideological imperatives.

Linearity can be burdensome, to paraphrase architectural theorist Catherine Ingraham. And it tends to underscore existing realities rather than transcend them. Take, for instance, Peter Eisenman and Michael Graves's 1965 Linear City—a proposed 22-mile urban megastructure linking

segments of the Interstate 95 corridor. While ostensibly flexible and infrastructural, it inadvertently mirrored trends in urbanization and industrialization, echoing developments along the U.S. Highway 1 corridor between Trenton and New York, and the industrial dystopias immortalized in Robert Smithson's 1967 *Artforum* piece, "The Monuments of Passaic." The burden of linearity becomes particularly acute when, at the level of critique, these concepts descend into *reductio ad absurdum*. This realm is exemplified by speculative linear projects like the Continuous Monument or Archizoom's No Stop City (1969–72), which push the concept to its logical—and absurd—extremes, illuminating the inherent limitations of megastructural linear design.

The Line compels us to evaluate whether the very concept of linearity can make sense in a world wracked by environmental crises, social injustice, and economic inequality. It certainly does not help that The Line exists mainly as exquisite renderings—slick, technical images whose very purpose is to secure an influx of capital. The result is alienating. The Line is so confounding because it appears as a megastructure-sized incision that treats the delicate desert ecosystem as though it were a smooth, isotropic space, devoid of obstacles and primed for the realization of pure geometry. This approach reflects a voracious appetite for

IMAGE: COURTESY NEOM

terrestrial alteration in service of a grandiose vision. The image that captures it best is Walter De Maria's "Mile Long Drawing" (1968), with its prostrate figure at the terminus of two lines, seemingly yearning for infinity yet constrained by the ultimate human limitation that is death itself. ■

Enrique Ramirez is a writer, critic, and historian of art and architecture.

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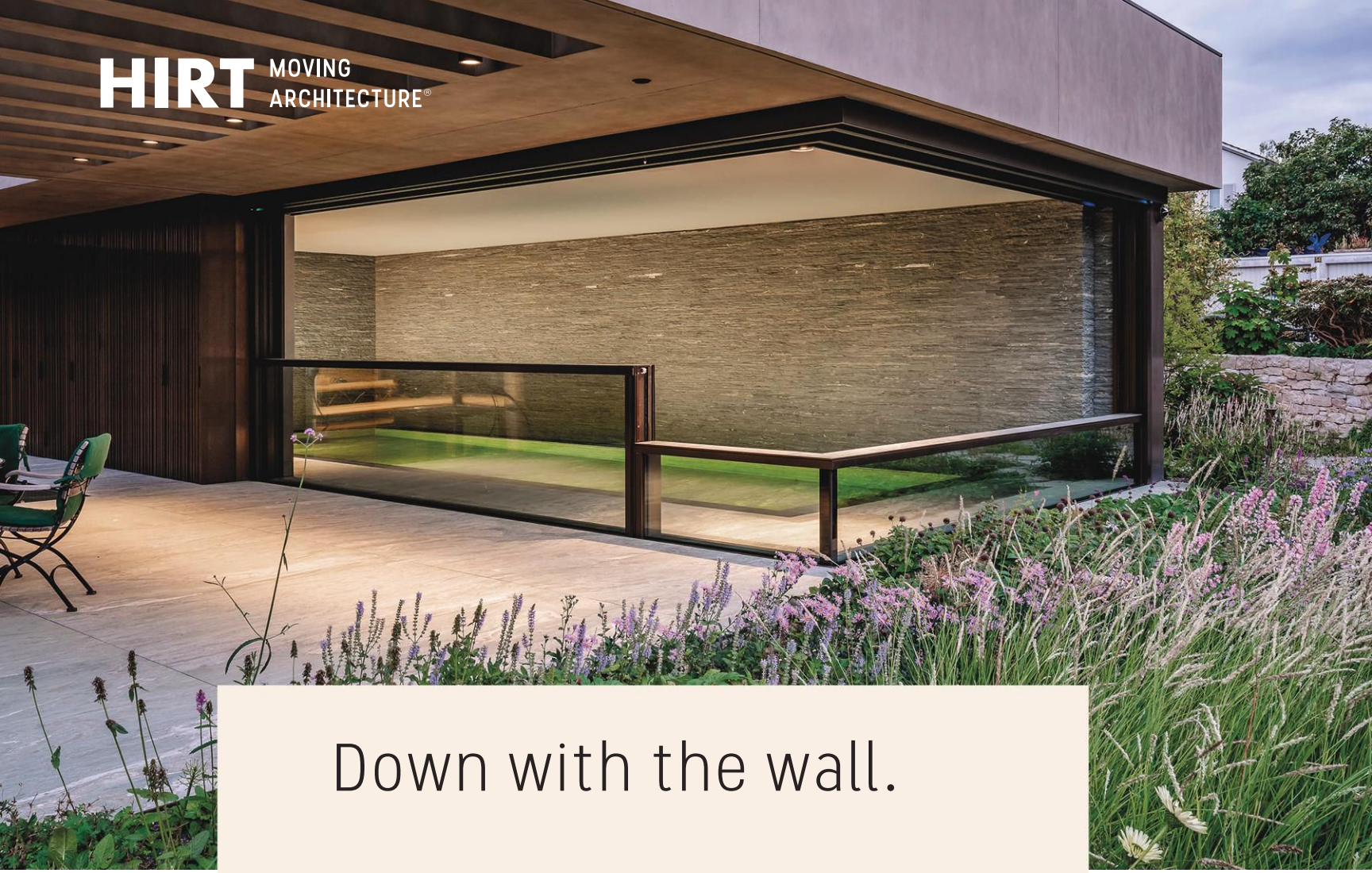

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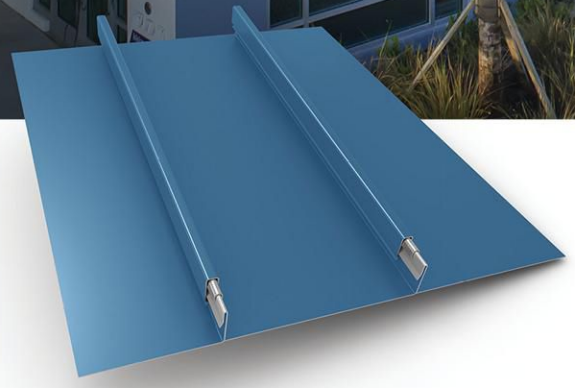

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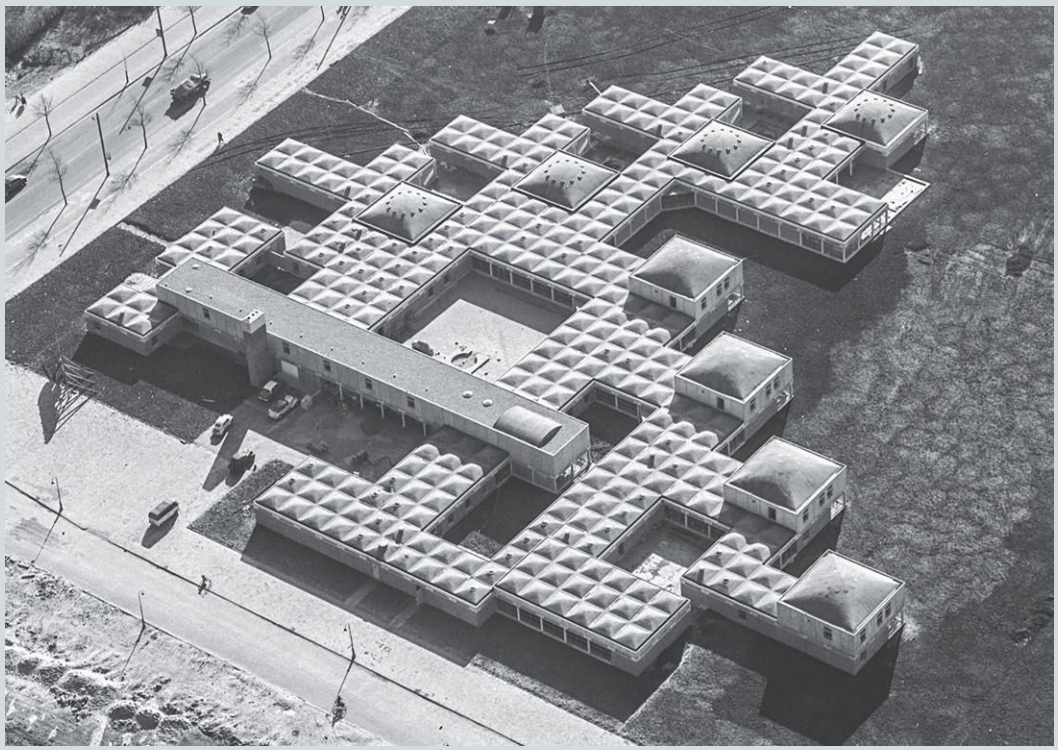

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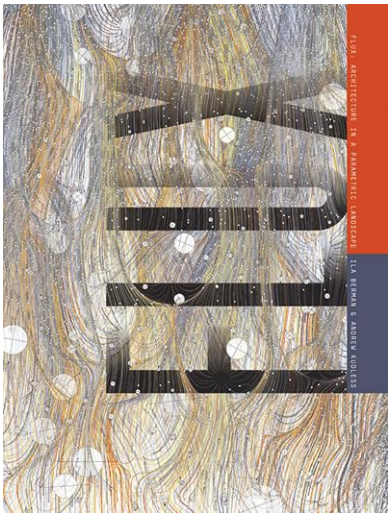
Flux: Architecture in a Parametric Landscape, *by Ila Berman and Andrew Kudless. Applied Research and Design Publishing, 320 pages, $55.*

REVIEWED BY NADER TEHRANI

***FLUX*, A NEW BOOK** written by Ila Berman and Andrew Kudless, inspects the architectural discipline as viewed from, and within, the parametric landscape. For me, attempting to review this book is a precarious task, if not because of the conflict of interest posed by having played a couple of cameos within it, then because of the sheer reckoning of being part of a generation that is now ready to be historicized. After 30 years of cultural production in this intellectual terrain, *Flux* takes on the parametric project—design mediated through computational and algorithmic protocols—as a collective one, with collaborators and competitors demonstrating how their work builds on each other's, making incremental advances to produce new forms of knowledge.

Densely curated, with an endless menagerie of well-known projects, this somewhat encyclopedic collection is organized in accordance with constructed taxonomies, carefully blending their theoretical underpinnings with the instrumental role of technologies that lie just under the surface of their ideas. The partnership of Berman and Kudless, both longtime academics, is strategic, with Berman's intellectual insight buttressed by her linguistic dexterity, and Kudless's analytical precision supported by a forensic study of the very projects under scrutiny. To be clear, if Berman unpacks the material through her rhetorical mastery, Kudless has



parametrically redrawn, or recoded, the projects he is inspecting, using the structure of their scripts as a foundation for untested transformations. To this end, the intellectual endeavor of this book is anything but passive: it creatively categorizes, forensically dissects, critically interrogates, strategically appropriates, and holistically participates, with the authors who, incidentally, were not engaged in this process of analysis. Architects of many eras are cited in each chapter, bringing thematic parity to key ideas over different historical periods; thus, though ideologically disparate, Kisho Kurokawa, Peter Eisenman, and EZCT are juxtaposed to demonstrate the

evolutionary capacity of cellular organizations across different hands and minds. Grounding itself historically through early explorations by figures such as Frei Otto, Eladio Dieste, and Felix Candela, the book also shows how certain ideas are transformed through the computational dexterity of contemporary figures such as Gramazio Kohler, Achim Menges, and TheVeryMany.

Curated as eight thematic chapters, with an introductory text and a sequence of projects paired with analytical drawings, the chapters are self-consciously treated as provisional conceptual vessels. Each contains the "dominant logic or morphological traits" of a set of explorations, acknowledging that many operate between chapters, with accrued associative qualities that bind them to ideas beyond a closed set of categories. Accordingly, Jenny Sabin's complex and interactive contribution to the book, ADA, is set within the chapter "Multi-Agent Networks," and yet one can clearly extrapolate its connections to operations adopted within "Cellular Clusters," "Woven Meshes," or "Emergent Surfaces."

If it took the featured architects some three decades to develop the installations, mock-ups, and buildings that form the research of this body of work, the protocols to which they have given birth have also become mainstays of conventional architectural practices today. Though the book does not explicitly make this claim, its timing and reflective view brackets a moment revisiting this thinking within a more experimental posture, from long before the institutionalization of its techniques. That these methods are commonplace today—and some even on the verge of obsolescence, with the advent of artificial intelligence—marks the unprecedented speed of contemporary culture. The book is timed precisely to record this historical passage, at the threshold of an accelerated history analogous to the incremental evolution of stop-motion techniques in 20th-century animations contrasted to the immediate output of contemporary generative models like Stable Diffusion.

In this sense, *Flux* might serve as a distant cousin to *Archaeology of the Digital* (2013), where Greg Lynn identified another series of architects of an even earlier period—Peter Eisenman, Frank Gehry, Shoei Yoh—who engaged the digital medium with innocence and speculative verve, though also with less precision. What stands out in the body of work presented in *Flux* is the clarity of its collective trajectory: the book is curated to tell a story, with a narrative that builds up ideas with techniques, elemental and raw in the beginning, gaining interactive complexity as it evolves through chapters. In this sense, the curatorial and analytical effort of this must be underlined as part of its critical contribution, if only because the projects contained within were certainly not conceived with that narrative in mind.

The consistency of the work also points to a salient characteristic of our contemporary condition; the omnipresence of the internet and the immediacy of communication has had the effect of collapsing time, geography, and

culture in such a way that it makes the overlaps between the different projects not only possible, but inevitable. While this has also eliminated the singularity of architectural authorship—what for centuries has defined the allure of the architect's "genius"—it has also exposed the degree to which the architect's reading of others' works (and in turn their influence) is part of a collective contract. In contrast, the narrative behind the *Archaeology of the Digital* is still woven around a set of architects whose design process invites the aura of mystification. Berman and Kudless's carefully crafted genealogy effectively demythifies the protocols that produce apparent complexity, and in doing so also redefines the role of authorship in the digital age.

The birth of digital platforms has given rise to a significant shift in architectural practices, long defined by formal, spatial, and material disciplines, all visually based. The rule-based logics of parametrics instead produce algorithms and scripts as their prime contribution, feats that are nonvisual in the first instance, though with complex compositional consequences as their by-product. Berman and Kudless help to recenter this history, though never throwing the baby out with the bathwater; that is, theirs is not an argument against composition per se, but rather a demonstration of how these projects look beyond the rarefied object but invest in the multiplicities produced by this new paradigm. As insinuated by Berman and Kudless, "multiplicity" can be seen in many guises: in how one project relates to the next, in the mass-customization of elements, in the iterative capacity of the generative logics, and the compositional reach of a simple rule. Though linear as a narrative, the book sequentially layers these projects together, weaving commonalities strand by strand in what emerges as a rich array of interconnected themes under one cover. ■

Nader Tehrani is principal of Nadaaa and former dean of the Irwin S. Chanin School of Architecture of the Cooper Union.

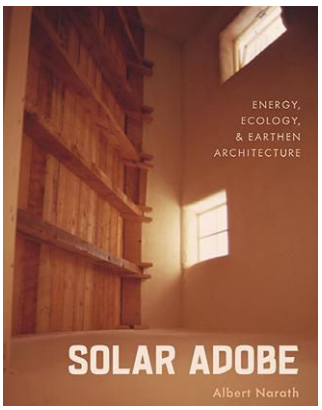
Solar Adobe: Energy, Ecology, and Earthen Architecture, *by Albert Narath. University of Minnesota Press, 296 pages, $33.*

REVIEWED BY KATHARINE LOGAN

"A FEW PEOPLE felt that only so much could be said about adobe." This quote, from an adobe building magazine achieving its one-year anniversary in 1975, forms an epigraph to the introduction to Albert Narath's new book, *Solar Adobe*. A reader returning to the quote after finishing the book is almost certain to laugh. Oh, how wrong they were! Subtitled *Energy, Ecology, and Earthen Architecture*, the book traces a largely forgotten yet freshly relevant period of experimentation with passive-solar design and adobe structures in the American Southwest of the 1970s, spotlighting the rich variety of characters, settings, themes, and narratives that contribute to this storied material's depth of meaning.

The author's aim is to explore the ways in which wide-ranging engagements with this

particular building material raised critical questions: about how architecture is practiced in a time of environmental crisis, whom it should benefit, and what a building is, or could become, as an object of energy-conscious design. Narath does this across four chapters, each recounting the '70s adobe scene from a different perspective, with black-and-white illustrations from the period supplementing the text.



A chapter entitled "Mud Machines" sets solar adobe in the historical context of environmental-control technologies in the United States. Beginning with a case study of an emblematic house designed in 1973 by the architect William Lumpkins, the chapter grapples with the apparent paradoxes of the romantic, vernacular-inspired "Spanish-Pueblo" building style and the rigorous scientific analysis of solar adobe (by former weapons engineers at Los Alamos Labs' newly formed Solar Research Group) as, essentially, a finely tuned, inhabitable solar collector. The chapter goes on to situate solar adobe experimentation and discourse as part of the ascendant notion of "appropriate technology" in 1960s and '70s America.

From an ecopolitical perspective, a chapter on "Earth Ecologies" illuminates the emergence of a design methodology for taking account of the environmental challenges presented by postwar urban expansion. In particular, the chapter focuses on the work of the architect and academic Ralph Knowles, whose research investigated adobe construction, ancient and modern, through the lens of ecosystem formation and maintenance. Cofounder of the University of Southern California's Natural Forces Laboratory, Knowles was influential in fostering the use of environmental data to analyze the interrelation of such variables as sun, wind, and water with building form.

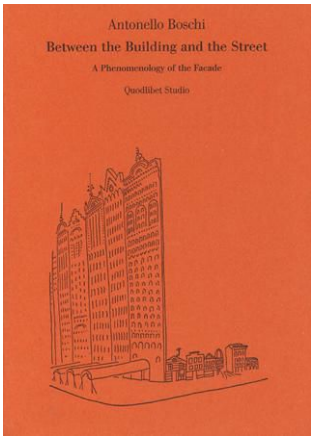
A subsequent chapter, "In and Out of Sight," examines the positioning of Indigenous architecture as a counter-precedent to modern urban-planning practices and their problematic legacy. Considering midcentury art-historic views of earthen building, the chapter centers on Yale academic Vincent Scully's perception—and deliberate image-making—of Pueblo architecture as a harmonious interplay of natural and human-made environments, and as a picture of architectural and cultural coherence. Narath then juxtaposes Scully's interpretations with those of architectural historian Reyner Banham, who has more consciousness of the hazards of "pale-face attempts to focus 'the Indian phenomenon,'" to query notions of evidence, observation, and positionality.

Throughout the book, Narath tells stories of the solar adobe movement—its thinkers, innovators, paradoxes, and potential—while keeping in the foreground the issues of appropriation of Indigenous culture and legitimacy of voice. The fourth chapter, "Mud/HUD," brings these concerns center stage, showcasing the work of a group of Indigenous scholars, designers, and preservationists, including the foundational work of the Isleta planner and scholar Theodore Jojola, in confronting what seems to have been the idiocy, obstinacy, and sheer arrogance of official housing policies as they pertained to—or rather dismissed and obstructed—Indigenous nations' heritage of adobe. The reader is left dumbfounded.

Beyond an audience that has a particular interest in earthen architecture, *Solar Adobe* will appeal to those curious to understand an underappreciated period in the history of architecture and to consider perhaps familiar themes of sustainability from a new perspective. More broadly, the book offers an object study in a material's potential for meaning. ■

Between the Building and the Street: A Phenomenology of the Facade, *by Antonello Boschi. Quodlibet, 496 pages, $58.*

REVIEWED BY LORENZO DEGLI ESPOSTI



IN 1967, when Aldo Rossi added an introductory essay to the Italian edition of Étienne-Louis Boullée's *Architecture, Essay on Art*, he quoted Denis Diderot. Commenting on the siting of Place Louis XV in Paris, Diderot stated that he would not have cleared the forest there—that it would have been better to let people peer into the bosque's shadowy depths from between the columns of a peristyle. In so doing, the French philosopher criticized unimaginative architects who could otherwise tap into ideas "awakened by the environment and surrounding objects."

Historian Antonello Boschi's thinking fits into this conception of architecture. In our current predicament, when architectural discourse has seemingly run rampant from *building*—consider the recent (and many) speculations about the digital, big data, and artificial intelligence; about climate, the Anthropocene, and forestry; about political rights and gender; and how architectural education has generally blurred into equivocal practices of "co-teaching" and "co-learning"—his book stands out for what many new thinkers might deridingly identify as a certain outdatedness. I am neither a Rossi loyalist nor a supporter of projects that primarily depend on their context, but I do believe in the disciplinary status of architecture—and Boschi demonstrates why

such specificity is necessary and useful for the precise moment in which we live.

The substantial, nearly 500-page volume makes its subject matter apparent from the title: that which exists *between* the building and the street. The subtitle circumscribes it even more: phenomenology and the facade. But it is Boschi's treatment of this subject matter, which is tied to contextual threads spun from the built environment more generally, that produces a richly interwoven tapestry. For him, facades are even more significant when their context has been appropriately considered and observed.

The author has divided the book into four chapters: "Paths," "Readings," "Itineraries," and "Marginalia." The fourth, however, is perhaps the most interesting, providing a comparative historical etymology of the term *facade* and its derivatives, beginning in 1612 with the definition given in the *Vocabolario degli Accademici della Crusca*, and moving on to those in Diderot and d'Alembert's *Encyclopédie* and in dictionaries authored by Quatremère de Quincy, Eugène Viollet-le-Duc, and Niccolò Tommaseo, among others. The third chapter also offers a selection of valuable case studies divided by type: "Facades between facades," which identifies projects by Felix Claus & Kees Kaan, Giorgio Grassi, Herzog & de Meuron, Umberto Riva, and Waro Kishi; "Facades en face," which deals with the corner (enter Álvaro Siza, Rafael Moneo, and Robert Venturi); and "Isolated facades," with one example, by Juan Navarro Baldeweg.

Supplementing the text is a lavishly illustrated set of plates featuring 334 pictures. Readers will discover Mannerist Roman palaces; the nuances between the architectural orders and rustication in the works of Michelangelo, Giulio Romano, Jacopo Sansovino, and Michele Sanmicheli; the continuous facades of the Piazza Ducale of Vigevano and the Palazzata of Messina; John Nash's Regent Street in London; French *hôtels particuliers*; and references to 18th-century books on the marvels of antiquity: Athens, Herculaneum, Palmyra, Baalbek, Paestum, and Split.

Boschi's bibliographical notes, equally rich in references, express a dialectical openness. On one hand, there are such figures as Heidegger, Norberg-Schulz, Rykwert; on the other, Wölfflin, Panofsky, and Wittkower—to say nothing of the many treatise writers and scholars, from Alberti and Durand to Eisenman and Venturi, who make occasional appearances.

Between the Building and the Street is so steeped in history and information that, at times, it fails to escape a kind of fragmentary nature—perhaps unavoidable given its denseness. But the project of architecture requires, first and foremost, knowledge of buildings and the city. The goings-on in other fields may certainly affect the discipline, but they will only ever remain ancillary to the architect's work. Boschi's book is a learned one, suited for those who still want to discuss architecture and cities, albeit from very different—yet still disciplinary—vantage points. ■

Lorenzo Degli Esposti is principal of Degli Esposti Architetti in Milan.

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JOSLYN ART MUSEUM | OMAHA | SNØHETTA

Well Done

A new wing, reimagined grounds, and a major renovation energize a beloved cultural institution in Omaha.

BY MATT HICKMAN
PHOTOGRAPHY BY NIC LEHOUX

AT THE TAIL END of 1994, several months after Norman Foster was awarded that year's AIA Gold Medal, the star British architect's inaugural commission in the United States opened in a somewhat curious location: smack dab in the American heartland, in Omaha. An expansion project connecting to the Joslyn Art Museum's landmark Memorial Building via a 200-foot-long glass atrium, the project marked a reserved stateside debut for the future Pritzker Prize laureate: a boxy, windowless gallery building wholly sympathetic to its older, Art Deco counterpart, completed in 1931. In a brief dispatch, *Progressive Architecture* asserted that Foster's new wing at the Joslyn proved the skeptics—convinced that his firm "could not do a building that fits into a historic context"—wrong. From their height and massing to the matching cladding in the form of blush-colored Etowah (or Georgia pink) marble sourced from the same quarry, the two buildings are in such close dialogue that, for nearly three decades, it was difficult to imagine how an inevitable third building on the Joslyn campus would engage with its predecessors.

Now, the Joslyn *is* three with the September 10 opening of the 42,000-square-foot Rhonda and Howard Hawks Pavilion. Designed by Snøhetta, the steel-framed new structure comprises a museum store, community room, and soaring, column-free main-lobby atrium-cum-event-venue anchored by a wide, curving staircase that leads to 16,700 square feet of gallery space spread across the building's second level. The Hawks Pavilion's "twist" connector flows into the museum's existing glass-topped passageway, fusing itself with Foster's addition and the Memorial Building, which underwent a substantial renovation. Foster's atrium got a fresh-up too, including replaced glass panels, much-needed hanging acoustic baffles, new lighting, and a revamped café and servery. All were part of a more than $100 million overhaul under the leadership of Jack Becker, who assumed the role of director and CEO of Nebraska's largest art museum in 2010.

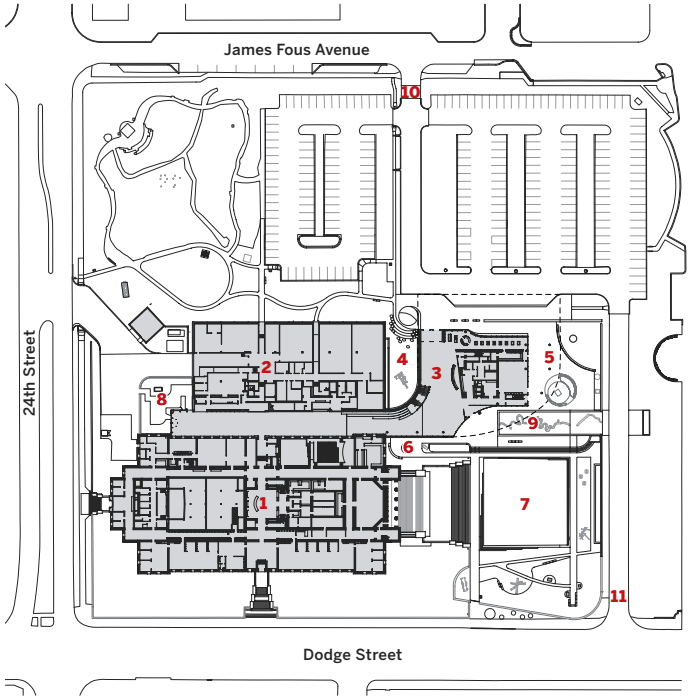
The New York office of Snøhetta was selected for the project alongside partnering local firm Alley Poyner Macchietto Architecture in 2018. With the Hawks Pavilion, Snøhetta eschews the path of deference taken by Foster, opting for subtle yet playful nods to the building's predecessors, mainly in its facade. A similar approach was taken by the firm with respect to the Mario Botta–designed building in their expansion of the San Francisco Museum of Modern Art (RECORD, May 2016). Echoing the patterning of the Memorial Building's monumental stack-stoned stairs in the precast-concrete baguettes that wrap around much

CANOPIES can be found on the south (above) and north (left) of the Hawks Pavilion. All three buildings are linked by an existing renovated atrium (opposite).

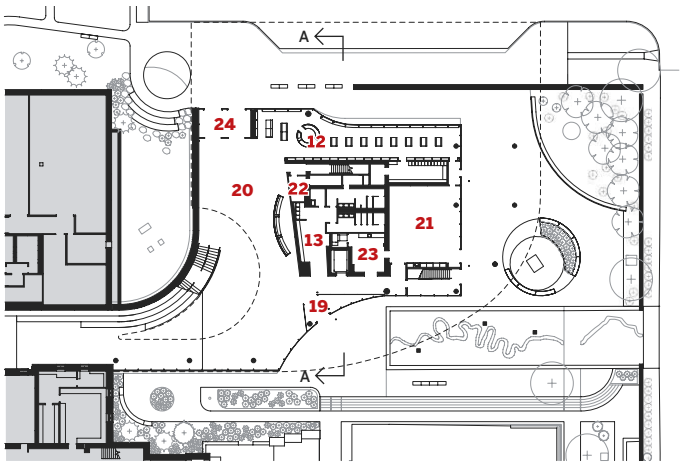
of the upper half of the building, they've also incorporated just a touch of the Joslyn's signature pink.

"The first question we were asked by people was if the new building was going to be pink, not even where it would be located. And our immediate answer was always no," recalls Aaron Dorf, project director on the Snøhetta design team, led by firm cofounder Craig Dykers. "We experimented with a pink aggregate that could bring the color out in the precast panels, and we found the right amount to add a light blush to the building that changes throughout the day."

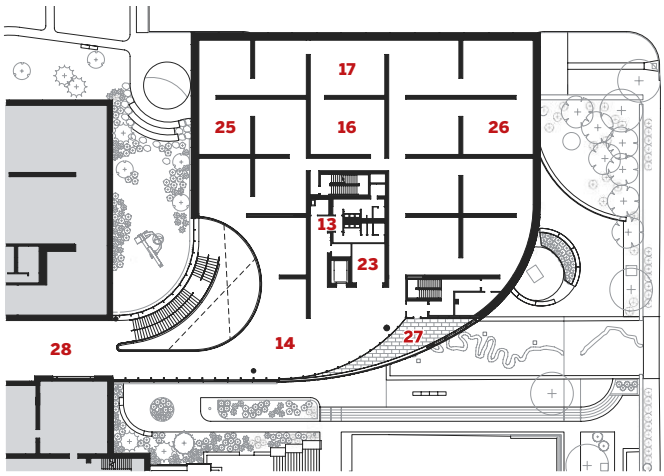
The warm, shifting color of the facade plays into Snøhetta's vision for the irregularly shaped building, which features a transparent first floor, markedly low-slung upon entry. The space opens to reveal an expanse of glass—a dramatic use of compression and release—and a top-heavy gallery level that "floats" above existing granite garden walls. With the two earlier buildings being so formal and anchored in the landscape, the Hawks Pavilion is envisioned as something more ephemeral, inspired by the wide-open



SITE PLAN

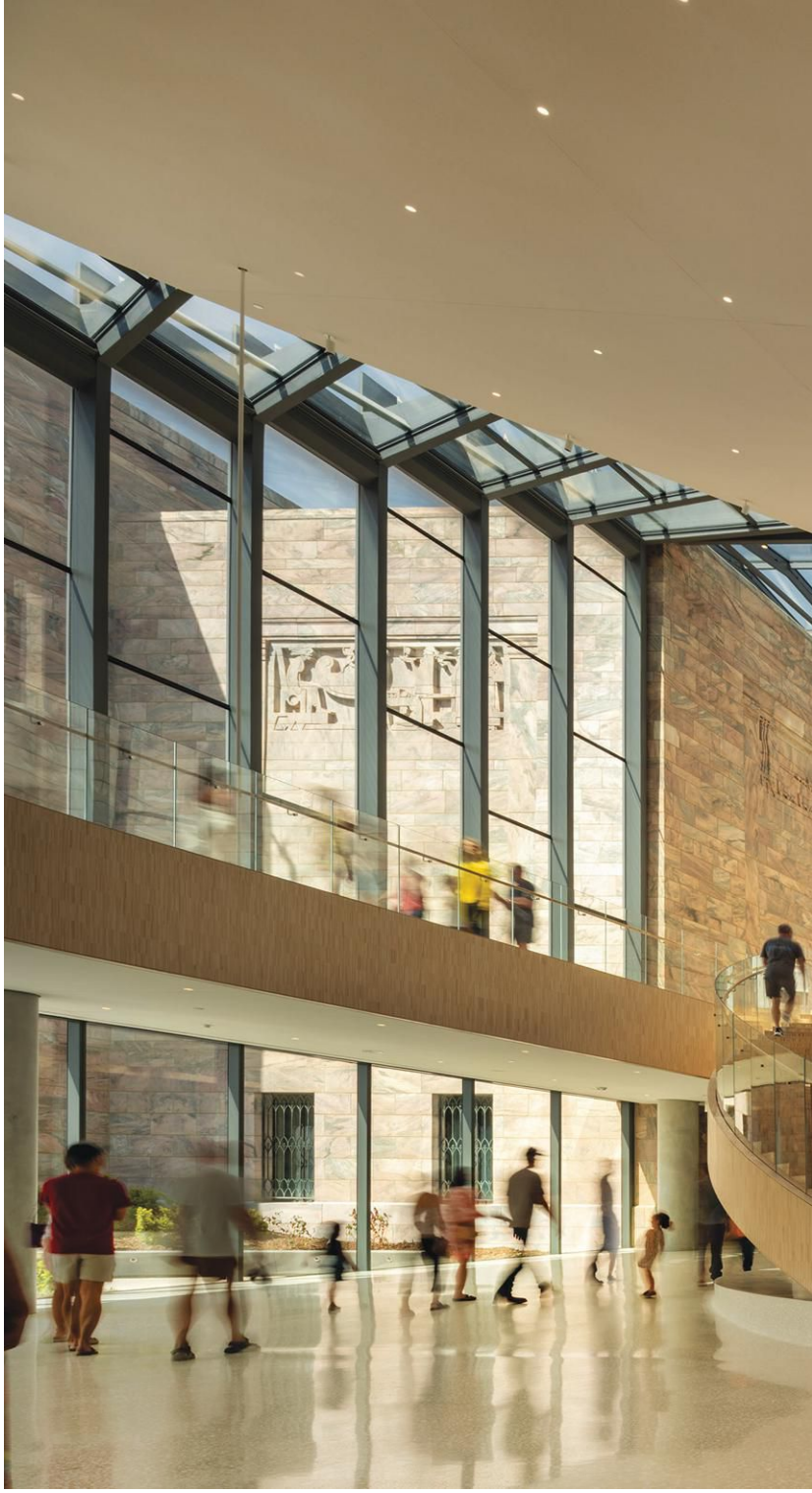


GROUND-FLOOR PLAN

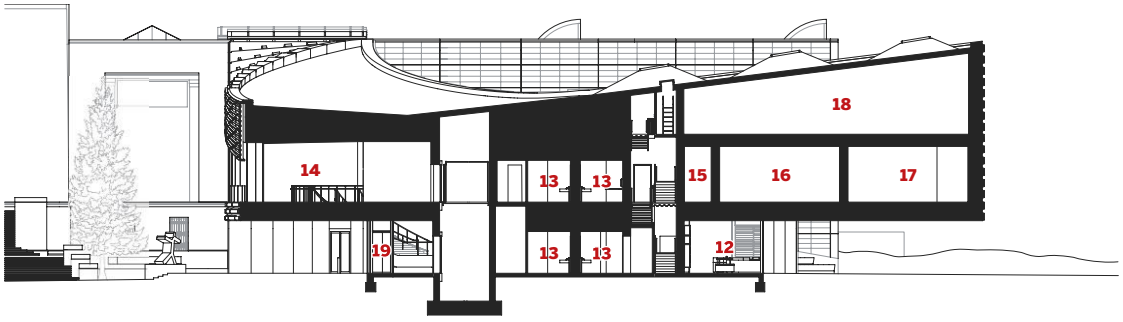


LEVEL-TWO PLAN

0 30 FT. 10 M.

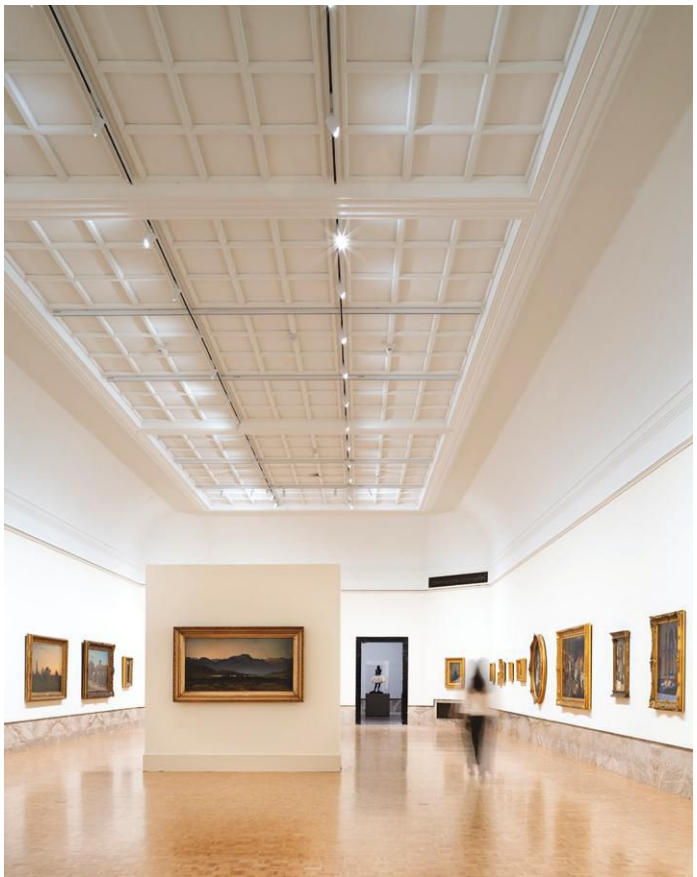


1 MEMORIAL BUILDING
2 SCOTT PAVILION
3 HAWKS PAVILION
4 NORTH POCKET GARDEN
5 COURTYARD GARDEN
6 SOUTH POCKET GARDEN
7 LAWN
8 ATRIUM GARDEN
9 EXISTING SCULPTURE
10 MAIN SITE ENTRY
11 SOUTH SITE ENTRY
12 MUSEUM STORE
13 RESTROOMS
14 OVERLOOK GALLERY
15 CORRIDOR GALLERY
16 MEDIA ARTS GALLERY
17 WORKS ON PAPER GALLERY
18 MECHANICAL
19 SOUTH ENTRY VESTIBULE
20 LOBBY
21 COMMUNITY ROOM
22 ADMINISTRATION
23 STORAGE
24 NORTH ENTRANCE
25 WEST GALLERIES
26 EAST GALLERIES
27 TERRACE
28 BRIDGE



SECTION A - A

THE HAWKS PAVILION'S Phillip G. Schrager Atrium offers views of the Memorial Building, 1994 Scott Pavilion, and entry garden.



Credits

ARCHITECT: Snøhetta — Craig Dykers, founding partner, architect; Michelle Delk, partner, landscape architect; Aaron Dorf, director, architect; Kate Larsen, director, landscape architect; Alex Stewart, senior project designer; Dan Marty, project architect; Laura Sandoval, Zeynep Göksel, Stephanie Loomis, project designers

ARCHITECT OF RECORD: Alley Poyner Macchietto Architecture

ENGINEERS: MKA (structural); Thompson Dreessen & Dorner (structural engineer of record); Olsson Associates (civil); Morrissey Engineering (m/e/p/fp)

CONSULTANTS: Anser Advisory (project manager); Front (facade); Arup (lighting, acoustics); A10 (sustainability)

GENERAL CONTRACTOR: Kiewit

CLIENT: Joslyn Art Museum

SIZE: 42,000 square feet (new construction); 20,800 square feet (renovation)

COMPLETION DATE: September 2024

Sources

EXTERIOR CLADDING: Coldspring (anchored stone masonry); Architectural Wall Systems/AWS, GATE Precast (rainscreen); Sto (exterior finish system)

CURTAIN WALL: AWS

GLASS: AGC Interpane

HARDWARE: Schlage (locksets); Sargent (closers)

SUSPENSION GRID: Armstrong

ACOUSTICAL CEILINGS: Pyrok

PAINT: Benjamin Moore

PLASTIC LAMINATE: Formica

CARPETS: Interface

FLOORING: DeMarco Brothers (terrazzo), Kaswell Flooring (wood)

SOLID SURFACING: Caesarstone

INTERIOR SHADING SYSTEM: Draper, Veil Engineering

LIGHTING CONTROLS: Crestron

PLUMBING: Sloan (toilets), Toto (flush valves), Laufen (sinks)

NEW and renovated exhibition space can be found in the Hawks Pavilion (opposite, top), the Memorial Building (opposite, bottom), and a sculpture-populated second-floor gallery overlooking the campus gardens (above).

skies of the Nebraskan plains: a cloud formation.

"The Memorial Building is a raw, classical monolith emerging from the ground, and the Foster pavilion is such a clean, rectilinear, and highly Cartesian box dropped onto the flat, raised plain," says Dorf. "One feels as if it's growing out of the land; the other is set perfectly on top of it."

In their design research, Snøhetta studied the Great Plains—and not just the area's ground conditions. "From our perspective, the sky defines the plains as much or more than the land, which the two existing buildings already had a connection to," adds Dorf.

Clouds, specifically ominous ones, also played a more practical role in the design of the building, located in a city subject to tornados and thunderstorms capable of producing softball-size hail. Working with an engineering consulting firm specializing in severe weather, the architects studied pedestrian wind comfort beneath the deep 163-foot-wide cantilever over the new main entrance on the north side of the building—an ideal place to take shelter when the sky opens up. Decisions regarding the robustness of the facade and of the roofing system also considered Mother Nature at her most extreme.

"They have enormous power, color, and quality," says Dykers of cloud formations over the Great Plains. "If you look at the pavilion, all the swoops, swirls, and shapes bring people a hint of what it's like to be in the Nebraska landscape."

The vast Nebraskan sky is pulled *into* the Hawks Pavilion through an innovative and relatively uncommon lighting system that mixes natural and artificial light in the building's core exhibition galleries, but not the media gallery and an adjacent works-on-paper space (currently showing an exhibition by Omaha native Ed Ruscha). All have white ash floors. With scooped light baffles overhead, the galleries to the east and west are topped by a sloped attic that functions as an illumination-mixing chamber that Dorf likens to an concealed theatrical lighting area in the flies.

"You've got a catwalk and technical lighting, in addition to big skylights, and lots of different shades that can mute the skylights or black them out as needed," he says. "What you get below is something that's a little more controlled than daylight, but also has that quality of color changing throughout the day. At other museums, you can usually see the skylights or the light source, and here we're disguising both to create just a soft, glowing effect."

Populating the light-filled Hawks Pavilion galleries is the first presentation of the 52-piece Phillip G. Schrager Collection of postwar and contemporary art. The collection, which comprises the most significant gift in the museum's history, includes works by Roy Lichtenstein, Lynda Benglis, Gerhard Richter, Jenny Holzer, and Robert Irwin.

In tandem with the debut of the Hawks Pavilion, the Joslyn reopened with the first full reinstallation of its collections. The renovation of the Memorial Building—praised as one of America's finest buildings upon its completion—includes new LED lighting, reconfigured garden-level administrative offices, two new educational spaces, a refurbished lecture hall, renovated meeting and classrooms, and myriad cosmetic fixes. Changes to the Joslyn's grounds are even more marked. Once largely cloistered, the campus is now more welcoming to Omahans through the lowering of perimeter walls, one to the south and another to the east. Encompassing three acres, that effort, led by Snøhetta partner and landscape architect Michelle Delk, has yielded a new Great Lawn at the foot of the Memorial Building; a series of new and reimagined gardens serve as social spaces and open-air galleries for the museum's growing sculpture collection. "There's a unified composition that was in part inspired by some of the art that we saw in the galleries," says Delk of the gardens, where the native grasses of the Great Plains and meadow plantings abound.

Ultimately, the *new* Joslyn Art Museum, with its trio of buildings woven together by a revitalized and accessible landscape, works so well largely because it avoids blotting out any of the site's history. Says Dorf: "We created something new, the power of which actually lives in its ability to honor the old." ■

PDX MAIN TERMINAL EXPANSION | PORTLAND, OREGON | ZGF

Against the Grain

A tree-filled airport terminal treads a different path, heralding a new era for civic-scale mass-timber construction.

BY LEOPOLDO VILLARDI
PHOTOGRAPHY BY EMA PETER

"IT SEEMS like everyone is just lost in a dreamworld," laments an outsider on the sketch comedy *Portlandia*. "For one thing, your airport is 20 minutes to and from. That's not how cities are!"

The irony of the bit is that, indeed, Portland's international airport is uncommonly easy to access, via car and public transit. The prime location is one of the reasons why those notably quirky Portlanders adore it. Outposts of local restaurants that serve food at the same price point as their downtown shopfronts (due to an anti-price-gouging policy) are another. Let's not forget the famous carpet pattern, which has spurred apparel of all kinds. But in August, PDX opened a tree-filled main terminal, designed by local architecture firm ZGF, that sets a new, sky-high standard for air travel.

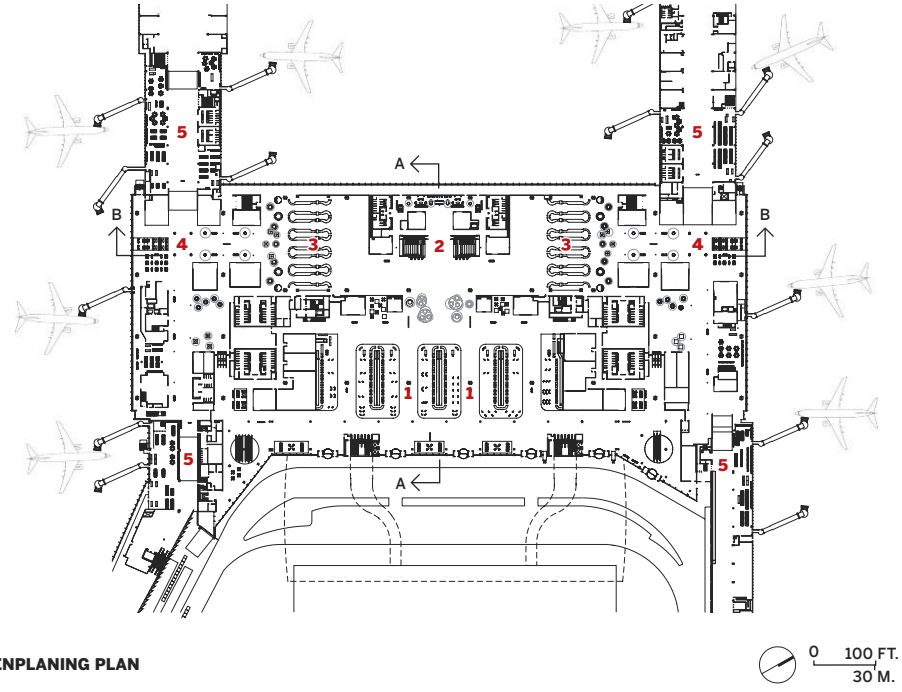
Getting to this point wasn't a stroll through the park. Until recently, the airport had shared some less fortunate aspects with other major hubs across the country, namely, incremental expansions that aimed to keep pace with ever-accelerating demands. By 2020, PDX's main terminal comprised 11 separate structures from different decades, all constructed on fill. "Some airports have the ability to build a terminal or an entirely new airport on the other side of the field and, one day, just turn the lights on," says Vince Granato, chief projects officer at the Port of Portland. But, with the terminal wedged between two active runways, which are, in turn, squeezed between the Columbia River and another waterway, PDX didn't have that luxury. Updating the agglomeration would have triggered complex (and costly) seismic upgrades without the opportunity to introduce the 21st-century fixings desired by airlines (which typically front the cost of such projects) and customers. "We're basically at the end of a cul-de-sac," Granato adds, "so we needed to figure out how to use the space that we already had most efficiently."

The Port's choice to enlist ZGF, founded in Portland but now with seven offices across North America, brought a team with intimate knowledge of the site (the firm oversaw several of the airport's previous expansions). As ZGF partner Gene Sandoval, who led design with fellow partner Sharron van der Meulen, recalls, "Focus groups made clear that the public wanted the new terminal to reflect the region. So, we asked ourselves: 'how can this project also drive the local economy and do it with equity?'"

The firm's answer to this question of heritage, as well as those raised by the complexities of labor costs, restrictions imposed by the Federal Aviation Administration, a need to keep the airport operational while its main terminal was deconstructed and systematically replaced, and an abundant supply of nearby lumber, came in the form of extensive prefabrication in mass timber.

Over the last four years, a 200-person team of workers fastidiously built 18 variously sized (the largest being 240 feet by 110 feet) modules, each comprising a layered system of glue-laminated arches sheathed above by mass-plywood panels and below by a lattice of dimensional lumber. In total, some 3.5 million board feet—2 million for the


Concourse D E
B C D E Arrivals

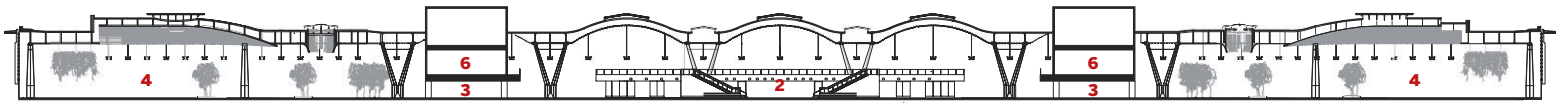


ENPLANING PLAN

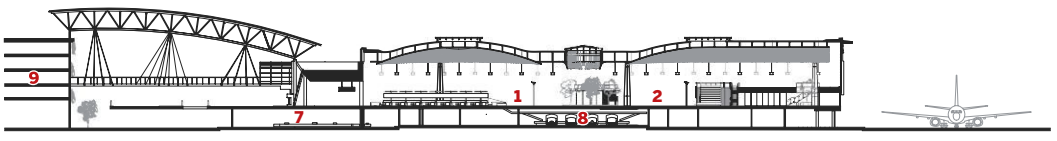
glulams, 850,000 for the panels, and 600,000 for the lattice—were used to build these modules—largely without the need of specialized labor, due to relative ease of connecting the components. All wood originated from within a 300-mile radius, and nonprofit Sustainable Northwest ensured that 73 percent of the roof's timber was either FSC certified or could be traced back to family-managed businesses or tribal landowners that engaged in ecologically responsible forestry practices. The process of installing each of the modules—the three days required to lift, move, and place them—as well as the details surrounding ZGF's comprehensive material-sourcing strategy and coordination with local mills, were described in a special section on wood construction in the June 2023 issue of RECORD.

Now open to the public, PDX's main terminal heralds a new era of civic-scale mass-timber construction. The cool and calming scene inside couldn't be further from the frenetic chaos many travelers must endure elsewhere—instead, it invites a certain slowness. Several planters of black olive, fern pine, and laurel fig dot the open and airy headhouse, which is capped by the prefabricated modules that together form an undulant nine-acre, 36-foot-high canopy punctuated by an array of occuli. These skylit clearings range from circular apertures to elliptical ones, where the ceiling's delicate lattice seemingly unravels to make way for a deluge of daylight. Sandoval likens walking through the terminal to a hike in the woods, "with the same smells and light hitting the forest floor."

After passing the ticketing counters, which are turned 90 degrees to create sight lines from the entrance clear through to the taxi-

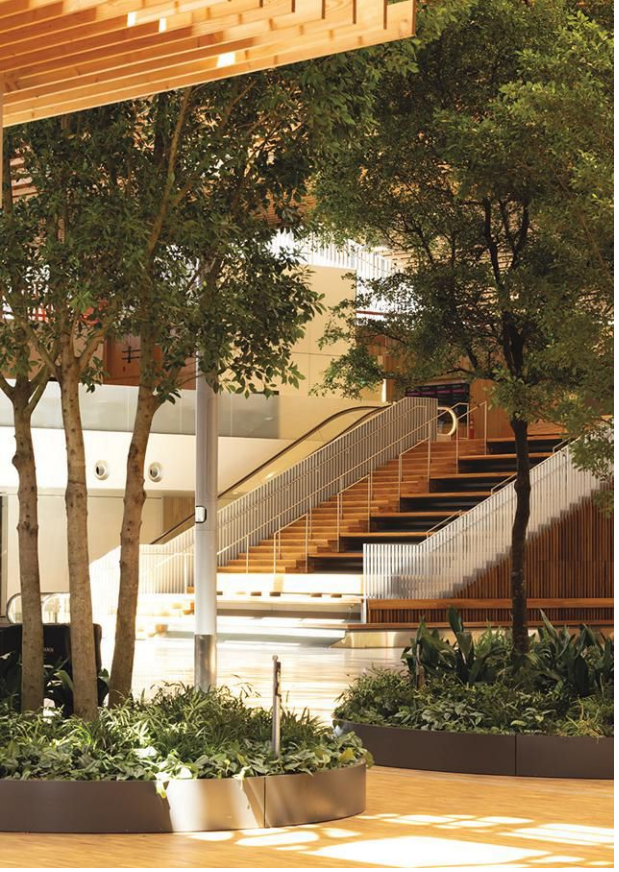


SECTION B - B



SECTION A - A

1 CHECK-IN/TICKETING
2 MARKET HALL
3 SECURITY CHECKPOINT
4 CONCESSIONS
5 GATE CONCOURSE
6 OFFICE
7 BAGGAGE CLAIM
8 BAGGAGE HANDLING
9 PARKING



PLANTERS (above) and artworks (right) abound. The exterior facade echoes the form of the undulant ceiling (opposite).

ways, travelers have the option to wander about a central two-story concession-filled "market hall," or proceed toward the security checkpoints to the left or right—but they needn't worry about queuing on the wrong side. PDX's four existing gate concourses are connected, after security, via a glazed hallway that runs along the northern edge of the new terminal. In this way, the plan acts as a valve to distribute crowds during peak travel times.

Expansive LED-art walls—one at each checkpoint—distract travelers from time spent in line at security and conceal office and mechanical spaces. Passengers walk underneath the walls to a lower-ceilinged screening area before reemerging into another parklike space. The architects treated this stretch, the last before the airport's gate concourses, like a sliver of Portland, quite literally. Freestanding mass-timber concessions with slatted awnings, ample movable and fixed seating, and multifunction streetlight-like fixtures that conceal cameras, speakers, lighting, and fire-safety equipment recreate the warp and weft of the city's urban fabric. "This isn't a typical retail gauntlet," says Nat Slayton, one of the project architects. "We modeled it to have almost exactly the same dimensions and scale as the beloved shopping street Northwest 23rd."

Here, at the outer edges of the new terminal, a curious detail sprouts up. Part of the curtain wall, hung from the canopy, overlaps

FREESTANDING concessions feature timber elements, such as slatted canopies (this image). A delicate lattice unravels at elliptical apertures, appearing to cascade (opposite).

another part, fixed to the floor, like two giant shingles. Due to the vestigial foundations underfoot, the team relocated seismic isolators to the tops of the 34 Y-shaped, grout-filled steel columns that hold up the roof assembly. In the event of an earthquake, the canopy is free to slide in any horizontal direction up to 24 inches, and the shingled overlap will facilitate movement at the envelope.

In the end, the new terminal almost doubles the footprint and volume of its predecessor without adding load to the central utility plant. "We're using about 50 precent less energy than the old structure," says Slayton, due to a tighter enclosure, optimized skylight placement, and a new, all-electric ground-source heat pump system. And much of that floor space remains open to the public for dining, people- and plane-watching, or waiting for arriving family or friends. "We're bringing back some of the romance of air travel," Sandoval says, evoking a moment when airports were destinations in and of themselves. Though two gates were lost to make space for the expansion, the airport added six more elsewhere, increasing the airport's capacity to 35 million passengers annually and giving it plenty of room to grow from the current 16.5 million.

Though public excitement over the terminal continues to build, Granato is quick to point out the 18 or so more months of work ahead. With the new hall open, the second phase can begin, and the last few remnants of the old structure will be shuttered and disassembled. Airside, four more modules await their final home. In the meantime, locals and visitors alike can rest assured that PDX's patterned carpet lives on in the new building. Adds Granato, "Now people can look up and see a beautiful ceiling too." ■

Credits

ARCHITECT: ZGF — Sharron van der Meulen, partner in charge; Eugene Sandoval, design partner; Patrick Boyle, project manager; Jacob Dunn, Mark Foster, Mark Haidle, Glen Justice, Tony Martinez, William McGee, Robert Packard, Cathylia Peacock, Christian Schoewe, Rena Simon, Nat Slayton, Kip Storey, team

ENGINEERS: KPFF, Arup (structural); PAE, Arup (m/e/p); GRI (geotechnical); HNTB (civil)

CONSULTANTS: W&W AFCO Steel (steel trade partner); Arup (aviation planning); Sustainable Northwest (wood advisor); Place (landscape); Terrapin Bright Green (biophilic design); Fisher Marantz Stone, Luma (lighting); RWDI (air/wind analysis)

LUMBER MILLS: Elk Creek Forest Products, Frank Lumber, Freres Lumber, Herbert Lumber, JayZee Lumber, Kasters Kustom Cuts, Manke Lumber, Zip-O-Log Mills

HARVEST SITES: Camp Adams, Camp Bishop, Camp Namanu, Chimacum County Park, Cow Creek Band of the Umpqua Tribe, The Nature Conservancy Central Cascades Forest, Coquille Indian Tribe, Hanschu Family Forest, Hyla Woods, Joint Base Lewis-McChord, Roslyn Urban Forest, Skokomish Indian Tribe, Willamette University Zena Forest, Yakama Nation

GENERAL CONTRACTOR: Hoffman Skanska Joint Venture

CLIENT: Port of Portland

SIZE: 1 million square feet

COST: $2.15 billion

COMPLETION DATE: August 2024

Sources

MASS TIMBER: Zip-O-Laminators, Timberlab, Freres, Calvert

STUCTURE: Thompson Metal Fab (Y columns); Greenberry Industrial (roof girders)

CURTAIN WALL: Benson, Arcadia

GLAZING: Deamor (skylights); Carey Glass with Glas Trösch, Viracon (glass)

INTERIOR FINISHES: Nevamar, Wilsonart, Formica (laminate); Daltile (tile); McGrory Glass, Pulp Studios (glass partitions); Zena Forest Products (wood flooring)

FURNISHINGS: Landscape Forms (seating); Hayworth, Vitra (chairs)

PAINTS AND STAINS: Timber Pro

Sea Change

As part of an emerging bayside park, an aquarium expansion helps revitalize an urban waterfront.

BY JAMES S. RUSSELL, FAIA EMERITUS
PHOTOGRAPHY BY LARA SWIMMER

AT THE NORTHERN end of a 1.5-mile park nearing completion—a transformation of Seattle's downtown waterfront—a rounded structure clad in Alaskan yellow cedar has risen. Urbanistically, it is a hinge that gracefully shifts the park's flat shoreline promenade to the Overlook Walk, a series of planted staircases and pedestrian ramps that ascend a 110-foot-high bluff to draw the park up to the city's famous Pike Place Market.

The Seattle Aquarium's $170 million Ocean Pavilion, designed by LMN Architects, is not an object planted on this park but embedded in it. The steps of the Overlook Walk entwine the curving shoreline-facing wall of the Pavilion. The aquarium's public terraced and planted roof opens vistas to Puget Sound (now increasingly referred to by the Indigenous name Salish Sea) as it seamlessly joins the walkway and continues to the Market. With Field Operations, landscape architect for the pavilion and the park, Muckleshoot-tribe plant expert Valerie Segrest has selected species that represent a metaphorical journey from the sea to the mountains.

Aquarium leadership had long sought to expand; the Brutalist primary geometries of its 1977 building had been erected over the water's edge, attached to converted space within a 1905 heavy-timber-framed pier building. The waterfront project made growth possible across from the original building, on the park's land, in contrast to earlier schemes that undercut the aquarium's conservation ethos by extending over water, threatening valued habitat.

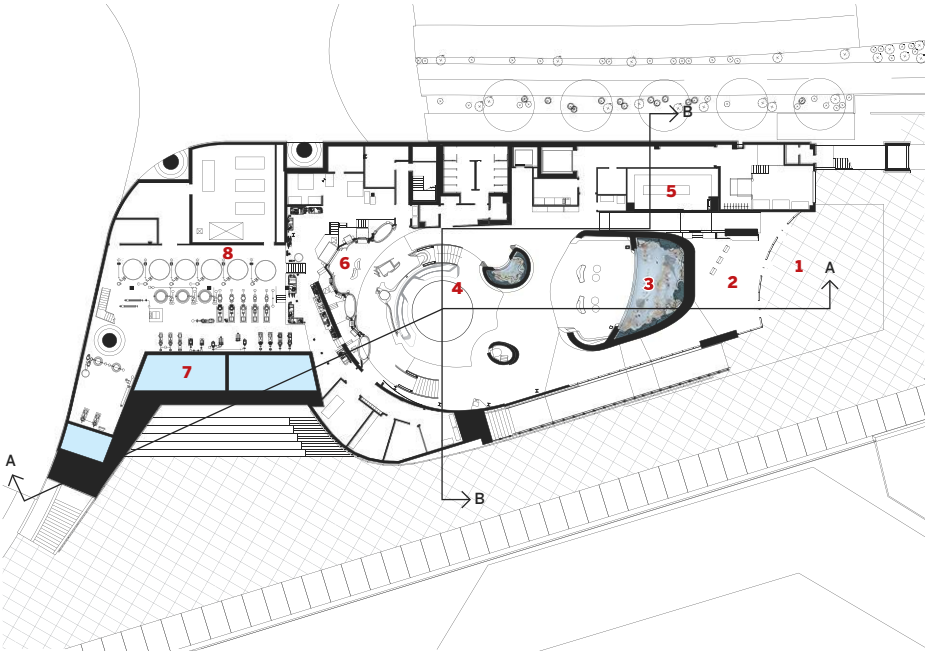
The park had its own complicated gestation. A two-level highway viaduct had long formed a noisy barrier between the downtown and the waterfront. Both the viaduct and the seawall were sufficiently damaged by a 2001 earthquake to force the city to restore the seawall and demolish the viaduct in favor of a deep highway tunnel. The space thus freed from the highway's shadow became the site of the park, which is opening in phases through early 2025. By routing Alaskan Way, which ran along the shoreline, behind the pavilion site, the park promenade could be widened into a generous fully pedestrian entry plaza that serves both the existing aquarium and the new pavilion.

The 50,000-square-foot building curves along the waterside steps, to recognize "this threshold of the Salish Sea and the urban core," explains Mark Reddington, an LMN partner. It presents a flat upper-level glass wall facing the park's esplanade to the south and cantilevers 48 feet out from the body of the building to shelter the entry plaza.

An oculus set into the plaza's ceiling invites visitors and passersby to look up at spotted eagle rays and shining schools of fish circling above within a coral reef–themed tank. Because daylight generally obscures the transparency of glass from the outside, the only way to make the exhibition tank visible was to put the window overhead in shade. "We wanted to open inviting connections between the inside and the outside of the building," Reddington says. The Ocean Pavilion contrasts

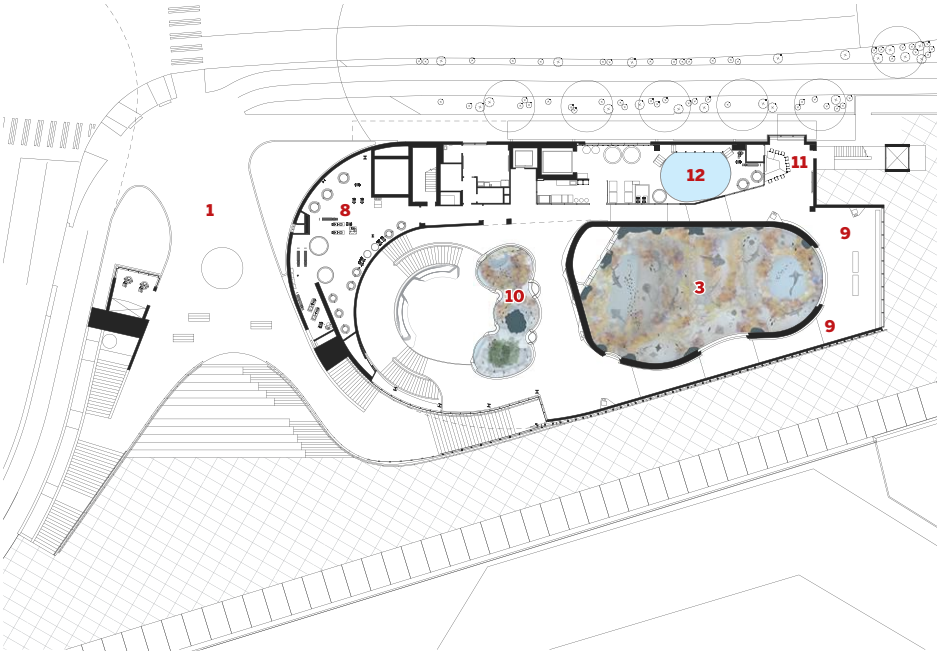
THE NEW building acts like a hinge on the revamped waterfront (this image). Visitors are able to preview a coral reef tank before entering (opposite).


SEATTLE AQUARIUM



LEVEL-ONE PLAN

0 30 FT. 10 M.



LEVEL-TWO PLAN

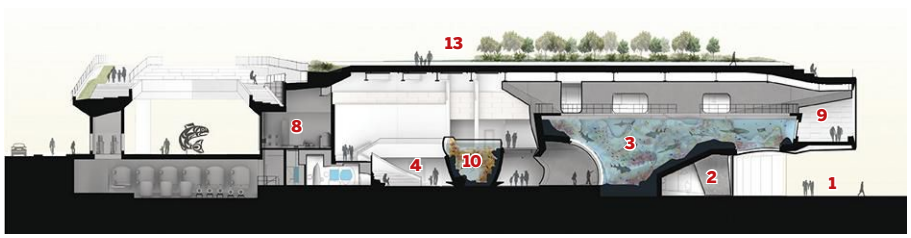
with the aquarium's longtime focus on local sea life to present the tropical aquatic world of the western Pacific.

The oculus is surrounded by an abstract pattern suggestive of fins and roiled waters, and inspired by carved disks for weaving called spindle whorls. The Lummi artist Dan Friday also embossed swirls and crabs in the concrete paving below, in an artwork called *Grandfather Rock*.

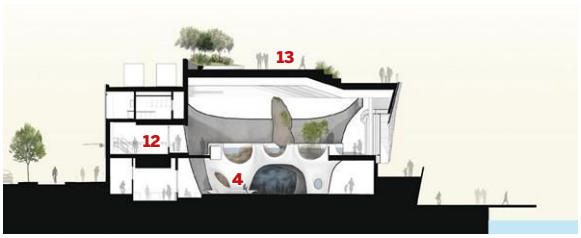
The patterns overhead and Friday's work are derived from native stories and evocatively introduce another theme, which is to include the worldview of native tribes, a generations-long outlook on stewardship of nature—these days leading local efforts to restore declining West Coast salmon populations, for example. "We think about animals and plants as relatives," explains Colleen Echohawk, a native consultant to the project.

Ultimately, a science-based curation was intertwined with a cultural one, including presentations on stewardship of natural resources as Indigenous groups live with them, on both sides of the Pacific. "We were respected and listened to and felt very involved as designers," Echohawk says.

1 PLAZA
2 LOBBY
3 CORAL REEF TANK
4 ONE OCEAN HALL
5 GIFT SHOP
6 SMALL EXHIBITS
7 RESERVOIR
8 SUPPORT SPACE
9 GALLERY
10 ARCHIPELAGO EXHIBIT
11 GROUP LEARNING
12 ANIMAL CARE
13 PUBLIC ROOF



SECTION A-A



SECTION B-B

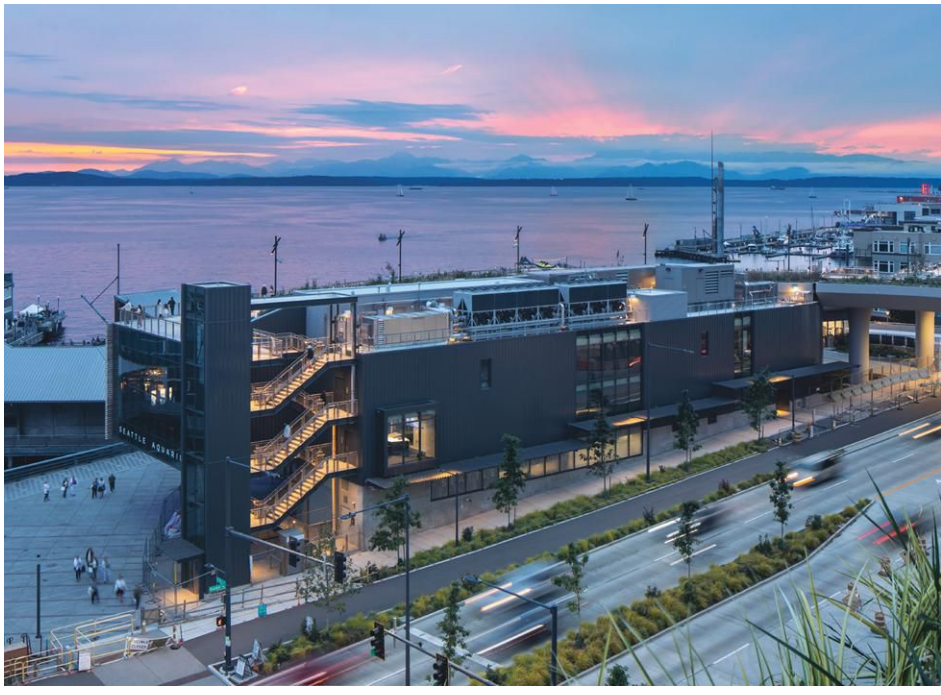
The whorls of artist Friday's artwork preview the looping exhibition path within. He suspended a school of colorful glass fish from the ceiling to visually escort visitors from the lobby around the two-story-high, 325,000 gallon coral-reef tank that is first glimpsed overhead at the entry.

As visitors round to the back of the tank, a tall opening curves as it rises overhead, offering an expansive view into the reef exhibit, which hosts 3,500 animals and plants that thrive at various depths. The exhibition-design firm Thinc worked with species specialists to shape shotcrete into the rich variety of niches, protective ledges, and open water suited to reef-dwelling plants, invertebrates, and fish.

This ovoid concrete vessel lengthens as it rises, supporting the great weight of water while managing seismic loads. Its concrete wall, with its dense net of reinforcing bar, was also used to suspend the upper-floor gallery that wraps the tank and offers more views in.

Beyond the reef exhibit is the circular One Ocean Hall, which orients visitors to the remaining exhibits. People gather on curving wood benches around the center of the hall, which opens to the upper level and hosts interpretive multimedia presentations and the telling of native stories.

The swooping exhibition armatures include clear-acrylic-walled tulip-shaped basins that project from One Ocean Hall's upper-level balcony, seen in jarring contrast to an undisciplined array of columns, beams, and exhibition lighting. Similarly,



WHILE THE pavilion curves along the waterfront, it presents a flat facade from the east (above) and the south (top), where it cantilevers over the entry plaza.

THE CORAL REEF tank (left) curves over visitors' heads. One Ocean Hall (above) is an orientation space. An upper-level gallery, reached via a sculptural stair (opposite, bottom) includes an archipelago exhibit (opposite, top).

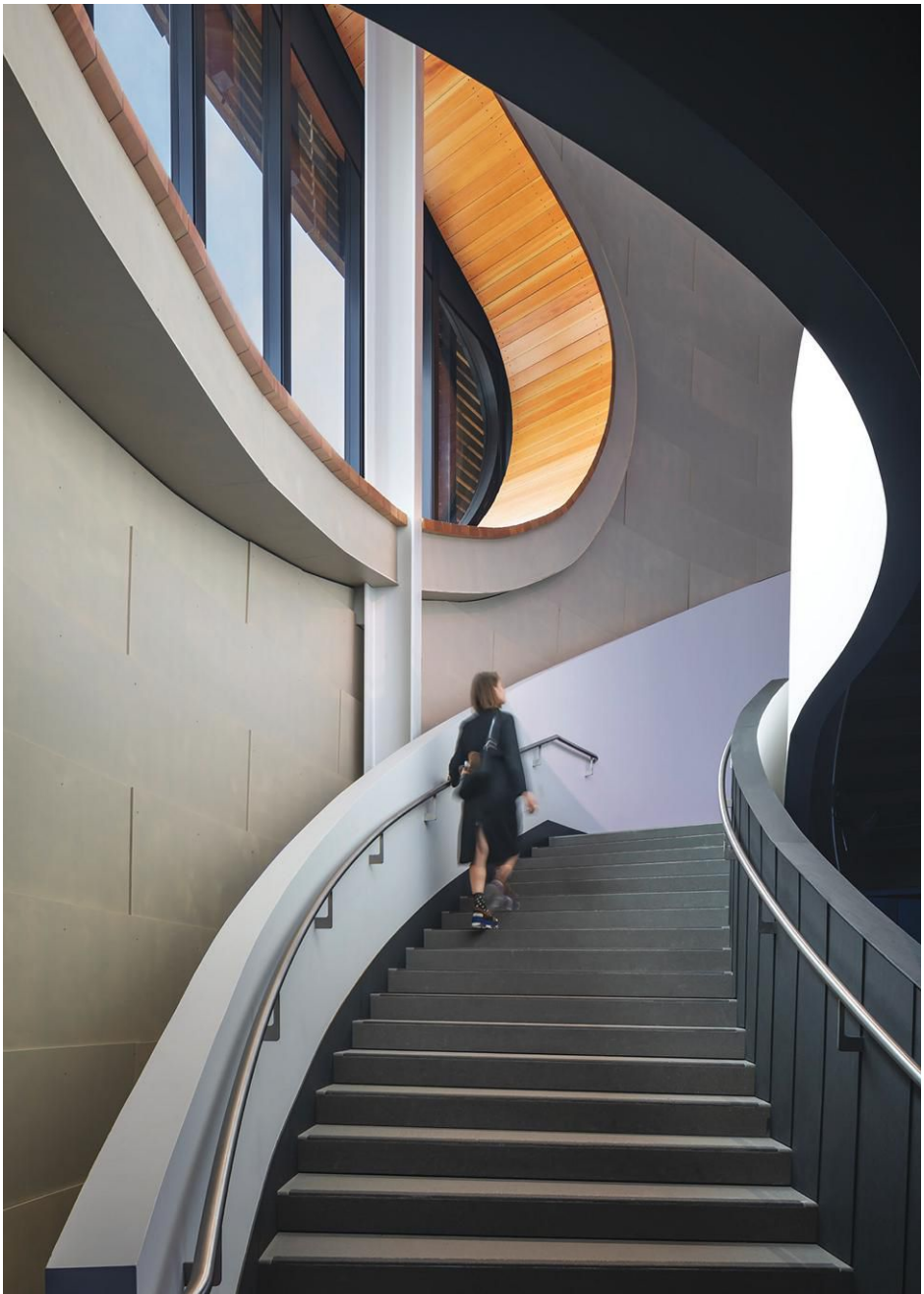
some back-of-house spaces align abruptly to the eastern side of the building. The bones supporting the building enclosure are never satisfyingly reconciled with the smooth sculptural curves of the exhibition elements.

A broad window offers a long vista across the Salish Sea, which takes the visitor out of the new building and out of the city to "convey the aquarium's idea of 'one ocean'—the tropics and the Pacific Northwest talking to each other," says Tom Hennes, Thinc's founder. Visitors can see kelp beds bob in the bay, just beyond the seawall, protecting the shoreline and sequestering carbon, much like the spidery roots of tropical mangrove featured in a balcony archipelago exhibit.

Naysayers criticized the carbon intensity of the facility and the display of marine life far from home. LMN pursued a comprehensive program to minimize operational and embodied carbon. "We believe we are hitting a 70

percent reduction in energy compared to similar facilities and a 95 percent carbon reduction," says LMN partner Osama Quotah. Strategies included using low-carbon concrete mixes and extensively filtering and treating water so that 96 percent of it can be recirculated. Heat exchangers reduce heating loads. The building sources all of its energy from local hydropower but, lacking space to include on-site renewables, the aquarium plans to purchase controversial offsets, which are intended to allow zero-carbon certification from the International Living Futures Institute, as well as to earn LEED Gold.

Like other facilities that hold wild creatures, the aquarium helps sustain endangered species—including the Indo-Pacific spotted shark that prowls the bottom of the reef tank—and shares some of this work in animal-care spaces visible to visitors. "This work is obviously aspirational," says aquarium CEO Robert Davidson. "But it also recognizes that the existence of the species we are housing—as well as our own—is at risk." ■



Credits

ARCHITECT: LMN Architects — Mark Reddington, Osama Quotah, Scott Crawford, Hanna Kato, Todd Schwisow, Mary Anne Smith, Vanessa Abin-Fuentes, Alex Woodhouse, Rives Kitchell, Masako Wada

CONSULTANTS: Magnusson Klemencic Associates (structural, civil); PAE Consulting Engineers (m/e/p); Thinc (exhibition design); Ardurra (life support systems); HLB Lighting Design (lighting); Palazzo Lighting (exhibit lighting); Teecom (exhibit technology); Field Operations (landscape); Valerie Segrest (horticulture); Headwater Peoples (tribal consultant)

GENERAL CONTRACTOR: Turner Construction

CLIENT: Seattle Aquarium Society

SIZE: 50,000 square feet

COST: $170 million

COMPLETION DATE: August 2024

Sources

CURTAIN WALL: Oldcastle BuildingEnvelope

WOOD CLADDING: TAAN Forest

AIR BARRIER: Soprema

TPO ROOFING: Holcim Elevate

HARDWARE: Schlage, LCN, Von Duprin, Trimco, ABH, Hager, Ives, National Guard

PAINTS AND STAINS: Sherwin-Williams, Tnemec

PLASTIC LAMINATE: Wilsonart, Fenix

RESILIENT FLOORING: Roppe, Nora, ECOsurfaces

CARPET: Edge, Tarkett, Interface

GENERAL INTERIOR LIGHTS: Kenall, Kelvix, Alphabet, Lithonia

ONE RIVER NORTH | DENVER | MAD ARCHITECTS

MAD House

In the Mile High City's northeast quarter, an apartment building has yet to achieve its evergreen potential.

BY LEOPOLDO VILLARDI
PHOTOGRAPHY BY IWAN BAAN

IN DENVER'S gritty, graffitied, postindustrial northeast, where local creatives have long flocked, developers have been busily transforming surface parking lots and former warehouses near the Union Pacific depot into new housing stock. When the din of construction equipment finally clears and the nearby tracks are free of passing trains, the sound of running water cuts through the silence. Where is it coming from? One might expect this while trekking through the Rockies, where runoff and snowmelt form brooks and creeks—but not here, on a sidewalk in the semi-arid Eastern Plains. What's more, the trickling sound emanates from above.

Bringing home a slice of the far-flung wilderness was the principal idea behind MAD Architects' One River North, a 187-unit apartment building. The designers furrowed a meandering biomorphic channel—peppered with vegetation and a cascading water feature—into the upper reaches of the 16-story building's bowed, glazed curtain wall. This inhabitable space was not only intended to attract outdoorsy tenants, but it reflects the pandemic era in which the project was conceived. "We were going through all these studies while stuck inside," says project director Jon Kontuly. "Creating spaces where people could still be together, but be outside, was really ideal," he adds, with physi-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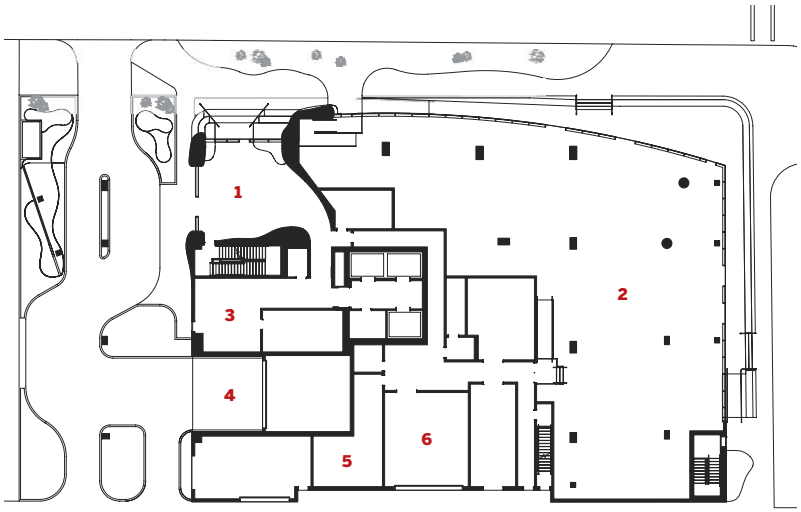
NORFOLK SOUTHERN

cal, mental, and social well-being top of mind.

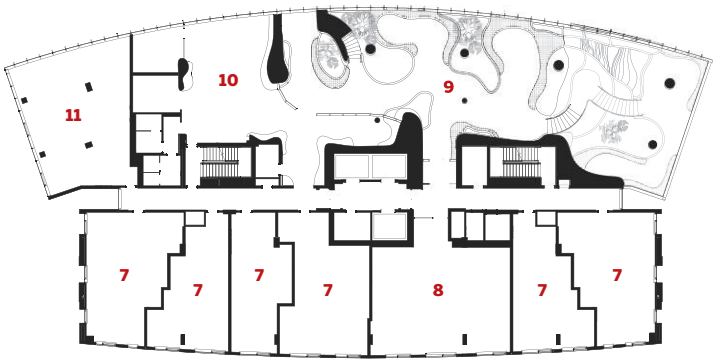
Biophilia is a word the architects of One River North repeat often. They liken the experience of traversing this "canyon" to that of hiking a trail—one that begins at the cavelike lobby and, after a brief detour through a nondescript double-loaded corridor, resumes on the sixth floor. Here, an escarpment of shared terraces and amenities sinuously ascends four stories, forming intimate pockets and exposed plateaus for people to congregate in and on, as well as inviting a certain exploration. "The idea is that residents are moving through different biomes, without actually going up 10,000 feet," says Kontuly of the journey. From the ninth floor, the channel continues upward to the "alpine" roof deck, leaving in its wake one-of-a-kind balconies—each seemingly with its own microclimate—at 18 of One River North's rentable units.

Much of the building is otherwise straightforward (apartments range from about $2,500 to $15,000 per month), and the three remaining facades are mostly clad in strips of bland and blocky EIFS. But, for the time being, the attention-grabbing north facade is a prominent marker on the Denver skyline, due to its relative distance from downtown and nearby construction that has yet to break ground.

To create the sculpted walls, MAD turned to digital tools. "A lot of it was trying out things in Rhino, rendering, and seeing what worked," says Kontuly of the trial-by-error process. The 3D model was then translated into a real-world patchwork of over 700 panels given form by a grid of CNC-bent galvanized bars sheathed in expanded metal mesh, lath, and hand-troweled plaster. Despite all the talk of biophilia, the architects contend that imitation of nature was not the final objective.



FIRST-FLOOR PLAN



SEVENTH-FLOOR PLAN

0 20 FT.
6 M.

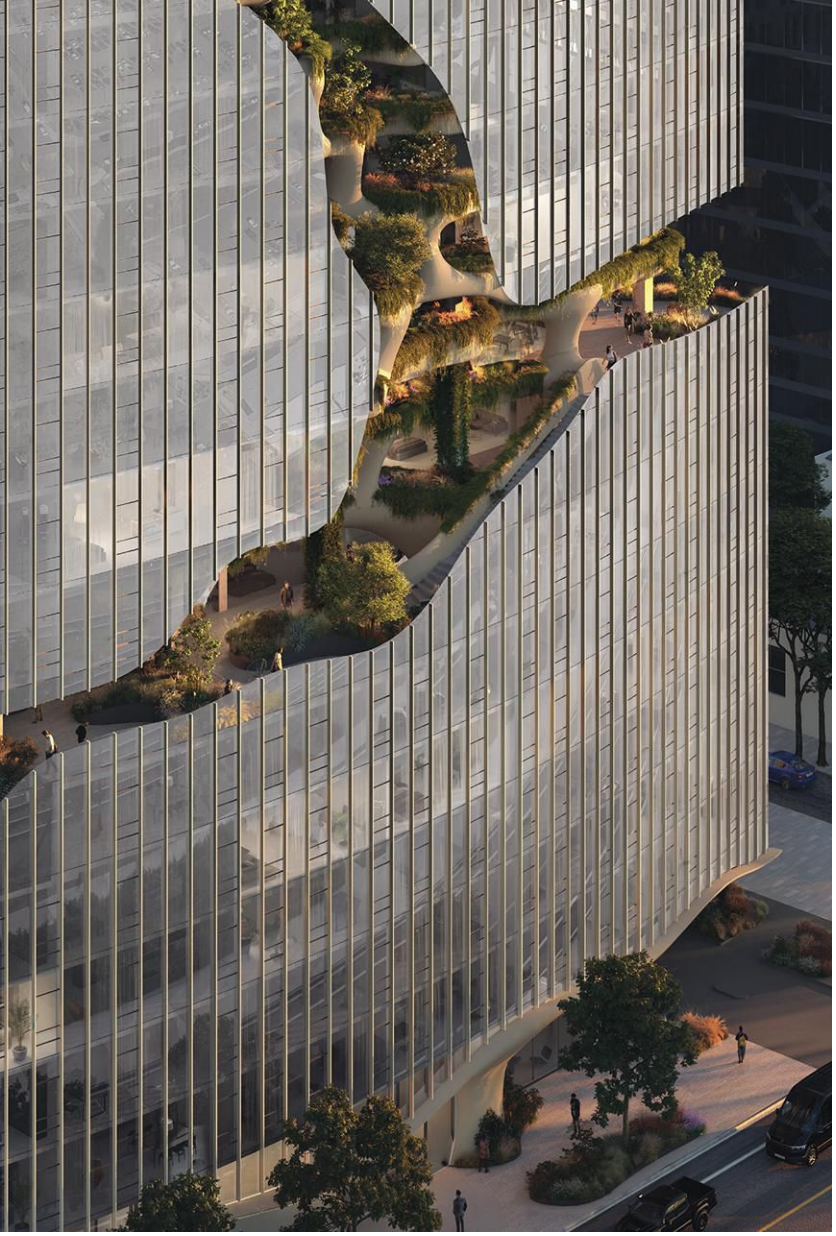
1 LOBBY
2 RETAIL
3 MAIL ROOM
4 RAMP TO PARKING
5 BIKE STORAGE
6 LOADING DOCK
7 APARTMENT
8 LEASING OFFICE
9 TERRACE
10 COMMUNITY ROOM
11 SITTING ROOM

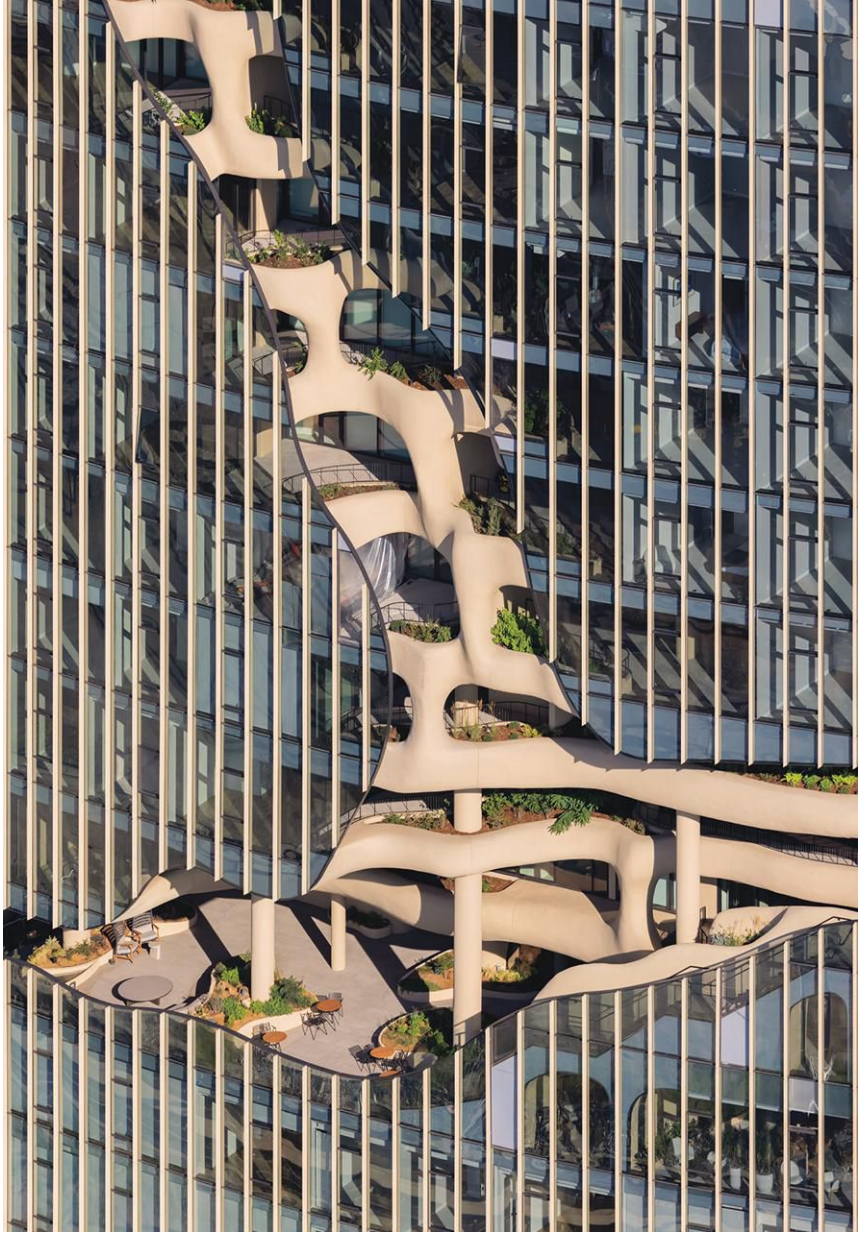
PLANTING DIAGRAM

BIOMORPHIC plaster walls define the spaces of the shared terraces and amenities (above) as well as the lobby (right).

Perhaps because of this, up close, the surfaces appear rather lifeless—without stonelike stratification, craggy ruggedness, or traces of the forces that cause erosion. Unsightly seams between the panels remind residents and guests of the wall assembly's artificiality.

This critique may be moot once the landscape has an opportunity to take root, mature, and fill the spaces. Early renderings of One River North depict a lushly planted crevice, brimming with vegetation and scandent vines wrapping structural columns today left sorely exposed. "Everything is a bit smaller than I would have hoped from day one," says landscape architect Jeff Stoecklein at architect-of-record Davis Partnership, adding that development across the state has depleted nursery inventories. This issue plagues many projects aiming to integrate the built and natural worlds, such as Stefano Boeri's seminal Bosco Verticale, which appeared similarly underplanted when it opened in 2014 but now stands as a flourishing, verdant tower. In Milan, however,





A RENDERING (above) depicts what One River North's terraced "canyon" (above, right) could look like once plants have matured.

Boeri's project benefits from full and direct sun, as well as a central irrigation system that minimizes upkeep. One River North has only one of those two things, prompting reasonable skepticism.

"One of the challenges is the northwest orientation. We're in shade, and that's tough for our plant palette," says Stoecklein, who worked with MAD to refine its initial landscape scheme to better suit the state's four-season climate. Even with a mix of native and resilient pine, aspen, grasses, and drought-resistant sedum taking the place of other deciduous trees and subtropical vines, Stoecklein anticipates a higher level of mortality than usual during the first few years. He is currently working on a long-term maintenance plan with Colorado State University's horticulture program and an irrigation consultant, but whether or not developers will follow it remains to be seen. One River North has the potential to go the way of the Bosco Verticale, but in the wrong hands it may also end up like Herzog & de Meuron's Pérez Art Museum in Miami, which recently replaced its hanging gardens with columns of plastic turf.

Despite a Fitwel certification, the insertion of greenery, and inspiration taken from Colorado's diverse natural landscape, sustainability efforts at One River North are largely confined to standard high-efficiency mechanical and plumbing systems. But architects and the public must be wary of biophilia masquerading as environmentally responsible building—especially if the former comes at the expense of the very habitats such projects claim to celebrate. Designers need not fall for the false dichotomy of choosing between sustainability *or* daring experimentation with material and form. The true challenge facing professionals today is tackling both, head-on. ■

Credits

ARCHITECT: MAD Architects — Ma Yansong, Dang Qun, Yosuke Hayano, partners in charge; Jon Kontuly, Flora Lee, Peng Xie, Edwin Cho, Horace Hou, Yunfei Qiu, Evan Shaner, Shawna Chengxiang Meng, project team

ARCHITECT OF RECORD: Davis Partnership Architects

ENGINEERS: Jirsa Hedrick (structural); ME Engineers (m/e/p)

CONSULTANTS: Kimley-Horn (civil); Marx Okubo (waterproofing); Geiler & Associates (acoustics); Group 14 (energy modeling); CPP (wind analysis); HKS&S (rainscreen)

GENERAL CONTRACTOR: Saunders Construction

CLIENT: The Max Collaborative

SIZE: 342,675 square feet

COST: withheld

COMPLETION: September 2024

Sources

ROOFING: Carlisle, Hanover, Bison

GLAZING: Vitro, Millet

DOORS: Oldcastle BuildingEnvelope, Trulite, Assa Abloy, SaftiFirst, Rytec

LOCKSETS: Schlage, Falcon Lock

LIGHTING: B-K, Erco, Aculux, Kelvix, LED Linear USA, Gotham

INTERIOR FINISHES: Sherwin-Williams, Benjamin Moore (paints); Graniti Fiandre, Bedrosians (tiles)

IMAGE: © MAD ARCHITECTS (LEFT)

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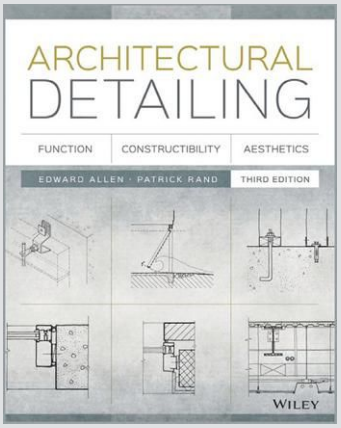

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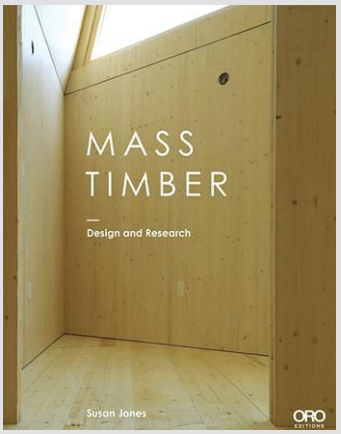

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AIA California

LOCATED IN the Dallas suburb of Addison, the Greenhill School is home to one of the more unusual campuses in the United States, and not just because of the peacocks (technically, peafowl) that wander freely about its 75 acres. The school, which was founded in 1950 as a coeducational, secular institution serving grades K–12, has a unique architectural tradition established by the pioneering Texas modernist O'Neil Ford, who designed five of the school's first buildings.

Ford's vision of a campus of modest buildings composed of warm brick that embrace their surroundings has been carried forward over the years by a series of leading architects, among them Gwathmey Siegel, Lake|Flato, and Weiss Manfredi. The latest addition to that assemblage, the 67,400-square-foot, $29 million Rosa O. Valdes STEM + Innovation Center, is the work of Bohlin Cywinski Jackson (BCJ), and follows neatly in the school's aesthetic tradition while also pushing it in a new, more sustainable direction.

"We didn't want it to be a spaceship that was just dropped into the middle of campus," says Lee Hark, the head of school. "At the same time, it was an opportunity for us to do something forward-thinking and distinctive."

The new building takes inspiration from the one it replaces, Ford's 1963 Agnich Science Building, which had been dramatically compromised, its central courtyard filled in to make space for additional classrooms. It occupies the same rectangular footprint as Ford's original structure, with the addition of a wing that extends off its southern flank. Like its progenitor, the Valdes Building is clad in warm, buff-colored brick, with Ford's central courtyard recreated (the landscape is by OJB) to provide a gathering space for students while introducing light into the building core.

"That extended the heritage of the O'Neil Ford building, so it didn't feel like necessarily a drastic departure, but it was kind of a progressive continuation of the original building," says Daniel Lee, a principal in BCJ's Philadelphia office.

Providing a sense of transparency was an essential goal of the project. "We wanted kids to be able to see the teaching and learning that was happening in all these different spaces," says Hark. To that end, classrooms and laboratories have large windows facing broad public hallways. On the southeast corner of the building, a "high bay" innovation lab has tall windows facing the school's central quadrangle, advertising the student activities within.

Throughout the building, light filters down from north-facing skylights that, from the outside, give the two-story structure a distinctive sawtooth profile. Glazed facades on the building's southern perimeter are shielded by a screen of horizontal aluminum louvers.

The building's exposed mass-timber structure,

ROSA O. VALDES STEM + INNOVATION CENTER | ADDISON, TEXAS | BOHLIN CYWINSKI JACKSON

Teaching Tool

In suburban Dallas, A STEM building helps kids learn about sustainability.

BY MARK LAMSTER
PHOTOGRAPHY BY NIC LEHOUX

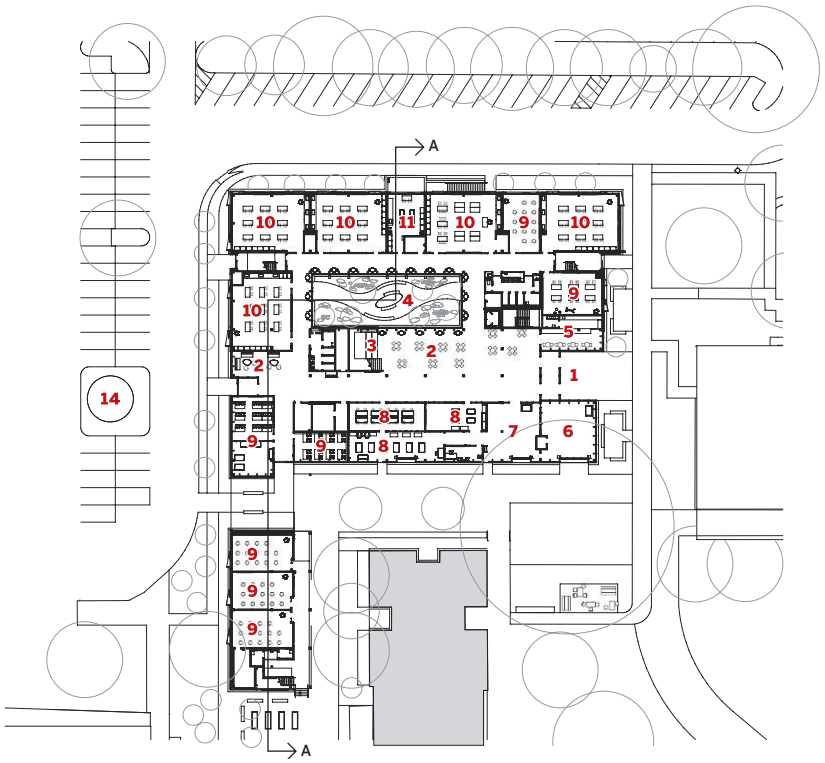
with a glulam frame and cross-laminated timber (CLT) floor slabs, adds to the sense of brightness on the interior. The system was chosen for its sustainability but also for its expedience; the pandemic pushed back the construction schedule, but the school insisted on maintaining its summer 2024 move-in date. Mass timber's off-site fabrication and quick on-site erection helped meet this target.

Most of the timber was sourced from a plant in Dothan, Alabama. "Bringing in mass timber is great, but boating it in from Europe or somewhere didn't quite make that equation as appealing," says Lee. That produced something of a challenge: the Dothan plant only turned out CLT panels of southern yellow pine, which didn't meet BCJ's aesthetic standards. Their solution: create a layered sandwich of yellow pine from Dothan with an outer layer of more appealing Douglas fir from a plant in Montana.

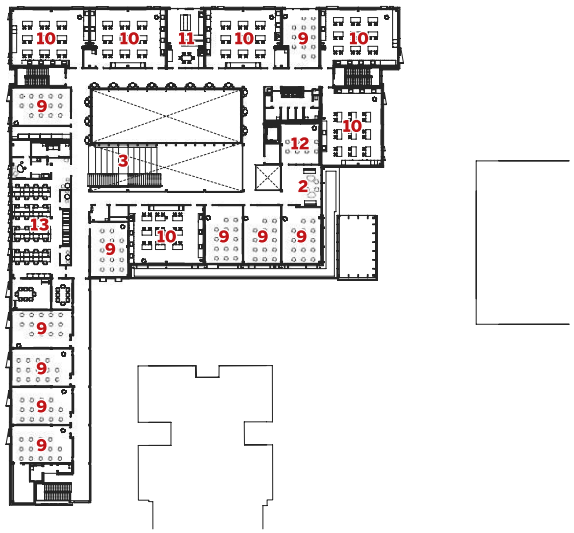
The building's systems were designed with a didactic purpose. "We wanted the building to be a teaching tool itself," says Kendra Grace, the associate head of school. "That's why you have the exposed ductwork and why everything is labeled, so that the kids can understand where the hot and cold water come from."

In the central courtyard, what the architects call a "rain veil" makes the capture of rainwater a visible process. As water sheets off the roof, it is guided down chains and through a series of filtering swales, eventually making its way to a water tower that had long been a school icon, even as it had fallen out of use.

1 ENTRY
2 COMMONS
3 SOCIAL STAIR
4 COURTYARD
5 CAFÉ
6 HIGH BAY
7 FABRICATION SHOP
8 INNOVATION SPACE
9 CLASSROOM
10 SCIENCE LAB
11 EXPERIMENTS/PREP
12 MATH CENTER
13 FACULTY OFFICE
14 RESTORED WATER TANK

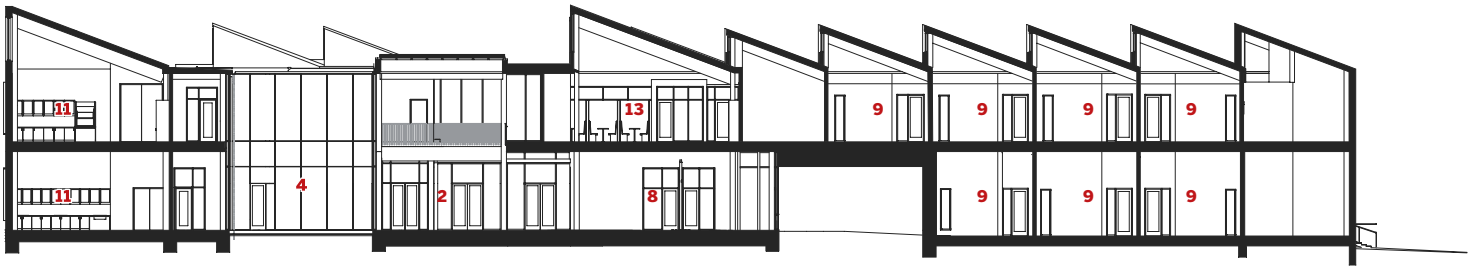


FIRST-FLOOR PLAN



SECOND-FLOOR PLAN

0 30 FT.
10 M.



SECTION A - A

0 10 FT.
3 M.

STUDENTS can gather on a bleacher stair (above) or in the adjoining open lobby. In the central courtyard, a "rain veil" makes the capture of rainwater a visible process (right).

NORTH-FACING classroom skylights (opposite, bottom left) lend the exterior a sawtooth profile (opposite, top). The glass-enclosed high-bay innovation lab (above) faces a central quadrangle. A mathematical puzzle is encoded in a stairwell wall (opposite, bottom right).

Not all of the building's sustainable features are quite so visible. In the basement, 10 ice tanks, each one 89 inches in diameter, drive the building's cooling system. Water is frozen overnight, when energy rates are low, and then used for cooling during peak daytime hours.

Beneath the floorboards, the architects left a 12-inch gap, or plenum, to accommodate changing infrastructural demands. "People kept asking us, how do you know what science education, what math education is going to be like in 10 years? And, of course, we don't know," says Hark. For that reason, classrooms have water and gas supplies on their edges, with power supply dropping from the ceiling. "If they need to reconfigure rooms one year, five years, 10 years down the line, that really gives them that flexibility," says Lee.

Above all, the building creates an inviting place for gathering in Greenhill's sprawling and uncentralized campus. Students can assemble in an open lobby area with movable tables and chairs, or sit on a large bleacher stair linking the building's floors. There's even coffee: a popular local chain will operate a café adjacent to the building's main entry.

One thing students can discuss, as they drink their caffeinated beverages, is a pattern built into a brick wall enclosing a stairwell on the building's south facade. That design is a mathematical puzzle waiting to be solved. "One of these days, we hope to get some notification from a student who has the solution," says Lee.

For now, the building is its own winning formula. ■

Mark Lamster is architecture critic for the Dallas Morning News.

Credits

ARCHITECT: Bohlin Cywinski Jackson — Daniel Lee, Tom Kirk, principals; Margaret Sledge, project manager; Habeeb Muhammad, Tom Breslin, Judy Chang, Nicolas DelCastillo, Chris Renn, Chuck Nawoj, Nora Chase, project team

CONSULTANTS: Walter P. Moore (structural); DBR Engineering Consultants (m/e/p/fp, data/telecom); Westwood (civil); OJB (landscape); Holmes Keogh Associates (code); Metropolitan Acoustics (acoustics)

GENERAL CONTRACTOR: Scott + Reid

CLIENT: Greenhill School

SIZE: 67,400 square feet

COST: $29 million

COMPLETION DATE: April 2024

Sources

MASS TIMBER: SmartLam

MASONRY: Acme Brick

CURTAIN WALL: Oldcastle BuildingEnvelope

WOOD CLADDING: Nakamoto Forestry

GLAZING: Guardian

SKYLIGHTS: H&H Skylight Fabricators

BIRD FRIT: NGS Films and Graphics

DOORS: NanaWall, Republic, VY Industries, Cookson Door, TGP, Renlita

HARDWARE: Schlage, Von Duprin, LCN, Ives

ICE TANKS: Calmac

JAMES LAWSON HIGH SCHOOL | NASHVILLE | HASTINGS

At the Crossroads

A public high school embraces nature and the legacy of its namesake activist.

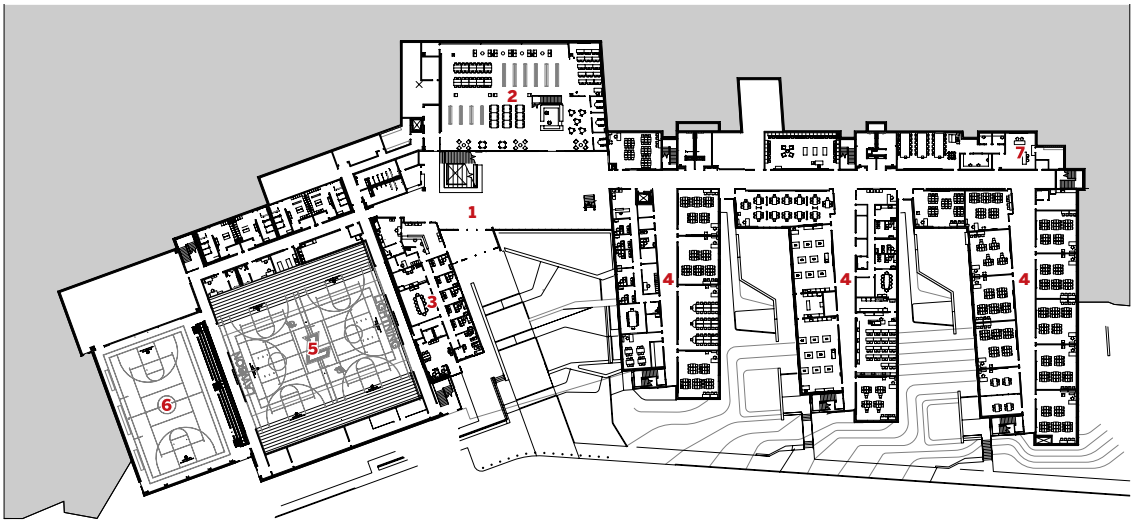
BY MATT HICKMAN
PHOTOGRAPHY BY GARRETT ROWLAND

ON JUNE 9, two months before the public high school in Nashville that bears his name opened for its second academic year, Reverend James Lawson died in Los Angeles at the age of 95. A pastor, professor, and confidant of Dr. Martin Luther King Jr., Lawson was expelled from Vanderbilt University Divinity School in 1960 for training activists in tactics of nonviolent resistance, including lunch counter sit-ins across Nashville and beyond, in the fight for racial equality. Although aware of the honor, Lawson never had the chance to visit Metro Nashville Public Schools' newest high school in person even though the official naming took place midway through construction. It's a shame, but the 310,000-square-foot complex does embody a key mission of the civil rights movement of which Lawson was a pivotal figure: to accommodate students of all backgrounds and abilities.

"There was the opportunity for this to be the place that was suitable to match Lawson's legacy," says Sam Wible, an associate principal at Nashville-based architecture firm Hastings, who served as director of the roughly $140 million project, completed as a 1,600-student-capacity replacement for Hillwood High School. (That facility, opened in 1959 as a junior high, had become cramped and rundown.)

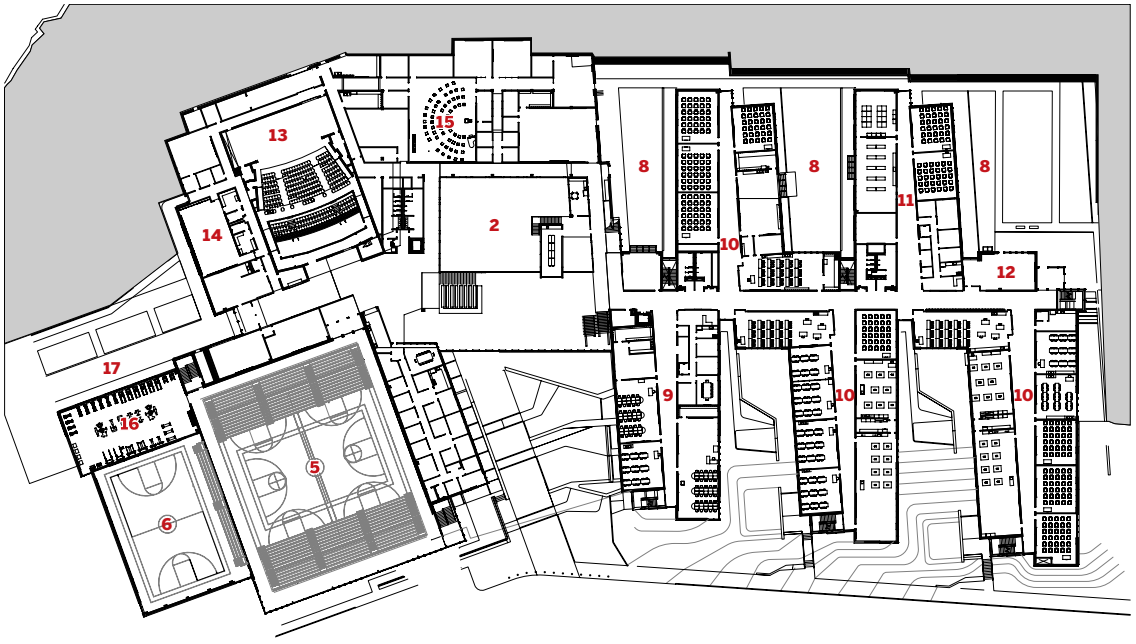
Lawson's spirit lives on through several design moments at the new school, including prominently positioned graphics and quotes spread throughout three levels. Just as essential as Lawson's guiding ethos of acceptance is the school's embrace of place. Nestled into a hillside on a heavily wooded 274-acre site (formerly a church compound), in the sprawling suburban neighborhood of Bellevue, just west of downtown, James Lawson High School is situated at a historic junction of commerce, where railways and roads converged along the Harpeth River to carry eastward the raw materials—including Tennessee limestone—used to build the burgeoning city of Nashville.

Featuring a precast-concrete-plank floor and roof structure, the



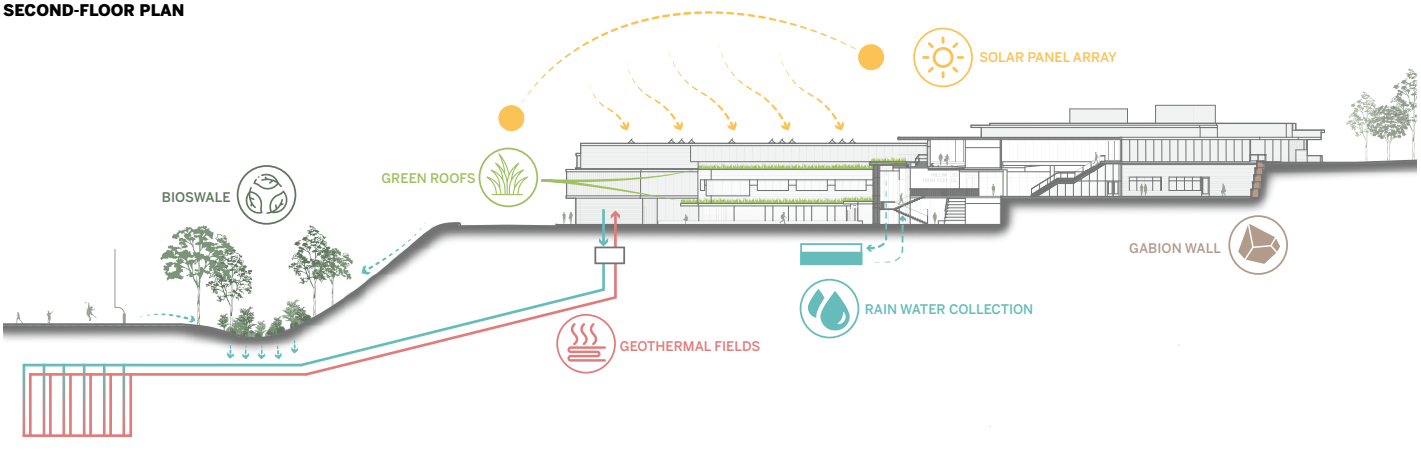
FIRST-FLOOR PLAN

0 50 FT. 15 M.



SECOND-FLOOR PLAN

1 COMMONS/MAIN ENTRANCE
2 LIBRARY
3 ADMINISTRATIVE OFFICES
4 FRESHMAN ACADEMY
5 MAIN GYM
6 AUXILIARY GYM
7 CTE STUDIO
8 COURTYARDS
9 ART, DESIGN & COMMUNICATIONS ACADEMY
10 ACADEMIC WING
11 ENGINEERING ACADEMY
12 COMMUNITY-RESOURCE CENTER
13 THEATER
14 DANCE STUDIO
15 BAND/CHOIR/ ORCHESTRA ROOM
16 WEIGHT ROOM
17 COMMUNITY ENTRANCE



SUSTAINABILTY SECTION

ACTING as campus nucleus, the Commons hosts everything from school dances to cheerleading practice and overflow lunch seating.

building doesn't incorporate the state's official rock, but it does feature a facade clad in gray shale brick with striations that reference the limestone bluffs so prevalent in the rolling topography of Middle Tennessee. Inside are the familiar and economical material mainstays of secondary education, including drop ceilings in the classrooms and brightly painted concrete-block walls lining the corridors.

"There was the challenge of parity—you're trying to raise the bar for schools, but the district is comparing it against what they have as their standard," Wible says. "There's resistance—and that's particularly true with the material palette."

The Hastings team does raise the bar with the steel-framed 3,000-square-foot Commons, a versatile double-height space at the heart of the building that serves as both grand entrance foyer and multiuse social hub for students. With terrazzo underfoot, white maple acoustic baffles overhead, and full-height glazing, the soaring space features social stairs and a second-floor makerspace dubbed the Cloud that hovers above the entrance to the school library. Stairs on either end of the Commons lead up to the classroom wings, the third-floor cafeteria, and other areas of the terraced building, whose sloping site offers at-grade access to the outdoors across all three levels.

And then there's the glass—an unusual abundance of it for a public high school—that melds the school with the surrounding landscape and pulls ample daylight into the interior. A chief beneficiary of this visual connection to the outdoors is the classrooms, which are organized across five wings—two in the rear and three in front—extending from a central spine at the north of the building. The result is a near-seamless but secure bond between indoor and outdoor spaces, including a series of courtyards, with two positioned between the rear classroom wings that double as open-air classroom spaces.

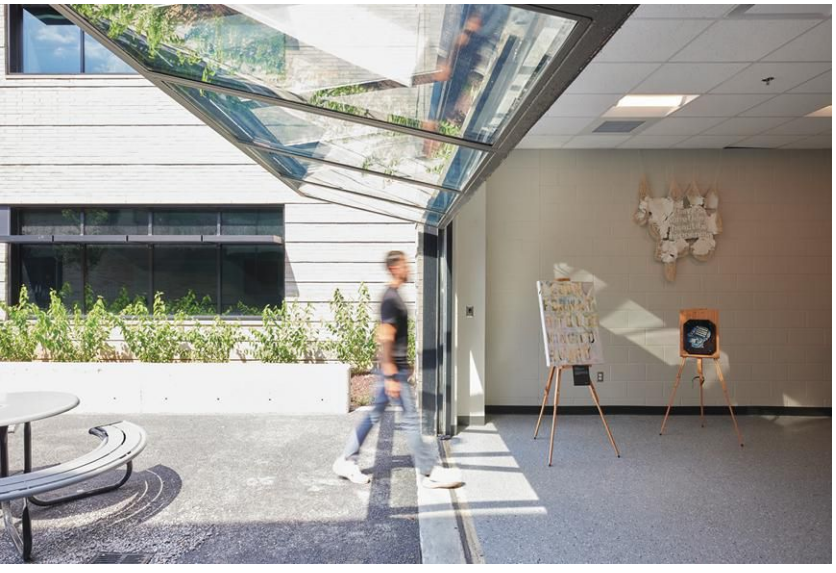
"It makes everybody nervous, but it's the right thing for students and educational environments, especially in this context," Hastings partner in charge David Bailey says of the glazing, in relation to safety concerns. So the glass is treated with bullet-resistant ballistic film in all areas near walking surfaces.

"Public school design can be so constrained and doesn't often get the chance to have a more modern expression that can elevate the architecture and the experience for the students," Bailey adds. "We sought to overcome that with this project—to connect with and have a light touch on the site and harness the beauty of it."

Another outdoor feature is a terrace accessible from the cafeteria, with a smattering of lunch tables. Looking out across the site to the sports fields downhill from the school, the view is majestic. If it weren't for the muted drone of Interstate 40, hidden behind a stand of trees on the southern edge of campus, beyond the football field, one would be inclined to think that James Lawson High School was plopped down in the rural-Tennessee countryside.

The building interacts with the bucolic setting in other ways too. As mandated by the district, the roof of the school is (almost) entirely free of unsightly protruding vents and mechanical equipment, visual clutter


ADC + ENGINEERING
ADMIN



HALLWAYS, classrooms, and communal spaces feature seamless connections to the outdoors (opposite, all); multiple sports fields, including soccer and practice fields, are located downhill from the school (above).

common on large institutional buildings. This move makes way for 11,600 square feet of planted roof and an assemblage of solar arrays atop the front three classroom wings that, together, form a 220-kilowatt photovoltaic system. A 30,000-gallon cistern captures rainwater for toilet flushing and other nonpotable-water needs. Beneath the football and soccer fields are 292 geothermal wells reaching 500 feet deep. A planted gabion wall at the rear of the classroom wings, while not fully grown in yet, promises even more verdancy to an already "green" school.

"When the project started, the sustainability goals were kind of the standard Metro goals," explains Bailey. "It took a while to get everybody on the same page as us—that we were going to elevate this project, push it forward as far as we could from a sustainability standpoint, and make it a flagship school, not only for Metro but for the state."

Inside, there are many aspects of James Lawson High School that stand out: a state-of-the-art 500-seat theater that's the first in the district to include a full fly loft; not one but two daylit gymnasiums—the larger, named the Thunderdome, brightened by clerestories; varied performing arts spaces, including a dance studio and dedicated rehearsal room for student rock bands; and an art gallery that opens to a large courtyard space. There's also an impressively outfitted culinary-arts kitchen that serves the school's Academy of Business and Hospitality; down the hall, in the Academy of Health Sciences wing, the back half of a salvaged ambulance and mock emergency room help to train aspiring first responders and medical workers.

On the north end of the complex, adjacent to a sheltered courtyard where students can wait for parents, is a space perhaps more imbued with the spirt of James Lawson than any other at the school: a community-resource center, fully accessible without having to enter the school proper, that's stocked with refrigerated and nonperishable food, school and household supplies, and clothing—including more than a few sequined prom dresses for the taking. Students and families are free to visit the center at any time and take what they need, no appointment necessary and no questions asked.

At a beautifully sited public school packed with enough bells and whistles to make it unparalleled in its district, it's this space dedicated to neighborly care—inclusive, altruistic, nonjudgmental—that puts what the good reverend preached into practice. ■

Credits

ARCHITECT: Hastings — David Bailey, principal in charge; Sam Wible, project director; Ethan Keller, project manager; Katie Laughinghouse, Alex Stinchcomb, project architects

ENGINEERS: EMC Structural Engineers (structural); Civil Site Design Group (civil); I.C Thomassson Associates (m/e/p)

CONSULTANTS: HDLA (landscape); Merck & Hill (acoustics); Schuler Shook (theater); Danley Culinary Design (food service)

GENERAL CONTRACTOR: Messer Construction

CLIENT: Metro Nashville Public Schools

SIZE: 310,00 square feet

COST: $125 million (construction)

COMPLETION DATE: July 2023

Sources

CURTAIN WALL: Tubelite

GLASS: Guardian

ROOFING: Holcim (elastometric); Dimensional Metals (metal); Greenrise (green roof)

DOORS: Tubelite, NanaWall

ACOUSTICAL CEILINGS: 9Wood, Armstrong, USG

PLASTIC LAMINATE: Wilsonart, Formica

FLOOR & WALL TILE: Daltile, Atlas Concorde USA, Schluter, Louisville Tile, Stone Source

FLOORING: Tartkett, Kährs

DOWNLIGHTS: H.E. Williams, Intense Lighting, Tivoli Lighting, FC Lighting, Camman Lighting

PLUMBING: American Standard, Bradley, Elkay

PHOTOVOLTAICS: Also Energy

GEOTHERMAL SYSTEM: AAON


Marymount School

MARYMOUNT SCHOOL | NEW YORK | COOKFOX ARCHITECTS

Growing Up

A vertical campus for a private girls' school reaches out to the neighborhood around it.

BY CLIFFORD A. PEARSON
PHOTOGRAPHY BY INES LEONG

JUST PAST the Beaux-Arts-inspired grand stair in the block-long lobby of Marymount's new building on Manhattan's Upper East Side, students are busy using 3D printers and the latest "maker" equipment to create projects exploring a rapidly changing world. Tradition and technology meet cheek by jowl, not just on the ground floor but in the three levels below grade and the 10 above. The 153,000-square-foot vertical campus nods to the school's 98-year history while clearly charting a new course for this private, all-girls Catholic institution.

Stretching from 97th to 98th Street, mid-block between Lexington and Park avenues, the building embeds itself in the city, an urban player that reaches out to its neighbors on both the north and south. Generous glazing at both ends, and terraces at various levels establish visual connections to the mid-rise buildings on 97th Street and to Lexington Houses, the towers-in-a-park public housing project on the north side of 98th Street. This is anything but a cloister.

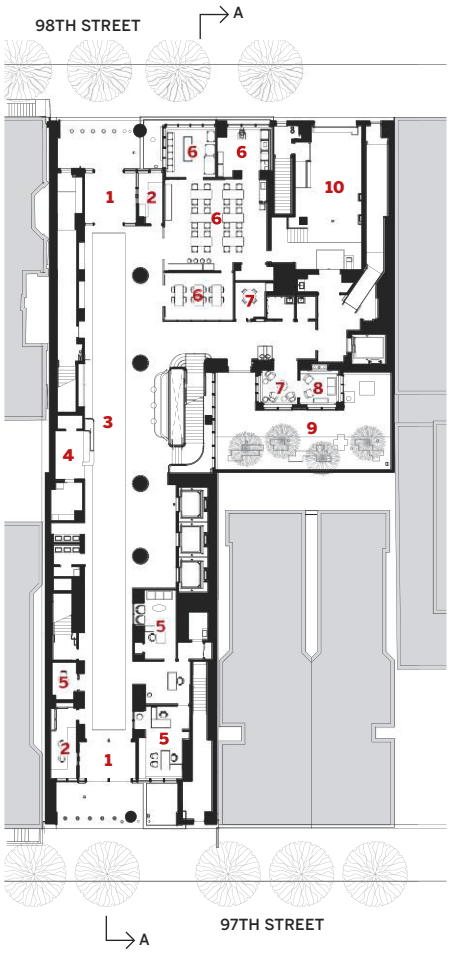
For most of its history, Marymount has been ensconced in a trio of Gilded Age mansions at Fifth Avenue and 84th Street. As its student body grew and its programs expanded, it took over additional buildings in the area, purchasing a townhouse on East 82nd Street in 1999 and then leasing an old school on East 97th Street from the Catholic diocese in 2011. As part of its expansion program, Marymount acquired a lot on 97th Street, which it used as an athletic field and hoped to turn into a new building. Eventually, it got approval to build on the site and hired CookFox to design the new structure, which opened in the fall of 2023 and now houses about 425 students in grades six through 12.

Nursery through grade five remain at the Fifth Avenue location, while Marymount sold the 82nd Street building and did not renew its lease on the second 97th Street school.

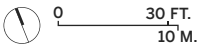
One of the hallmarks of the Fifth Avenue property is its curving grand stair, where headmistress Concepcion Alvar greets the girls each morning, hugging most and providing encouragement to all. Richard Cook, founding partner at CookFox, and Bethany Borel, project manager for the Marymount job, wanted to capture that magic in the new building. So they carved out a space at the center of the project for a modern interpretation of the Fifth Avenue stair, using American walnut for the balustrade on one side and bent steel on the other. They crafted a series of thick columns, wrapped with vertical wood strips that reach up to the ceiling, to create a lattice running the length of the lobby. The treelike columns and curving branches impart a vaguely Gothic tone to the elongated space. While the forms are contemporary, the gestures are rooted in history. "We're modern architects," says Cook, "but we wanted the school to have a sense of familiarity and the same kind of intimacy as the old mansion."

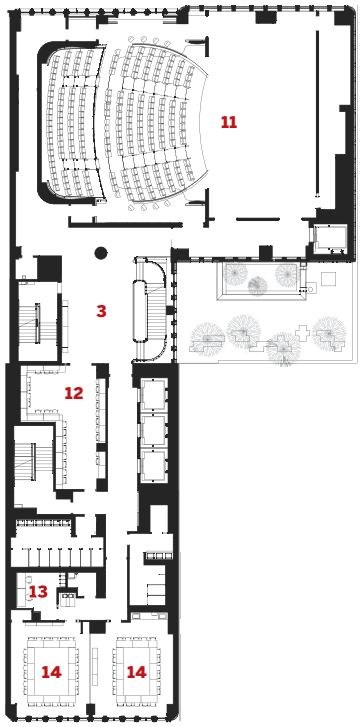
On the north side of the site, the new building has 100 feet of street frontage; on

THE SCHOOL steps back in response to its residential neighbors on 97th Street (opposite). A notch cut near its center brings daylight into shared spaces (right).

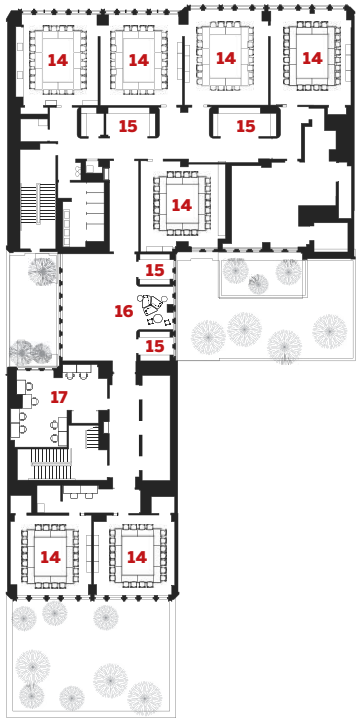


GROUND-FLOOR PLAN



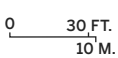


SECOND-FLOOR PLAN



TENTH-FLOOR PLAN

SECTION A - A



1 ENTRY
2 SECURITY
3 LOBBY
4 RECEPTION
5 OFFICE
6 SCIENCE LAB
7 MEETING
8 LOUNGE
9 TERRACE
10 LOADING
11 THEATER
12 DRESSING ROOM
13 THEATER TECH
14 CLASSROOM
15 LOCKERS
16 COMMONS
17 WORKSPACE
18 MUSIC PRACTICE
19 DINING
20 CHAPEL
21 GYMNASIUM
22 DANCE STUDIO

the south side, just 50 feet. As a result, the architects placed the largest programmatic elements—the gymnasium, the theater, and the chapel—on the north. The other big piece—the dining facility—occupies the entire fifth floor, with a terrace on the south. Between the north and south wings, CookFox stacked a series of gathering spots—starting with the central stair and continuing with single- and double-height "commons" areas on the top five floors. Windows on the east and west bring daylight into these social spaces on the upper floors, belying their location at the center of a mid-block building, and serving as a helpful orienting device. "Bringing in daylight was a constant priority for us," says Borel.

The architects designed modern curtain walls for the north and south facades, combining glazed terra-cotta with glass and metal. They took inspiration, though, from the fenestration on one of the Fifth Avenue mansions in terms of proportions for the windows and the terra-cotta piers. The references are subtle, but evocative.

The new building provides some key features that Marymount lacked before, such as

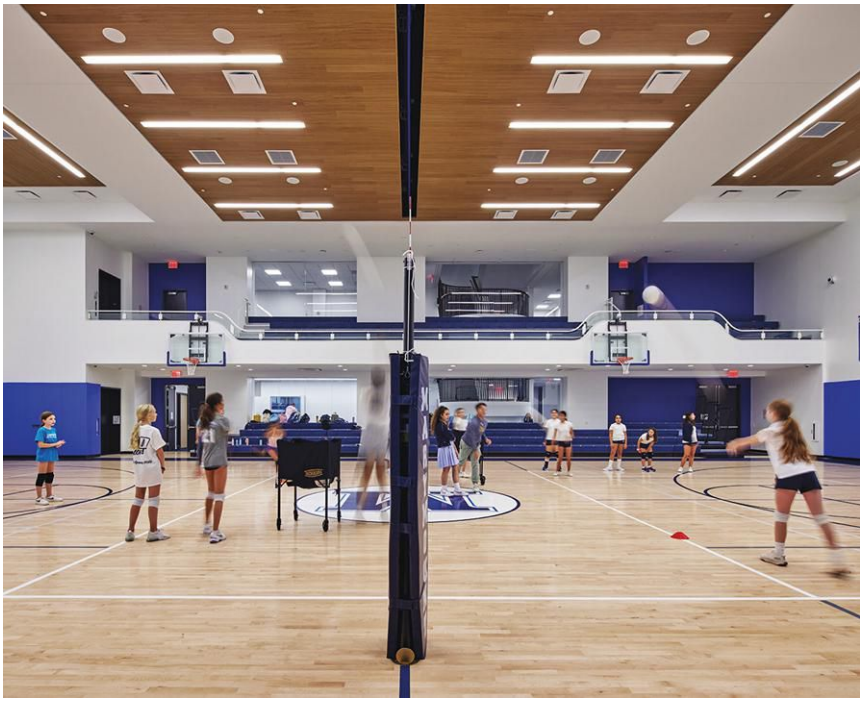
THE MAIN STAIR (above and right) nods to the one at the school's Beaux-Arts building on Fifth Avenue but uses a contemporary design vocabulary. Treelike columns express a sense of growth and support.

a full-size gym and a 300-seat theater with a balcony, stage fly system, and sophisticated lighting. The school, which long had strong programs in sports and theater, now has facilities to match. This has made Marymount more attractive to new students and parents, as well as to current students who might have gone elsewhere when moving into upper grades, says Alvar.

Working with engineers at Severud Associates, the architects designed the building with a poured-concrete frame, which took advantage of low prices available at the start of the Covid pandemic. Large post-tensioned concrete beams, 4 feet 5 inches deep, were used for the 100-foot-wide gym.

The school provides STEAM (science, technology, engineering, arts, and math) education and combines science labs and arts classrooms on the same floors to emphasize the integration of disciplines. CookFox designed the classrooms for maximum flexibility, to accommodate teachers' different approaches and a variety of furniture arrangements. In the commons areas students constantly push sofas, tables, and chairs into various configurations. Instead of lining hallways with endless rows of lockers, the architects created small clusters of lockers with built-in seating and a bulletin board on one side for students to personalize.

The chapel on the sixth floor takes advantage of north-facing windows and a simple palette of wood and plaster to create a calm



gathering space for up to 250 people. Coupled rows of slender white oak columns curve around one end of a shallow dome suspended from the ceiling. Hand-finished with a plaster containing mother-of-pearl, the dome hovers above a small podium and adds an ethereal touch to the chapel. "We wanted to create the sense of a clearing in the woods," says Cook.

Outdoor spaces designed by Terrain NYC are integrated throughout the project—from a small courtyard tucked behind the grand stair on the ground floor to the dining terrace on the fifth floor, a prayer garden on the sixth floor, and a pair of rooftop gardens. "Our work is obsessed with connecting people and nature," says Cook.

The building employs a number of green-design strategies. About 10 percent of all products installed during construction are composed of recycled material, including 1,200 tons of scrap metal used for rebar. More than 18 percent of all products installed during construction were extracted and manufactured within 500 miles of the project, reducing greenhouse gas emissions from transportation.

Alvar, who has been headmistress for 20 years and will be stepping down in 2025, says the new building creates "spaces that inspire the children" and underscores the school "as a learning community."

In a city like New York, private schools compete fiercely to attract students and donations. Marymount's new building has given it a distinct edge over its rivals, while at the same time offering students and staff a nurturing environment for learning and exploring. ■

THE CHAPEL (above) offers space for reflection, while daylight animates the dining floor (opposite, top) and classrooms (opposite, bottom left). The full-size gym (opposite, bottom right) sits below grade.

Credits

ARCHITECT: CookFox Architects — Richard A. Cook, founding partner; Pam Campbell, partner in charge; Bethany Borel, project manager; Seth Brunner, project architect; Zach Kern, architect

ENGINEERS: Cosentini Associates (m/e/p); Severud Associates (structural); Philip Habib & Associates (civil); Langan Engineering (geotechnical)

CONSULTANTS: Gary Zimberg (owner's rep); Terrain-NYC (landscape); Apeiro Design (theater) Gilsanz Murray Steficek (building envelope)

GENERAL CONTRACTOR: Triton Construction

CLIENT: Marymount School of New York

SIZE: 153,000 square feet

COST: withheld

COMPLETION DATE: September 2023

Sources

MASONRY CMU: Montfort Brothers

METAL PANELS: BAMCO

METAL-GLASS EXTERIOR WALL: PGNY

GLAZED TERRA-COTTA: Shildan Group

STOREFRONT: Kawneer

METAL-FRAME WINDOWS: Pichler

EXTERIOR GLASS: Tvitec System Glass

SEATING: Stillfried Wien (chapel chairs); KI (classroom and dining chairs); Allsteel (sofas and stools in Commons)

ILLUMINATED by a large skylight, the high-ceilinged common area houses storage cubbies and invites play (this image). Outside, the elevated skylight is a distinctive marker (opposite).

SFORZACOSTA PRESCHOOL | MACERATA, ITALY | BDR BUREAU

Playing Scales

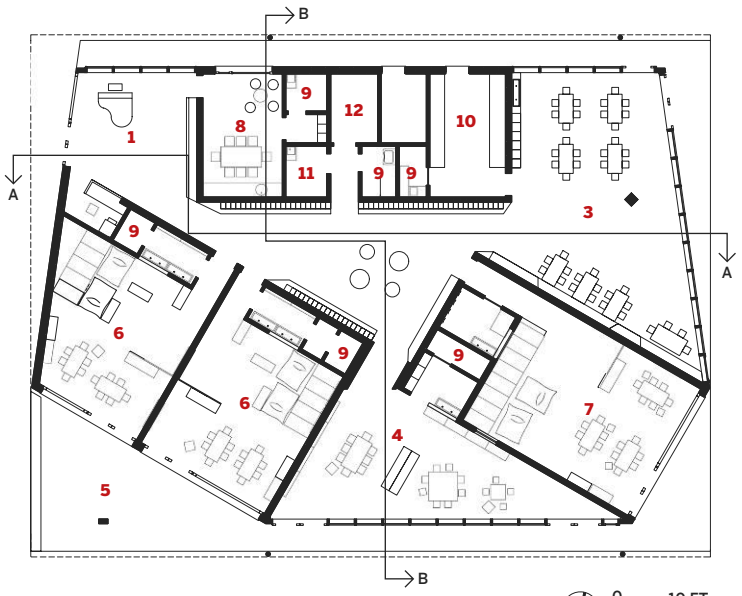
A musical client and a resourceful design team create a new preschool in central Italy, presto.

BY MOLLY HEINTZ
PHOTOGRAPHY BY FEDERICO FARINATTI

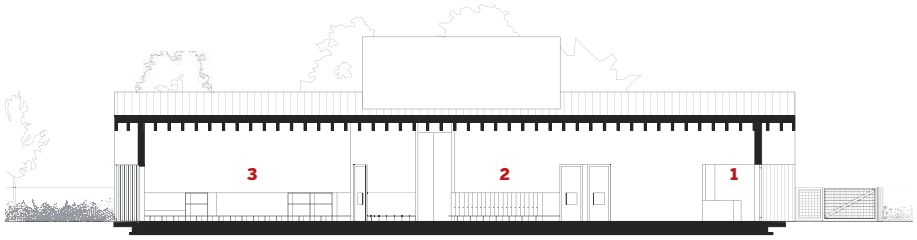
A SHINY BLACK piano beckons from within a glass-enclosed corner of the Sforzacosta Preschool. For students approaching the entrance to the small building with sloping timber eaves, the grand piano signals what awaits beyond the threshold: an even grander wall of kid-size instruments arrayed on shelves in an expansive atrium that doubles as an impromptu performance space. The separation anxiety often experienced by young children at the beginning of the school day stands no chance against this colorful percussion buffet, with its choice of xylophones, tambourines, or maracas.

The new school building, designed by Turin-based BDR Bureau, comes with musical bona fides. The patron of the project is the Andrea Bocelli Foundation (ABF), the nonprofit started by the famous Italian tenor in 2011 with the goal of empowering distressed communities. Sforzacosta, a village of about 2,000 inhabitants in the municipality of Macerata, is in the Marche region of central Italy, where life was brutally disrupted in August 2016 by an earthquake that killed hundreds. As part of an initiative to support education in the affected area, ABF partnered with the city of Macerata to renovate two existing elementary school buildings and, on the same campus, construct a new building for children up to age 6. One of ABF's long-term aims is to demonstrate the innovation and agility that becomes possible when private entities partner with public systems or, as ABF CEO Laura Biancalani has described it, how such partnerships "find solutions that can speed up achieving important goals."

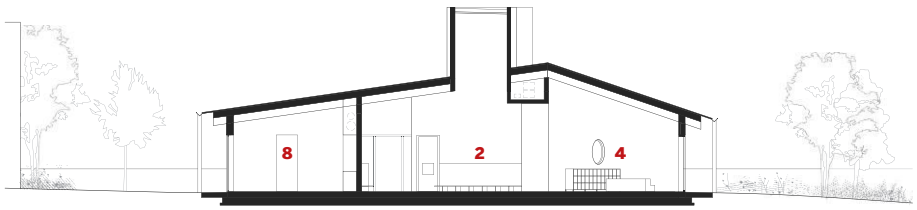
The need for speed was paramount for Simona Della Rocca and Alberto Bottero, the founding partners at BDR Bureau, one of three young Italian firms invited to the ABF-organized design competition with a brief that dictated a strict project time line. After winning, BDR had only five months to design and oversee the construction of the new school building, which was completed in November 2023. "We decided



GROUND-FLOOR PLAN



SECTION A - A



SECTION B - B

1	ENTRANCE ATRIUM	**5**	COVERED PORCH	**9**	RESTROOM
2	CUBBY AREA	**6**	PRESCHOOL CLASSROOM	**10**	KITCHEN
3	MEAL AND READING SPACE	**7**	TODDLER CLASSROOM	**11**	LAUNDRY
4	ART/SCIENCE SPACE	**8**	TEACHERS LOUNGE	**12**	STORAGE

the plan should be as compact as possible," says Della Rocca, noting the firm's wish to preserve outdoor space in the heart of Sforzacosta. "And, because of the timing, we chose to work with a very simple typology, using platform frame wood construction that could be prefabricated and preassembled." The glulam wood-frame system was available locally, saving additional time.

Through an iterative process using physical models, BDR settled on a single-floor plan where transitions become a key motif. Three boxlike volumes, each rectangular in plan, are contained under an expansive pitched roof that covers 5,700 square feet of classrooms and common spaces. "The boxes act as structural elements and bracing," says Della Rocca, noting the vertical pattern created by the

frame system. "It's always the same structural module, which is repeated. From the outside, it's easy to read how the building works."

By turning two of the three boxes to sit at an acute angle relative to the roof, dynamic interiors emerged, as did the opportunity for covered porches outside. "The building envelope itself stretches inwards at certain points, to create intermediate spaces that act as thresholds," says Della Rocca. "We wanted to work with this idea of the in-between and think about a series of diverse sequences that you come to understand as you walk through them." Sometimes, transitions are intentionally amplified with overscaled elements, such as a monumental wood portal that leads into an area for art and science projects, whereas other spaces flow seamlessly into one another. Hefty wood columns become anchoring landmarks in flexible open-plan areas.

In every classroom, glass-paneled walls and doors bring in ample daylight and establish a link to the outside, where eaves of varying depth allow for protected play next to the building. (A second exit in each room is also a seismic security measure.) The outdoors is evoked even in the central common space, where a large double-height skylight rising above exposed timber beams creates the effect of a sheltering pergola and serves as an exterior marker of the building's

A WALL of instruments encourages music-making (above). The design emphasizes elements of transition, like glass doors (right), portholes (below, right), and portals (opposite).

soaring, light-filled interiors.

It's a building designed to appeal to the youngest generation, from the outside in. The aluminum-paneled roof, with its exposed timber structure and metal gutters, recalls human-scale domestic dwellings, and the exterior of glass and plaster expresses an inviting sense of transparency and simplicity. All of this carries over to the interior, which is clean and minimalist but never austere thanks to the use of tactile wood throughout.

This blank canvas of a building comes to life with its arts-focused curriculum for 70 preschoolers—one toddler class and two preschool classes—who learn, nap, and eat in the various rooms. The piano-adorned atrium becomes the site of lively music workshops. A small kitchen for preparing meals sits adjacent to a library area in the common-area space, where banquettes integrated into bookcases double as lunchtime seating. The scaled-down bathrooms are among several areas that feature porthole cutouts in the walls, underscoring a sense of connectivity and curiosity. Long trough-style bathroom sinks allow kids to help tidy up by washing paintbrushes and other supplies. Throughout the building,

BIO-BASED linoleum floor coverings create smooth surfaces (left). Prism-style toys reveal properties of light and color (above).

bio-based linoleum flooring is easy to clean and covers a radiant-heating system that provides ample warmth in Macerata's mild climate.

Despite the challenging schedule—two months for design and three for construction—BDR found time to design a toy for the art and science workshop: a prism-like form of colored panels that reveals the properties of translucent material. Even though Della Rocca says that BDR doesn't want to specialize, the small, five-person studio does seem to gravitate toward designing spaces for learning. BDR is now completing a school for children with special needs near Brussels, renovating a secondary school in Turin, and collaborating on a school and park in Varese, also in northern Italy. "Curiosity is an essential part of our work," says Della Rocca. "Providing good answers for the community and spaces that have a positive impact on daily life is an important ambition for us. Somehow, in a school, this is very visible." ■

Credits

ARCHITECT: BDR Bureau — Alberto Bottero and Simona Della Rocca, principals; Morena Gagliardi, Alina Salahoru, team

ENGINEERS: Paolo Bianchi (construction); Andrea Montagna (structural); Serpilli (systems)

CONSULTANT: Serafino Carli (pedagogical)

GENERAL CONTRACTOR: Subissati

CLIENT: Andrea Bocelli Foundation

OWNER: Municipality of Macerata

SIZE: 5,700 square feet

COST: withheld

COMPLETION DATE: November 2023

Sources

WOOD FRAME: Subissati

CURTAIN WALL: Schüco

ROOFING: Ondulit Italiana Spa

DOORS: Tecno Porte

FLOOR COVERING: Forbo (Marmoleum cocoa linoleum)

CUSTOM WOODWORK AND FURNISHINGS: Arredi 3N dei Fratelli Nespoli

LIGHTING: Targetti Sankey

PHOTOVOLTAIC: Expofin

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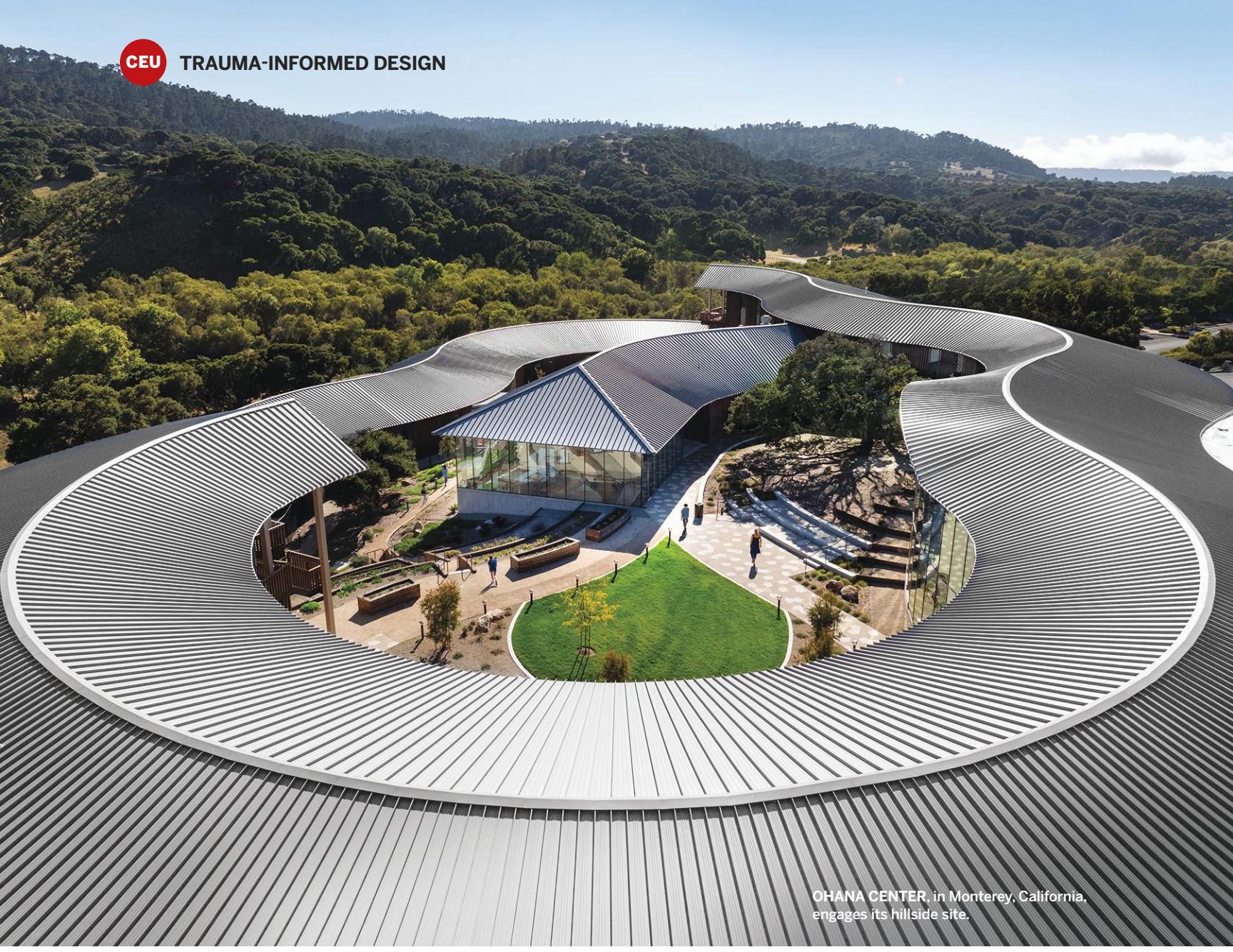


OHANA CENTER, in Monterey, California, engages its hillside site.

Healing by Design

Four youth-centered environments aim to soothe kids—mind, body, and soul.

BY KATHARINE LOGAN

A CHILD MAY survive violence, homelessness, or other profoundly distressing circumstance, but that doesn't mean it's over. The stress-response system that trauma activates in the body can have long-term effects, especially for children, whose incipient development makes them extra vulnerable. With an estimated 25 percent of children in the U.S. experiencing such conditions, trauma-informed design (TID) for youth-centered environments can play an important role in helping kids heal.

According to the Substance Abuse and Mental Health Services Administration, individual trauma can be defined in terms of "three E's:" it results from an event, series of events, or set of circumstances that the individual experiences as physically or emotionally harmful or life-threatening, with lasting adverse effects on the individual's functioning and mental, physical, social, emotional, or spiritual well-being. Trauma-induced effects can include impaired concentration, organization, and/or emotional regulation; hyperarousal to a constant state of tension, suspicion, or panic; disengagement; and difficulty relaxing, sleeping, digesting food, or finding enjoyment in life.

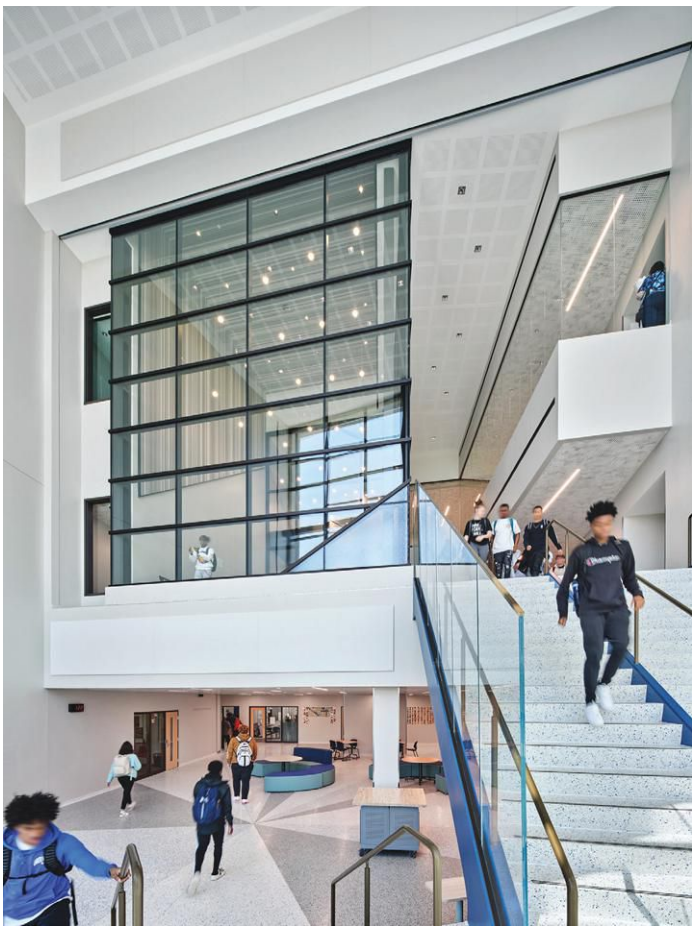
The experience of the environment, however, is also somatic: the body registers its surroundings before the conscious mind does.

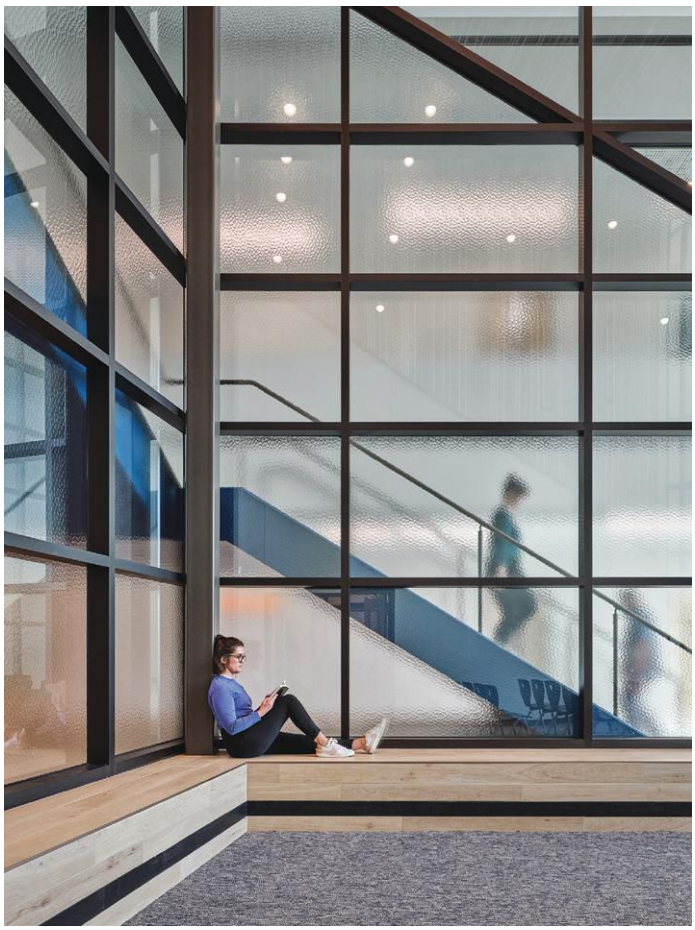
PHOTOGRAPHY: © GLEN MCDOWELL

Murals on a freestanding wall at Boys Town, in Omaha, depict the institution's history on one side (top) and aspects of student life on the other (above, left).

So, through careful attention to the user's experience, architecture can help to mitigate trauma's effects. The practice of trauma-informed design—or designing for dignity, as those who prefer a strength-based term are calling it—draws on evidence-based multidisciplinary research, including brain science, biology, social work, and architecture, to identify and minimize potential trauma triggers and to design buildings that promote self-esteem and healing. At its core, trauma-informed design entails fostering a sense of safety, through comfort, connection, and choice. Fundamentally, says Chad Holtzinger, founder of Denver-based Shopworks Architecture, a firm that has produced a forthcoming book on the practice, "when you walk through the door, you should feel that the place is affirming and safe."

Four recent projects showcase trauma-informed design in youth-centered settings. The Boys Town Education Center, completed in 2023 by DLR Group, serves grades four through 12 on a nonprofit residential campus, for troubled boys as well as girls, near Omaha, Nebraska. The Mothership (2024), by Shopworks Architecture, shelters 12- to 24-year-olds experiencing homelessness in Denver. Montage Health Ohana Center for Child and Adolescent Behavioral Health (2023), by NBBJ, provides mental-health treatment in Monterey, California. And the Parrott Creek Child and Family Services expansion (under construction), by El Dorado, is an 80-acre





THE BOYS TOWN Spirit Hall (above, left and right) is enclosed in both clear and textured glass. Tile patterns originated as a student-group project (opposite, bottom right).

retreat for highly traumatized youth in Clackamas County, Oregon.

Typically referred by clinical professionals, caseworkers, the juvenile justice system, or parents seeking help, a significant number of the students at Boys Town Education Center face behavioral-health and/or academic challenges. "You can't learn if you don't feel safe," says Vanessa Schutte, principal and K–12 education leader in DLR Group's Omaha office, on the decision to prioritize trauma-informed design for the new building.

An initial challenge in promoting a sense of security through design was the fact that the project is located on the main drive of the Boys Town campus, which, as a National Historic Landmark, is something of a tourist destination. The architect's first move was to configure the three-story, 110,000-square-foot school so that students wouldn't feel gawked at. Along the drive-facing facade, a series of bays project from the building, one per classroom; these allow large windows to be positioned perpendicular to the exterior wall so that students enjoy daylight and views out, but tour-bus passengers don't see in. The main entrance courtyard is screened by a monumental wall, with the drive-facing side depicting elements from Boys Town's history and the school-facing side celebrating aspects of student life in a bright mural for which students themselves were consulted.

In addition to fostering privacy from the outside, the projecting bays work spatially inside. For each classroom, they provide an alcove that serves both as a small-group breakout area and as a respite spot where a student who needs a bit of space can pull aside without having to leave the class. "Many of the students have boundary issues," Schutte says, "so classrooms allow for more square footage per student [55 rather than the more typical 35] to help with that comfort level."

Another key strategy for reducing anxiety makes use of transparency to let students preview spaces before entering. The glazed enclosure of Spirit Hall, a nondenominational two-story volume for prayer and contemplation that forms the heart of the school, lets potential visitors see in advance whether the hall is occupied, even as texturing of the lower portions of the conceals the particular identity of those within. Along the corridor wall of each classroom, a 12-foot stretch of glazing provides views in and out. Further enhancing security, careful analysis of sight lines has ensured that there are also places of refuge, concealed from the corridor and defined by a change in finishes. Transparent walls on small-group and meeting rooms express openness and connectivity, but when occupants want privacy, a swipe of a teacher's card lowers a blind. And, for a mental reset during class changes, corridors end with windows providing a view to nature.

As with the entry mural, a particular focus for the design was the integration of art and the engagement of students in its creation. Examples include the three-dimensional installations of student-painted butterflies, also created in collaboration with the artist Watie White, and tile patterns that originated as student-group endeavors. The art projects

PHOTOGRAPHY: © MICHAEL ROBINSON (2 AND OPPOSITE, TOP AND BOTTOM, RIGHT); DANIEL PATRICK MULLER (OPPOSITE BOTTOM, LEFT)

MOTHERSHIP (below, left), a shelter for previously homeless youth in Denver, has a skylit common room (above, left) and outdoor terraces (above).

offer "the ability for students to see themselves within the facility," Schutte says. As "stories of coming together to help each other and to create something beautiful," she adds, they epitomize Boys Town's mission.

Art, quality materials, and well lit, welcoming spaces are examples of what Holtzinger calls "visual cues of worth." As at Boys Town, such cues play a significant role in Shopworks' design for the Mothership, a 66,600-square-foot, four-story shelter for up to 135 previously homeless children and young people. Features such as a bright, comforting lobby, a skylit common room with a choice of alcoves or central space, of tables or lounge seating; dignified materials including wood, concrete, and ceramics; good ventilation and acoustics to avoid sensory overload; and amenities such as a music studio, art room, and outdoor terraces all contribute to a place that tells residents they're valued. "Kids don't choose to be homeless. They happen to be homeless," Holtzinger says. "We want to destigmatize that."

Tripling the capacity of the site's previous, dormitory-style building (dark and smelling of mildew and socks, as Holtzinger describes it), the Mothership represents a significant innovation in the typology of shelter. Unlike existing models in Denver's youth system—"We've got 20 years of data that says the outcomes aren't great," Holtzinger says—the building is configured into seven co-housing-like "neighborhoods." Each one accommodates 12 to 18 residents and consists of a shared kitchen, living/dining room, bathing facilities, and double rooms with beds, desks, and a sofa. The use of transparency and attention to sight lines allow for previewing one space from another, and a design that minimizes dead ends and offers choice of route to further reduce anxiety.

The neighborhoods are intended as transitional housing that supports residents until they feel ready to move out on their own (or reach the maximum age). They are places where residents can build self-worth, practical skills like cooking, doing laundry, paying rent on time, and maintaining a credit score, and a social network that could continue to support them after they leave. "We're trying to set kids up to experience life in a salutogenic, life-affirming way," Holtzinger says. Even in the building's emergency dormitory, to which new arrivals are admitted before moving to a neigh-

PHOTOGRAPHY: © MATT STAVER (3)

borhood, each bed has a phone shelf, lamp, coat hook, and locker, details meant to offer occupants a sense of personal space and control over their environment right from the start.

The Mothership is the result of years of pre-design effort, with Shopworks supporting its nonprofit client, Urban Peak, in grappling with questions from unfamiliar perspectives, such as those involving real estate, finance, zoning, building code, and trauma-informed design, that ultimately led to the neighborhood paradigm. "Architects play an outsized role in developing projects like this," Holtzinger says. "Our role was more of being a partner in figuring out what the project needed to be."

When people are treated with dignity, their stress—evidenced by heart-rate variability and cortisol levels—drops. Architecture's ability to contribute to this through design for dignity is especially relevant in therapeutic environments such as the Ohana Center for Child and Adolescent Behavioral Health. "The building itself becomes an element of our prevention program," Ohana's physician in chief and medical director, Susan Swick, has said. "It creates a sense of possibility and hope."

The 55,600-square-foot mental health facility comprises an outpatient-treatment wing, inpatient rooms, classrooms, a variety of therapeutic spaces, and places for informal gathering, all designed to ensure occupants' sense of comfort, choice, and control over their circumstances. Supported by research suggesting that soft lines are more soothing than sharp angles, the design incorporates gentle curves at multiple levels of scale, from a winding plan to filleted millwork corners. The proven benefits of movement on mental health informed the decision to position the gymnasium prominently, at the center of the facility. The building also incorporates transparency for previewing what's ahead, art to enrich and engage, and materials that convey dignity and worth (Ohana is one of the country's largest health-care buildings to use mass timber, for example).

Throughout the design process, a primary goal was to maximize occupants' connections to the landscape, "so that nature can become part of the healing process," says Jonathan Ward, a partner at NBBJ. With a hillside site that looks out over Coastal live oak–studded hills, openings—from glazed walls to window nooks—provide panoramic or focused views from every part of the facility. Outside, the curves of the building define three enclosures designed around stands of oak. Stepping down the site from more public to more private zones, the upper courtyard is associated with the outpatient area, the central one with the dining room and gym, and the lower with the inpatient rooms. And because working with troubled children and youth can be stressful for front-line staff—with turnover at such facilities typically as high as 40 percent a year—staff break spaces are designed to provide refreshment and help reduce burnout, with outdoor terraces and splendid views.

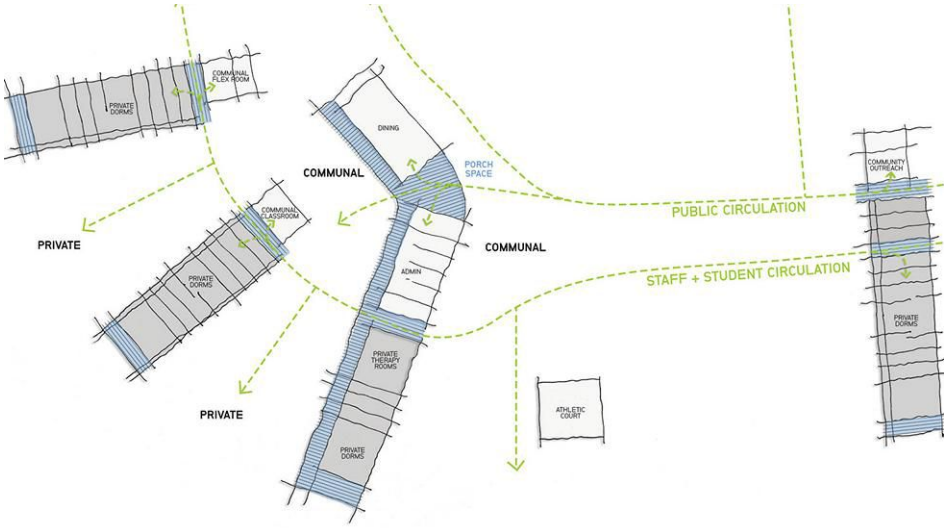
Additional strategies for a salutogenic building include the installation of certain fragrant plants throughout the facility, particularly ones that release pinenes, compounds which have been shown to boost immune function. Outside, a fruit and vegetable garden provides enjoyable and productive tasks that can help children to recover their sense of personal agency. "What we've done is create a model for how architecture and design is part of the healing environment," Ward says. "Beyond technology and efficiency, it's about the human experience. It's about understanding how humans are best adapted to their environment to be productive, healthy, and happy."

As at Ohana, connection to nature is a vital aspect of trauma-informed design at the expanded facilities of Parrott Creek Child and Family Services, an 80-acre retreat that provides restorative programming for traumatized teens. Inspired by a vernacular farmhouse on the site, the project takes for its parti the concept of the porch: a safe, sheltered, transitional space that offers users the option

The gym (above) was placed at the center of Ohana to take advantage of the benefits of movement on mental health. Ohana's design incorporates curves at multiple scales, including that of a hallway (above, right).

PHOTOGRAPHY: © TY COLE/OTTO (2)

At Parrott Creek, a retreat in Oregon for traumatized teens, a network of porches provides transitions from public to private.



PARROTT CREEK—CONCEPTUAL CIRCULATION DIAGRAM

to connect with others or find solitude in relationship with the landscape. "The porch concept resonates across cultures," says Elisandra Garcia, director of engagement at El Dorado. "It provides an intimate place for a difficult conversation or a moment of decompression during a hard day, but also a warm place where we welcome loved ones." The design interprets the porch in various versions throughout the compound, using the element to wrap around, cut through, or open up simple building forms, define circulation paths, link or buffer adjacent uses, and focus each structure on a creek or woodland view.

A full set of trauma-responsive strategies deployed at Parrott Creek ranges from clarity of wayfinding to a special finish on bedside walls that's comforting for kids to touch if they're anxious in the night. Even a photovoltaic array with battery backup contributes, guarding against surprise power outages that could trigger kids' trauma and cause chaos. "Sustainability is a measure of trauma-informed design," Garcia says.

In addition to its specific strategies and solutions, Parrott Creek exemplifies TID as a process. Extensive engagement began with identifying the priorities of the nonprofit developer, Adre—to let kids be kids was No. 1—and then expanded to include the facility's wider community: parents, grandparents, probation officers, therapists, teachers, staff, and, especially, the kids. The architects used a variety of formats for eliciting the children's input: asking about their days, what they did on a Monday morning or a Saturday; issuing them with disposable cameras to document aspects of the site that they particularly enjoyed; and distributing magazines for making collages of their ideas about the best place to sleep (open skylights and windows) or the best place for therapy (soft furniture and monochromatic materials). In workshops, a 3D site model helped the kids to visualize ideas, and tracing paper got them sketching them like pros. "As architects, we have spatial and technical expertise," Garcia says, "but the community, the user, is the expert in their own needs."

As these four projects show, trauma-informed design offers ways to create environments that engender trust and healing among distressed children and youth, wherever they are. The lessons from Boys Town, for example, will become a part of every project Schutte's team is involved with going forward, she says, "because every school in America has kids who have experienced trauma." Whether in education, housing, or health care, "if we design through the lens of dignity, for the kids and for the staff," Holtzinger says, "we can create enriched environments that make a real difference in people's lives." ■

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Learning Objectives

1 Define "trauma-informed design," or TID.

2 Discuss which disciplines TID draws upon.

3 Explain the relevance of TID, particularly in youth-centered settings.

4 Describe how the tenets of TID can be deployed in educational, residential, and health-care environments.

AIA/CES Course #K2410A

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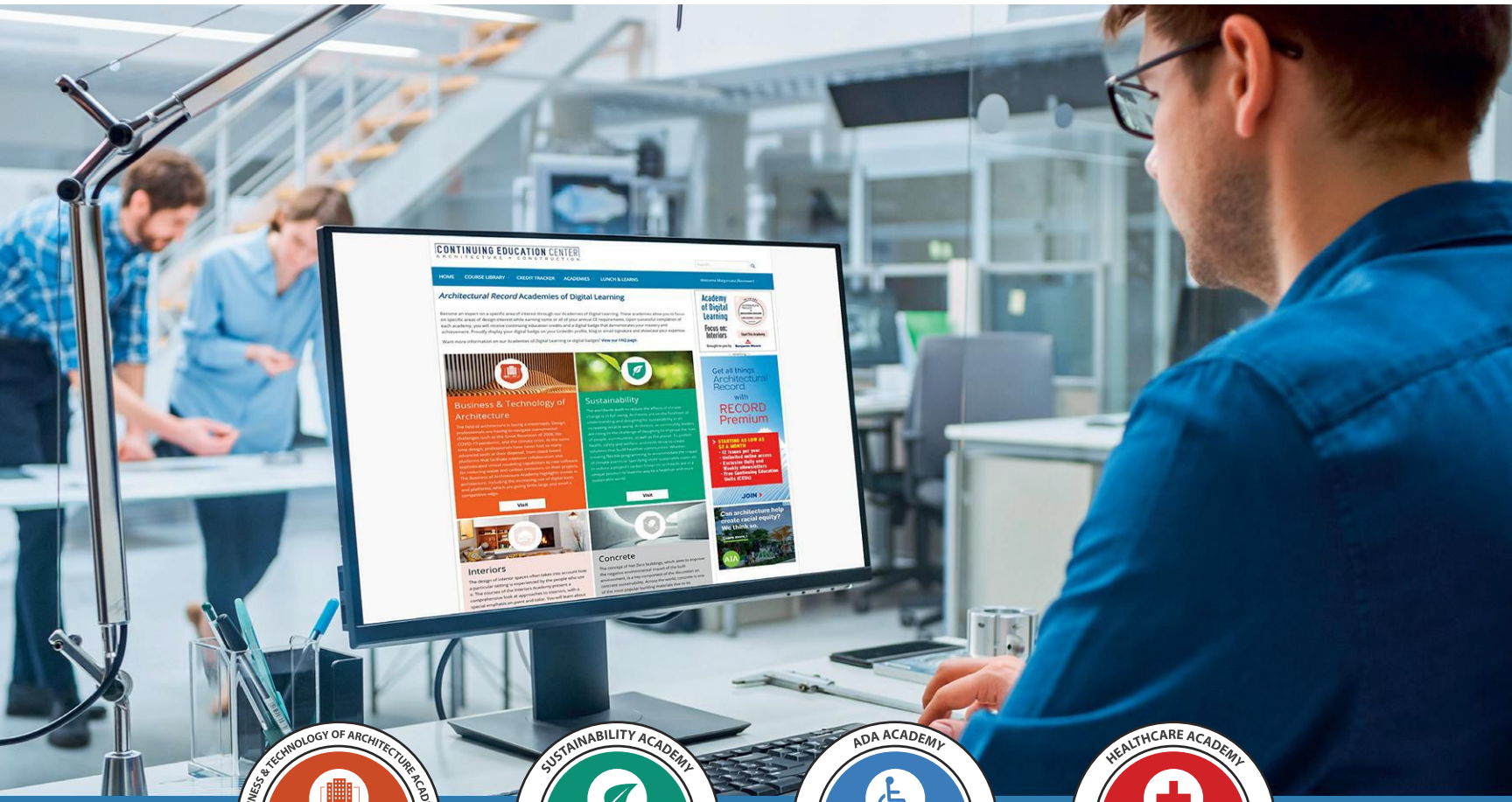

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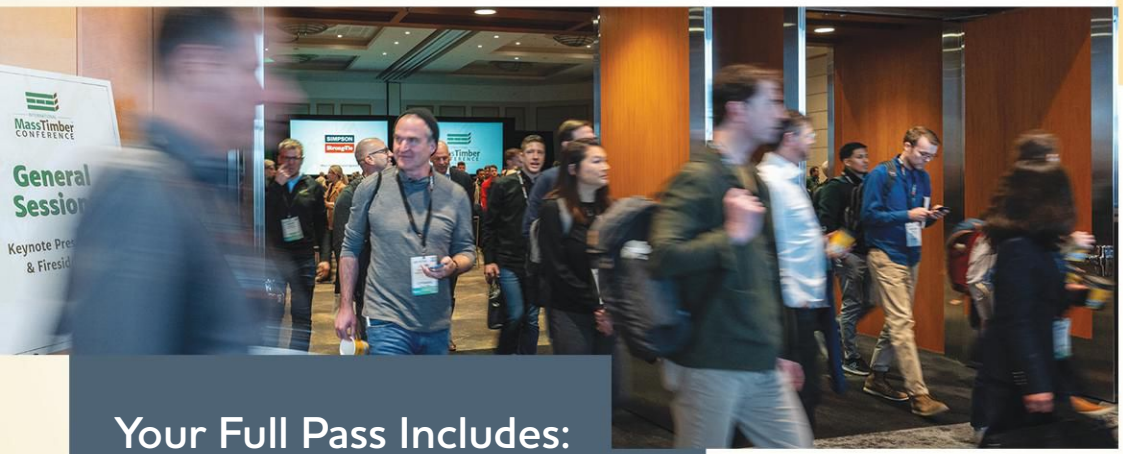

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In this section, you will find four compelling courses highlighting creative solutions for tomorrow's buildings brought to you by industry leaders. Read a course, and then visit our online Continuing Education Center at ce.architecturalrecord.com to take the quiz free of charge to earn credits.

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Metal for Aesthetics and Performance

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Photo courtesy of The Propane Education & Research Council

Energy Efficiency and Resilience of Building and Renovating With Propane

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IN SU AC

CATEGORIES

AC ACOUSTICS
BE BUILDING ENVELOPE DESIGN
EM ELECTRICAL AND MECHANICAL
IN INTERIORS
PM PRODUCTS AND MATERIALS
RE RESIDENTIAL
ST STRUCTURAL
SU SUSTAINABILITY

Courses may qualify for learning hours through most Canadian provincial architectural associations.

The combination of durability and versatility makes single-skin metal panels an attractive choice for projects requiring a greater defense against nature.

Photo courtesy of Metal Construction Association

Metal for Aesthetics and Performance

Single-skin metal pans offer a versatile, durable, and flexible option for sustainable construction

Sponsored by Metal Construction Association | *By Andrew A. Hunt*

Single-skin metal panels are a cornerstone of modern architecture, providing versatility, durability, and aesthetic flexibility for a wide range of commercial applications. This presentation delves into the two primary types of panels: Roll formed and custom. Roll formed panels, produced by passing metal sheets through rollers, are often specified for their cost-effectiveness and efficiency, making them a popular choice for projects requiring quick and reliable solutions. In contrast, custom panels cater to specific design requirements, offering architects the freedom to create unique architectural aesthetics while maintaining functional integrity.

Beyond the panels themselves, this presentation offers a comprehensive overview of the various metals used in them—copper, stainless steel, zinc, and aluminum—highlighting the material's adaptability. Each metal's unique properties contribute to the panels' functional and aesthetic qualities, allowing architects to craft visually striking exteriors that also meet specific performance criteria.

Finally, this presentation will introduce participants to the creative possibilities inherent in single-skin metal panel design.

Continues at ce.architecturalrecord.com

Andrew A. Hunt *is Vice President of Confluence Communications and specializes in writing, design, and production of articles and presentations related to sustainable design in the built environment. In addition to instructional design, writing, and project management, Andrew is an accomplished musician and voice-over actor, providing score and narration for both the entertainment and education arena.* ***www.confluencec.com***

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Learning Objectives

After reading this article, you should be able to:

1. Compare and contrast two types of single-skin metal panels: Roll Formed and Custom designed.
2. Identify the many types of metals that can be used for single-skin metal panels, their origin, and performance attributes.
3. List the occupant health and safety benefits single-skin metal panels can provide by offering high performing rain screen, sunscreens, and a physical barrier from the elements.
4. Describe various real-world examples of how specifying single-skin metal panels can support architects' vision for both durable and aesthetically unique projects.

To receive AIA credit, you are required to read the entire article and pass the quiz. Visit **ce.architecturalrecord.com** for the complete text and to take the quiz for free.

AIA COURSE #K2409P

The College of Osteopathic Medicine (OCOM) in Winter Garden, Florida, utilizes advanced building products and phase change materials to create a space for students that promotes health, education, and addresses climate-related challenges.

Photo courtesy of Armstrong World Industries

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1 AIA LU/HSW 0.1 ICC CEU

1 IDCEC CEU/HSW

Learning Objectives

After reading this article, you should be able to:

1. Examine extreme temperature, humidity, and climate conditions and their direct impact on cognitive function and well-being of building occupants.
2. Explore the intersection of healthy and green buildings and the role they play in climate resilience.
3. Review how utilizing innovative building materials can improve energy efficiency and regulate indoor temperatures.
4. Review practical solutions through case studies showing building optimization and efficiency.

To receive AIA credit, you are required to read the entire article and pass the quiz. Visit **ce.architecturalrecord.com** for the complete text and to take the quiz for free.

AIA COURSE #K2409R

Climate Resilient Building Design: Optimizing Temperature Control and Energy Efficiency

Sponsored by Armstrong World Industries

Join us for an enlightening session where public health and building material experts delve into the convergence of green and healthy buildings. Discover how climate-related challenges, such as extreme temperatures and weather events, impact the well-being and productivity of building occupants. This course will explore innovative building practices and materials designed to regulate indoor temperatures, reduce carbon emissions, and mitigate rising energy costs. Additionally, learn about advanced building materials, including phase change materials, and forward-thinking solutions that enhance the resiliency of interior spaces.

Armstrong World Industries

Armstrong is committed to developing new and sustainable ceiling solutions, with design and performance possibilities that empower its customers to create beautiful, high-performance residential and commercial buildings. Armstrong continues to grow and prosper for the benefit of all its stakeholders. armstrongceilings.com/commercial

Brentwood Elementary School in Austin, Texas, gets a modern upgrade.

Photo courtesy of Georgia Pacific

Creating a Safe Haven in Educational Buildings

Designing and specifying materials in schools to support health, durability, and learning

Sponsored by Georgia Pacific | *By Andrew A. Hunt*

Designing educational buildings is a complex and multifaceted endeavor that presents architects with both significant challenges and unique opportunities. These structures are not merely spaces where learning occurs; they are environments that must cater to the diverse needs of students, staff, and the community at large. An educational building's design must ensure safety, health, and comfort while fostering an atmosphere conducive to learning and growth.

The experience of occupying an educational building will greatly impact the knowledge the students take with them. A student's ability to concentrate on the task at hand and to feel secure and comfortable are critical ingredients for their success. In this course, we will look at some of the challenges associated with educational buildings that impact the learning environment for students, staff, and visitors, and explore options available to support a well-designed and constructed space for learning.

THE UNIQUE CHALLENGES OF EDUCATIONAL BUILDINGS

Educational buildings are as diverse as the students who walk their halls. These structures range from preschools to colleges, vocational schools to biological laboratories, sports centers to libraries. Each building type has specific requirements based on size, location, and intended use. Designing such spaces involves more than assembling classrooms, laboratories, and offices. Architects must create environments that accommodate various activities, from focused individual study to collaborative group work. High schools, for example, often combine multiple functions, providing spaces for students, support areas for staff and gathering areas for community use. Educational buildings must cater to diverse user groups, including students, teachers, administrators, and the broader community, ensuring that the needs of each group are met effectively. While one design style does not fit all user groups, there are common

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Learning Objectives

After reading this article, you should be able to:

1. Identify design and specification options for building products and materials that support health, wellness, and safety in educational building.
2. Assess design opportunities for architects to optimize the learning environment and reduce both external and internal distractions.
3. Explain the importance of designing educational buildings with safe student access and egress to support the safety and well-being of occupants.
4. Describe how durable building materials and products in high-traffic areas support the mission of educational buildings by mitigating risks created by water migration and creating a more functional learning environment.

To receive AIA credit, you are required to read the entire article and pass the quiz. Visit **ce.architecturalrecord.com** for the complete text and to take the quiz for free.

AIA COURSE #K2406M

Photo courtesy of Georgia Pacific

Architects must consider safety, health and comfort when designing for educational buildings.

themes and attributes that apply to educational buildings as a whole and effectively address most requirements.

Noise Control

Managing and reducing the amount of noise in educational buildings is crucial for creating an optimal learning and working environment. For students, a quiet environment is essential for concentration and effective learning.

A study conducted by the Acoustical Society of America found that poor acoustics and high noise levels in classrooms are linked to decreased student performance. The research uncovered that in many classrooms in the United States, the speech intelligibility rating is 75 percent or less. In practical terms, this means that listeners with normal hearing can understand only 75 percent of the words spoken in the classroom. Research also demonstrated that noise impacts short-term memory and comprehension, with younger children being particularly vulnerable to these effects.[1]

In non-auditory tasks such as reading and writing, noise impairs students and their ability to learn, especially for children. Depending on the nature of the tasks and sounds, students encounter difficulties with perceptual and cognitive processes or have a shorter attention span and problems with focus. These issues result in lower test scores and increasingly create problems with disruptive behavior in the classroom. Data also suggests that over the long term, excessive and uncontrolled noise in the classroom may affect children's cognitive development.[2]

Uncontrolled noise in educational settings can impact students of any age. A study published by the World Health Organization (WHO) and the European Commission's Joint Research Centre found that exposure to noise in college classroom settings can negatively affect cognitive tasks. The research further emphasized that older students with chronic exposure to noise, such as traffic or construction sounds, can lead to reduced attention spans and lower academic performance, as well as lower GPAs.[3]

Teachers and staff also suffer negative consequences when noise remains unchecked in educational buildings. The Journal of Speech, Language, and Hearing Research concludes that the vocal health of teachers was most negatively impacted by excessive noise. In quieter settings, teachers can deliver lessons without straining their voices, and students can hear and understand instructions more easily. This contributes to a more efficient teaching process and a healthier work environment for educators, reducing fatigue and improving job satisfaction.

A Safe Space

Safety is a paramount concern in educational building design, as the risks to students and staff come from many different areas. Fire is an ever-present concern, so educational buildings must comply with National Fire Protection Association (NFPA) standards, such as NFPA 101 (Life Safety Code) and NFPA 72 (National Fire Alarm and Signaling Code). These are crucial for fire safety in educational buildings and cover areas such as fire alarms, emergency lighting, exit routes, and fire-resistant materials to ensure schools can be safely evacuated during emergencies.

Related to access and egress, architects should consider standards outlined by the U.S. Department of Homeland Security that emphasize the importance of physical security measures in schools. Building layout and design both play a significant role in ensuring security in educational settings. Layout and design should include planning for interiors with clear sightlines, unobstructed visibility of hallways and entrances to reduce hiding spots, and even the installation of safe rooms. Additionally, architects may need to include features such as surveillance systems, secure entry points, and lockdown capabilities to protect against potential threats.

A safe space must also be a healthy space, which is why creating a healthy indoor environment—especially focusing on indoor air quality (IAQ)—is crucial for successful learning.

Continues at ce.architecturalrecord.com

Andrew A. Hunt** is Vice President of Confluence Communications and specializes in writing, design, and production of articles and presentations related to sustainable design in the built environment. In addition to instructional design, writing, and project management, Andrew is an accomplished musician and voice over actor, providing score and narration for both the entertainment and education arena.* ***www.confluencec.com www.linkedin.com/in/andrew-a-hunt-91b747/

Clean, domestic energy is a reality for residential projects choosing propane.

Photo courtesy Propane Education & Research Council

Energy Efficiency and Resilience of Building and Renovating with Propane

Exploring propane's energy advantages for residential renovations and new construction

Sponsored by The Propane Education & Research Council

By Amanda C Voss, MPP

Imagine a product that increases access to clean, affordable, reliable energy for any home. Or a product that reduces carbon emissions while dependably meeting energy needs.

The compelling force behind many traditional sustainability and energy programs has been reducing the operational energy consumption of buildings. However, as buildings grow more energy efficient, the embodied environmental impacts stemming from production, construction, maintenance, and disposal of building materials or products represent an increasing share of a building's total environmental burden.

Fortunately, having a product that provides accessible energy in a responsible manner is a reality that does not have to wait on the progress of science or technological innovation. It exists today, in the form of propane.

Propane is a low-carbon energy source that produces fewer harmful emissions than competing fuels. According to the US Office of Energy Efficiency and Renewable Energy (EERE), 52% fewer greenhouse gas emissions are released when using propane, as compared to an equivalent amount of electricity generated from the U.S. grid.[1] In analyzing residential heating needs, 50% fewer greenhouse gas emissions (GHG) are produced from residential propane furnaces than from all-electric models.[2] Propane combustion is also cleaner than heating oil, resulting in lower CO_2 emissions, 12 percent fewer greenhouse gas emissions, and 80 percent fewer NOx emissions, when compared with a heating oil furnace.

Propane is extremely energy efficient, especially when compared to other energy sources. Liquid propane has a higher energy density than ethanol, methanol, and liquefied natural gas, meaning propane vehicles go farther on a tank of fuel than most other liquid alternative

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0.1 ICC CEU

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Learning Objectives

After reading this article, you should be able to:

1. Evaluate the environmental benefits provided to a project by propane, including reduced greenhouse gas and NOx emissions and lowered energy costs.
2. Conduct a thorough comparative analysis of propane-fueled systems through the lens of energy and performance.
3. Outline the profile of environmental and cost advantages for a renovation project when converting from heating oil to propane.
4. Validate why propane is both an adaptable and renewable energy source, as well as demonstrate how this fuel contributes to net zero energy homes and environmental qualifications, including LEED for Homes (LEED H v4) and the 2015 National Green Building Standard (NGBS).

To receive AIA credit, you are required to read the entire article and pass the quiz. Visit **ce.architecturalrecord.com** for the complete text and to take the quiz for free.

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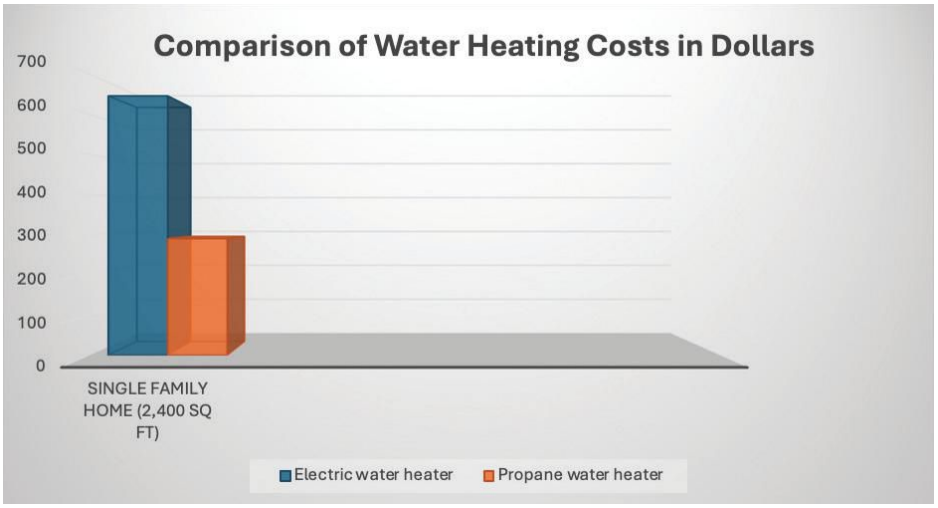
Data courtesy of Propane Education & Research Council



Comparison of annual costs for an average single-family home using propane water heating, displayed in orange, versus electric water heating, displayed in blue.

fuels, assuming comparable equipment efficiency. This energy density benefits home appliances powered by propane. A standard propane water heater with a tank performs more efficiently than a standard electric water heater with a tank. An ENERGY STAR storage tank propane water heater can save a household 13-16% on heating costs over a year, as compared to an efficient electric model. In a 2,400-square-foot home, an electric water heater would cost the homeowner about $645 a year, whereas a propane heater would cost only $290 a year. That adds up to annual savings of about $355 a year.

Propane has an exceptional environmental profile. Still, no energy source can be considered completely "clean." Even energy sources labeled as renewable, like solar, wind, and hydroelectric, have environmental challenges. However, when carbon emission levels are used as a benchmark, propane remains one of the cleanest fuels available. In comparison to other widely used fuels, the US Energy Information Administration (EIA) shows that propane offers one of the lowest carbon emissions per million BTUs.[3] Put into perspective, over its lifespan a storage tank propane water heater produces 46% fewer greenhouse gas emissions. A propane tankless water heater sends about 70% fewer emissions into the atmosphere. A tankless water heater, powered by propane, can last anywhere from 15 to 20 years with proper maintenance and operation. In comparison, a standard tank water heater normally has a working life of 10 years or less. Besides efficiency, propane tends to be a more affordable energy option. While fuel costs fluctuate, propane is generally cheaper per BTU compared to oil, according to the U.S. Energy Information Administration (EIA).

In addition to environmental performance, propane proffers excellent environmental benefits once on site. Propane is stored as a liquid, but when released into the air, it vaporizes and dissipates–which means it won't contaminate groundwater, drinking water, marine ecosystems, or other sensitive habitats. When vaporized, propane produces virtually no ozone-harming effects and, unlike natural gas, it is not a greenhouse gas in its un-combusted state. Because of these advantages, propane is a preferred fuel source in environmentally sensitive areas like nature preserves and national parks.

Using propane as a fuel or energy source means harnessing an available clean technology to reduce emissions while still meeting energy needs. Propane is clean and non-toxic. Propane is abundantly available, and the growth of renewable propane technology means it can be used sustainably for generations to come.

REALIZING PROPANE'S ADVANTAGES TODAY

Propane is a high-performing, safe, and cost-effective energy source. Propane has lower carbon emissions than natural gas, fuel oil, diesel, and even electricity. In fact, 60% of the U.S. electric grid is still powered by natural gas or coal, which has high carbon emissions. Propane is a domestic resource and in high supply, so pricing is consistent and competitive with other energy sources.

Currently, 12 million U.S. households use propane for space heating, water heating, or cooking. Since propane-powered appliances are energy-efficient, homeowners save on energy costs and minimize their consumption. Many states and municipalities offer incentives for using clean alternative fuels, including propane. For the homeowner, propane is an exceptionally stable fuel source. Power from propane is often cheaper than electric power and offers better price stability, which translates into predictable energy bills.

When specifying equipment for a new home, or a home under renovation, the design professional is committing to a decision that will have energy and performance implications for 20 years or more. Selecting appliances and equipment that use propane as a fuel source provides confidence that today's decision can reduce emissions immediately, with the prospect of enhanced reduction and costs in the future.

Addressing the Limitations of Electricity

All things electric, from vehicles to appliances, are currently in the spotlight. As oil prices peak, another electric power is spurring additional consumer interest in the Northeast: using electric heating to supplant fuel oil. Design teams, builders, and contractors are increasingly navigating energy source discussions with their clients.

Continues at ce.architecturalrecord.com

Amanda Voss, MPP, is an author, editor, and policy analyst. Writing for multiple publications, she has also served as the managing editor for Energy Design Update.

In plans for 380 Stuart in Boston's Back Bay, careful product selection, creative design strategies, and a willingness to invest in triple glazing are setting new standards for the energy performance of curtain walls.

Image courtesy of CBT Architects

Net Zero Performance and Curtain-Wall Systems

What's Achievable Now and What's Possible in the Future

Sponsored by The Ornamental Metal Institute of New York

William B. Millard, PhD

As a metric, a goal, a marketing instrument, a criterion within certification systems, or a buzz phrase, the term *net zero* can mean different things to different people. Like *green*, *sustainable*, or *eco-friendly*, net zero is sometimes used loosely to indicate good intentions without a rigorous foundation of greenhouse gas (GHG) emission measurement to support it. Nevertheless, through the efforts of conscientious designers and the forward-looking segments of the building-products industries, net zero and near-net-zero buildings have moved from an intention to a reality, and today's architects are in a position to advance decarbonization by incorporating net zero standards into their designs. Curtain walls, as essential contributors to (or detractors from) a building's energy performance, are one of the critical sites for these efforts.

Architects and builders may view net zero, or at least some claims about it, with a degree of justifiable skepticism and caution. Canadian Minister Catherine McKenna, the former chair of the United Nations' High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities, said at the 27th Conference of the Parties (COP27, Sharm El-Sheikh, Egypt, 2022) that "the planet cannot afford delays, excuses, or more greenwashing," crediting some organizations with making tangible, purposeful progress on emission reduction while charging that in other areas, "too many of the net zero pledges are... little more than empty slogans and hype" (COP27 "Zero Tolerance").

The High-Level Expert Group, created by Secretary-General António Guterres after COP26 in Glasgow, 2021, identified several patterns of conduct by non-state actors (industry, financial institutions, cities, and regions) that compromise the value of the net zero and "net-zero-aligned" concepts. These categories of greenwashing include claims of net zero status by entities that continue to build or invest in new fossil-fuel

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1 AIA LU/HSW 0.1 ICC CEU

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Learning Objectives

After reading this article, you should be able to:

1. Define fundamental terms such as net-zero energy, net-zero carbon, absolute zero carbon, and carbon neutrality, and demonstrate familiarity with applications of these concepts as defined by U.S. and international organizations.
2. Recognize the range of available curtain-wall systems that contribute to a building's performance, including widely available products, advanced or aspirational technologies, and traditional or low-technology approaches.
3. Recognize several recent and contemporary construction projects that have achieved or approximated net-zero carbon metrics through high-performing curtain-wall systems and complementary approaches.
4. Understand the long-range environmental effects of designing and building with the range of facade technologies, placing the contribution of curtain walls in the context of a building's overall performance.

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supply; purchases of low-integrity credits; focusing on reducing emissions intensity rather than absolute emissions, or tackling part of emissions rather than the full value chain of Scopes 1, 2, and 3 (as defined by the GHG Protocol to address operational and embodied carbon, direct and indirect); lobbying to undermine governmental climate policies; and reliance on voluntary initiatives rather than regulated requirements for net zero (U.N. High-Level Expert Group, *Integrity Matters*, p. 7). The group's report insists on "not only long-term pledges but also short-term science-based targets" and public reporting with verifiable, comparable information on these actors' progress.

Yet regardless of misuse of the term and contention over its meaning, the net zero concept can guide and motivate efforts to improve buildings' performance. Net zero at its best designates a serious commitment to managing both operational and embodied carbon, achieved through the deployment of a full range of systems and technologies, both familiar and new. Since facades account for a substantial proportion of a building's energy use and consequent carbon footprint, optimizing the function of a curtain wall offers considerable leverage toward GHG emission reduction on the single-building scale and beyond. Net zero codes in some locations are driving impressive achievements despite the inherent challenges in the thermal properties of curtain-wall systems (see Case Studies, "380 Stuart Street").

NET ZERO, ABSOLUTE ZERO CARBON, AND OTHER BENCHMARKS

Net zero can be seen not so much as an innovation by the architects and engineers of the developed world, comments Dennis Vermeulen, AIA, LEED BD+C, partner at Marvel in New York, but as a traditional global norm reflecting the frugal energy-use patterns of nonindustrial societies. "The skeptic in me sometimes thinks that it's intentionally not clear," he says, "so people can make more out of things." He recalls a conversation early in his career, after he had been studying net-zero buildings and "crowing, 'Oh, we're going to do a net-zero building,' and someone I was working with said, 'You know, about half the world lives net zero right now.' And I think in terms of how the term should be used, that's actually the correct term. You don't heat or cool your home. Your home is actually built out of local material. Maybe it's bio-based material; it's what you have. It's certainly not much bigger than what you need. In the last, maybe, 20 years, that's changed. So I think more and more people are living in cities and living in architectural environments, but to me, the correct concept of zero is really zero."

In the developed world, there are more near-net-zero buildings, net-zero-ready buildings, and buildings that use offsets to reach a zero emission measurement than buildings that can satisfy rigorous net zero criteria. The net zero concept, to Vermeulen and other practitioners, is most useful when interpreted in a broad context. "Standardization of the terms would really be helpful," he says. "When we look at it as design, we're really looking at carbon footprint, so that's everything from extraction of materials, fabrication of systems, shipping it to the site, installing it, and then building a building, and then operating a building. And even how you would dismantle a building and recycle those materials: that's what we'd like to look at. And when we do that, of course, we're very far away from the kind of zero carbon that we want to be. But every day, I think we get a little bit better."

Shanta Tucker, PE, LEED AP BD+C, director at the New York office of environmental consultants Atelier Ten, credits the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) with offering "a pretty good working definition that combines an energy-efficient building that has no fossil-fuel use with the ability to produce as much electricity locally as it uses within a year." A net-zero building in this sense is metered and connected to the utility grid, has infrastructure that produces electricity (e.g., photovoltaics [PVs] where applicable), and may also have some purchased green power.

The U.S. Department of Energy (DOE) has incorporated the ASHRAE standard by reference in its newly published definition, requiring a building to be highly energy-efficient, free of on-site GHG emissions from energy use, and powered solely from clean energy. DOE's fuller definition of those three criteria, the relevant report states, is a minimum standard, not a regulatory standard in itself but one to be used by public or private entities determining buildings' zero-emission status:

- **Highly energy-efficient:** Buildings must demonstrate exceptional energy efficiency, placing them among the top performers in the market or achieving significant reductions in energy use compared to model codes.
- **Free of on-site emissions from energy use:** Zero-emissions buildings must eliminate direct GHG emissions from on-site energy consumption.
- **Powered solely from clean energy:** All energy used by the building must come from carbon-free sources, whether generated on-site or procured from off-site sources. (U.S. DOE, "National Definition of a Zero Emissions Building")

The DOE definition also does not permit carbon offsets, an approach drawing frequent charges of allowing fudging by entities continuing to emit GHGs. DOE's interpretation of a zero-energy building is based on source energy use intensity, one of multiple metrics used in the field (for an overview of ten common metrics provided by the Scottish firm Integrated Environmental Solutions, see Buckley).

Mic Patterson, PhD, LEED AP BD+C, ambassador of innovation and collaboration at the Facade Tectonics Institute (FTI), agrees with the UN group about undisciplined interpretations of net zero, associating it with other terms often used imprecisely (*sustainability*, *regenerative architecture*, etc.) in a category he calls "sustainababble."

Continues at ce.architecturalrecord.com

***Bill Millard** is a New York-based journalist who has contributed to Architectural Record,* The Architect's Newspaper, Oculus, Architect, Annals of Emergency Medicine, *OMA's Content, and other publications.*

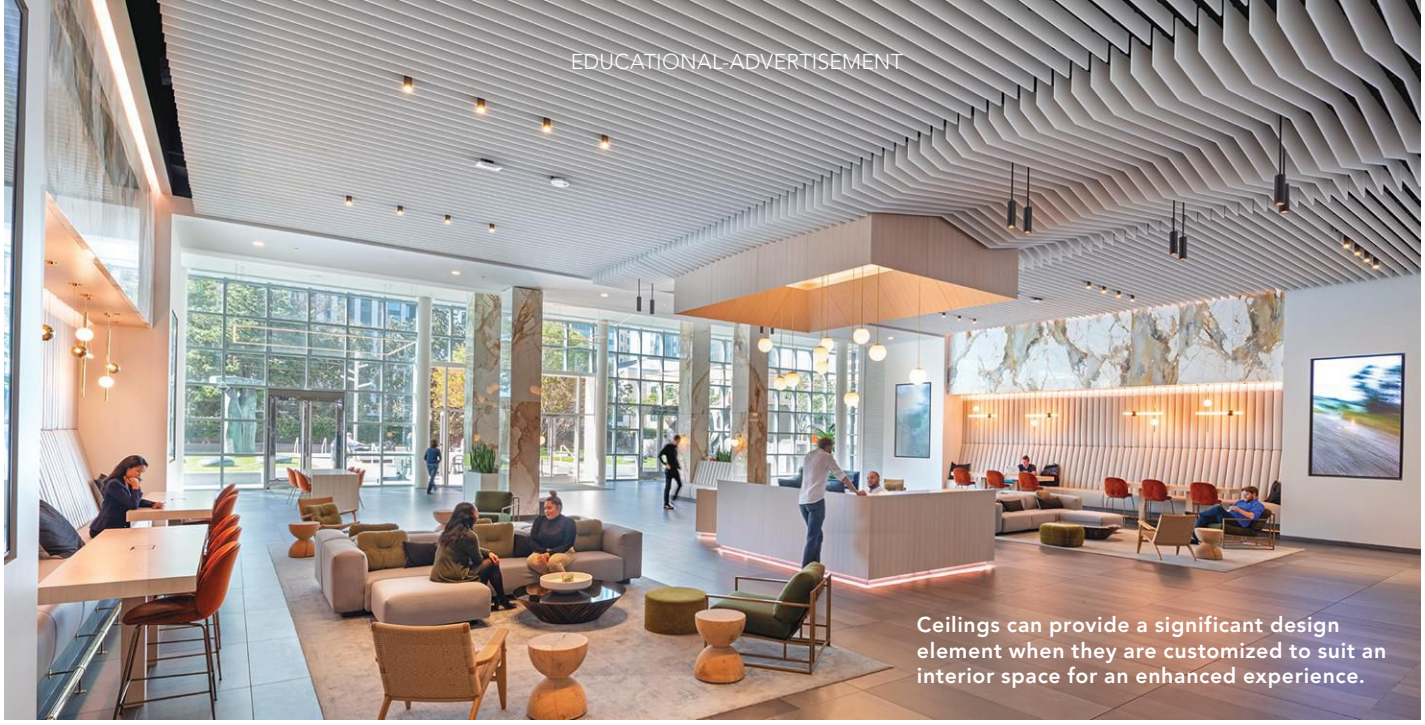

Photo by Jasper Sanidad. "1111 Broadway" Oakland, CA, Rios Clementi Hale Studios.

Ceilings can provide a significant design element when they are customized to suit an interior space for an enhanced experience.

Custom Ceiling Design

Systems can meet many different needs and design goals

Sponsored by Arktura | *By Peter J. Arsenault, FAIA, NCARB, LEED AP*

The design of building interiors is often focused on walls, floors, and furnishings perhaps because of a perception that these are where people interact most with the indoor environment. However, just as we experience a beautiful sky outdoors, the design of a ceiling indoors can have a significant impact on the look, feel, and character of an interior space. This happens because people react to more than just the visual aspects of a ceiling, which, while important, belies the other ways we interact and perceive spaces. This includes the impact of a ceiling on acoustics in a space, on achieving a sense of either motion or stillness or creating a benign or dramatic experience. This course covers many of these different aspects of ceiling design and the ways that they can be customized to suit many different design goals in all types of buildings.

Continues at ce.architecturalrecord.com

***Peter J. Arsenault, FAIA, NCARB, LEED-AP** is a nationally known architect who has authored nearly 300 continuing education courses focused on advancing building performance through better design.*
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Learning Objectives

After reading this article, you should be able to:

1. Identify and recognize the characteristics of ceiling systems that can contribute to comfort, health, and general welfare for occupants.
2. Investigate the principles of acoustical comfort as they apply to the health and welfare of people in buildings.
3. Assess the ways to integrate the different aspects of custom ceiling design into a coordinated solution for improved indoor environments.
4. Specify fully integrated systems in a variety of green and conventional buildings and formulate appropriate selections related to specific applications.

To receive AIA credit, you are required to read the entire article and pass the quiz. Visit **ce.architecturalrecord.com** for the complete text and to take the quiz for free.

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Upcoming Exhibitions

Difficult Landscapes: Architecture Against the Odds
London
October 11, 2024–spring 2025
The Royal Institute of British Architects presents an exhibition exploring feats of architectural achievement in the face of complex sites and tricky commissions. Divided into three thematic sections—Difficult Landscapes, Difficult Urban Spaces, and Difficult Reworkings—the exhibition delves into over 20 projects across the United Kingdom, dating from the 1900s to today. Presented through original drawings, photography, models, and plans, the show includes projects by Britain's top architects, such as Neave Brown, Nicholas Grimshaw, and Norman Foster, as well as the younger practices Tonkin Liu, KnoxBhavan, and Carmody Groarke. For more, see architecture.com.

Ongoing Exhibitions

Outré West: The American School of Architecture from Oklahoma to California
Oklahoma City
Through October 20, 2024
An exhibition at the Oklahoma Contemporary Arts Center explores the work of the American School of Architecture, which emerged from the University of Oklahoma in the postwar period. Led by practitioners such as Bruce Goff and Herb Greene, the American School developed as an alternative to the European influence of the Bauhaus and Beaux-Arts movements then dominant in U.S.-based architectural practice, and emphasized individual creativity and experimentation: "We preach no dogma," Goff said. The exhibition explores the work of architects who were educated and mentored in Oklahoma in the 1950s and '60s and went on to develop practices in California, where a cultural openness and booming economy created ideal testing grounds for their unconventional approaches to design. On display are large-scale photographs, architectural models, and press clippings exploring the works of architects such as Violeta Autumn, John Marsh Davis, Arthur Dyson, Donald MacDonald, and Mickey Muennig, among others. See oklahomacontemporary.org.

Beatriz Morales: Capisayo
Plano, Illinois
Through December 8, 2024
Mexican artist Beatriz Morales graces the Mies Van der Rohe–designed Edith Farnsworth House with a site-specific textile installation that enters traditional craftwork into conversation with the house's history. Morales's fiber-based works extend throughout the 1951-built building, including the titular *Capisayo*, named after a Mexican rain cape woven from palm leaves, and *Quimera*, an agave-fiber installation piece dyed with natural ink. The large-scale installations are accompanied by works merging painting with embroidery, as well as a number of abstract portrait paintings. For more, see edithfarnsworthhouse.org.

Design Agendas: Modern Architecture in St. Louis, 1930s–1970s
St. Louis
Through January 6, 2025
Beginning in the 1930s, St. Louis's urban landscape was transformed with the works of internationally known architects such as Erich Mendelsohn, Eero Saarinen, and Minoru Yamasaki, ushering in a new period of urban renewal and cementing the city's legacy in the history of modern architecture. The Kemper Art Museum at the Washington University of St. Louis presents a major exhibition contextualizing the city's most celebrated works of modern architecture within the regional developments of the mid-20th century such as New Deal urban planning, the Great Migration, and the civil rights movement. Bringing together architectural drawings, models, photographs, films, digital maps, and artworks from local archives and institutions, the exhibition explores the complex and contradictory story of modern architecture that reshaped the city in an era marked both by architectural innovation and large-scale urban destruction and racial segregation. For more information, see kemperartmuseum.com.

Germane Barnes: Columnar Disorder
Chicago
Through January 27, 2025
In his first solo museum exhibition at The Art Institute of Chicago, Germane Barnes challenges the Western canon with an architectural counternarrative rooted in the Black experience and African diaspora. The Chicago-born architect centers his project on recasting the enduring legacy of Classical forms, particularly the Doric, Ionic, and Corinthian, with designs for three new columns. Presented in the exhibition through drawings, collages, and commissioned sculptural works, they include the *Identity Column*, which celebrates Black beauty, the *Labor Column*, which considers the role of slavery in America's economic growth, and the *Migration* column, which meditates on the transcontinental journey of enslaved Africans, using water as a site of Black memory, loss, and selfhood. For more, see artic.edu.

Materialized Space: The Architecture of Paul Rudolph
New York
Through March 16, 2025
The Metropolitan Museum of Art presents the first major museum exhibition dedicated to the career of Paul Rudolph, the influential second-generation Modernist who came to prominence in the 1950s and '60s, alongside peers such as Eero Saarinen and I.M. Pei. The wide-ranging exhibition surveys a large swath of Rudolph's architectural contributions, from early experimental houses in Florida to concrete civic commissions and lushly detailed interiors, as well as utopian visions for urban megastructures and mixed-use skyscrapers. Works on display include a selection of over 80 artifacts at a variety of scales, from the small objects that he collected throughout his life to a mix of material generated from his office, including drawings, models, furniture, material samples, and photographs. See metmuseum.org.

Events

Making Home—Smithsonian Design Triennial
New York
November 2, 2024–August 10, 2025
The seventh offering in Cooper Hewitt's Design Triennial (which was established in 2000) explores design's role in shaping the material and emotional realities of "home" across the United States and its territories. Featuring 25 site-specific, newly commissioned installations throughout the Andrew and Louise Carnegie Mansion, each floor of the exhibition is organized by themes that evoke experiences of home, from cultural interpretations of domesticity to experimental and utopian concepts and construction models for more sustainable building. For more, see cooperhewitt.org.

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Regional Insert

SNAPSHOT

This spring at the annual exposition of the Association of Siamese Architects under Royal Patronage (ASA) in Bangkok, Thai architecture firm HAS Design and Research unveiled an installation inspired by the country's architectural heritage and natural landscape. Commissioned by Thai aluminum companies S-ONE Group and KIN in honor of ASA's 90th anniversary, the swooping structure is composed of thousands of handcrafted aluminum rods. Elevated above the ground, the "Aluminum Grotto" creates an open space underneath for gathering, inspired by *tai-tuns*, the multifunctional spaces found under traditional Thai stilt houses. "The structure provided visitors with more than a visual experience," says architect Jenchieh Hung, cofounding principal of HAS with Kulthida Songkittipakdee. "It became a place of rest, social interaction, and events—workshops, design seminars—that transformed the perception of the space." Over the course of the expo, the Grotto attracted 10,000 daily visitors. Though intended to be a temporary structure, the project's success led the clients to permanently install it at a public space in the city's Khan Na Yao District. *Pansy Schulman*

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