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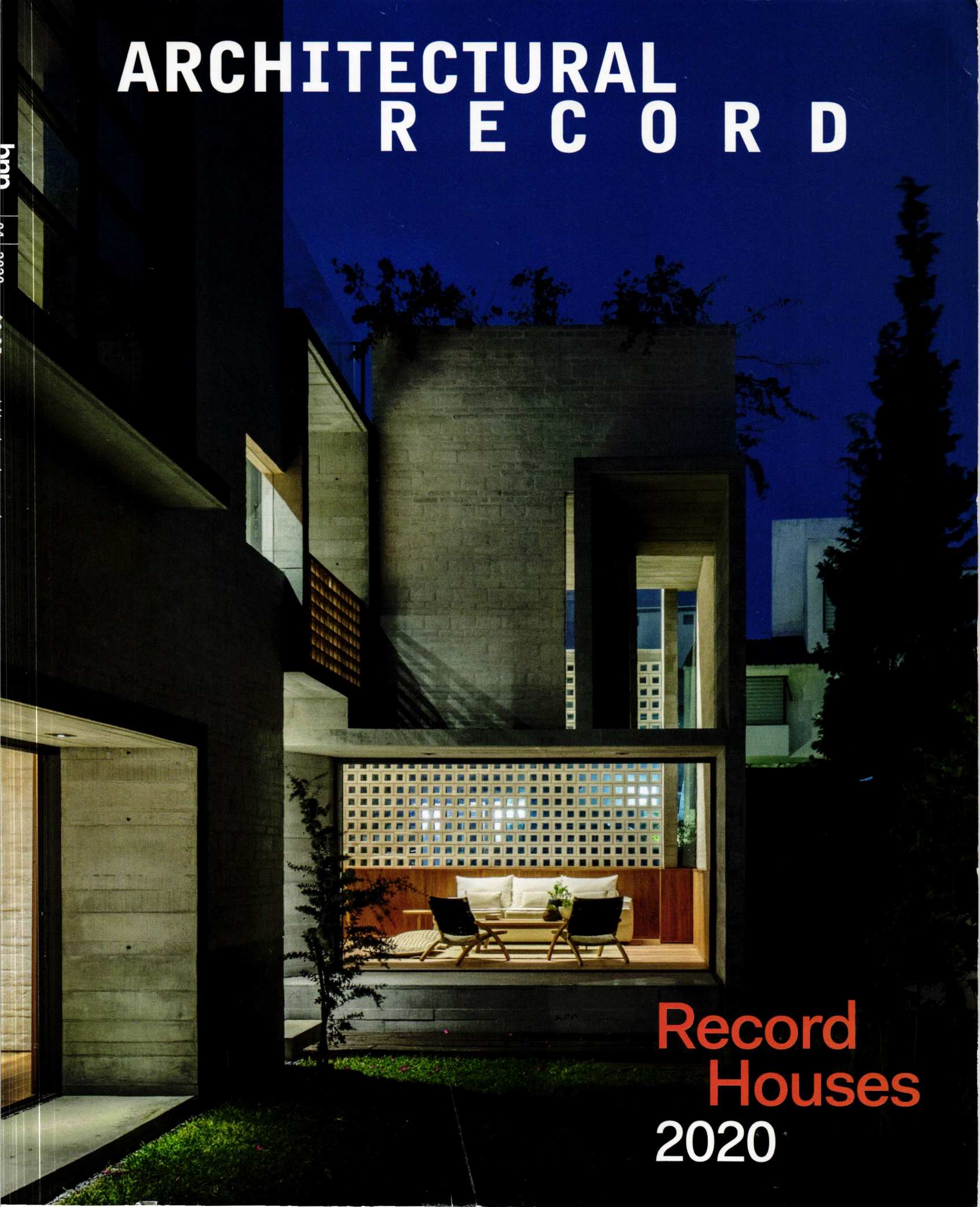

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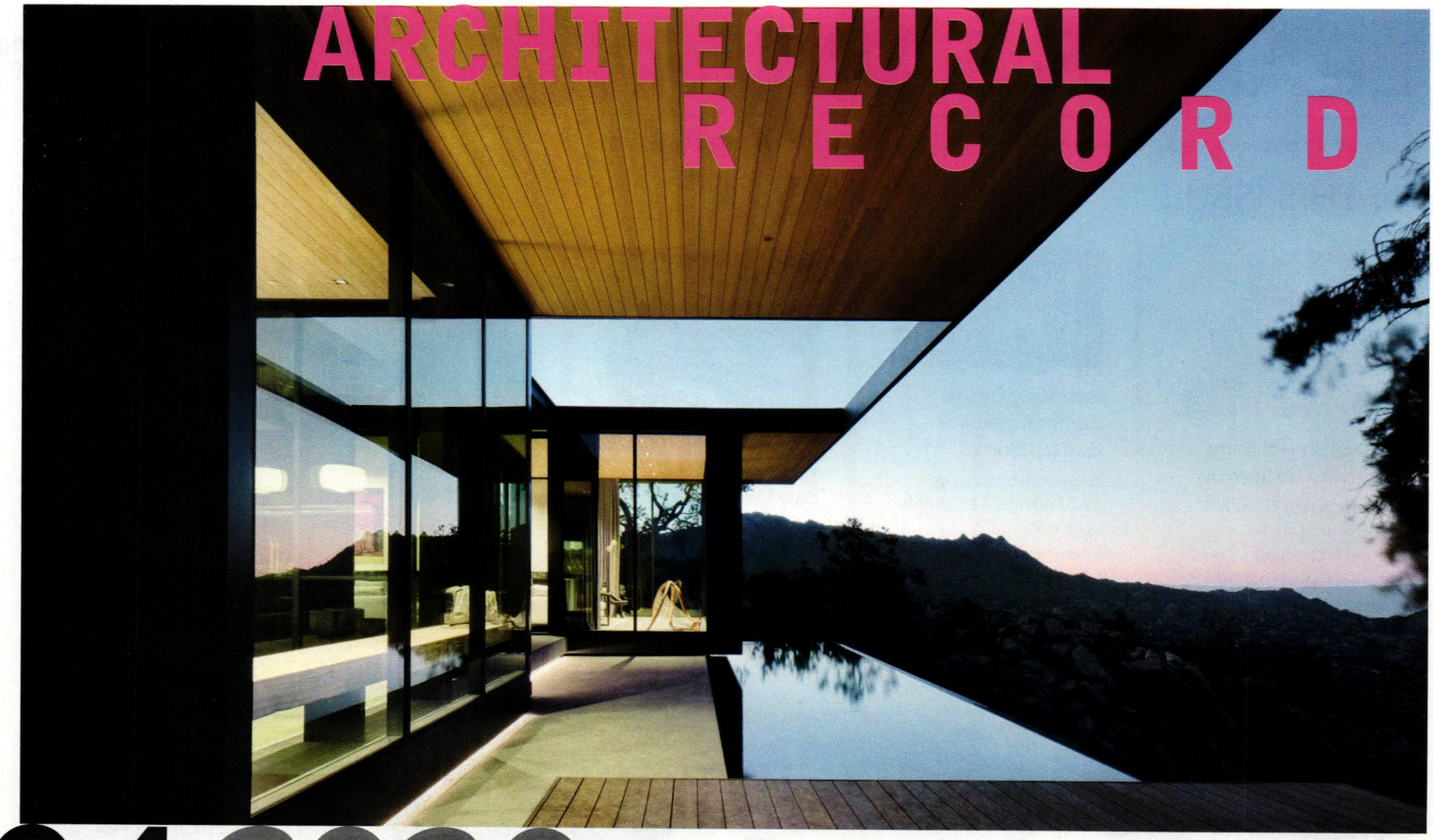

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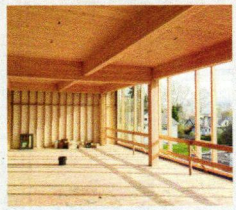

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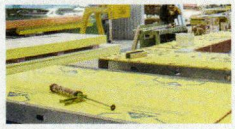

Changing the Way We Think of Prefabrication: New Solutions for Your Building Envelope

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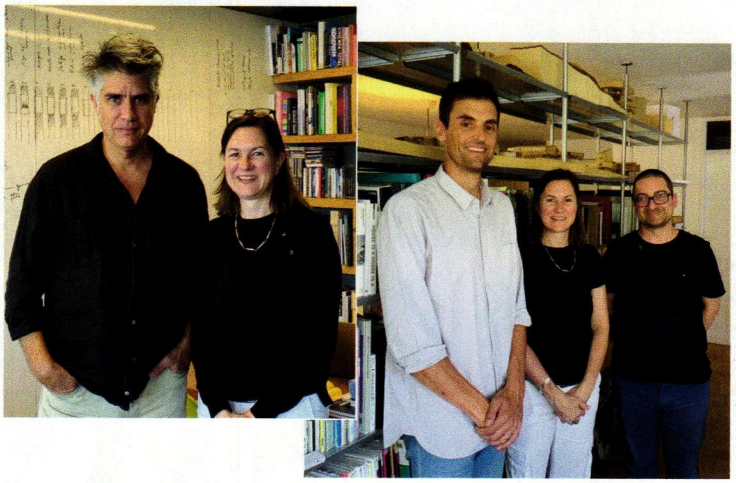
Beyond the printed page: highlights from our website, live events, and other happenings.

ROCK AND ROLL

Senior editor Joann Gonchar posed for a photo on a bench in the window of Aidlin Darling's High Desert Retreat (page 94) in Palm Desert, California.

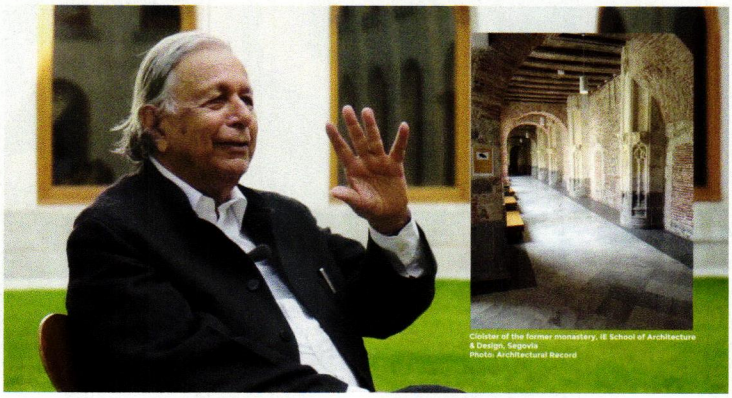


TOUR DE CHILE

Managing editor Beth Broome met with 2016 Pritzker Prize–winner Alejandro Aravena (above, left, on left) and architects Max Núñez (above, right, on left) and Stefano Rolla (above, right, on right) while in Chile visiting a house designed by the Office of Ryue Nishizawa (page 62).

DESIGN FOR THE AGES

Senior news & web editor Miriam Sitz (far right) moderated a panel discussion on intergenerational design at the Center for Architecture in New York, featuring (from left to right) Penn State University professor Matt Kaplan; Arthur Chang, principal of NADAAA; Older Adults Technology Center curriculum manager Joyce Weil; and Margaret Sullivan, principal of Margaret Sullivan Studio.



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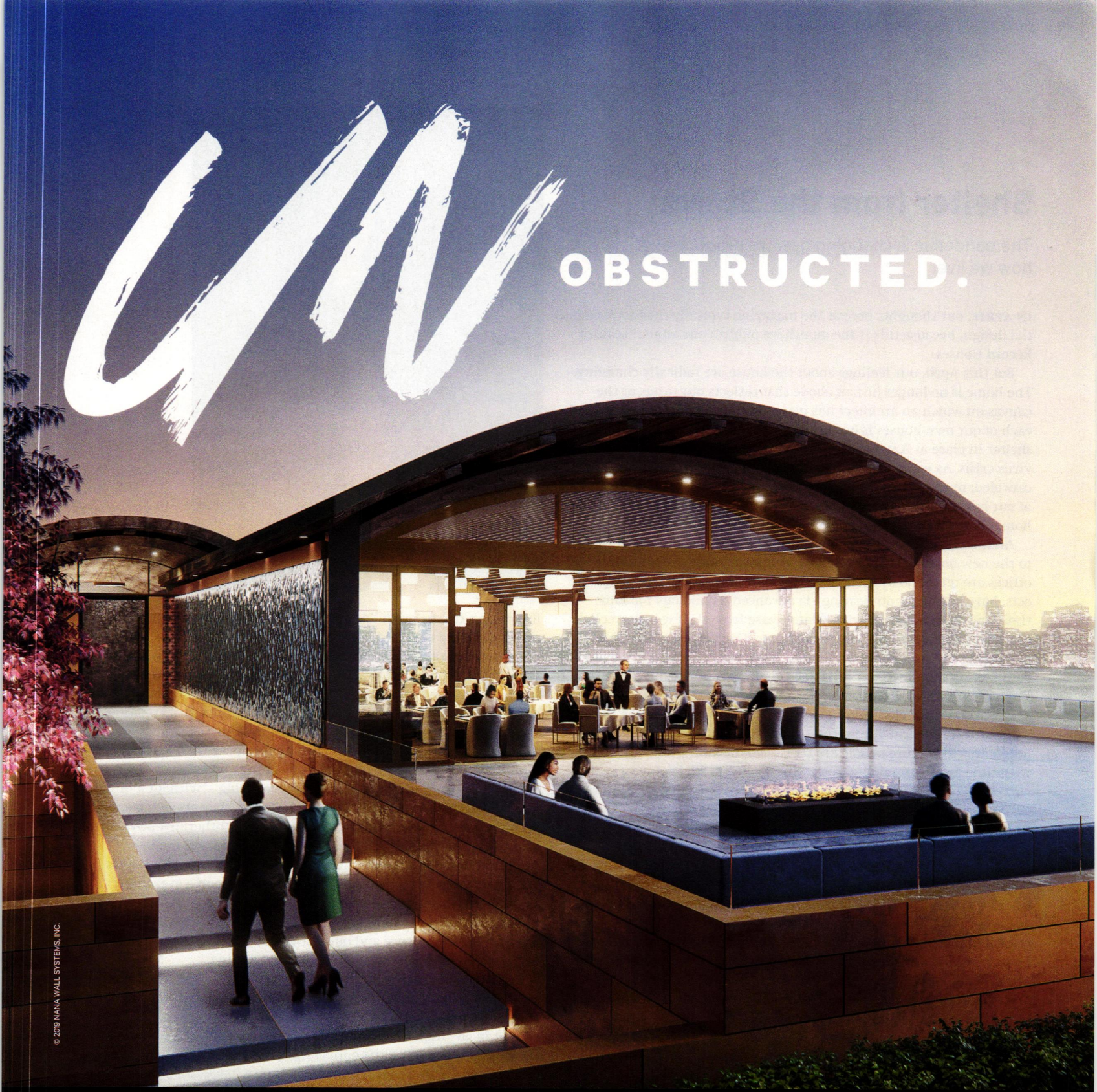

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The pandemic is changing how we practice and how we live.

IN APRIL, our thoughts here at the magazine typically turn to residential design, because this is the month we publish our annual issue of Record Houses.

But this April, our feelings about the house are radically changing. The home is no longer just an abode that reflects our tastes or the canvas on which an architect has played out new design ideas. Instead, each of our own houses is becoming an essential redoubt, a refuge to shelter in place as America and the world tries to ride out the coronavirus crisis. As we go to press, workplaces are closing; trips are canceled; museums and restaurants are shuttered. If we like the design of our houses, that's good, because we're going to spend more time at home than we ever imagined.

Architecture firms, like other businesses, have had to adjust quickly to the new normal. Every day, more architects notify us that their offices are temporarily going dark. Big practices, with far-flung projects, have been communicating via advanced technology for some time, and so have moved with relative ease from staff working collaboratively in offices to working from home. Gensler, with 50 offices worldwide and over 6,000 employees, had weeks of experience with the coronavirus shutdown in China and other parts of Asia before closing all its offices in North America, Europe, and Latin America, with staff now working and telecommunicating remotely. One thing the firm leadership also learned from their colleagues in China, a spokeswoman noted, was to "ensure people are still . . . maintaining a healthy balance with time away from doing work." Similarly, KPF had gained experience from the firm's Hong Kong and Shanghai outposts, before moving everyone in its New York headquarters home. "We've asked our staff to be disciplined, to keep journal-like logs," said KPF President James von Klemperer, "but also to exercise, take breaks, and eat well."

For smaller firms, the shifts away from collaborating in the office—if that is what they have decided to do—have been more difficult, with leaner staffs and fewer digital tools. In San Francisco, some offices first decided on "optional" attendance if an employee could walk or bike to work, but the sudden mandatory order last month to close businesses and shelter in place meant firms were scrambling to finish setting up equipment and protocols. "It's been an exhausting few days," wrote Eric Robinson, principal at the 23-person Paulett Taggart Architects, a firm known for designing affordable housing. The last in-office staff meeting, with "many young ones who've never even seen a recession, was emotional," he said. "We're trying to communicate a level of calm to our staff. It's not easy."

Architecture schools, as the pandemic surged, have had to make dramatic changes as well. Many programs will complete the term remotely. Deans, such as Sarah Whiting of Harvard's Graduate School of Design (GSD), have been informally discussing best practices with each other. "It's a huge challenge," she said. One GSD professor became a pioneer of remote teaching early in the term, after she had to self-isolate following a trip to South Korea. "Zoom was much more convenient and powerful than I expected," said Jungyoon Kim, who teaches landscape design, of the software program that lets you draw remotely on another's laptop. "In Zoom crits, 'Can I share my screen and stop yours?' means, 'Can I have trace paper?'" Still, she has deeply missed the nuanced personal interaction with her students. "Any virtual relationship should still be based on real affection and interest," she says.

Jeanne Gang has brought her firm's experience with advanced digital tools to the GSD studio she is teaching and believes her students are transitioning easily to remote learning—"without a hitch so far." Lacking access to the GSD fabrication lab, they are being encouraged to make "analog models at home" or find "other inventive forms of making." While she believes the remote studio will make her students "stronger at communicating their ideas," she also knows what's missing. As students and practitioners become ever more fluent in new technologies, what they lose, ironically, is something her own office, now working remotely, has always prized. "We value our community culture and our shared social space so much," she says, "which makes being apart more challenging."

Perhaps as a relief from these dark days, you might find in this issue inspiring or intriguing ideas of home—such as Thomas Ryan's Three Chimney House in Virginia's horse country (page 74) or a retreat in the high desert of California by Aidlin Darling (page 94). Or, for a particularly daring marriage of design and nature, check out Ryue Nishizawa's Ochoquebradas House (page 62), perched on a coastal cliff in Chile. Looking at the images, you can almost hear the waves crashing on the rocks below, as the endless tide rolls in and out.

Cathleen McGuigan

Cathleen McGuigan, Editor in Chief

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perspective

This is not just a public health crisis, it is a crisis that will touch every sector, so every sector and every individual must be involved in the fight.

—World Health Organization Director-General Tedros Adhanom Ghebreyesus, speaking to the media on March 11 about COVID-19.

Founders of Grafton Architects Win 2020 Pritzker Prize

BY MIRIAM SITZ

ARCHITECT Yvonne Farrell was at home in her kitchen on the evening of January 19, 2020, when she received a phone call from Martha Thorne, the executive director of the Pritzker Architecture Prize. The call brought news that has just been announced today: Farrell and Shelley McNamara, cofounders of Grafton Architects, are the 47th and 48th laureates of the Pritzker Architecture Prize. "It came out of the blue," Farrell told RECORD, speaking by phone from an "inner sanctum" of the firm's office in late February. (The announcement was still under embargo, even from their colleagues.) "It was an incredible surprise. We are still excited about this incredible award and recognition."

Yvonne Farrell and Shelley McNamara (above) are the first Irish architects to receive this honor. Their project for UTEC in Lima (right) won the first RIBA International Prize in 2016.

Farrell and McNamara cofounded Grafton Architects along with three others (who have since left) in 1978, in a 650-square-foot space on the top floor of a building on Grafton Street in Dublin. The firm name reflects its setting rather than its founders' egos—a value that permeates their significant body of work in Ireland and abroad. "We thought about the ethos of making a cooperative practice, one that wouldn't be related just to the individuals," said McNamara. And, besides, Farrell added, "saying five names takes too long for a telephone answering machine."

The Pritzker jury citation commends this year's winners for their "deep understanding of 'spirit of place,'" noting their ability to create monumental institutional projects that are "zoned and detailed in such a way as to produce more intimate spaces that create community within." The "vertical campus" of UTEC, the Universidad de Ingeniería & Tecnologia (RECORD, November 2015), completed in 2015 in Lima, Peru, demonstrates this, while also showcasing Farrell and McNamara's skill at finding contextually sensitive solutions to challenging sites and programs. Bordered by a highway on one side and a residential neighborhood on the other, the stacked form of the 365,000-square-foot, 10-story concrete structure echoes the city's oceanfront cliffs, stepping down as it approaches the neighborhood in response to the changing scale of its surroundings. The architects achieved this effect by placing larger spaces, mainly laboratories, on the lower floors, with the smaller volumes of classrooms and professors' offices on top. "I think it is wonderful, to be able to create a big, muscular piece of infrastructure that also creates really interesting spaces for encounter," says Columbia University professor and Pritzker jury member Barry Bergdoll.

The largely open-air structure, with abundant terraces and patios appropriate for Lima's mild climate, also highlights what Bergdoll calls the "extraordinary sectional complexity" of Grafton's work. "They create spaces of incredible visual richness, but also spaces that solve problems in terms of lighting, connecting public spaces, and really creating a zone for encounters in buildings, from Lima to Milan."

Earlier projects set the trajectory for the laureates' preoccupation with thoughtful integration. Their North King Street Housing in Dublin (2000) defers to the warehouses around it with its restrained, unadorned exterior. For the Università Luigi Bocconi in Milan (2008), the architects created a sunken interior space for large gatherings, which is visible from the sidewalk. And in Toulouse, France, the Université Toulouse 1 Capitole, School of Economics (2019) reflects its context in both its materials—concrete and stone, sourced nearby—and design features: buttresses, ramps, and courtyards recalling the bridges, walls, and towers of its medieval city.

The 2020 Pritzker Prize comes on the heels of several other prestigious awards. In the fall of last year, the Royal Institute of British Architects (RIBA) named Grafton winner of the 2020 Royal Gold Medal, the UK's top prize for architecture. The year before, the firm won the

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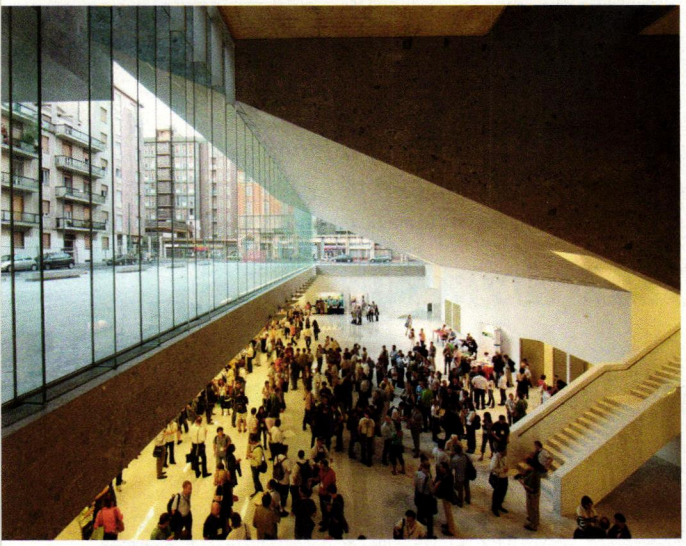

At the Università Luigi Bocconi in Milan (left), completed in 2008, the architects carved out a sunken public space, visible from the street through expansive glazing.

PHOTOGRAPHY: COURTESY ALEXANDRE SORIA

2019 James Gandon Medal for Lifetime Achievement in Architecture from the Royal Institute of Architects of Ireland. In 2016, the UTEC building took the inaugural RIBA International Prize. And in 2012, Farrell and McNamara were honored with the Silver Lion Award at the Venice Architecture Biennale for the exhibition *Architecture as New Geography*. (This past fall, Farrell spoke at RECORD's annual Innovation Conference in New York.)

In 2018, the pair curated the 16th edition of the international architecture exhibition at the Venice Biennale around the theme Freespace. The experience gave Farrell and McNamara an opportunity to articulate their approach to design in a public forum. "In creating our manifesto for the Biennale, we wrote down a litany of our shared values," Farrell told RECORD. "That came very easily, because architecture is not just ideas—it's translating ideas into very physical realities." Their Freespace manifesto highlights the generous, democratic quality of architecture to provide "spatial gifts for those who use it" and to leverage resources that they call "nature's free gifts"—sunlight and moonlight, air, gravity, materials.

While their shared and deeply held values have cemented Farrell and McNamara's lengthy creative partnership, the architects also credit their colleagues for shaping their journeys. "Because we've known each other so long, there's a profound sense of basic trust in judgment and integrity and support," McNamara told RECORD, "but we're not alone in a room all the time. We have a fantastic group of colleagues, and we benefit from their skills, talent, and passion."

"Shelley and I are, at a human level, extremely touched that our peers—people we don't know, and people we do know—have acknowledged the body of work that we and our team have been creating over the years," Farrell told RECORD. "We are truly delighted and humbled to receive this global recognition for what we do every day. And that is what we do: we work every day."

Farrell and McNamara are the first architects from Ireland to win the Pritzker, which is considered by many to be the profession's highest honor. U.S. Supreme Court Justice Stephen Breyer serves as chair of the eight-member Pritzker Prize jury, which added Bergdoll and New York–based architect Deborah Berke to its ranks last year, replacing outgoing jurors Richard Rogers and Ratan N. Tata.

Details about the ceremony's location and date will be released in the fall. ■

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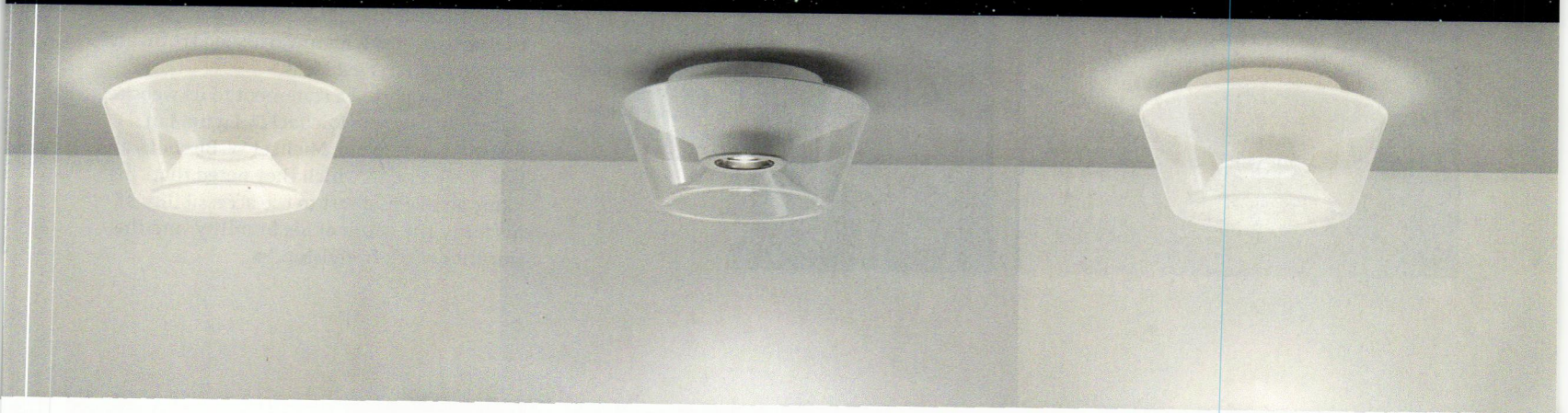


Obituary: Henry N. Cobb, 1926–2020

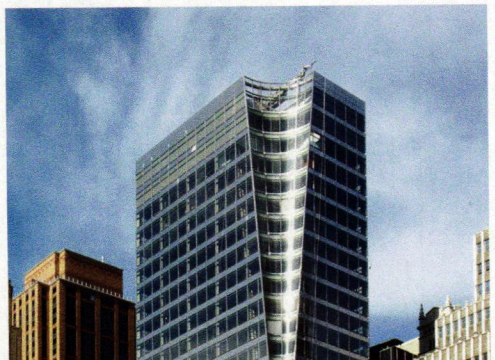
BY MIRIAM SITZ

MODERNIST ARCHITECT Henry N. Cobb, a founding partner of Pei, Cobb, Freed & Partners, known to friends as Harry, died March 2, 2020, one month before he would have turned 94.

Born in Boston in 1926, Cobb was educated at Phillips Exeter Academy and Harvard College, before graduating from the Harvard University Graduate School of Design in 1949. He co-founded an architecture firm in New York in 1955 with I.M. Pei and Eason H. Leonard. The firm's name changed from I. M. Pei & Associates to Pei, Cobb, Freed & Partners in 1989. (I.M. Pei died last year at age 102, while James Ingo Freed died in 2005 at age 75.)

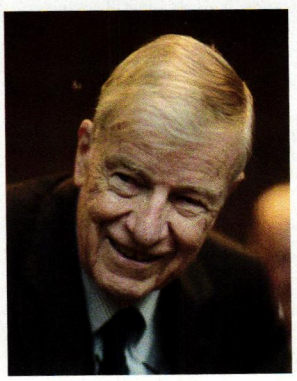
"Harry Cobb, throughout his 70-year career, built with tenacious care and elegance the landmarks of our cities," structural engineer Guy Nordenson, a close friend of Cobb's, tells RECORD. "For so many of us, he also stood as the fulcrum of our culture of architecture. His legacy is everywhere."

Cobb and his colleagues shaped cities and skylines across the globe with such projects as Place Ville Marie (1962) in Montreal, ARCO Tower in Dallas (1983), the Charles Shipman Payson Building (1983) at the Portland Museum of Art in Maine, Moakley U.S. Courthouse & Harborpark (1998) in Boston, Torre Espacio (2008) in Madrid, Palazzo Lombardia (2013) in Milan, and 7 Bryant Park (2016) in New York.



New York Times architecture critic Michael Kimmelman noted on Twitter how the architect of the John Hancock Tower (1976) in Boston was "still producing works of subtlety like the African American Museum in Charleston at the end of his life," calling him a "truly humane and generous soul" as well as a "poet of form."

Between 1980 and 1985, Cobb served as chair of the architecture department at the GSD, where he taught Sophia Gruzdys, a professor at USC and vice president of the AIA Continental Europe. "Harry's belief in me as a young student forged my career in architecture at the GSD and, later, in our design team in his office," Gruzdys tells RECORD. "Harry also confided that while architecture school prepares you for the first 10 years of your career, it is the following 20 that will sustain you. You need to embrace a broader intellectual search, speak an unvarnished truth, and remain open to new ideas."



A young Cobb (top, left) posed with a model of the John Hancock Tower in Boston (top, right). Pictured at left in 2018, the architect also designed 7 Bryant Park in New York (far left).

The firm posted a statement to its website, signed by partners Michael D. Flynn, Ian Bader, Yvonne Szeto, Michael W. Bischoff, and José Bruguera, in which they noted that "his many accolades attest to the accessibility of his ideas, the depth of his humility, and the sincerity of his friendship." ■

PHOTOGRAPHY (CLOCKWISE FROM TOP, LEFT): COURTESY PEI COBB FREED & PARTNERS; © GORCHEV & GORCHEV; JOHN WEBNER; MARSHALL GERDOMETTA/CIRIUH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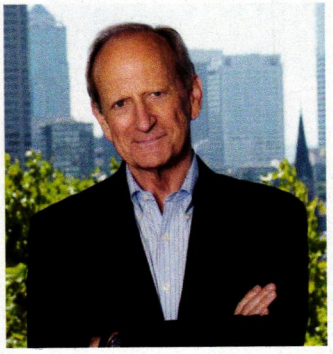
Denis Hayes

BY JOANN GONCHAR, FAIA



FIFTY YEARS AGO this month, Americans observed the first-ever Earth Day. Denis Hayes was the event's principal national organizer. Over the course of his varied career, he has served as the special assistant to the governor of Illinois for natural resources and the environment, worked as a Silicon Valley lawyer for the firm Cooley, and was the director of the Solar Energy Research Institute (now the National Renewable Energy Laboratory). Since 1992, Hayes has been president and CEO of the Bullitt Foundation, a nonprofit organization focused on protecting the natural environment of the Pacific Northwest. Hayes and the Bullitt were the client for a six-story net zero energy and water office building in Seattle's Capitol Hill neighborhood that houses the Foundation's own offices as well as commercial tenants. Seven years after completion, the Miller Hull–designed Bullitt Center remains the largest project to earn Living Building status. RECORD recently spoke with Hayes about Earth Day, the Bullitt Foundation's initiatives, and the possibilities for an environmentally sound future.

How did you get involved in Earth Day?

I had decided that I wanted to devote my life to what we would now call human ecology, urban ecology, or industrial ecology. That vocabulary did not then exist, but I was trying to understand why the world was so badly malfunctioning. I was in graduate school, and a senator from Wisconsin, Gaylord Nelson, had given several speeches advocating for environmental teach-ins on college campuses. Nothing like that was going on at Harvard, where I was at the time. So, with the audacity of youth, I flew to Washington, D.C., hoping to get the charter to organize the Harvard campus. I got a 15-minute courtesy interview with the senator. It turned out he didn't have anybody organizing Harvard, or Cambridge, or Boston. Our interview turned into a couple of hours of talking, and I went back with the charter for Boston. Then a couple of days later, I got a call from his chief of staff asking whether I would drop out and come to D.C. to organize the United States. I confess, it was the most rapid series of job promotions that I've ever experienced.

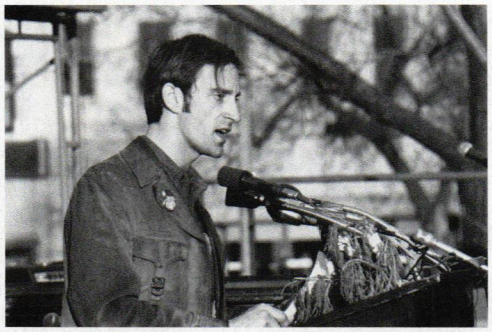
What was that initial time like?

Relatively swiftly, it became clear that the environment wasn't really a hot issue on college campuses, compared with the Vietnam War, civil rights, and feminism. Not that long after I started, we began to focus on cities and communities rather than colleges, and we came up with the name Earth Day. After it acquired some momentum, college students did get actively involved, but they were not initially at the leading edge. It all happened in a very brief period. From the time that I was hired in December 1969 until the event itself was only five months.

I understand that there were some very tangible political and legislative outcomes of that first Earth Day. Can you tell me about them?

After that we converted the Earth Day organization into a lobbying organization. We

PHOTOGRAPHY: © DAVID HILLER (THIS PAGE); NIC LEHOUX (OPPOSITE, TOP)



Denis Hayes was the principal national organizer of the first Earth Day in 1970 (bottom). He is now president and CEO of the Bullitt Foundation, headquartered in a Living Building Challenge–certified building in Seattle (left).

launched a campaign against a "dirty dozen" members of Congress, and on environmental issues we managed to provide the margin of the defeat for seven of the 12 congressmen—something that gave us instant credibility on Capitol Hill. We lobbied for the Clean Air Act of 1970 as well.

Do you view your mission at Bullitt as a continuation of your Earth Day work?

Yes, but there's an irony in that. In 1990, Earth Day went global, with 144 countries. It has been international ever since. At Bullitt, we're moving in the other direction. The foundation is trying to turn the Emerald Corridor—the area from northern Oregon through southern British Columbia—into a model for the planet of sustainability and resilience. But we just operate in our little part of the world.

What are some Bullitt initiatives that have had implications beyond the Pacific Northwest?

One project of particular interest to your audience: we decided to try to build a building that would not merely *not* cause much damage, but would actually be restorative and leave the world a better place. We tried to make something that would mimic the actions of the Douglas fir forest that once was on our site—something that would get all of its energy from the sun, all of its water from the rain, and not produce anything toxic. And we wanted to do it in a way that was no more expensive than a conventional office building, and run it at a profit by leasing it to standard commercial tenants. We overcame an enormous number of regulatory, legal, and financing difficulties and are now beginning to see these kinds of living buildings sprout up in a great many places.

We've also developed vigorous efficiency standards and programs to put it in the interest of building owners, tenants, investors, contractors, and utilities to collaborate to go to a very deep level of building efficiency. The big problem with commercial buildings is that the tenant who pays the utility bills is not going to make an investment in a building that somebody else owns. So we came up with a strategy, got it passed by the Seattle City Council and then adopted by Seattle City Light. The team that put it together with our support is now working to implement similar programs in Oregon, California, Nevada, and Hawaii.

Is there hope that we can avoid the worst impacts of climate change?

The time for action had to have been at least a quarter-century ago. It's too late now to avoid hurricanes, typhoons, floods, droughts, wildfires, rising oceans, and marine acidification. Not until we begin to do the most modest thing—which is to produce less carbon dioxide in a year than we did the year before, generating less and less until we get to zero and then keep going until we pull back to less than 350 parts per million—will we start to get into a range that would be considered a normal climate. On the positive side, much of the technology that we need to create a world that is beautiful, resilient, healthy, and equitable already exists. We know how to build buildings that use a fourth, or even a fifth, as much energy as buildings constructed to comply with most codes. In ever-expanding regions of the world, we now have renewable energy so cheap that it's less expensive to erect and operate solar- and wind-energy plants than it is to operate most existing fossil fuel–powered plants. We know how to do this. We just have to make a political commitment to build an alternative future. ■

Italian Architect Vittorio Gregotti Dies After Contracting COVID-19

The architect who helped transform the Estadi Olímpic de Montjuïc (1927) in Barcelona into the 1992 Olympic Stadium died of pneumonia in Milan on Sunday, March 15, 2020, at age 92.

Virginia Tech Architecture Names Aaron Betsky New Director

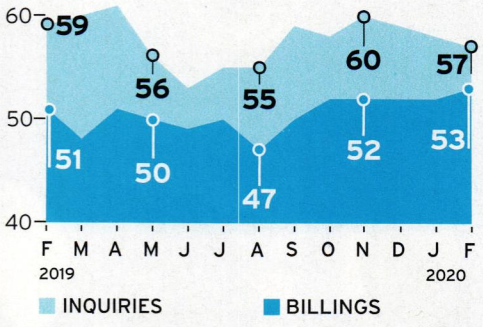
The former president of Frank Lloyd Wright's School of Architecture at Taliesin (SoAT) will step into his new role at the School of Architecture and Design on June 1. Before joining the SoAT in 2015, the Yale alumnus taught at SCI-Arc and Taubman College of Architecture and Urban Planning at the University of Michigan, among other institutions.

Conferences, Expos, Trade Shows Postponed Due to Coronavirus

The 2020 editions of the AIA Conference on Architecture, the Venice Architecture Biennale, Salone del Mobile and Fuorisalone, LightFair, Design Shanghai, Light + Building, the Council on Tall Buildings & Urban Habitat's conference, and many other professional gatherings have been rescheduled due to COVID-19.

30 Hudson Yards Observation Deck Opens in New York

A new glass-bottomed platform opened at the KPF-designed skyscraper in mid-March. Rockwell Group designed the interior spaces, which include a restaurant, bar, and area for events. Emerging from the tower's 100th floor some 1,100 feet up, "Edge" (as it's called) is the highest outdoor observation deck in the Western Hemisphere.



Firm Billings Remain Positive

According to the latest data from the AIA, the Architectural Billings Index rose in February, from 52.2 to 53.4. (Scores over 50 indicate an increase in billings.) New project inquiries and new design contracts also continued to increase.

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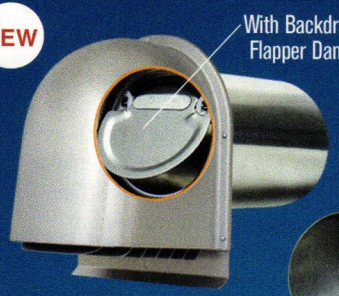

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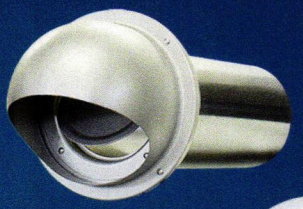

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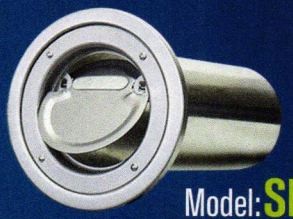

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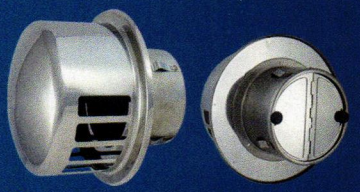

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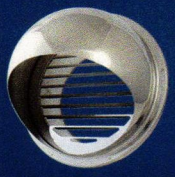

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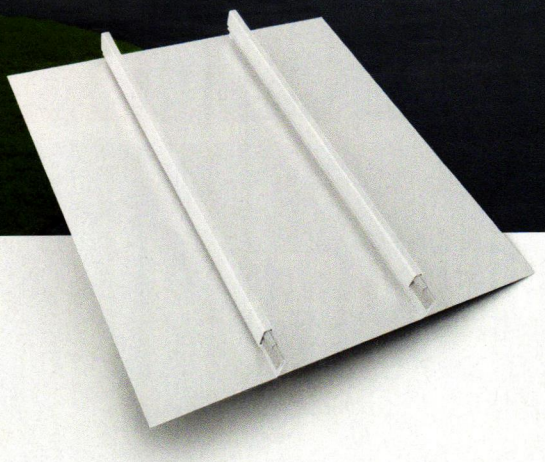

"The metal roof really makes this house unforgettable. If it didn't have the metal roof, the design wouldn't have the same impact. The roof is one of the elements that catches people's eyes. The metal roof makes this house very memorable."

-Brandon Ingram, Architect, C. Brandon Ingram Design

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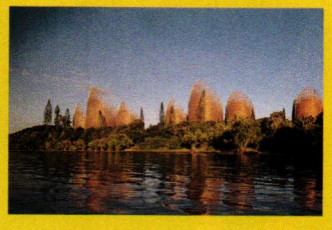

The architect for the Jean-Marie Tjibaou Cultural Centre near Nouméa, New Caledonia, is **Renzo Piano Building Workshop** (1998). The series of ten pavilions is admired for its use of vernacular forms and passive cooling and shading strategies in a hot climate.

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Custom planter sections in lightweight GFRC concrete topped with custom-curved steel backed and backless benches. Central Pocket Park Project. LaGuardia Airport, New York, NY. Designed by Supermass Studio/HOK. Photo Credit: Jeff Goldberg, Esto.

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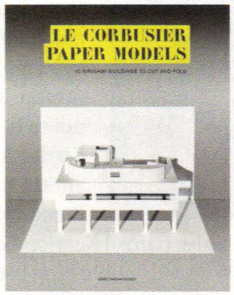
Le Corbusier Paper Models: 10 Kirigami Buildings to Cut and Fold, *by Marc Hagan-Guirey. Laurence King Publishing, 40 pages, $29.99.*

Reviewed by Linda C. Lentz



HONE YOUR knife skills, and you can recreate semblances of 10 works of the Modernist master with this challenging collection of model templates devised by British paper artist Marc Hagan-Guirey.

The model-making method used is kirigami, a variation of origami that involves cutting in addition to the typical folding of a single piece of paper. The results, not unlike pop-up cards, are limited to how well a building can be plotted as a two-dimensional pattern, so some are quite abstract.

While Ronchamp is missing from the selection, Hagan-Guirey does include landmarks such as Le Corbusier's Unité D'Habitation in Marseille, of 1952, and Villa Savoye, of 1931, as well as several important unbuilt works such as the Maison Citrohan, a mass-produced-housing concept inspired by the efficiency of the French automobile and designed with Pierre Jeanneret from 1920 to 1922.

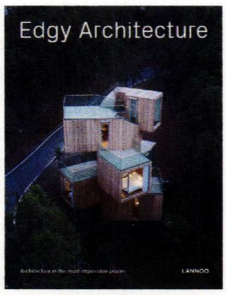
Working with a skilled partner, I attempted to make kirigami models of the latter two examples with fairly successful results. What we learned: PAY CLOSE ATTENTION! Each model has an introductory page with drawings and a brief, engaging project backgrounder, as well as the removable template. These are clearly, though somewhat delicately, marked on the back side with solid lines for cutting and blue or red broken lines to indicate where and how to fold.

The paper is not as weighty as routine model stock, so a super-sharp precision blade, a very good quality cutting surface, and a delicate touch are essential. (We had a few near slips.) The Villa Savoye, in particular, has a series of incisions close together to form the curve of the upper pavilion. (Some calculating was needed to get the piloti at the right height—a printing error the publisher claims will be rectified.)

Now, you may wonder, what to do with these diminutive structures after they're completed? They need support, so they could be displayed along a shelf backed by a wall. And you can dare visitors to name and date the project. Or you could always send them as greeting cards to fellow disciples of Corbu.

Edgy Architecture: Living in the Most Impossible Places, *by Agata Toromanoff. Lanoo Publishers, 224 pages, $45.*

Reviewed by Josephine Minutillo



"EDGY" CAN mean a lot of things—"experimental" and "avant-garde" come to mind. The projects in this book, mainly houses, are certainly those. But they are also edgy in the literal sense, as in built on an edge. A deeply sloping site: not a problem. An actual cliff: even better!

Several of the residences featured have been published in the pages of this magazine. Among them, MacKay-Lyons Sweetapple Architects' Cliff House, a simple wood box that teeters off the edge of a bedrock cliff along the Nova Scotian coast. Chilean architecture studio Pezo Von Ellrichshausen's Loba House, on the other hand, is embedded into its cliffside site midway down that country's long coastline, its sturdy concrete roof becoming a platform for enjoying stunning ocean views.

Casa Del Acantilado—Spanish for, you guessed it, Cliff House—was a sensation when it was completed five years ago. Without doubt the most bizarre house of the bunch, its wavy form and scale-like cladding (all roof) is perched above the Mediterranean in Salobreña, Spain.

Not all of the 60 case studies are secluded mountainside retreats, though there are quite a number of those, from a boxy summer spot in the Swiss Alps to a sculptural ski getaway in Whistler, British Columbia.

Urban projects are fewer, but several hillside homes in Los Angeles made the cut. Among them, Stack House, by 2017 Record Design Vanguard firm FreelandBuck is a composition of white cubes, well, stacked on top of each other. Eric Rosen Architects carved the Barrington Residence (RECORD, December 2017) out of its challenging topography so that the grassy surface of the roof becomes part of the site. Taking inspiration from artist Gordon Matta-Clark's 1970s work *Splitting*, the architect sliced the slope beneath it, where a dramatic cantilevered stair has views to the city's famous Getty Center atop an adjacent hill.

You won't find detailed explanations of how these seemingly impossible structures were built, and some houses are frankly more edgy than others. But the photos are great, and this is, after all, a picture book. ■

perspectivebooks

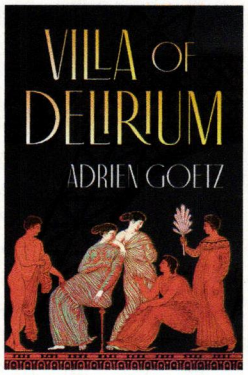
A Journey into Time and Place

Villa of Delirium, *by Adrien Goetz; translated by Natasha Lehrer. New Vessel Press, 321 pages, $26.95.*

Reviewed by Suzanne Stephens

NOVELS BASED on history can be fascinating, particularly when the author demonstrates both a convincing commitment to facts and a dramatic ability to animate characters, events, and settings of the past. Adrien Goetz's fictionalized history of the actual Villa Kerylos in Beaulieu-sur-Mer, on the French Riviera, follows this dual agenda. While the ups and downs—friendships, love, betrayal, and adventure—are given their due, the book is most successful in its historical research. Still, Goetz's exploration of such themes as class disparity and anti-Semitism—set against the construction of a villa based on one from an era, ancient Greece, known for its democratic ideals—adds a certain piquancy to the tale.

The main protagonist is the Villa Kerylos, built in 1902–08 by the architect Emmanuel Pontremoli, for his clients Theodore and Fanny Reinach, who are French, Jewish, and extremely affluent. The narrator, the fictionalized Achilles Leccia, is a Greek Corsican whose mother, a chef, and father, a gardener, live nearby on the estate of Gustave Eiffel. (For all the engineering innovation of the Eiffel Tower in Paris, its designer occupied a rather traditional house.)



Through Eiffel, the young Achilles gets to know the Reinachs. In spite of his admitted lack of culture and being an "absolutely hopeless" student, Achilles is taken under the wing of the scholarly patron Theodore, who insists he learn archaic Greek as well as draw the house while it is being constructed. Achilles later becomes a painter.

Goetz's description of the house is precise in its details but strangely vague in suggesting the overall experience of the place. Differentiating it from its antique model, Theodore wanted it to have a lot of windows—each a "frame for a fragment of landscape"—along with modern plumbing. But for all his interest in the architecture, Goetz doesn't apply the Greek notion of *ekphrasis* (a vivid description for a work of art) very thoroughly in discussing the result, with its peristyle of Doric columns, mosaics, and other design features. Although the plans are in the book, it might have helped to have included photos. But you can see views of the furnished rooms and exteriors online—or even visit the restored house-museum. In addition, there is a French book of essays and photos, *La Villa Kérylos*, edited by Regis Vian des Rives, with a preface by Karl Lagerfeld. This is not to be confused with *The Villa Kerylos: A Novel*, by Carolyn Doggett Smith, that takes place during the Roman Empire with another house named Kerylos (Greek for sea swallow). With this publishing background, it is easier to understand the current title, *Villa of Delirium*.

While Goetz's undertaking is impressive, there is a point when all his scholarly digging makes you want to say, "Just get on with the story." The author, who teaches art history at the Sorbonne and is editor of *Grand Galerie*, a quarterly published by the Louvre, has been praised for his erudition. But erudition can seem so precious, even if you think that stuffing the novel with tons of facts is edifying. Here, the ambience oddly gets lost. ■

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Rising Seas Threaten Historic Houses

Coastal communities try inventive strategies to save significant structures.

BY CORNELIA DEAN

PEOPLE WHO own historic properties have long struggled to sensitively adapt them to changing times. They have come to terms with wiring and plumbing, once considered too disruptive for old buildings, and moved on to innovations like solar panels. On the theory that the greenest building is the one already built, architects are adapting historic structures to new uses altogether.

But these problems of adaptation pale beside an issue facing more and more historic houses and other properties: flooding from sea-level rise, especially in communities along the eastern seaboard, from Newport, Rhode Island, to St. Augustine, Florida, where the ocean has risen about a foot since the middle of the 20th century, and the rise is accelerating. Colonial-era neighborhoods find themselves awash during and after storms—or even when the moon is full. Scientists predict that, by 2100, seas will be three to six feet higher than they were in 2000.

So far, there are three main approaches to saving historic buildings from the ocean: moving them inland, armoring them with sea walls, or raising them on stilts. But these techniques can destroy the historic character that makes a property worth preserving in the first place.

When a single structure is moved to higher ground, a hole is left in the historic fabric and the structure's notable relationship with the sea is lost. Armor drastically alters a site and inevitably results in damage to the natural coastline.

The most widespread tactic is elevation. Building codes enacted under the National Flood Insurance Program mandate raising buildings, sometimes by 20 feet or more. When buildings are elevated one by one (as is typical), a pleasant streetscape of once-harmonious rooflines can turn into an unsightly mess. "Lollipopping," critics call it.

Many preservationists have fought putting a historic house on stilts, because that alters its foundation, porches, doors, and stairs, as well as its relationship to the street. (Properties listed in the National Register, or with other historic designations, are usually exempt from such requirements.)

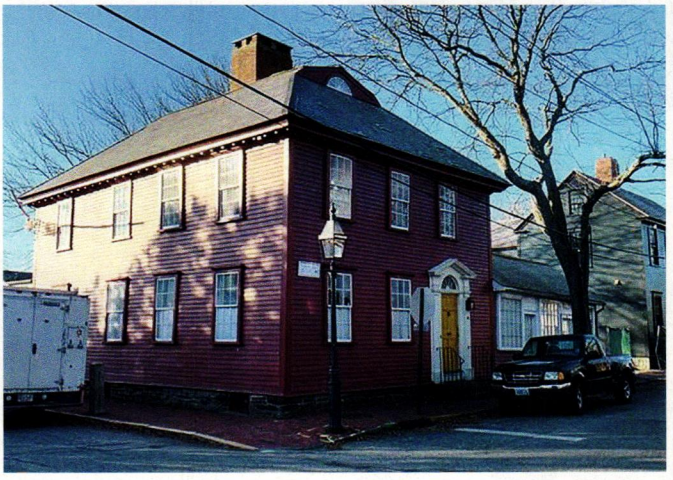
But now, repeated flooding is prompting an urgent rethink, including consideration of an array of unconventional or even bizarre remedies.

The simplest steps are called "dry flood-proofing"—keeping sandbags at the ready in case of high water, or using basement sump pumps. Some owners are moving mechanical systems to upper floors. The Newport Restoration Foundation installed a space heater in one of its historic building's basements—and bolted it to the ceiling.

More intriguing is "wet flood-proofing," a kind of surrender to the water. With this strategy, the idea is to accept rising water, and make no effort to keep it out of basements. Some historic structures were actually built with stone foundations meant to allow water to flow in and out. If basement walls are impermeable, architects can fit flood vents into the walls, which let water in. After a flood, of course, water has to be pumped out. The technique has proved effective in New England, where many Colonial buildings are plank-on-frame construction and relatively impervious to minor flooding. In addition, many old buildings in the region were built with lime plaster, used since Roman times, that is durable and mold-resistant. And, if all else fails, basements can be converted to cisterns. So far, there are few deliberate examples of this—except in Venice, where lower floors of many buildings have been abandoned to water. (Unfortunately, when salt water dries in bricks and other materials, it leaves behind a host of problems.)

In addition, wet flood-proofing does prevent what could be a dangerous buildup of exterior pressure on basement walls, as water soaks the ground around them. This external pressure can be worsened when municipalities attempt to limit stormwater runoff by installing permeable paving on their streets, which has the unintended consequence of soaking the ground with even more water.

Whatever the merits of these approaches, there is a growing realization among coastal geologists, urban planners, architects, and preservationists that sea-level rise is a problem that must be tackled not building by building but rather with a community or regional perspective, taking into account not only a structure's architectural significance, but its economic, social, or even sentimental importance.



The colonial Christopher Townsend House (1725) in Newport, Rhode Island, relies on "dry flood proofing." A heater in the basement is bolted to the ceiling.

And there needs to be discussion of what we mean by historic preservation. If a historic house must be elevated 10 feet or more, fitted with a cistern instead of having a basement, or actually made buoyant, has preservation gone too far? Have we irreversibly damaged its historic integrity?

Unfortunately, many historic properties threatened by sea level rise are beyond saving, or soon will be. Some preservationists are already urging their colleagues to think hard about the unthinkable: that some buildings must be relinquished. The National Parks Service (NPS), stewards of a large portfolio of sites in danger of sea level rise, is on the record for calling for this kind of effort. "Funding temporary repairs for resources that cannot, because of their location or fragility, be saved for the long term demands careful thought," wrote Jonathan B. Jarvis, then director of the NPS, in 2014.

Today, historic preservation cannot be only about preserving buildings against change—especially if they are on the coast—but acknowledging that change is inevitable, and accelerating, and ways must be found to manage that. If a house is elevated in ways that destroy its historic character, something irreplaceable is already lost. But if analysis paralysis stymies action, much more that is irreplaceable will be lost as well. ■

Cornelia Dean is a science writer for The New York Times.

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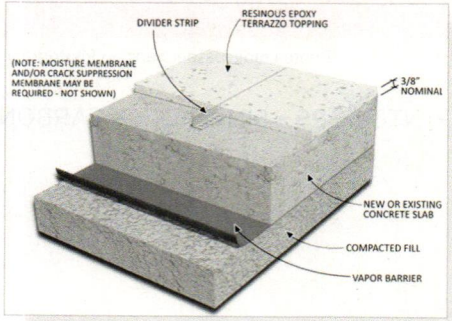

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Master of Materials

Neri Oxman at MoMA illuminates and inspires.

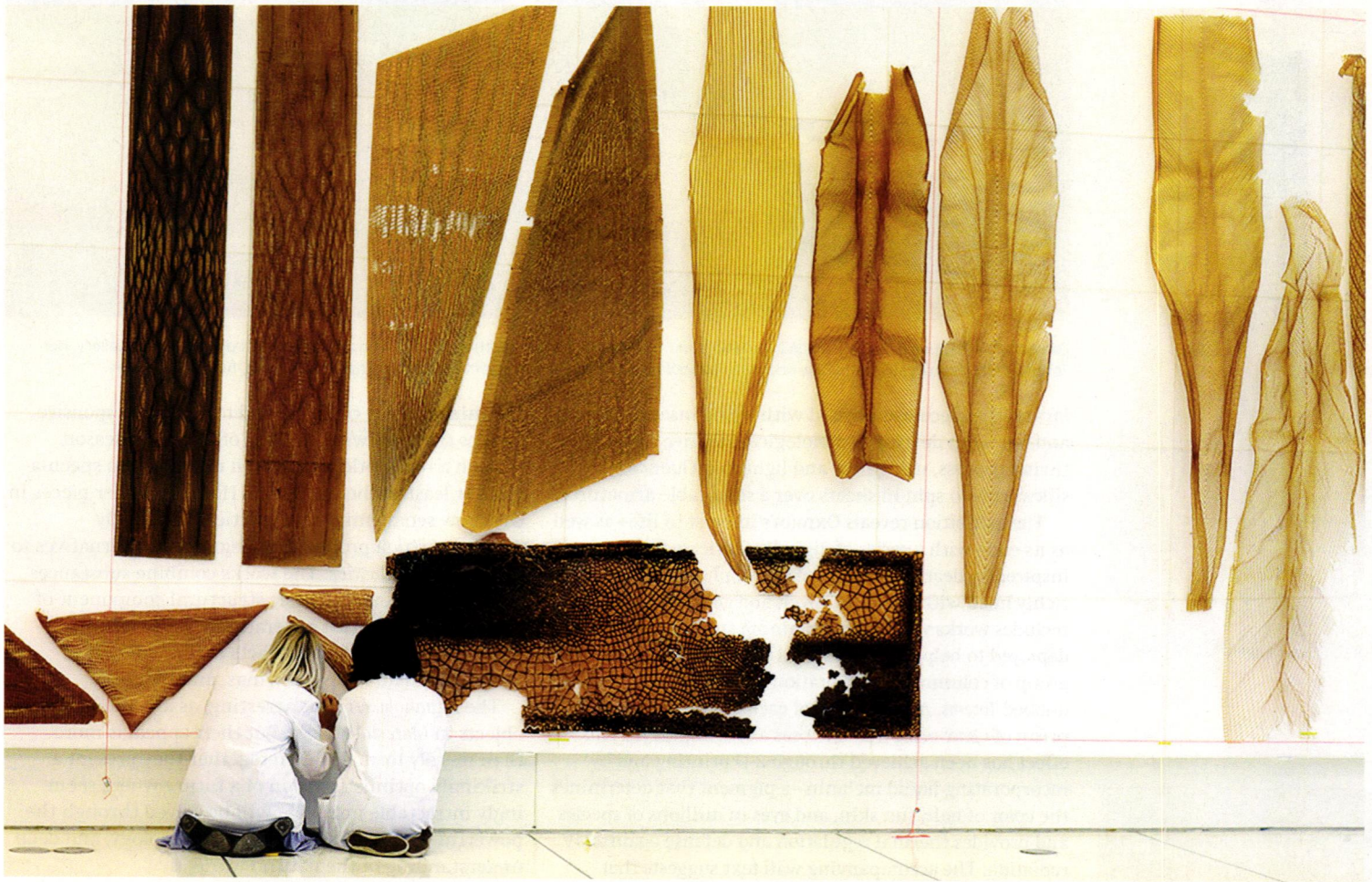
BY JOANN GONCHAR, FAIA

Just before press time, in response to the COVID-19 outbreak, the Museum of Modern Art in New York announced its temporary closure. For updates, visit moma.org. Neri Oxman: Material Ecology *is currently scheduled to run through May 25.*

ARCHITECTURE IS by nature transdisciplinary, encompassing art and engineering. But the work of Neri Oxman, founder of the Mediated Matter Group at the MIT Media Lab, takes this integration to an extraordinary level. The investigations of the polymath Oxman, who studied medicine before switching to architecture, fuse biology, computation, and digital manufacturing to propose new ideas for materials, objects, and buildings. A selection of the projects created over the course of her 20-year career are on view in the thought-provoking *Neri Oxman: Material Ecology* at New York's Museum of Modern Art (MoMA).

The centerpiece of the exhibition, organized by MoMA senior curator Paola Antonelli, is *Silk Pavilion II*, a tensile shelter that extends from floor to ceiling in a 26-foot-high gallery on the street level of the newly expanded museum (RECORD, December 2019). The pavilion's translucent skin was spun by 17,000 silk worms. But instead of relying on traditional silk-harvesting methods, which entail boiling cocoons, and therefore killing the

The work in the exhibition encompasses a wide range of experimental materials, including *Lazarus* (above), which combines photopolymers with bismuth, silver, and gold, and *Aguahoja* (below), created with substances such as pectin and cellulose as alternatives to petro-based plastics.



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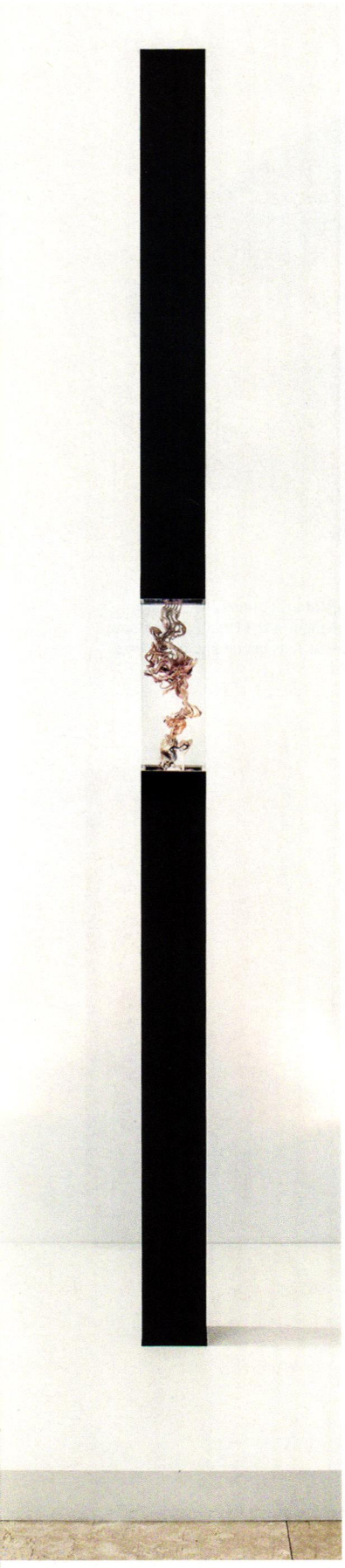

Oxman's *Silk Pavilion II* (above), made in collaboration with 17,000 silkworms, stretches from floor to ceiling in a double-height gallery. Her *Totems* (left) incorporate tendril-like channels that hold liquid melanin—a pigment that determines color in skin, fur, hair, and eyes.

larvae, the piece was created with living insects. Oxman and her team developed a biological additive manufacturing process, using heat and light to influence silkworms to spin in sheets over a steel-cable armature.

The exhibition reveals Oxman's interest in life—as well as its end—with a series of digitally fabricated works inspired by death masks and made of photopolymers richly hued with bismuth, silver, and gold. The show includes works where life-sustaining substances are deployed to help form structural frameworks, such as a group of column-like explorations which Oxman has dubbed *Totems*. At the center of each is a rectangular prism of clear resin that encloses a swirling form. This effect has been achieved through 3-D printing and by incorporating liquid melanin—a pigment that determines the color of hair, fur, skin, and eyes in millions of species and provides thermal regulation and defense against UV radiation. The accompanying wall text suggests that melanin someday could be used to produce responsive facades that vary with the time of day or the season.

Such a real-world application might sound speculative—at least in the near term. However, other pieces in the show seem eminently practical, especially *Aguahoja*, which proposes biodegradable alternatives to conventional plastics. The works combine substances such as cellulose—the basic structural component of plant cell walls—with generative design and digital fabrication, producing artifacts that recall veined leaves, diaphanous insect wings, and tree bark.

The *Aguahoja* series is arresting, as are almost all the objects in *Material Ecology*. But their appeal is more than merely formal. Taken together they present a strikingly optimistic vision of a future where seemingly intractable problems will be solved through the powerful combination of design, technology, and deep understanding of the natural world. ■

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Rem to the Rescue, or Not

Countryside, The Future at New York's Solomon R. Guggenheim Museum is a provocative show that ultimately disappoints.

BY ALEXANDER GORLIN, FAIA

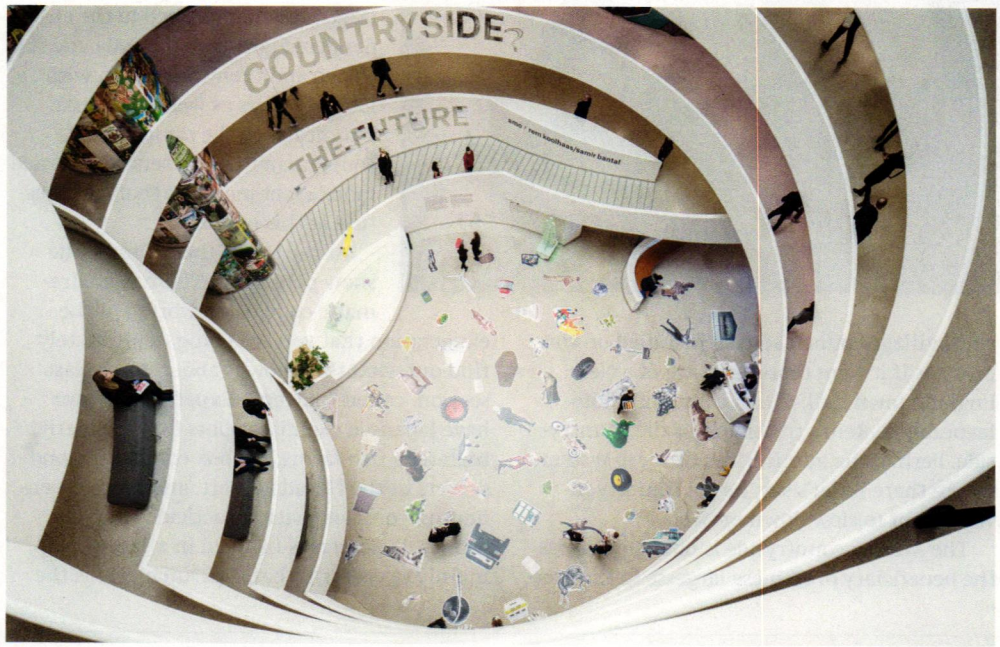
Just before press time, in response to the COVID-19 outbreak, the Solomon R. Guggenheim Museum in New York announced its temporary closure until further notice. For updates, visit guggenheim.org. Countryside: The Future *is currently scheduled to run through August 14.*

AS REM KOOLHAAS explains in the introduction to this exhibition, over the last 20 years he had noticed changes in a Swiss village he often visited. In a "Rem" van Winkle mode, he seemed to awaken finally to find his pastoral retreat despoiled. First it was finding a bad Postmodern addition to a beloved old barn. Then it was the discovery of a charming 1909 photograph of Russian peasant farmers, along with another of the alienating red-lit space of a contemporary Dutch greenhouse growing tomatoes. He wonders, "What happened?"

Highly energized, Rem summons trusty students at the Harvard Graduate School of Design; the Central Academy of Fine Arts, Beijing; Wageningen University, Netherlands; and the University of Nairobi. Working with lots of live ammo from AMO (the research group of his Office for Metropolitan Architecture), his posse takes off to four continents —north, south, east, and west—to study ways to save Mother Earth.

The result is a torrent of words, images, and artifacts—including farmer Barbie dolls—unspooled along the great Guggenheim ramp on the walls, floors, and ceilings. Don't expect any conclusions or answers, since Rem and team struggled mightily, Laocoön-like, with the material, ultimately drowning in the writhing serpents of data. In a time when statistics indicate that most people occupy cities, Koolhaas seeks "to construct a composite picture of the current condition of 'countryside'—a glaringly inadequate term for all the territory that is not urban."

This hot mess of a show is at once provocative, fascinating, enraging, disturbing, barely hopeful, and contradictory. Signage is inscribed on both the ribbonlike parapets and walls of Frank Lloyd Wright's rotunda, evoking Jenny Holzer's digital art or a Bloomberg financial display. But for a show that presents itself as research and reportage, it has curious lacunae in its historical perspective and its contemporary context. For example, global warming is dealt with peripherally through examples such as the melting Siberian permafrost. But it is not given its own section, even though it is the single most important issue confronting the "countryside," now and in the future.



Koolhaas's new exhibition, which scatters artifacts and images throughout the Guggenheim's rotunda, raises more questions than it answers.

The exhibition starts off auspiciously enough with a discussion of two ancient concepts of what the countryside is for, the Roman *otium*, or leisure, and a similar idea in China, *xiaoyao*. Then, in rapid succession, we skip to Marie Antoinette's notorious *Hameau de la Reine*, where she could pretend to be a shepherdess, and on to 1960s hippies, then to the current boom in bucolic spa and wellness culture.

All hell breaks loose in the political section. Here we are confronted by a newly constructed photoshopped collage on a curving wall of "the future of the world prepared in smoke-filled rooms by mostly white men . . ." Sitting at a desk next to Hitler is Franklin D. Roosevelt —implying some sort of a collaboration or affinity. Then we are treated to the 19th-century thinker Charles Fourier and his Phalanstery as a utopian community in the countryside. Along come the *grand projets* of the 20th century, the most fascinating of which is Atlantropa—a German engineer's idea to dam the straits of Gibraltar, draining the Mediterranean to connect Europe with Africa and irrigate the Sahara. Needless to say, it got nowhere, but this is the scale of a project Koolhaas admires.

Hitler's autobahn appears as part of his "Blood and Soil" German countryside renewal, along with Stalin's and subsequent Soviet leaders' attempts to reverse Siberian rivers to create more farmland. The United States section notes the imposition of the Cartesian grid by Jefferson across the west regardless of geography or Native American lands. Abraham Lincoln is cast as the villainous author of the 1862 Homestead Act, selling off indigenous lands to white settlers. On the other hand, Mao Tse-Tung's "Great Leap Forward" in China, an agricultural revolution and staggering failure that resulted in tens of millions of deaths by starvation, is noted merely as a "harsh modernization campaign." The "Cultural Revolution" an internal Maoist purge, destroying libraries, closing schools and universities, burning books, killing as many as 2 million, and ruining the economy, is described by Koolhaas as a "true disruption" as if it were a positive way of describing a new Silicon Valley product. Whoa.

Happy-Chinese-people propaganda posters are presented uncritically, and there is even a

perspective**exhibition**

In the political section, Franklin D. Roosevelt is photoshopped next to Hitler, forcing the viewer to question a possible collaboration.

rural village council setting installed on the ramp as if it were representative of a New England town hall. China comes off quite favorably in Rem's treatment of the countryside. Perhaps he admires the Chinese system, where there is, let's say, no community involvement to slow down projects.

The African countryside is noted mainly as the beneficiary of Chinese largesse in the presently suspect "Belt and Road" initiative, without mention of the Kenyan artist Michael Soi's critical *China Loves Africa* series. A curiously large section is devoted to the endangered gorillas of Uganda and the Congo and their interaction with local villagers as well as tourists. Overheard on the ramp from a young man to his parents: "I learned more about monkeys than architecture at this exhibition."

At the top of the rotunda, the show peters out. There is no dramatic conclusion worthy of the expectation that you are going to ultimately find out what this show is about. In the last section, called "Extreme Experiments," we have Japanese exercise robots for the elderly, high-tech fish farms, big box computer cloud servers in the Nevada desert, and more greenhouses, complete with insecticide-spraying drones. Descartes is invoked in a short film, mainly to confirm that the Dutch grid is the source of all countryside wisdom.

Strange that a great thinker, as Koolhaas has proved to be over the years, has abdicated his role of providing solutions to the problem of the countryside, given the stage prepared by Frank Lloyd Wright; his Broadacre City was a futuristic plan from 1932 to disperse the city into the rural parts of the U.S. In fact, we are given virtually no modernist background for its display, despite the 2013 exhibition at MoMA of *Le Corbusier: An Atlas of Modern Landscapes*, curated by Jean-Louis Cohen, or the landscape urbanism movement now advocated by professor Charles Waldheim at Harvard's Graduate School of Design.

Is *Countryside, The Future*, Rem's own *On the Road*, à la Jack Kerouac, recounting his globetrotting adventures? Is it journalistic reportage, or is it a garbled polemic? Or is it simply Rem's latest enthusiasm, which somehow works its way into the extraordinary buildings OMA produces? In any event, as you depart, don't forget to visit the robust gift shop with *Countryside*-themed hats, key chains, tote bags, T-shirts, pencils, and cups. ■

Alexander Gorlin, FAIA, has contributed to RECORD *over the years and has his own practice in New York.*

PHOTOGRAPHY: © ALEXANDER GORLIN, FAIA

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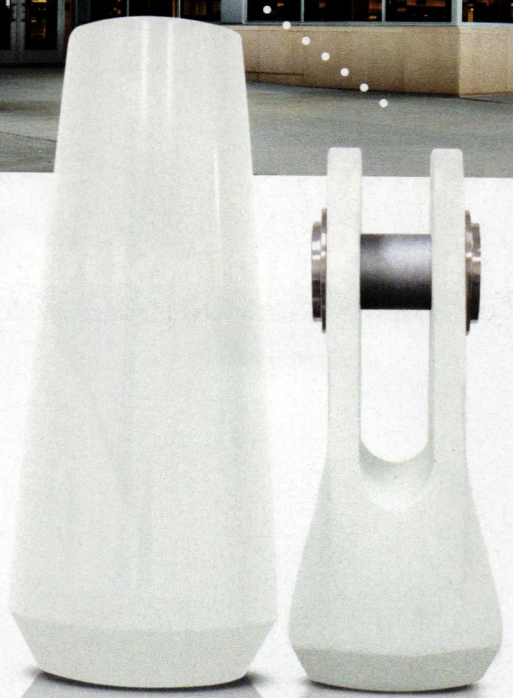

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By Sheila Kim

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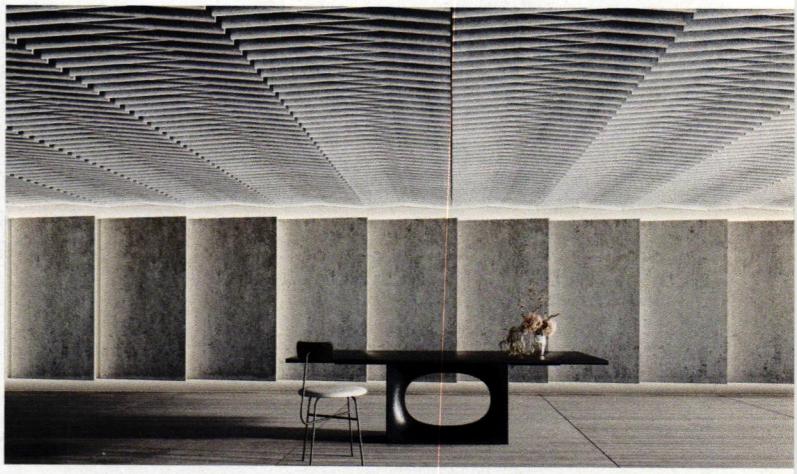
The Armstrong Ceiling Solution's MetalWorks series now includes Airtite, a line of hydronic radiant ceiling systems. Copper tubing on the back side of the panels circulates hot or cold water to efficiently heat or cool spaces using minimal air ventilation. The panels come in six types, such as 1"-batt-insulated aluminum or perforated aluminum with acoustic fleece. Standard sizes are 2' square and 4' by 2'.
armstrongceilings.com



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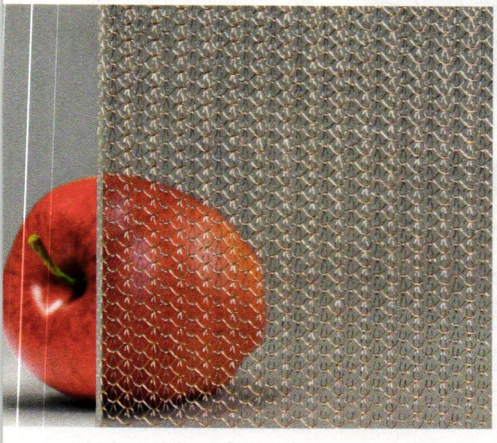
unikavaev.com



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bendheim.com

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rebelwalls.com

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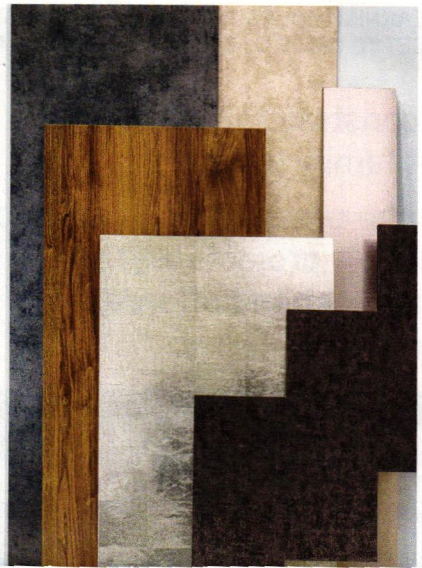
designtex.com



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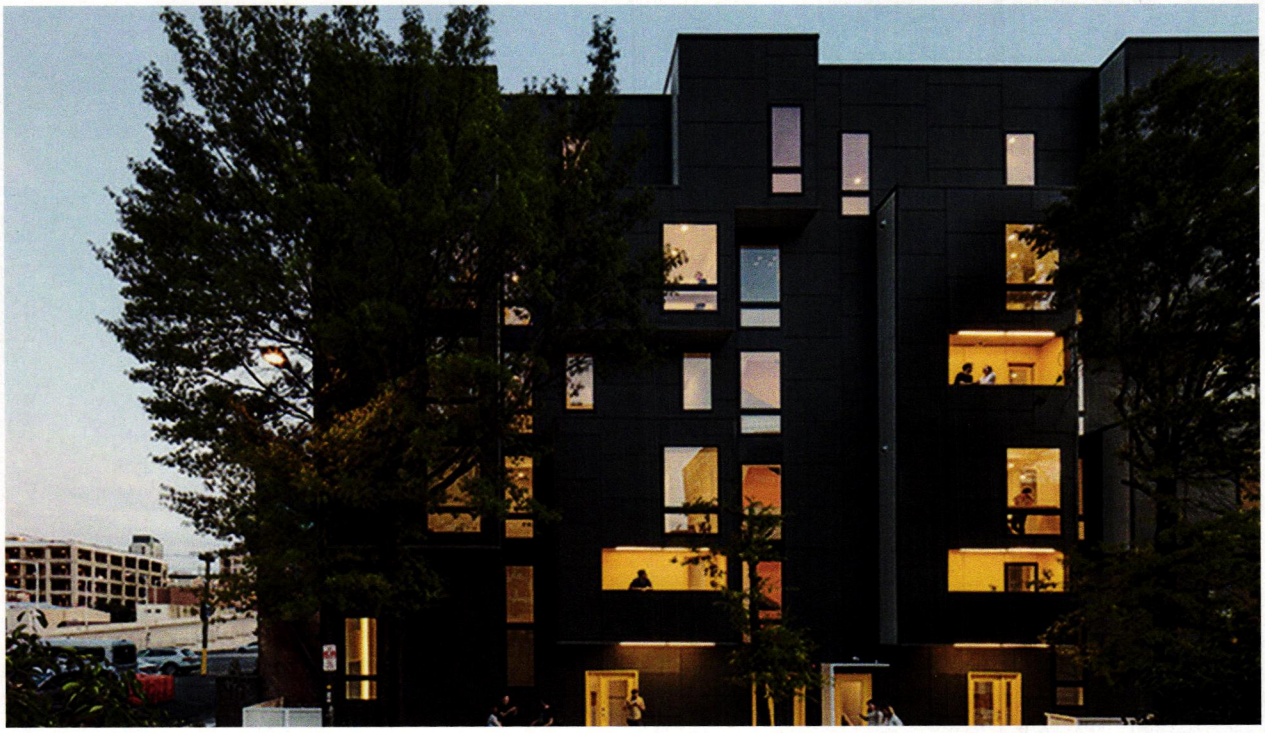

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SPEAKERS:

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President and Quality Director, Holst Architecture

JAKE WATKINS
Design Staff
Holst Architecture

BRIAN PHILLIPS
Principal & Creative Director, Interface Studio Architects (ISA)

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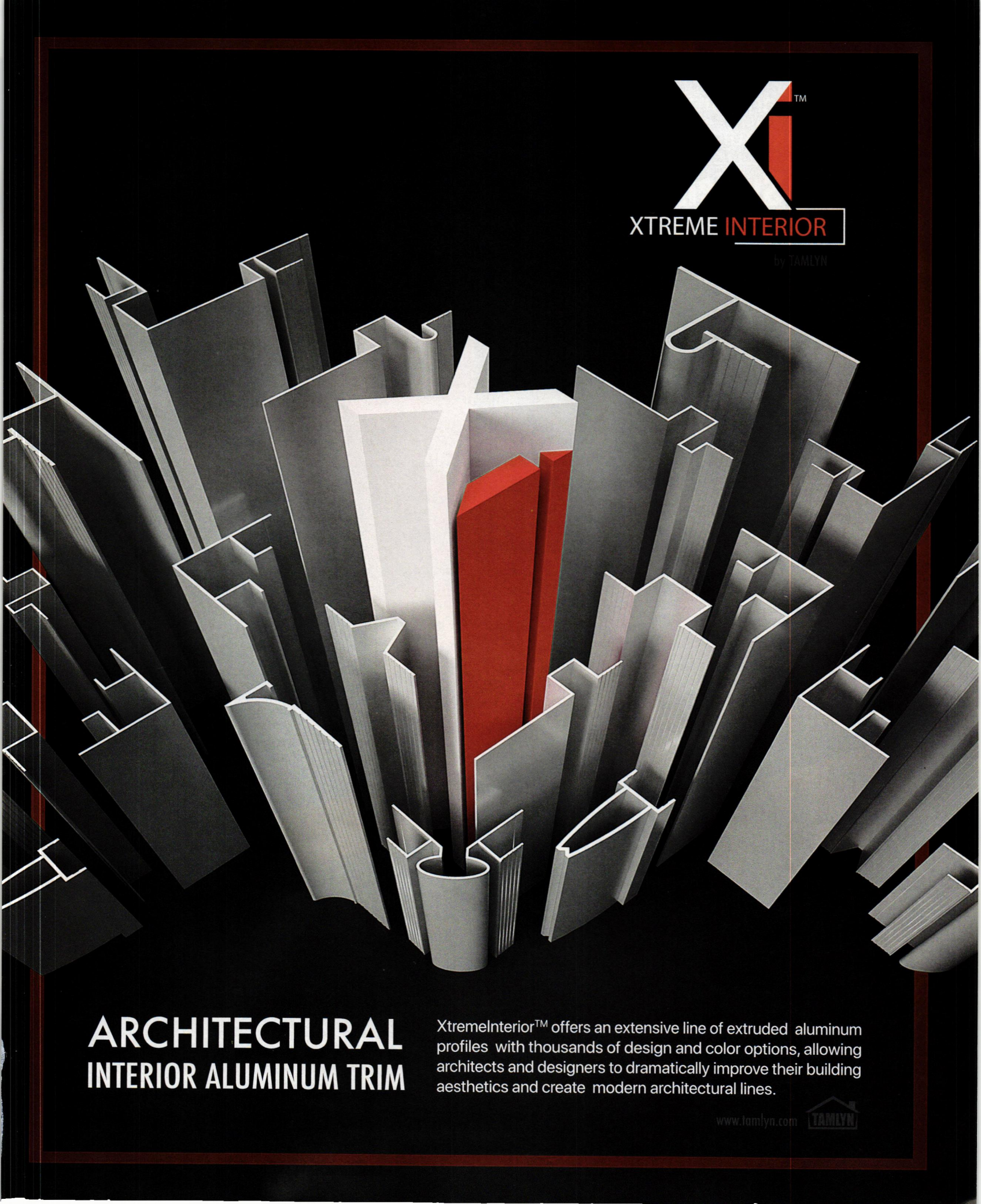

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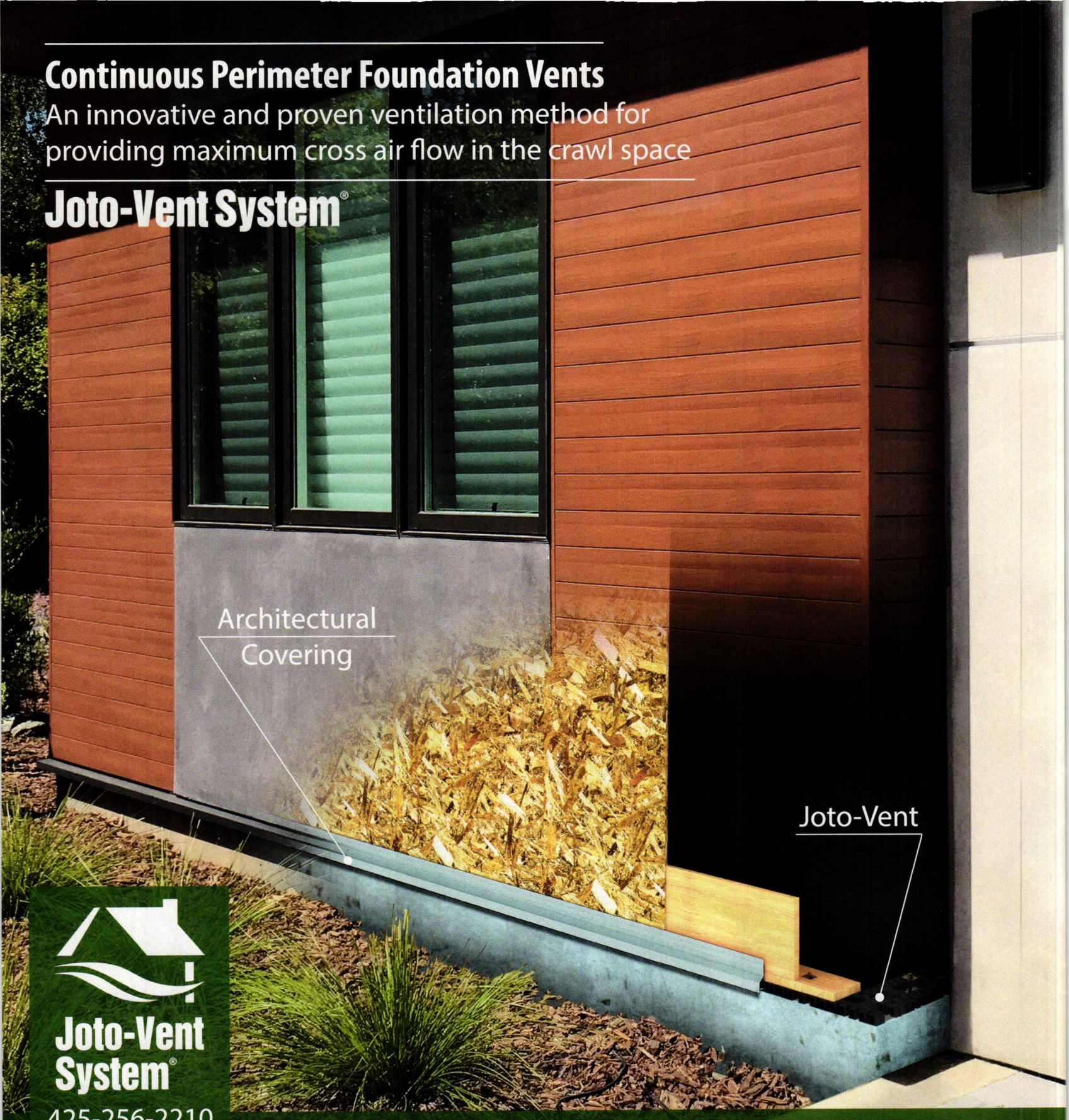

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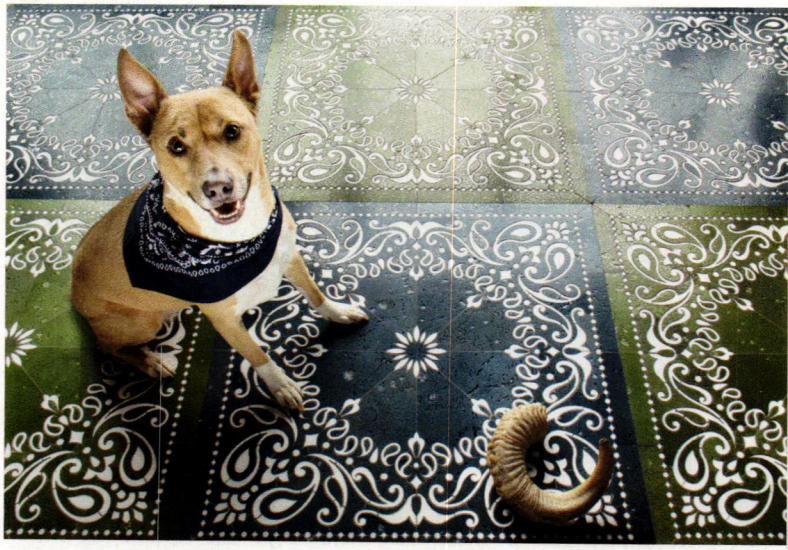
The Perfect Coverup

This spring's new architectural surfaces are both handsome and high-performing.

By Sheila Kim

Macro

Casalgrande Padana's Macro has the appearance of terrazzo, with its exaggerated stone pattern on a white, gray, dark gray, or black background—but it's actually made of porcelain. Suitable for both wall and floor applications, the slabs are easy to clean and specifiable in ¼" to ⅓" thicknesses and in formats up to 46½" by 93".
casalgrandepadana.com

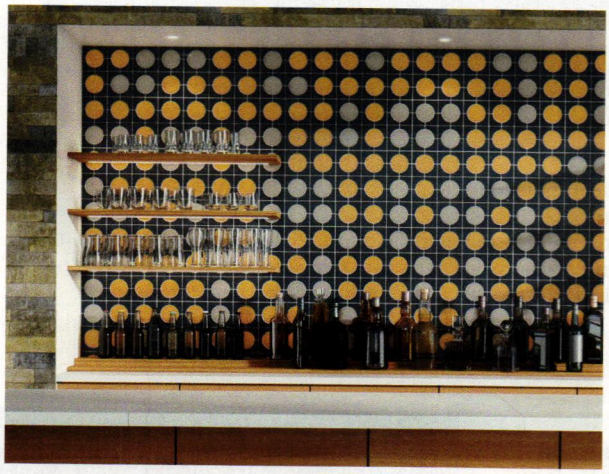


The New World Collection

Interior designer Sasha Bikoff journeys from the aesthetics of 17th-century Europe to modern-day America in these handcrafted stone-mosaic tiles. The compositions, for example, include two vintage American bandana patterns (above), a floral design evoking Renaissance-era lace, and a reproduction of a 17th-century Dutch cartographer's map painting. The lace and bandana designs are 1' square while the Atlas Maior mural is made to measure.
newravenna.com

Yakedo

Manufacturer Emser collaborated with Gensler on this porcelain tile series that replicates the look and feel of Japanese *shou sugi ban*, a burning technique that preserves timber surfaces. Available in 8" x 47" planks with a ⅜" thickness, the tiles come in five colorways and a matte finish. Yakedo can be used for walls, shower floors, kitchen counters, and exterior walls, among other applications.
emser.com



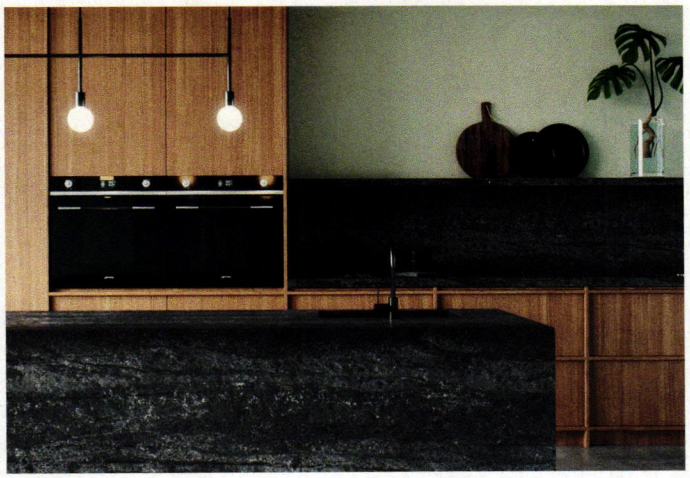
Cursive Wall Tile

Geometry, color, and modularity coalesce in Crossville's new wall-tile collection, ensuring unlimited combinations and layouts. The tiles come in a square, triangle, circle, demilune, and two rectangular shapes in popular colors such as Rose Gold, Charcoal, and Soft Teal. Coordinating corner pieces are available to frame the circle and demilune tiles. All tiles have a glossy finish.
crossvilleinc.com

Spindrift Marble Nebula

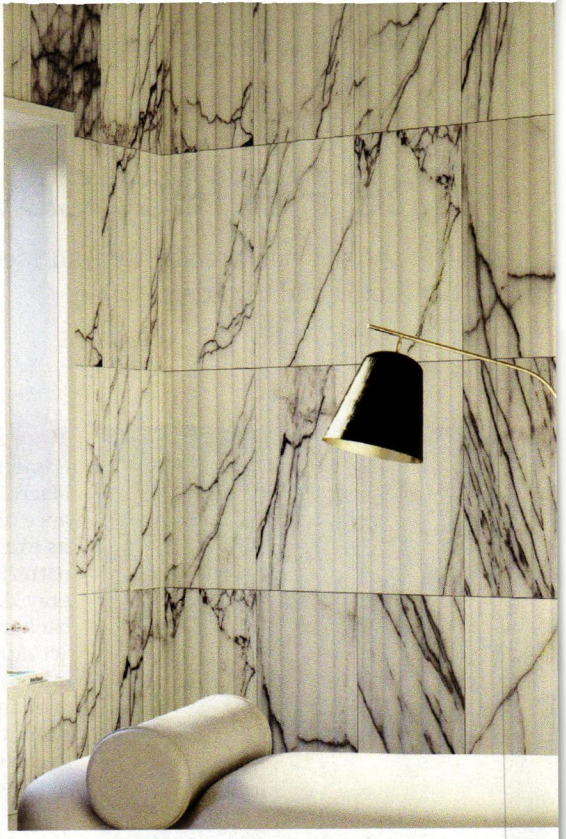
In a twist, Island Stone's Spindrift Marble mosaic tiles are composed of organically shaped slices of marble to mimic a bed of river stones. Inspired by the natural process of metamorphosis—during which rocks transform as they are subjected to heat and pressure—one of the collection's new colorways, Nebula, features swirls, blots, and textures recalling fossil imprints and traces of the elements in a gray, white, and black palette.
islandstone.com

products tile & stone



Black Tempal 5810

With black still on-trend in kitchen design, Caesarstone has introduced three variations of the hue for the start of 2020. Among them is Black Tempal, a quartz surface with a charcoal-black base and subtle layer of soft mineral deposits. The result evokes granular highlights in authentic stone. Slabs are available in ¾" or 1" thicknesses and an overall size up to 56½" x 120".
caesarstoneus.com



Flute

A play on the fluting of classical columns, Flute, from Artistic Tile, is reversed, with convex undulations, in two different marbles: Nero, with inlaid brass lines, or honed lilac on white. The curves—nine to each 12" x 24" tile—project close to an inch and have varied widths. The tiles are suitable for vertical interior applications; the lilac marble is also approved for shower-wall installation.
artistictile.com

Liquid Sky

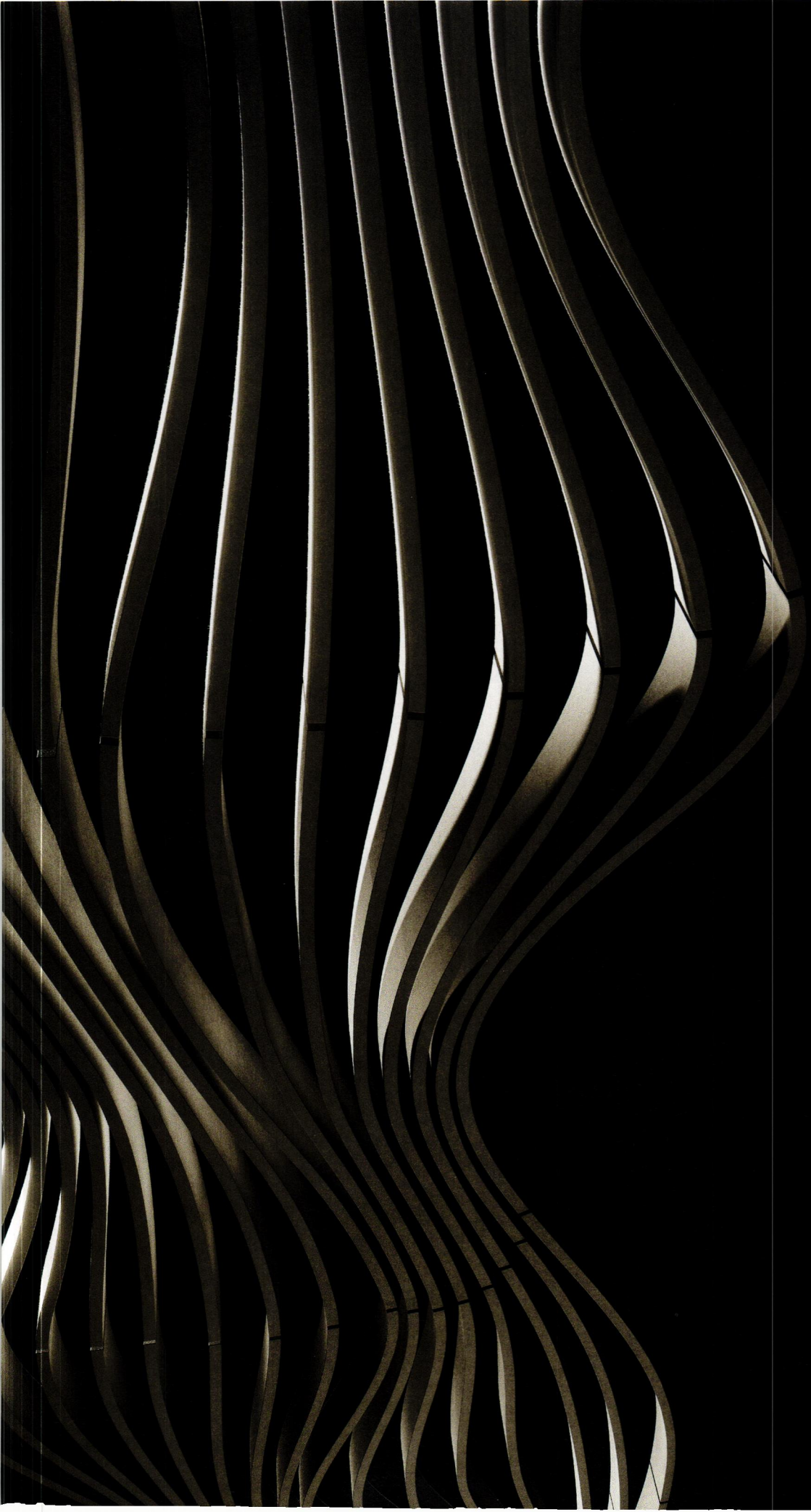
In collaboration with London-based Patternity—a group specializing in pattern creation and research—Cosentino developed the Liquid collection for its ultracompact (sintered through extreme pressure and heat) surfacing brand, Dekton. Sky is one of the collection's three intriguing designs. Sporting a cloudlike pattern of gray wispy swirls on a white ground, it interprets the scientific principles of fluid dynamics. The slabs are large-format, measuring up to 56" wide x 126" long.
dekton.com

Regolo

Minimal and subtle, this Appiani series creates maximum visual impact. It comprises 3" x 12" rectangular tiles and coordinating mosaics, all of which are matte and supersaturated in nine (depending on the design) soft colors, including a muted cerulean and a warm gray. The tiles can be smooth or have any of three textures: raised dots, raised bars, and a microwoven pattern.
appianimosaic.com

Oberlin

Reinforcing the black-palette trend in kitchens, Wilsonart's Oberlin is a large-scale terrazzo-inspired quartz slab, with gray and bronze flecks of varying shades and sizes on a gray-black background. Like the company's other quartz products, Oberlin is resistant to stains and abrasions, making it ideal for countertops. It is available in one size, 55" x 120", and two thicknesses, of about ¾" and 1⅛".
wilsonart.com



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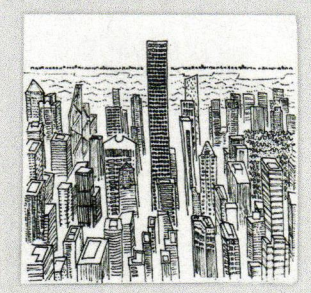
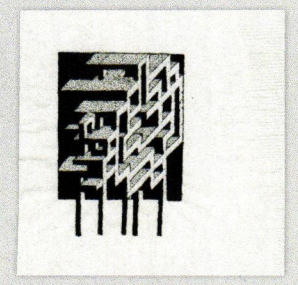
The sketches of the winners and runners-up will be published in the November 2020 issue of *Architectural Record* and shown online in the ArchitecturalRecord.com Cocktail Napkin Sketch Gallery.

HOW TO ENTER:

- Sketches should be architecture-oriented and drawn specifically for this competition.
- Create a sketch on a 5-inch-by-5-inch white paper cocktail napkin. You may cut a larger napkin down to these dimensions.
- Use ink or ballpoint pen.
- Include the registration form below or from the website.
- You may submit up to 6 cocktail napkin sketches, but each one should be numbered on the back and include your name.
- All materials must be postmarked no later than September 4, 2020.



Winning Sketch 2019 by Jeongin Kim, Registered Architect



Winning Sketch 2019 by Jordan Lutren, Non-Registered Architect

DEADLINE: September 4, 2020. ENTER NOW!

For more information and official rules visit: **architecturalrecord.com/cocktail-napkin-sketch-contest**
Due to the volume of entries, cocktail napkin sketches will not be returned.

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- ❒ YES
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Entry form the size of 5 x 5 cocktail napkin, for reference.

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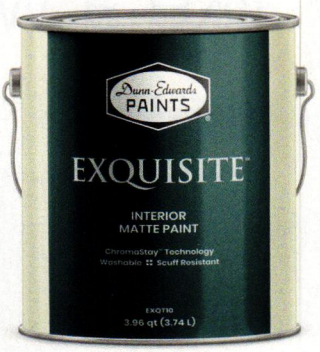

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Record Houses 2020

OCHOQUEBRADAS HOUSE, CHILE
OFFICE OF RYUE NISHIZAWA

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Cliffhanger

A house strikes a dramatic pose atop its untamed site.

BY BETH BROOME

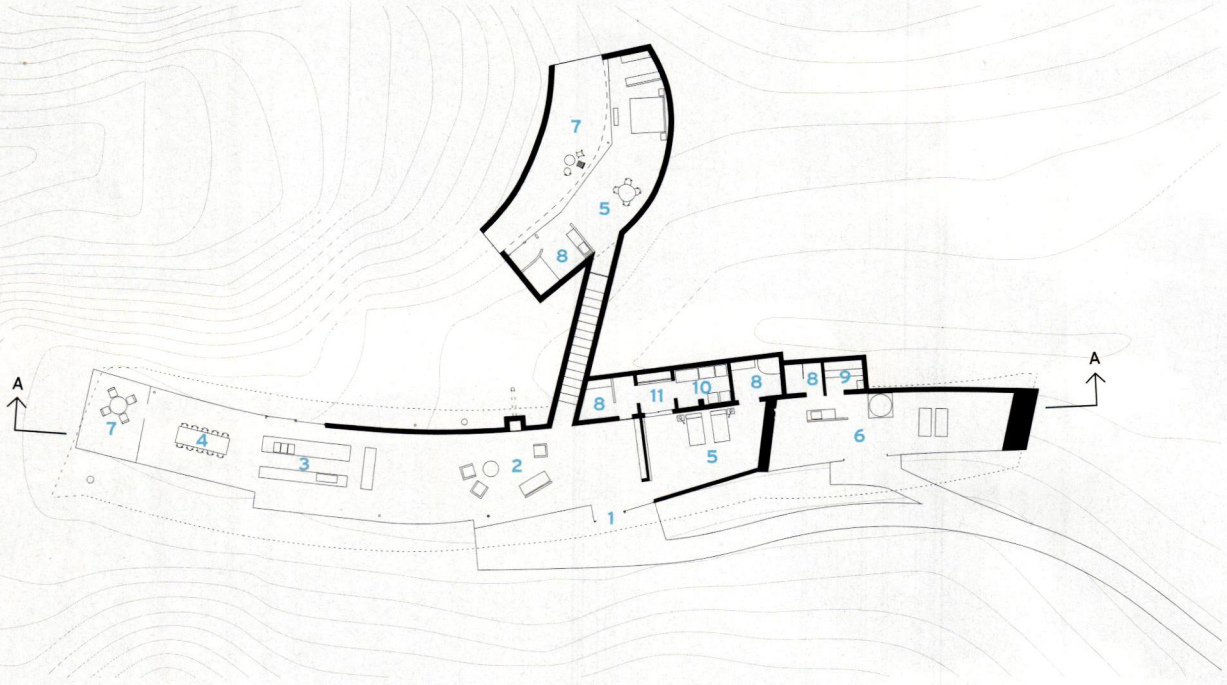
PHOTOGRAPHY BY CRISTÓBAL PALMA

CHILE'S RUGGED central coast is not for the faint of heart. Outside the small fishing town of Los Vilos, 140 miles north of Santiago in a place called Ochoquebradas, the wind whips as the sun beats down on the arid, treeless landscape and the Pacific Ocean thrashes the rocky shore. Tokyo-based architect Ryue Nishizawa has responded to this unforgiving backdrop with an unusual serpentine house that shows its mettle and provides shelter, but not too much. "The presence of wild natural elements such as sea and wind is powerful," says the architect. "We wanted to make a house with a strong nature."

The house is part of a project named Ochoalcubo ("eight cubed"), the brainchild of Santiago businessman and design impresario Eduardo Godoy, which embodies eight development projects in Chile, each with eight buildings designed by different architects. Six years ago, the first phase was completed farther down the coast, with eight houses by established as well as up-and-coming local designers. Following devastating earthquakes in Chile and Japan in 2010 and 2011 respectively, Godoy was moved to make the project's third and fourth phases a collection of buildings by designers from these two countries.

With the help of his friend Toyo Ito, Godoy, who runs his development concern with his son Philippe, brought in Kazuyo Sejima, Kengo Kuma, Junya Ishigami, Sou Fujimoto, Atelier Bow-Wow, Akishisa Hirata, onishimaki+hyakudayuki, and, of course, Nishizawa to design houses that sit along an 875-yard stretch of coastline in Ochoque-

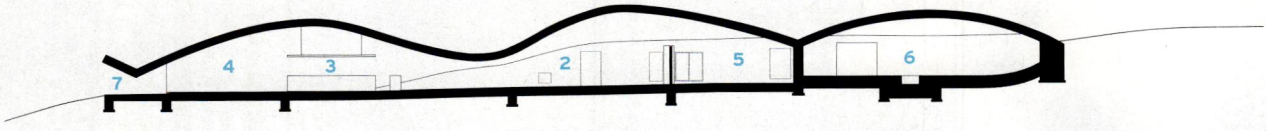
MAKING WAVES The house was built 55 feet above sea level (50 feet above the tsunami line). The team says the craggy promontory required little site work—a blessing, given the precariousness of the location.



1 ENTRANCE
2 LIVING
3 KITCHEN
4 DINING
5 BEDROOM
6 SPA
7 TERRACE
8 BATHROOM
9 SAUNA
10 STORAGE
11 LIGHT WELL

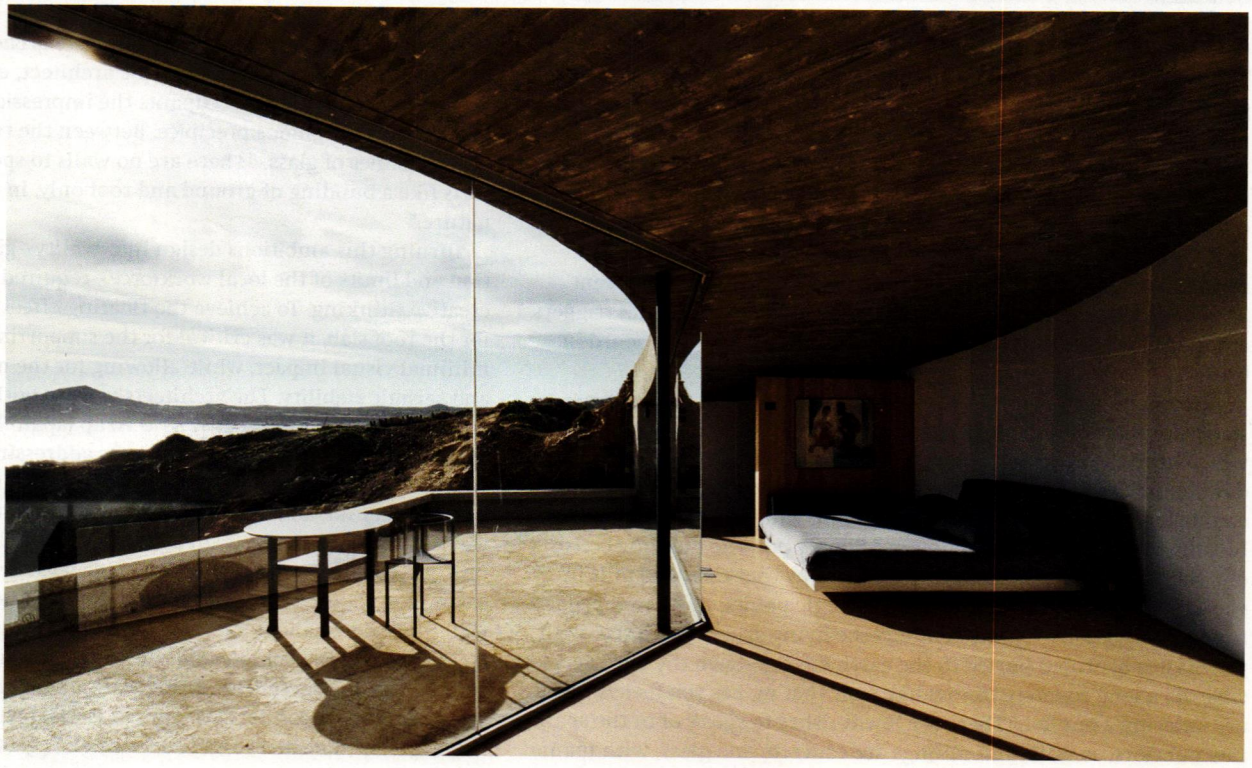
FLOOR-PLAN

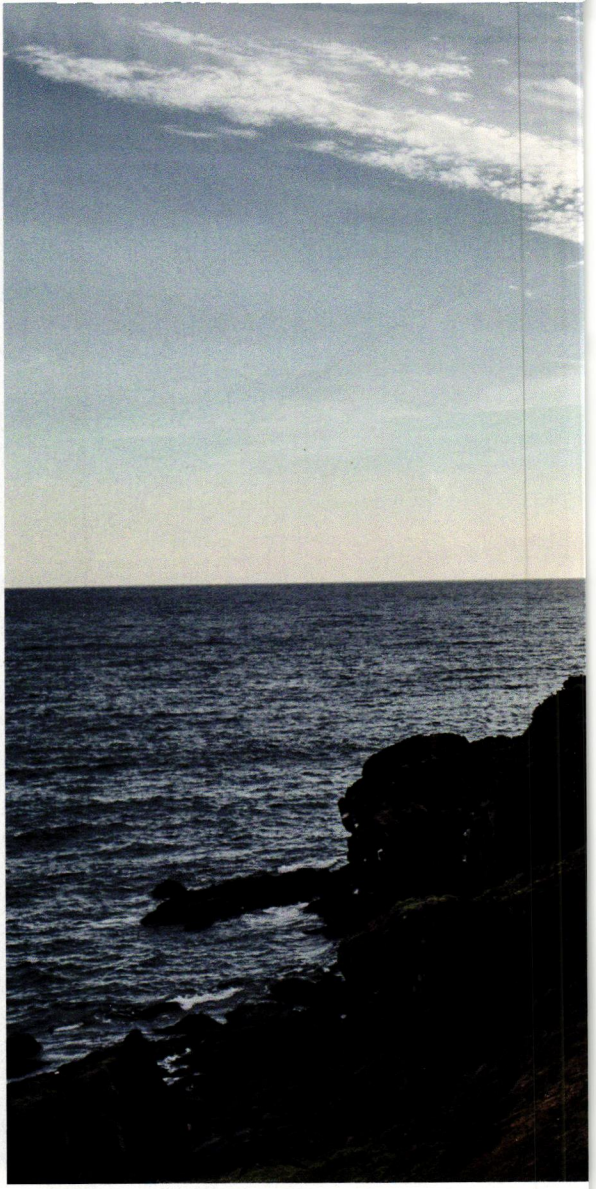
0 16 FT.
5 M.



SECTION A - A

ON THE EDGE
The master bedroom (opposite and right) is tucked into the cliff farther down the hill from the main volume (above), which contains the living area. The team started construction with this subterranean portion, using it to test the concrete under the conditions here.





bradas (Eight Ravines). Eight Chilean firms are also designing houses. The architects were given virtual carte blanche, other than minimal guidelines such as a mandate to use concrete as the principal building material and for each structure to be of limited size (with most under 3,000 square feet). To date, a house by Alejandro Aravena—a dramatic trio of concrete blocks leaning and stacked atop one another—is complete, and one by Max Núñez—a swoopy form perched along the cliff—is under construction, both just down the shore from Nishizawa's house. "We want to show that it is possible to do a different kind of development here," says the younger Godoy, "one that triggers emotions—not the same boring architecture that is the standard in Chile."

Approaching the project, Nishizawa envisioned an undulating structure that would hew to the topography of the site's promontory, which drops down precipitously to the raging surf below. "While developing the shape," says the architect, "we studied how the house could blend in with the site's rough terrain while responding more broadly to the coastal environment." Simply put, the building consists of a slab on rock topped by a concrete canopy that rises and falls in waves and is pinned to the earth at strategic points, like a tent pegged to the ground. This volume contains the living spaces and a spa, with the master bedroom buried in the earth farther down the cliff, accessible via a long concrete tunnel-like stair that makes you feel as if you are entering a bunker. (There are few finishes to speak of in the spare, raw interiors, as walls and ceilings are concrete and glass, with mañio wood for flooring.) Using the roof to create arches that connect to diagonally oriented anchors, notes the architect, enabled large spans and broad views out—giving occupants the impression of teetering on the edge of the vertiginous precipice. Between the two slabs are floor-to-ceiling planes of glass. "There are no walls to speak of," says Nishizawa. "It is like a building of ground and roof only, in the midst of abundant nature."

Turning this ambitious design into reality—given the farflung location and limits of the local workforce—required determination and creative thinking. To achieve the floating effect that Nishizawa desired for the roof slab, it was critical for the supporting structure to have minimal visual impact, while allowing for the needed roof thickness and seismic stability. The architects worked with structural engineers Luis Soler P. & Asociados as well as Arup Japan. The biggest challenge, says Soler's Dario Mutoli Lopicich, was addressing the support of the curved slab's sea-facing southwestern corner to make it appear to melt into the ground, and "avoid ruining the visual magic the architects wanted." To do this, the team anchored a 16-inch solid steel column into a 16-foot-squared foundation (made with over a mile of rebar)—"not a common solution for a one-story structure," he points out. A shear wall (sunk down about 8 feet) between the living space in the ocean-facing prow of the volume and the spa at its stern provides seismic stability, as do concrete retaining walls and large subterranean concrete beams that connect the house's eight steel columns. All in all, there is a lot more steel and concrete below ground than what you

INTO THE WILD The house's minimal composition stands up to the site's harsh climate and vegetation. A long concrete walkway cantilevers from the slope, creating a grand entry.

actually see, says Eric Meinardus, who was the builder and executive architect (as well as the builder for Aravena's house).

From a construction standpoint, the hardest part was creating the formwork for the roof. "We had a plan, but no instructions," says Meinardus. To get the geometry right, the team took cross sections from a computer model to determine specific coordinates for each point that would require a column to support the formwork—about 1,500 in all, he says. The team mapped these points onto the ground and erected the wood formwork atop temporary steel props adjusted to the corresponding heights and welded to diagonal rebar (in case of seismic activity during the process). Pouring the concrete also had its challenges. A telescopic pump with a long arm carried the material out to the promontory; the roof was created in two pours. The large amount of steel reinforcement required by the structural engineers' calculations helped prevent the concrete from sliding off the steep areas of the curve. Nonetheless, workers armed with buckets still had to capture the slippery material as it ran down the peaks and dump it back at the top until it cured—a low-tech but effective method.

The team reduced exposure to the elements by sinking the house into the topography and adapted its shape to mitigate solar heat gain and the effect of high winds. Deep eaves further protect against the sun and the structure's thermal mass helps with day-to-night temperature swings.

On its impossible site with its fantastical form, the Ochoquebradas house stands apart—both literally and figuratively. You have to think that this daring is due in part to the absence of an owner—the house (unlike Aravena's or Núñez's) has yet to be sold. This fact may also account for some of the awkwardness of the ancillary spaces, which live in the shadow of the awe-inspiring prow that thrusts you out into the elements. With Chile's ongoing civil unrest and protests, now combined with the uncertainty associated with the COVID-19 crisis, it is a challenging time indeed for marketing such an idiosyncratic (and luxe) abode, not to mention the larger visionary project of Ochoalcubo. Moving into this precarious future, the house is a totem of optimism and a reminder of the power of an adventurous spirit. ■

credits

ARCHITECT: Office of Ryue Nishizawa – Ryue Nishizawa, principal; Kenichi Fujisawa, Katsunori Ono, Taeko Nakatsubo, design team

EXECUTIVE ARCHITECT: Eric Meinardus, Sarah Bosch

PROJECT MANAGEMENT: Eduardo and Philippe Godoy

ENGINEERS: Luis Soler P. & Asociados, Arup Japan (structural)

GENERAL CONTRACTOR: Meinardus Jara y Asociados

SIZE: 3,765 square feet

COST: withheld

COMPLETION DATE: November 2019

SOURCES

STOREFRONT SYSTEM: Schüco

GLAZING: AGC

HEATING SYSTEM: Jaga

BATHROOM FIXTURES: Duravit

KITCHEN APPLIANCES: Miele

Pebble Beach Residence | California
Jim Jennings Architecture

Speaking Volumes

Well-proportioned forms give the structure a strong architectonic quality.

BY SUZANNE STEPHENS

PHOTOGRAPHY BY JOE FLETCHER

PHOTOGRAPHY: COURTESY JIM JENNINGS ARCHITECTURE (OPPOSITE, BOTTOM)

THE MODERN, minimal rigor of the Pebble Beach house on Northern California's coast should be expected in the work of the San Francisco architect Jim Jennings, in practice since 1975. Jennings, known for an elegant precision of line and clarity of planes and volumes in his residential projects, such as his Carmel House (RECORD, April 2015) and the Visiting Artists House (RECORD, April 2003), is the consummate architects' architect: His colleagues admire the age-old principles of proportion, balance of mass and void, and unity of composition in his design. Add to that a contemporary functional ethos and a commitment to new materials and technologies and it is clear why he has gained his solid, albeit quiet, reputation.

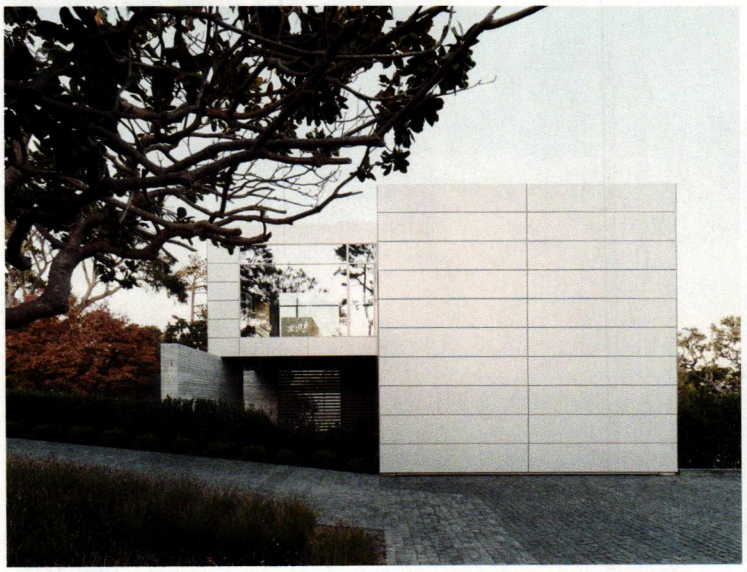
Of course, Jennings needs the right clients who share his values and understand the effort that goes into realizing his ideas. Fortunately, he found them, once again, with Stephen and Maryan Ackley. Not only do they collect abstract art and admire modern architecture, but Stephen is a cofounder of a real estate development company, near San Francisco, where Maryan is an accountant. Both are familiar with the ins and outs of residential design and construction. With a full-time residence in the Bay area, the Ackleys had a weekend home for some years in Carmel before deciding to move nearby to Pebble Beach and its striking setting.

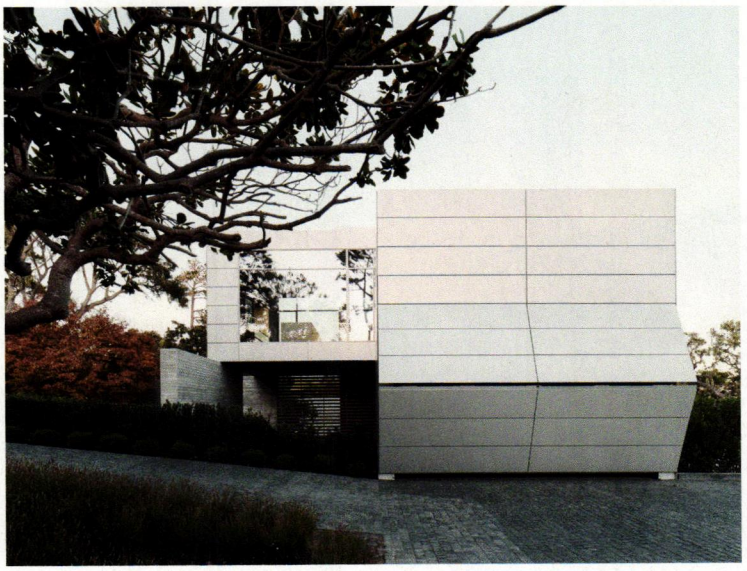
Like Carmel, the Pebble Beach area is known for its craggy shores, where windswept cypress trees jut up against the sky and deep blue waves crash onto rocks. Yet its verdant hills, and its public and private golf courses, distinguish it from the picturesque village of Carmel, known for its storybook architecture and the lack of traffic lights.

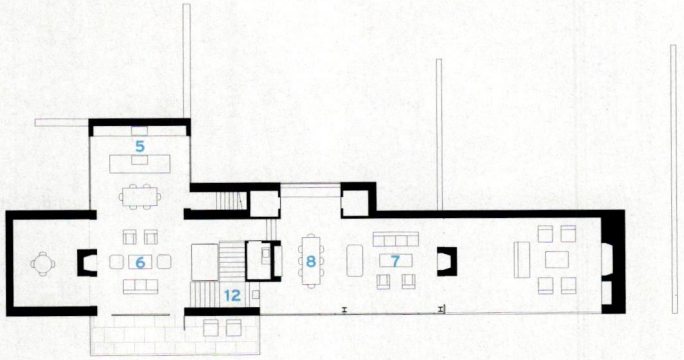
Since the architectural review board of the community of Pebble Beach not only restricts size and height for new construction but votes on the compatibility with the Spanish Mediterranean and California Contemporary styles of its dwellings, Jennings was fortunate: his spare, aluminum-and-stone-clad solution found a persuasive advocate on the review board who convinced some skeptics that it would fit right in.

To reduce the mass of a 6,700-square-foot house on its narrow half-acre site, Jennings nestled the three-level, steel-frame structure into the sloping property and submerged the lowest floor (which holds the media room, wine storage, and a guest bedroom) belowground. A

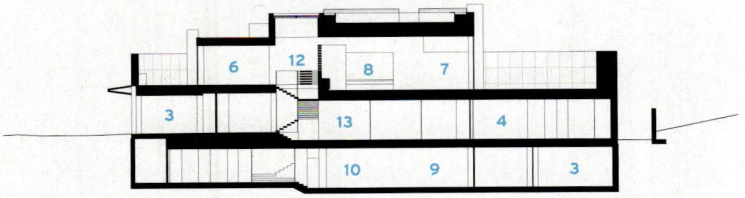
PLANAR PLAY At the back of the house (this photo), poured concrete cross walls define bedroom terraces. At one end is a parking area and the garage (below, left). The entrance vestibule also opens to a large terrace on the east (below, right).



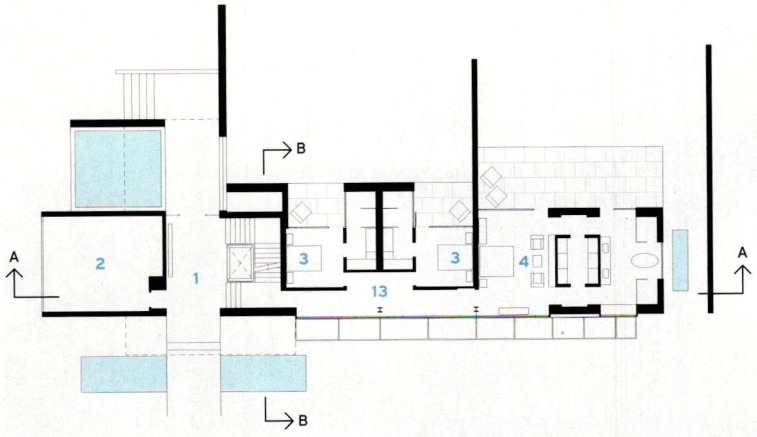




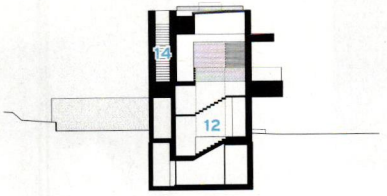
UPPER-LEVEL PLAN



SECTION A - A

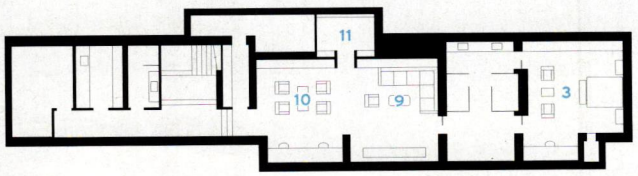


GROUND-FLOOR PLAN



SECTION B - B

0 15 FT.
5 M.



LOWER-LEVEL PLAN

0 15 FT.
5 M.

1 ENTRY
2 GARAGE
3 BEDROOM
4 MASTER BEDROOM
5 KITCHEN
6 FAMILY ROOM
7 LIVING ROOM
8 DINING ROOM
9 MEDIA ROOM
10 LOUNGE
11 WINE ROOM
12 CENTRAL STAIR
13 GALLERY
14 STAIR TO ROOF

PHOTOGRAPHY: © SHADE DEGGS (OPPOSITE)

SERENITY REIGNS The crisp linearity of the living area on the house's upper level leads to an outdoor terrace (above); the garage's hydraulic bifold doors are clad in aluminum panels (opposite, closed and opening) with the upper portion concealing another terrace.

perimeter skylight extending along the eastern edge admits daylight into these spaces. Above it, at grade, is a level designated for the master bedroom and bath, along with two smaller bedrooms, all of which have their own outdoor terraces. On top of this floor is the main living level, where the family room and kitchen, plus the dining and living area, open onto terraces facing north, east, and south.

To further break up the massing of the dominant rectangular volume, Jennings pulled out the kitchen and the family room on the upper level at the back of the house. On the ground level underneath, he extended the cross walls of board-formed concrete, partially enclosing the bedroom terraces. On the other side, facing the lawn, Jennings pushed the main level's terrace out from the strong, horizontal facade—a volumetric expression that recalls Le Corbusier's garden elevation at the Villa Stein in Garches, France, of 1927. Jennings's version appears softer, however, owing to the muted gray tones of the aluminum and pietra serena sandstone rainscreen cladding. These panels follow a 24-inch module, whereas the concrete walls at the base, poured in Alaskan yellow cedar boards, each three-inches deep, foster "a delicacy of scale," in Jennings's words.

Aside from its formal qualities, the house, of course, needed to be livable. The Ackleys enjoy entertaining and having their grown children visit, so they wanted flexible living spaces that could accommodate (and offer privacy for) varying numbers of guests. Jennings's multilevel parti addresses such concerns with a variety of indoor and outdoor spaces. To connect the three levels, Jennings placed a central stairwell near the entrance, which is at the south end of the house, easily accessible to the parking area.

The entrance is discreet. You go down some steps from the outdoor parking area, and find yourself in a porte-cochère of sorts, under the main volume of the house. Entering the house into a vestibule, you encounter the central stair where wood treads cantilevered from steel-framed walls wrap around a freestanding glass tower. This central stair Jennings describes as the "the heart of the house." (A second, smaller stair near the kitchen area leads up to the roof deck.) The tower acts as a light well, a solution found in houses in Minoan Crete (1600 BCE), although this one is glazed at the top and is enclosed by triple-laminated

LIGHT SOURCE
Open-riser stairs with wood treads wrap around a light well of laminated glass (left). The stair extends from the lower level to the upper living spaces (below), where another smaller stair leads from the kitchen area to the roof. Rift-cut walnut cabinetry separates the dining and living area from the family room.

PHOTOGRAPHY: © SHADE DEGGS (BOTTOM; OPPOSITE)

glass panels on four sides that softly illuminate the interior. Constructing the light well was not easy. Because of the translucent panels' large size (they are 15 feet long and each one weighs about 1,000 pounds), the pinned connectors joining them at the corners needed to be carefully engineered.

In reaching the main upper level, you feel you are in the trees as you move from kitchen and family room at one end to the living and dining area at the other, with abundant views and access to the terraces. The serenity is palpable. The interiors, executed with Leverone Design, depend on a palette of misty gray and soft taupe, including rift-cut walnut for the cabinets. The simplicity and linearity of the furniture and related objects evokes classic modern prototypes.

Outdoors, the sculptural, abundant planting by Andrea Cochran Landscape Architecture offers a counterpoint to the house's crisp rectilinearity. Olive trees and Japanese maples are combined with boxwood, hydrangeas, anemones, and iris. The interaction with the landscape is just more evidence that Jennings is a sympathetic collaborator with other design professionals. That fact, as well as the way he combines classical and modernist principles—and executes them with great finesse in the handling of details and materials—is why he has long proved he is an architect's architect. ■

credits

ARCHITECT: Jim Jennings Architecture –Jim Jennings, design principal; Paul Burgin, Nick Elster, project architects; Daniel Osborne, Randy Ruiz, Aine Coughlin, Misa Grannis, Tiffany Xu, project team

ENGINEERS: Borm International Structural Engineers (structural); Laufs Engineering Design (glass); Johnson Leifield Structural Engineers (stone cladding, anchorage)

INTERIOR DESIGNER: Leverone Design

CONSULTANTS: Andrea Cochran Landscape Architects (landscape); Monterey Energy Group (energy)

GENERAL CONTRACTOR: Pacific Peninsula Group

CLIENTS: Stephen and Maryan Ackley

SIZE: 6,700 square feet

COST: withheld

COMPLETION DATE: July 2019

SOURCES

ALUMINUM COMPONENT PANEL: Kingspan

LAMINATED GLASS PANELS: Sedak, Sevasa

CURTAIN WALL: SMARTci, Greengirt

MOISTURE BARRIER: VaproShield/RevealShield

Three Chimney House | Charlottesville, Virginia | TW Ryan Architecture

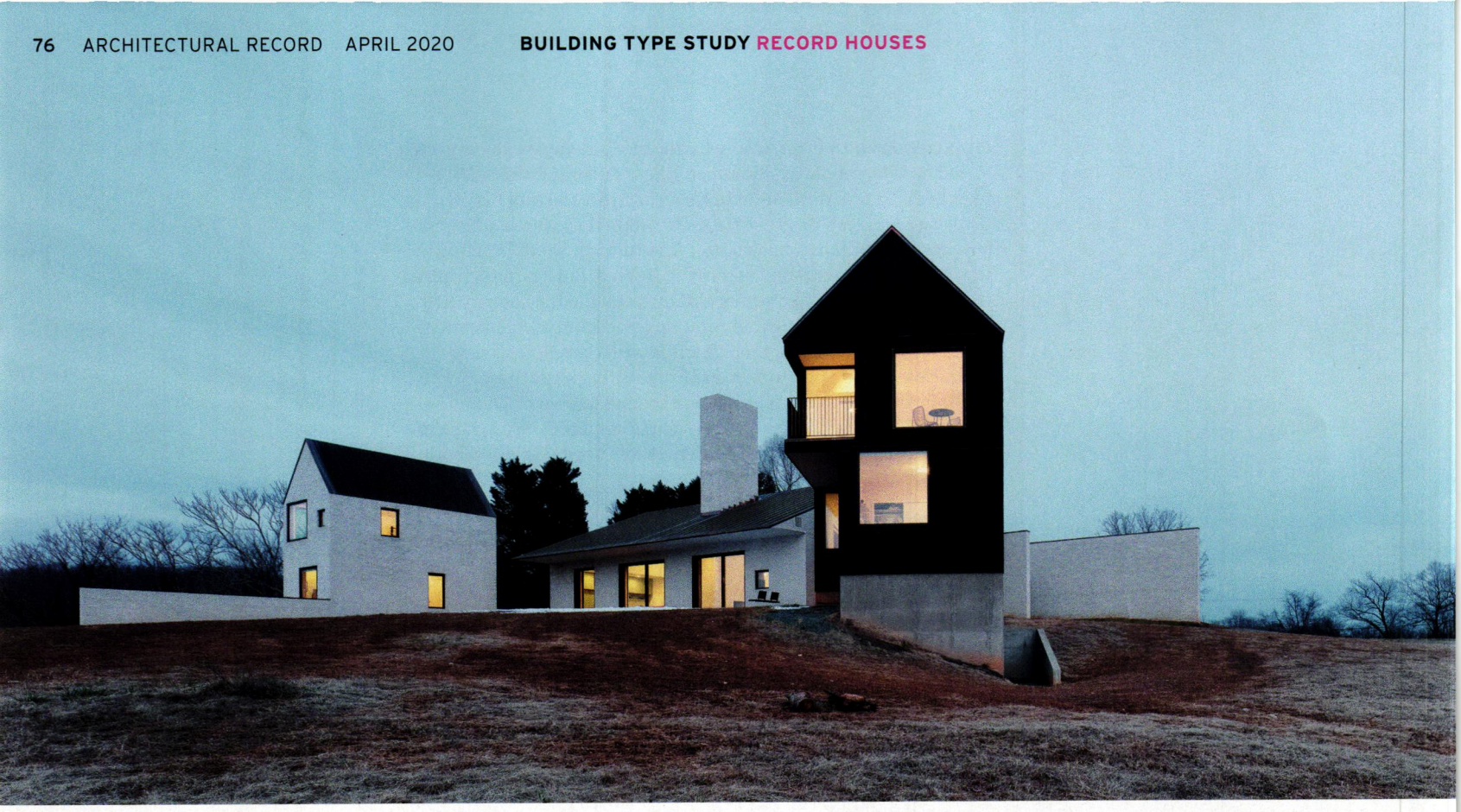
Southern Comfort

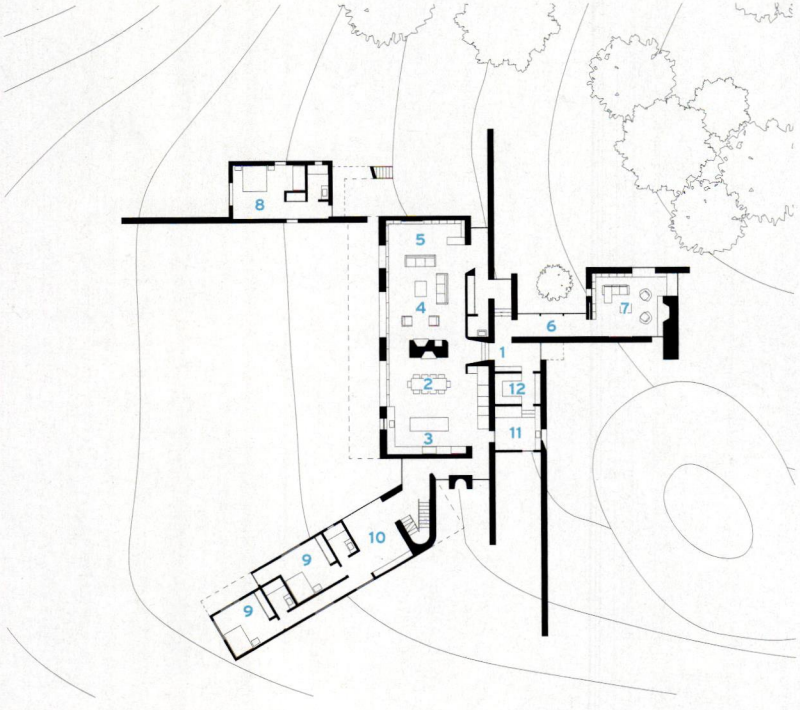
Regional landmarks inform a contemporary residence set amid the hills of horse country.

BY JOSEPHINE MINUTILLO

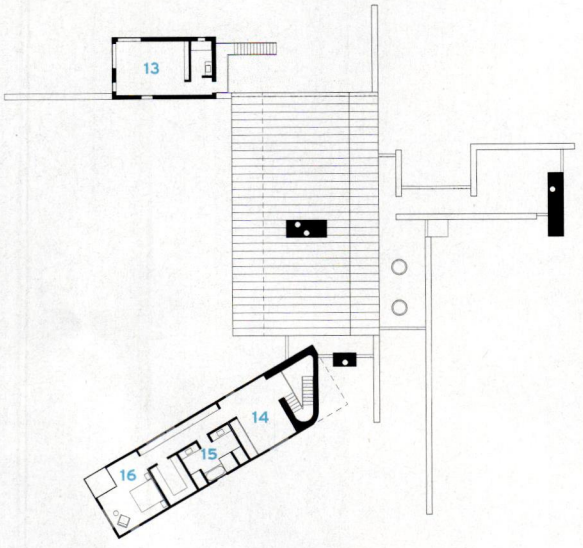
PHOTOGRAPHY BY JOE FLETCHER

CHARLOTTESVILLE IS not where Cassie and Carrington Guy expected to end up. The couple first hired architect Thomas Ryan in 2013—like them, he was then based in New York, just starting his own firm—to renovate a brownstone in Brooklyn they were looking to buy. When that didn't materialize, they thought about building a small weekend retreat on Long Island instead. But again their plans changed. With their two young children craving the country life they experienced visiting their grandparents, and a work-from-home scenario becoming more feasible with Carrington's new business venture, the Guys, both originally from northern Virginia, decided to plant roots near the hometown of Thomas Jefferson, founding father and self-taught architect. Ryan, now in San Francisco and designing residences and art galleries on both





GROUND-FLOOR PLAN



SECOND-FLOOR PLAN

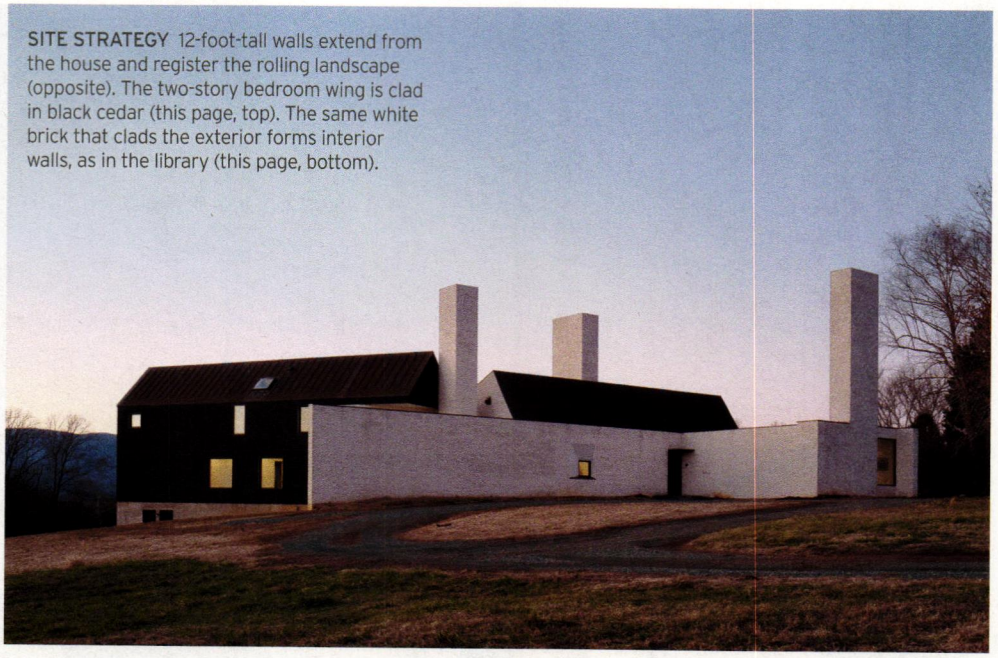
0 20 FT.
6 M.

1 ENTRY HALL
2 DINING
3 KITCHEN
4 LIVING
5 BAR
6 PICTURE GALLERY
7 LIBRARY
8 GUEST BEDROOM
9 BEDROOM
10 PLAYROOM
11 LAUNDRY
12 MUDROOM
13 ARTIST STUDIO
14 OFFICE
15 MASTER BATHROOM
16 MASTER BEDROOM

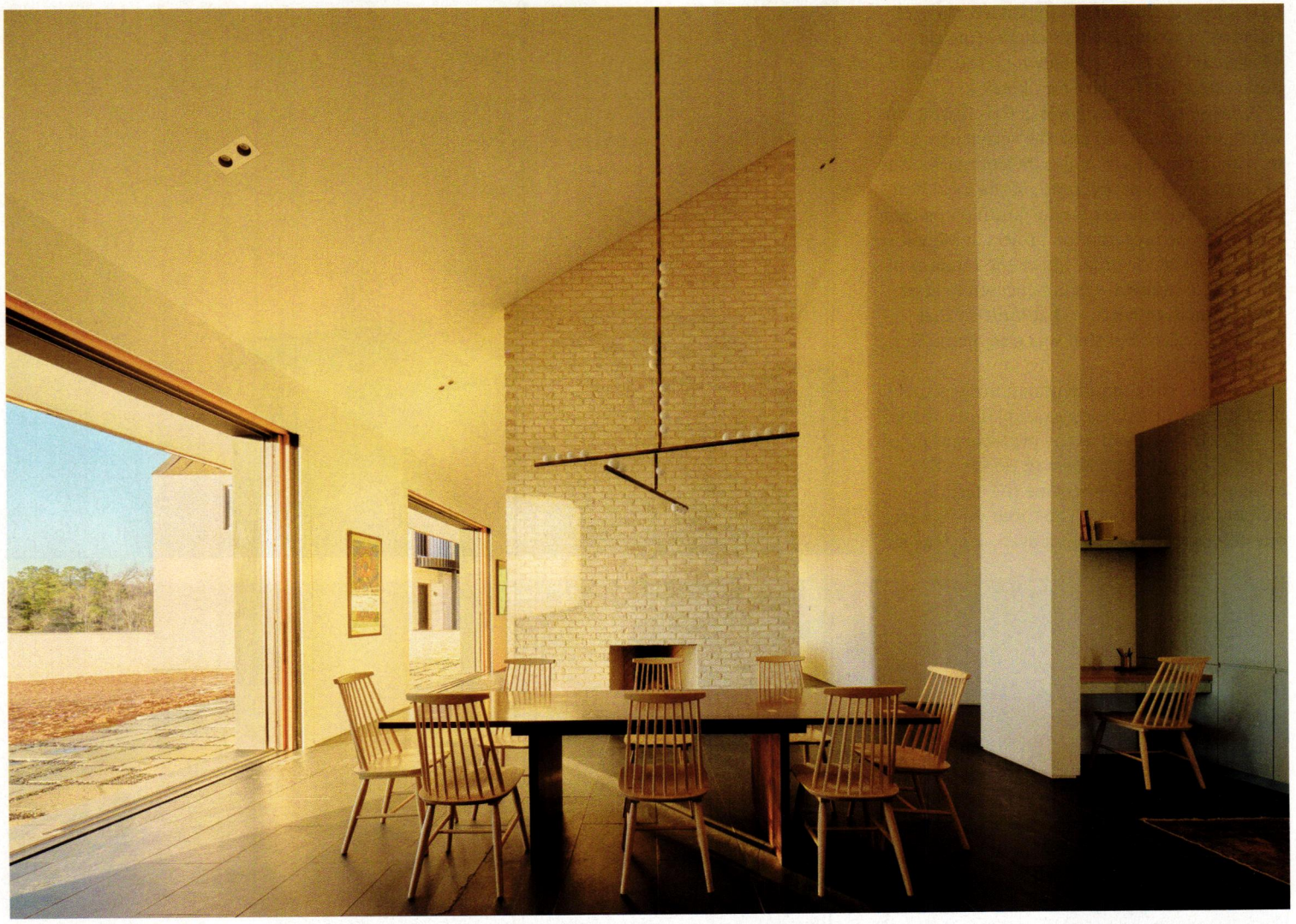
coasts, was thrilled at the expanded scope of the project, and helped his clients find the 45-acre rolling property on which they would build their 5,800-square-foot house.

A native of bordering North Carolina, Ryan was familiar with not just the vernacular architecture of the area, but also its landmarks. The Guys, too, had a strong sense of the local heritage, with both sides of their families engaged in the unique preservation project at Menokin, farther east in Virginia, where the remains of a 1769 manor house are being encased in glass. They wanted a structure that built on that Southern legacy, but that was also distinctly contemporary.

For Ryan, the monumental chimneys that punctuated those lasting examples of colonial architecture—as well as the more recent precedent of Louis Kahn's Korman House (1973) outside Philadelphia—became the defining element of this project. The three shafts here, one of which houses a pizza oven, are exagger-



SITE STRATEGY 12-foot-tall walls extend from the house and register the rolling landscape (opposite). The two-story bedroom wing is clad in black cedar (this page, top). The same white brick that clads the exterior forms interior walls, as in the library (this page, bottom).



COUNTRY LIVING 12-foot by 10-foot apertures in the kitchen (above) and living area can be opened completely to offer connection to the outdoors. A Rumford fireplace is the centerpiece of the living room (left). A view from the east reveals the low slung volume of the library (opposite).

ated in height, each reaching 35 feet and towering over a two-story bedroom wing to the south, a detached guest suite with an artist studio to the north, and a one-story living area in the center.

Inspired in part by Mies van der Rohe's Brick Country House (1923), like another residence in this issue (see page 80), the plan—somewhat U-shaped, with its south wing askew to optimize views of the Shenandoah Mountains to the west—has perpendicular site walls extending past the structure, acting as marks in the landscape. "It is a way to register the rolling terrain," says Ryan. The inner spaces unfold along these trajectories as a series of intimate rooms—all with stunning views of the mountains and nearby horse farms. The grandness of the long, open kitchen, dining, living, and entertaining area, with

a sloping ceiling that soars 23 feet, is itself broken down by one of the three chimneys at its center. Its traditional Rumford fireplace is in use several nights a week during the cold months. In warm months, sliding glass walls as large as 12 feet by 10 feet open completely to connect this most public of spaces to the exterior, where an outdoor dining area and pool are planned.

Like Mies's unbuilt project, Ryan's country house is brick. The standard-size units, white in appearance, were lime coated prior to firing in the kiln for a sometimes coarse, sometimes milky finish. In an application process that took some practice among the masons, mortar joints were left rough and flush to the face of the brick, emphasizing the mass of the surface instead of the individual blocks. Copper roofs—the seams on the lower 4 feet of which were hammered down to create a flat edge—cover the three pitched volumes, whose elegant proportions are similar to those of local barns. "It's essentially the dimension of two cubes topped by a triangle," says Ryan. The black cedar used for many of those barns also clads the bedroom wing, differentiating that more private section from the rest of the house.

Throughout the minimal interiors—the only exceptions are the children's rooms, where walls and furniture are adorned with the colorful doodles of the occupants, encouraged by their artist mother—white-painted walls mingle with brick walls and slate or wood floors. Brick, metal, stone, wood. Says Ryan, "We used everything Jefferson used." Jefferson's own late 18th-century home nearby, Monticello, had a metal-domed roof, radical at the time and difficult to build.

Ryan's house is not radical. Rooted in its place, this impressive structure atop a gently sloping ridge stands out among its distant neighbors in the hills of horse country—its traditional materials, historic references, and familiar forms reconfigured and refreshed in a 21st-century interpretation that, like those earlier precedents, not only stands out, but should stand up to the test of time. ■

credits

ARCHITECT: TW Ryan Architecture – Thomas Ryan, principal

GENERAL CONTRACTOR: Evergreen Builders

CLIENT: Cassie and Carrington Guy

SIZE: 5,800 square feet

COST: withheld

COMPLETION DATE: January 2020

SOURCES

MASONRY: Old Texas Brick

WINDOWS: Loewen

ENTRANCES: Pivot Door Company

LOCKSETS: Ashley Norton, Baldwin, Emtek

SKYLIGHTS: Velux

CUSTOM WOODWORK: Vaneri Studio

PAINTS AND STAINS: Benjamin Moore, Farrow & Ball

INTERIOR LIGHTING: Lindsey Adelman, Lambert & Fils, Allied Maker, RSA

EXTERIOR LIGHTING: B-K Lighting

DIMMERS AND CONTROLS: Lutron, Forbes and Lomax

PLUMBING: Vola, Duravit, Toto, Blanco

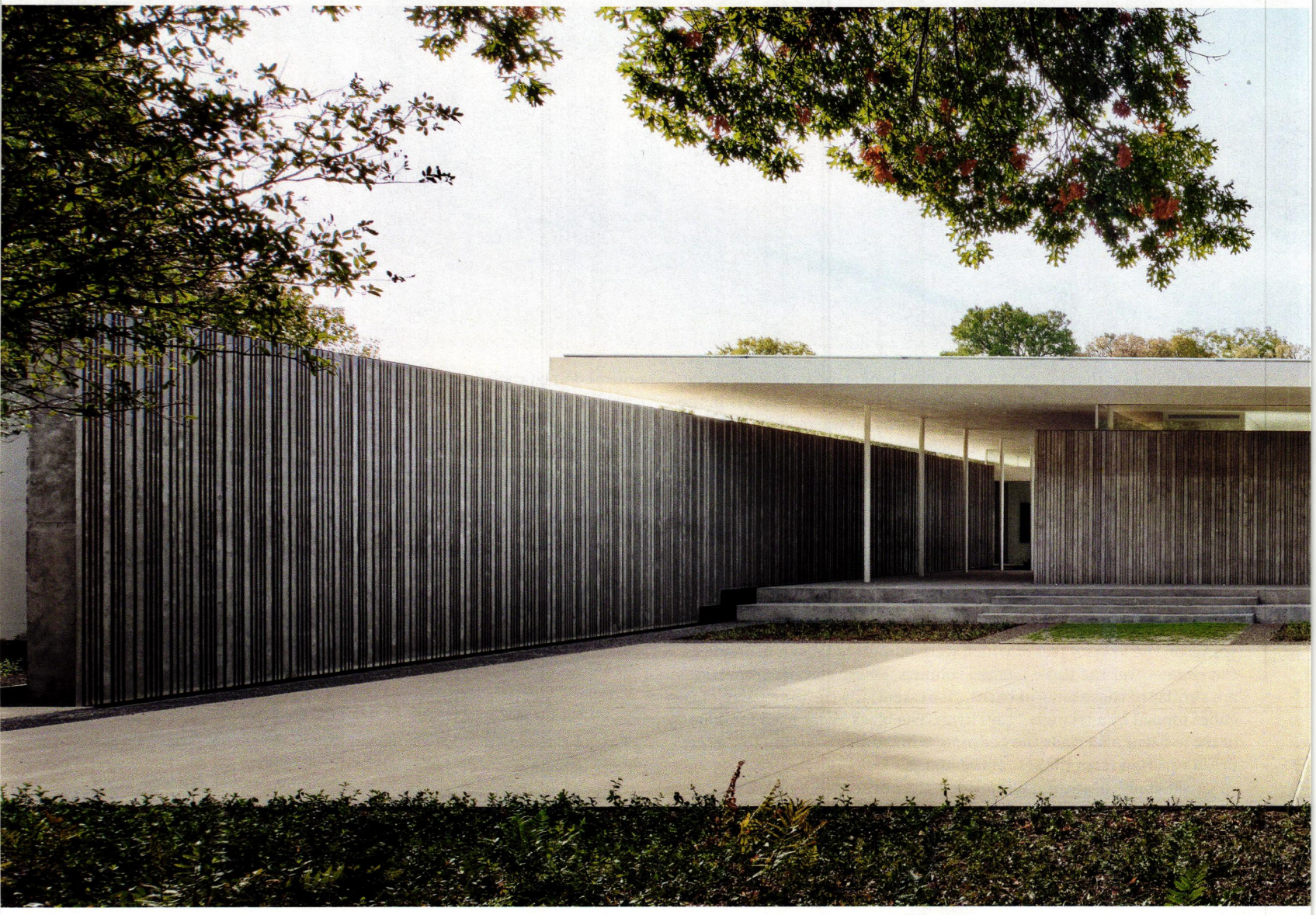
Preston Hollow Residence | Dallas | Specht Architects

Keeping a Low Profile

A minimalist house balances restrained materiality with a composed natural setting.

BY LINDA C. LENTZ

PHOTOGRAPHY BY CASEY DUNN



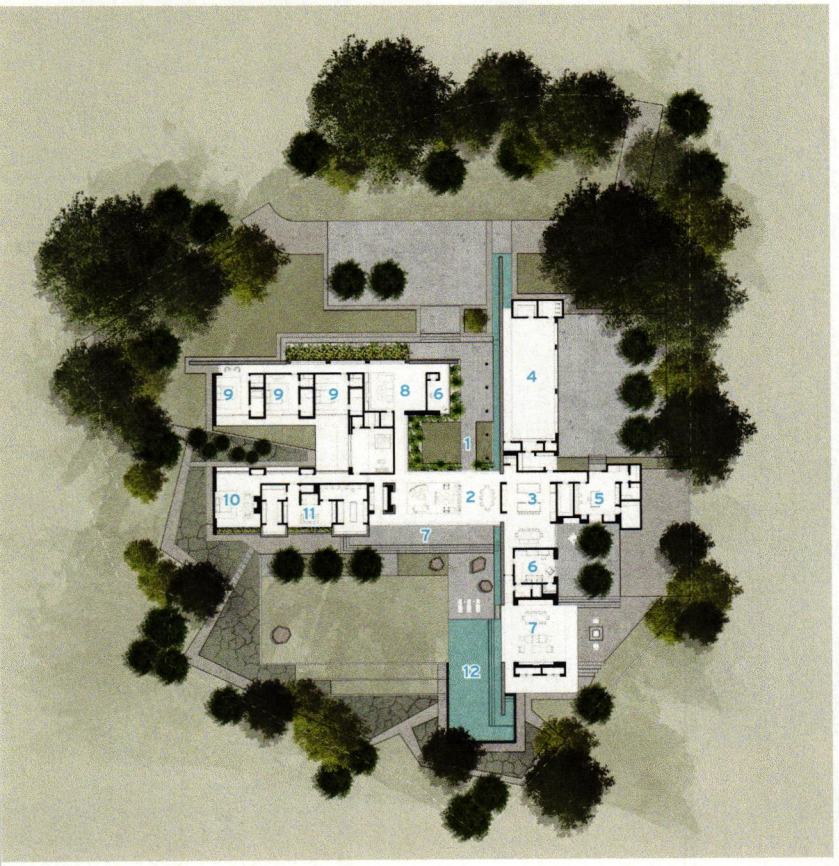
AN OUTLIER in a city associated with vast stretches of flat, sun-drenched plains, the north Dallas neighborhood of Old Preston Hollow, established more than 80 years ago, is a coveted oasis of gently rolling woodlands crisscrossed by creeks and bramble. This, says homeowner Brandie Gehan, an Austin transplant, is what attracted her to the 1½-acre parcel of land here, on which she and her husband would build a new house for their family of four.

The 10,000-square-foot, single-story residence, completed last spring, was designed by New York–and Austin–based Specht Architects to take full advantage of the wedge-shaped site, situated within the curve of a looping road and adjacent to a secluded sculpture park owned by the Nasher family. What's amazing about the location, says firm principal Scott Specht, is, "it's right in the middle of the city, yet you really can't perceive any other houses."

Inspired by the mid-20th century modern houses scattered among the traditional and contemporary architect-designed residences in this upscale community, Specht devised a hybrid concrete structure with steel and wood framing that stretches into the landscape with two intersecting wings, each organized around an 18-inch-thick board-formed wall. These brawny structural forms—corrugated on one side, smooth on the

THE RIGHT ANGLE From the motor court, perpendicular concrete walls seem fortresslike, but a strategic gap reveals a serene entrance (top) with interior and landscape views.

INSIDE OUT Dramatic lighting illuminates the entry, fenestration, and reflecting pool that wraps the spine wall (right); a planted impluvium collects rainwater (bottom); the living room flows into the master suite, where heated travertine floors transition to stained white oak (opposite, top); the dining area opens to a covered terrace and has views through the kitchen (opposite, bottom).



SITE PLAN

0 40 FT. 10 M.

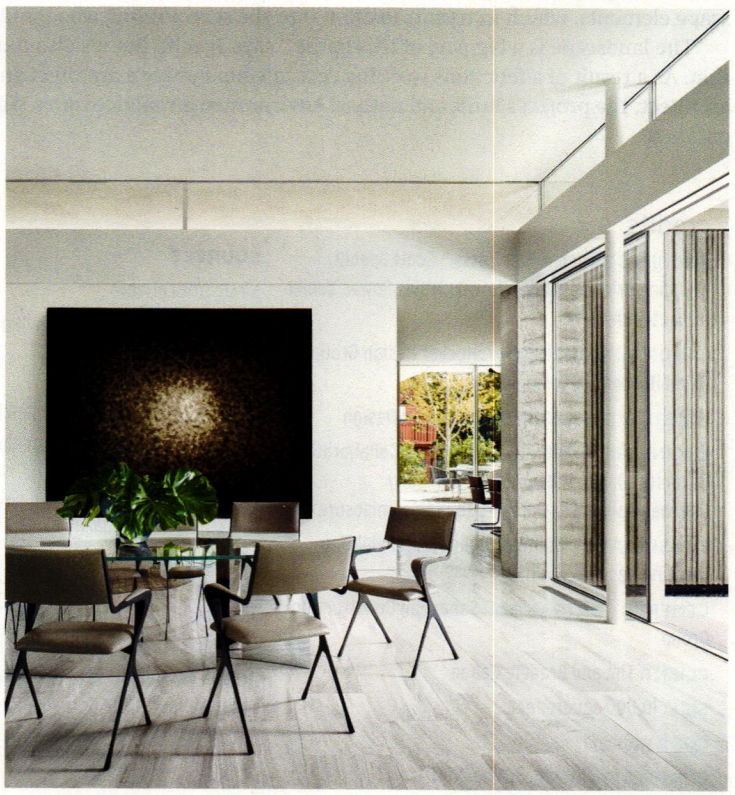
1 ENTRY ATRIUM
2 LIVING/DINING
3 KITCHEN
4 GARAGE
5 SERVICE
6 OFFICE
7 OUTDOOR LIVING
8 MEDIA ROOM
9 BEDROOM
10 MASTER SUITE
11 MASTER BATH
12 POOL

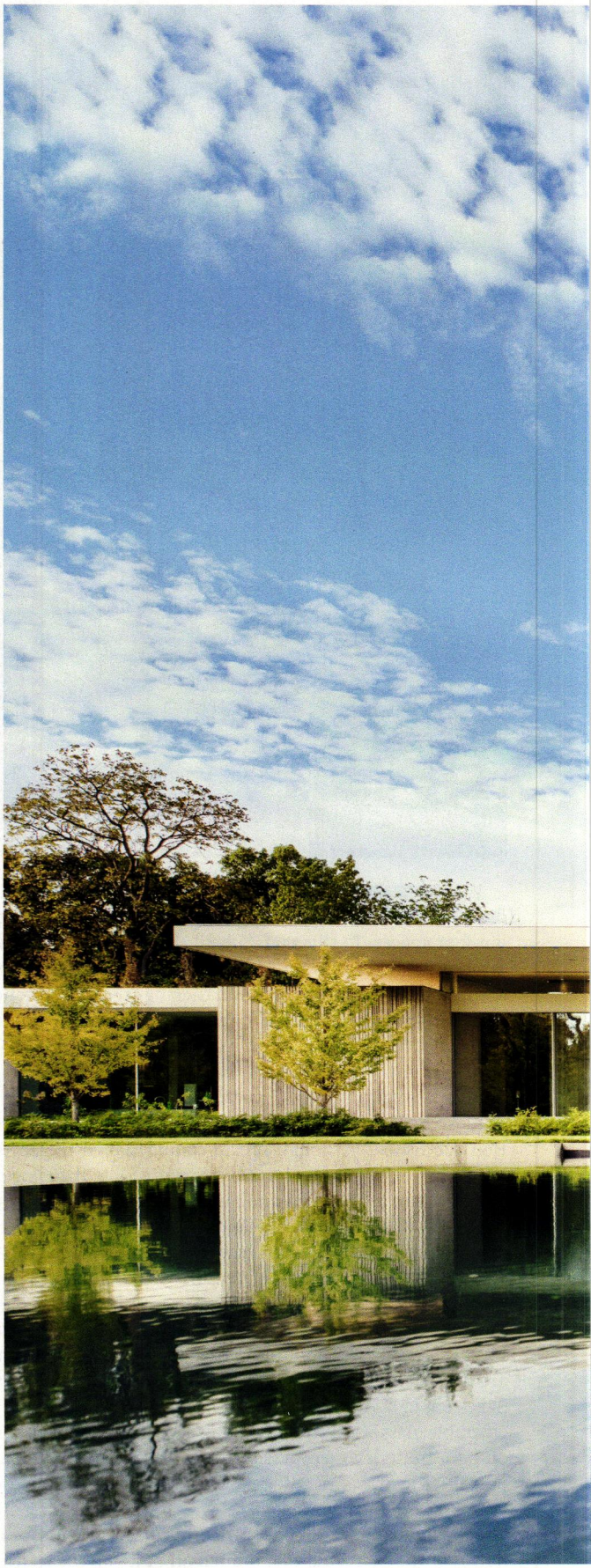
other—were crafted using techniques borrowed from the Brutalist era of the 1960s and '70s, but sanded lightly after curing to achieve a 21st-century sheen. The main one, at 208 feet long, serves as a spine for the home's public zone and runs along its north-south axis surrounded by a narrow band of water that ripples and falls gently at the front of the house, then flows into the swimming pool at the rear. (It reads as one plane but is actually interrupted by the dining room and terrace.) The other, a 122-foot-long span, supports a bedroom wing and runs along the east-west facade, sliced by an eye-level window on a hallway.

Despite the heft of the concrete, the water feature lends the house lightness, as do the use of slender steel columns, continual perimeter clerestories and a roof that seems to float above it all with a calibrated cantilever that mitigates sun penetration throughout the year. In addition, Specht clad much of the exterior in white stucco to offset the rich gray hue of the concrete.

While the Gehans gave the design team creative license, the couple did stipulate that they wanted a fluid interaction between indoor and outdoor spaces. To this end, Specht collaborated closely with landscape architect David Hocker, whose work balanced the rigid geometry of the architecture. At the street, a weathering-steel picket fence Hocker designed provides a refreshing take on a familiar form, and, while somewhat bare during a visit in February, it promises to be interwoven with increasingly lush plantings as the season and years progress, to provide a natural cover of privacy for the house beyond.

In plan, the project evokes Mies van der Rohe's unbuilt Brick Country House (circa 1923), though Specht claims that Frank Lloyd Wright, and to a certain extent Paul Rudolph, were more of an influence on his work here, evident in the mass and texture of the building's concrete, its extending walls, and captured fields of vision. The architect also drew from Classical and Asian design elements to create a broad, shallow stair that steps up to the entrance—an atrium, where a Roman-style impluvium, planted with a Japanese maple, captures rainwater used for irrigation. The house opens here, literally and visually, with fixed glazing that reveals large daylit rooms for living, working, and entertaining. These are washed in a neutral palette that beautifully frames an "event" lawn (large enough for sports and activities) and the landscape beyond. Operable glass walls in most of the rooms enable the desired indoor/outdoor lifestyle and provide natural air movement when the weather permits. The dynamic interior, with decor by Los Angeles–based Magni Kalman Design, flows from a central living and dining area into the west wing, which houses kitchen, office, and service areas, or into one of two halves of the east wing that branch off of it—on the south, the master





REAR VIEWS On the south side, sections of textured cast concrete reappear to support the master-suite elevation (above); the roof cantilevers out over the terrace, calibrated to mitigate sun penetration indoors (right), and the spine wall slices through the infinity swimming pool from the back of the house.

suite and gym; and on the north a media room, children's bedrooms, and guest suite.

Corridors—and even the garage—frame tall, controlled views out to slender strips of water and greenery. "The site itself is almost dead flat, but drops off steeply at the rear," explains Specht. To maximize its potential, Hocker terraced the back of the yard with retaining walls and, in one particularly effective move, worked with the architect to align the pool along the spine wall (instead of across the grass as originally intended), extending it toward the steep gradient with a dramatic infinity edge. This made room for the expansive lawn, flanked by sections of locally sourced sandstone boulders and rocks, that steps down the hill more gently and leads to a gravel-lined path that rings the house, among native plants and an arching bamboo canopy. It's a very manicured and formal design, according to Hocker, with the architecture dissolving into these landscape elements, which in turn transition into the surrounding woodlands.

"The landscape is a big part of this house," says Specht. But it's also much more than that. As a result of a felicitous working relationship between architect and landscape architect, the project's built and natural environments coalesce into a single, holistic entity. ■

credits

ARCHITECT: Specht Architects – Scott Specht, founding principal; Jakeb Novak, Travis Power, senior project architects

LANDSCAPE ARCHITECT: Hocker Design Group – David Hocker, founding partner

INTERIOR DESIGNER: Magni Kalman Design

ENGINEERS: Architectural Engineers Collaboration (structural); E.D. Miller Service Company (mechanical); Acton Partners (building enclosure)

CONSULTANTS: Douglas Architectural Lighting (lighting designer)

GENERAL CONTRACTOR: Sebastian Construction Group

CLIENT: Tim and Brandie Gehan

SIZE: 10,000 square feet

COST: withheld

COMPLETION DATE: Spring 2019

SOURCES

STUCCO: LaHabra

WINDOWS: Panoramah! (sliding glass doors); ItalWindows (fixed)

GLAZING: Guardian

HARDWARE: FSB; Halliday Baillie

TILE & STONE: Porcelanosa; Caesarstone; Stone Source

APPLIANCES: Sub-Zero; Miele; Thermador; Spark Modern Fires (fireplace)

LIGHTING: Specialty Lighting Industries; Indy Lighting; Tech Lighting; Cooper Lighting; Lutron (controls)

RECEPTACLES: Bocci

PLUMBING FIXTURES & FITTINGS: Dornbracht; Grohe; Kohler; Toto; Boffi; Blano; Infinity Drain

Zenteno House | Mexico City | Sebastian Mariscal Studio + Alfonso Frade

Outside In

A family of four enjoys a seamless connection with the outdoors.

BY MIRIAM SITZ

PHOTOGRAPHY BY RAFAEL GAMO

A NEW HOUSE in Mexico City is defined as much by light and shadow as it is by the brick, concrete, and wood that give it form. Architects Sebastian Mariscal and Alfonso Frade designed the four-bedroom, 4,700-square-foot suburban residence for a family of four in Las Águilas, an upscale neighborhood on the southwest side of the city. With generous connections to the outdoors, the dynamic structure presents a private but intriguing face to its surroundings.

The clients—a businessman, a photographer, and their two teenage children—came to Mariscal, a family friend, with programmatic requirements and priorities but an open mind regarding the design. "They were just excited to live in a modern house that was at the same time very warm and pleasant," says Mariscal, a Mexico City native whose practice is now based in Boston. He helped the clients identify the site—an empty sloping lot in a gated community with nearly 90 homes—and pinpoint their priorities: togetherness, intimacy, and comfort. Frade, who previously worked for Mariscal in San Diego, where the architect's practice was formerly based, collaborated with Mariscal on the design, providing local expertise and also acting as general contractor.

A screen of 4-inch-square hollow concrete boxes, each including a pane of glass, make up the house's facade, imparting a sense of privacy despite its porosity. Shocks of bright pink bougainvillea spill over the

SCREENED IN Behind the concrete-box facade, a glazed wall in the living room (above) fully opens to the garden (opposite) and a small deck made of railroad ties.

top edge from planters on a roof terrace. And although the house abuts another residence, it seems to stand alone. "I wanted to create a feeling of mystery about what is within the house," says Mariscal. "You don't see much from the street—how big it is, or even how many stories it is." Anticipation and curiosity build as you approach the deep wood-wrapped entryway—which, at just 7 feet high, is intentionally compressed. It presents a surprising contrast as you step into the double-height foyer where, as the architect puts it, "You begin a journey of discovery."

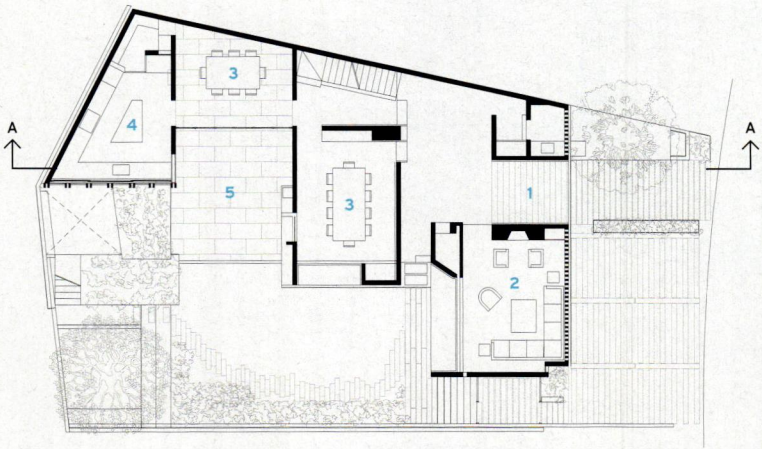
Inside the poured-in-place-concrete structure, the lively complexity of the section begins to come to life. Overhead, a bridge connects the client's home office, placed along the front edge of the residence, with the bedrooms of the second floor and a staircase up to the third and top floor. To the left of the entryway, the living room opens to the back garden via a movable glazed wall. In the afternoon, the square frames of the concrete facade cast a checkerboard of sunlight, above the generous glazing, onto the concrete upper walls of the double-

BRIDGE AND TUNNEL Suspended above the entry vestibule, a concrete bridge (left) connects the home office to the second- and third-floor bedrooms (top, left). A wood balcony overlooking the garden spans the full length of the master bedroom (above).

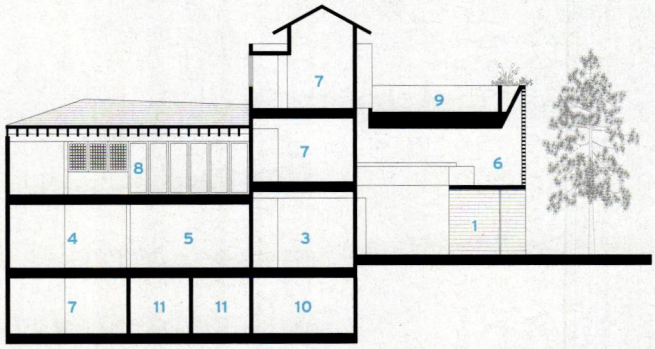
height room. Walking further into the ground level, spaces become increasingly private; you first reach a formal dining room, which also opens to the garden, followed by a daily-use dining area, and finally the kitchen. As the more intimately scaled passageways open up to spacious rooms, varied ceiling heights differentiate each area—a strategy Mariscal employed to break up the volume of the structure, while responding to the sloping topography of the site. "You can get lost inside some larger homes, because the spaces are not contained," he explains. "Here, I wanted you to flow through the house, and be hugged by it in a different way from one place to the next." Slight changes in floor elevation, such as the three steps you descend from the entry hall to the dining room, also heighten the awareness of traveling through different zones.

From the back garden, the home appears almost as a cluster of volumes, each with their own character: the double-height street-facing living room, topped by a garden overlooking the roof terrace; a three-story tower, housing the children's upper-floor bedrooms beneath a gabled roof that bears a photovoltaic array connected to the municipal grid; and a two-story volume at the back, where a wooden screen encloses the second-floor balcony of the master suite. Throughout, generous windows allow for easy access to enjoy Mexico City's mild climate, while the clever and unexpected placement of skylights and other glazed openings pulls daylight deep into the interiors.

Despite the focus on differentiating spaces, a limited material palette unifies the house, providing continuity and rooting it firmly in its context. "It celebrates Mexican craftsmanship in every corner," says Mariscal. At its base, masonry clads the concrete structure—a locally produced red brick, painstakingly coated with a mixture of sand, mortar, and white cement. "The artisanal finish had to be done by just one person to look consistent," explains Frade.



GROUND-FLOOR PLAN



SECTION A - A

0 10 FT.
3 M.

1 ENTRY
2 LIVING ROOM
3 DINING ROOM
4 KITCHEN
5 PATIO
6 OFFICE
7 BEDROOM
8 MASTER SUITE
9 ROOF TERRACE
10 STORAGE
11 MECHANICALS

BIRD'S-EYE VIEW The top bedroom of the central three-story tower (above) looks out at an olive tree, planted in an elevated bed, and opens to the roof terrace. A skylight and second-floor patio (opposite) pull natural light into the entryway, which connects to the backyard.

Between the gleaming warmth of tzalam wood, the diffuse brightness of the treated brick, and the pleasing roughness of the board-formed concrete, the house offers a study in contrasting textures. Add to these the constant, subtle changes in light and shadow, and the quality of light within the residence, which oscillates between luminous, dramatic, and moody, depending on time of day.

The architects designed the landscape, which extends beyond the ground-level garden to lush elevated planters on the second and third stories of the house, with the cascading bougainvillea as well as vinca, and even an olive tree. "Vegetation softens the building and creates a dialogue, a dance between construction materials and organics," says Mariscal. A rainwater catchment and filtration system provides water for the landscaping.

The house has no mechanical cooling system, but instead depends on its plentiful openings for cross ventilation and thick walls for insulation. Even during Mexico City's rainy summer months, windows and doors can remain open, thanks to deep thresholds that shelter the interiors. Year round, Casa Zenteno invites occupants to truly live in the landscape of their suburban oasis. ■

credits

ARCHITECTS: Sebastian Mariscal Studio – Sebastian Mariscal, principal; Alfonso Frade, architect, general contractor

ENGINEER: Oscar Trejo (structural)

CONSULTANTS: Catalino de la Cruz (masonry); In Light (lighting); Sergio Ruiz, Hugo Maldonado (m/e/p); Oscar Ramirez (ff&e/logistics manager); Fernando Perez Badillo (construction superintendent)

SIZE: 4,700 square feet

COST: withheld

COMPLETION DATE: May 2019

SOURCES

PRECAST CONCRETE: Grupo Joben

WINDOWS & GLAZING: Instal

DOORS: Nauman

CABINETS: Decoración Comercial

FURNISHINGS: La Metropolitana, Oscar Hagerman

LIGHTING: Birot, David Pompa, Osram, Tecnolite, Magg

PLUMBING: Moen

PHOTOVOLTAIC SYSTEM: Go Solar

INDOOR PLANTS: Diseño Botánico

High Desert Retreat | Santa Rosa Mountains, California | Aidlin Darling Design

A Rock and a Soft Place

A getaway high above the Coachella Valley takes advantage of its site's unusual topography.

BY JOANN GONCHAR, FAIA

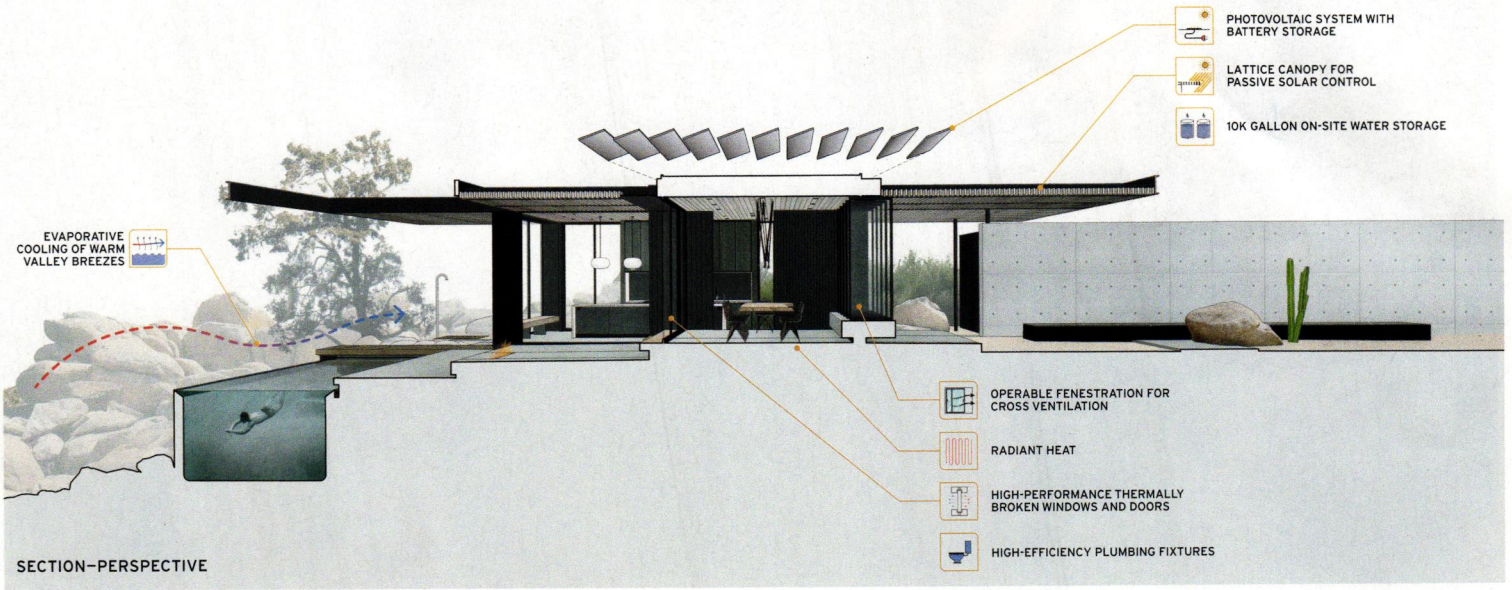
THE HOUR-LONG drive from Palm Springs, California—which includes winding roads into the Santa Rosa Mountains, with dramatic views around every turn—provides some foreshadowing of what visitors will find at High Desert Retreat, the latest house by San Francisco architects Aidlin Darling. But on arrival, when you pass through the property's gate and head down the long driveway, these expectations are defied, at least initially. What you first encounter is a pair of mute perpendicular poured-in-place concrete walls. A volume clad in charcoal-black wood and an overhanging flat roof peek out from behind them, providing a hint of habitation, while a small water feature and glazed void signal the entrance. But there is no spectacular vista.

It's not until you step inside that you are rewarded with the prize: just beyond the entryway (which doubles as the dining room), a terrace, and an infinity swimming pool, the land appears to fall away, revealing a jaw-dropping panorama of the Coachella Valley basin 4,500 feet below, and of the mountain ranges that define it. The 3,100-square-foot weekend retreat was conceived not only to highlight this far-off landscape but also to take advantage of the distinct natural features of the immediate surroundings—namely, boulders that seem to have been artfully strewn (if a bit precariously balanced) on the three-acre lot by some divine being. The programmatic spaces, including the dining area, kitchen, living room, master suite, and two-bedroom guest pavilion, have been arranged around these rock formations or, as Joshua Darling, Aidlin Darling principal, says, "nested" among them. Floor-to-ceiling windows—some of which form the walls of entire rooms, some of which are slotlike apertures—are just inches away from these geologic compositions.

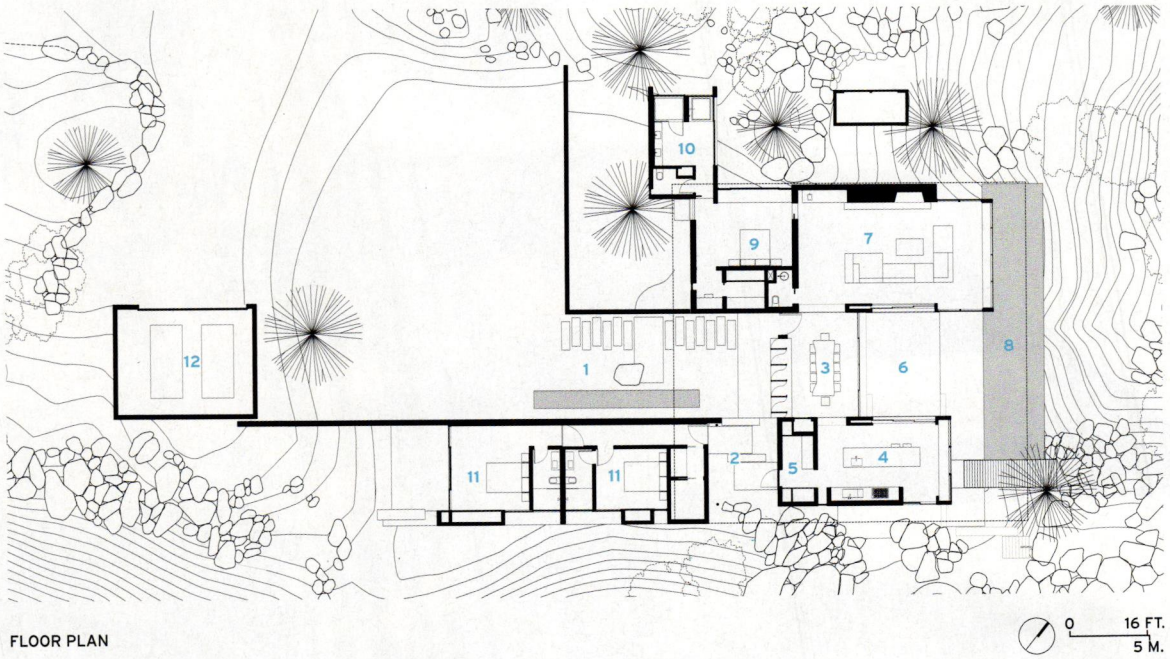
Designing with the rocks, as well as preservation of the site's old-growth pinyons (a type of desert pine), were directives from the clients—a biotech executive and a literary agent based in San Francisco.

CLIFF DWELLER Visitors to High Desert Retreat are greeted by a pair of poured-in-place concrete walls (opposite). The house's living spaces have been carefully planned around the site's naturally occurring rock formations (this page).

PHOTOGRAPHY: © ADAM ROUSE; JOE FLETCHER (OPPOSITE)



SECTION–PERSPECTIVE



FLOOR PLAN

They reached out to Aidlin Darling after visiting the firm's Windhover Contemplative Center at Stanford University, an amalgam of a spiritual retreat and art gallery enclosed within a modernist composition of rammed earth and glass and set within a grove of oak trees (RECORD, February 2015). The couple fell in love with the project and the way it incorporated nature.

For this residential project, the firm deployed various strategies to merge the desert and the architecture. The house, an assemblage of single-story wood-and-steel-framed rectangular volumes, defines a series of outdoor spaces. Most of these elements—both open-air and enclosed—are sheltered under a single overhanging roof. While the plane overhead remains constant (door openings have been designed without headers, so that nothing interrupts this horizontal datum), the ground plane steps subtly down by one or two risers, following the topography, making some areas—the kitchen, the living room, the adjacent terrace—taller than the others. With help from the generous full-height glazing, this approach invites the landscape in, and "embraces" nature, says Darling.

Other decisions also help blur the boundary between inside and out, such as the continuation of the interior materials on the exterior. The smooth concrete that serves as the finished floor almost everywhere within the house is also used outside for patios and walkways. The ceiling, of vertical-grain fir boards, extends as an outdoor soffit. A lattice canopy at the same elevation appears to be the identical species, but is pine specially treated to withstand the harsh desert climate. The siding—also of treated pine, but burnt, wire-brushed, and stained to resemble Japanese *shou sugi ban*—covers the walls indoors and out. In combination with a few hand-plastered walls, sleek walnut millwork, and leather-cushioned built-in seating, the tactile dark wood walls create an atmosphere of rustic sophistication.

The connection between the outside and the inside is more than merely formal or aesthetic. The house can literally open itself up to the landscape, since many of the window walls either pivot or slide, allowing the clients to take advantage of evaporative cooling from the

VIEW FINDER
While the master bedroom and bath (above) look out onto one of the property's unusual boulder compositions, the living room (right) has dramatic views over the Coachella Valley.

PHOTOGRAPHY: © ADAM ROUSE (TOP); JOE FLETCHER (BOTTOM)

OPEN AND SHUT The house embraces its site with sliding and pivoting glass doors that open the dining room to the entry courtyard (above) and the kitchen to the pool terrace (top). The master bedroom (opposite) includes warm touches such as oak floors and a walnut built-in with leather cushions.

swimming pool and a microclimate that is consistently 15 or 20 degrees cooler than that of the valley floor, regardless of the season or time of day. There is also radiant heating for those occasional chilly winter days, and a conventional forced-air cooling system, since summer temperatures can easily reach the upper 90s. The 15-kilowatt rooftop photovoltaic array has been designed to meet at least 75 percent of the electricity demand.

The clients moved in last June, before the house was completely finished, and have spent about 10 days of every month here since. They describe it as peaceful and calm, with Zenlike aspects that are gradually revealing themselves over time. They talk about the morning sun raking across the impressive rock formation that sits right outside the bedroom window, the reflections from the pool that shimmer on the living room ceiling, and how tarantulas are attracted to the exterior cladding. "They are quite elegant and benign," the couple insist. Fortunately, this observer did not encounter any arachnids during a recent visit. But I did see the mountain ridges, framed by the kitchen window, begin to turn from brown to purple in the late-afternoon light. Experiencing the changing landscape from this smartly designed perch made it easy to understand why the owners are often reluctant to return to their everyday lives at the end of a long weekend. As they say, "It is a difficult house to leave." ■

credits

ARCHITECT: Aidlin Darling Design – Joshua Aidlin, partner in charge; Adam Rouse, project architect; Ben Damron, Sarah Kia, project team

CONSULTANTS: Strandberg Engineering (structural); Monterey Energy Group (mechanical); Sladden Engineering (geotechnical); Feiro Engineering (civil); Custom Controls (low-voltage systems)

GENERAL CONTRACTOR: D.W. Johnston Construction

SIZE: 3,100 square feet

COST: withheld

COMPLETION DATE: November 2019

SOURCES

SIDING: reSawn Timber/Accoya

GLAZED WINDOWS AND DOORS: Monumental Windows and Doors

MOISTURE BARRIER: Tyvek

ROOFING: Carlisle SynTec Systems

PRECAST CONCRETE: Custom Crete Werks

MILLWORK: Henrybuilt

LIGHTING AND CONTROLS: Vibia, No. Eight Lighting, Meljac, B-K Lighting, Lutron

PHOTOGRAPHY: © JOE FLETCHER

Rio House | Rio de Janeiro | Olson Kundig

Cloud Forest

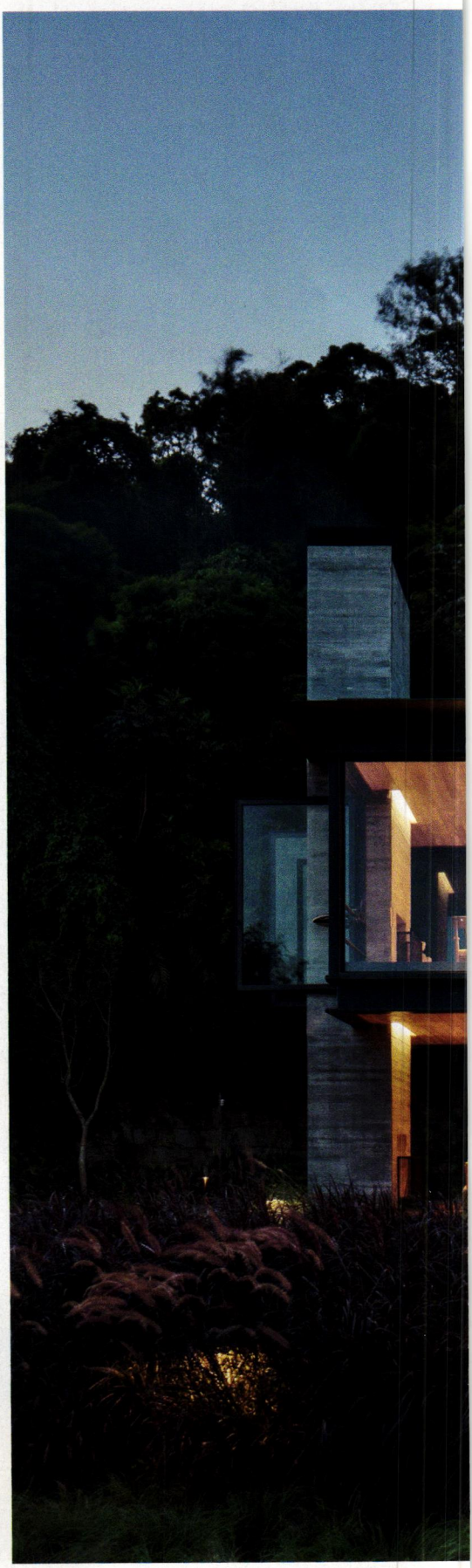
An intimate dwelling offers views of the Brazilian jungle.

BY TOM HENNIGAN

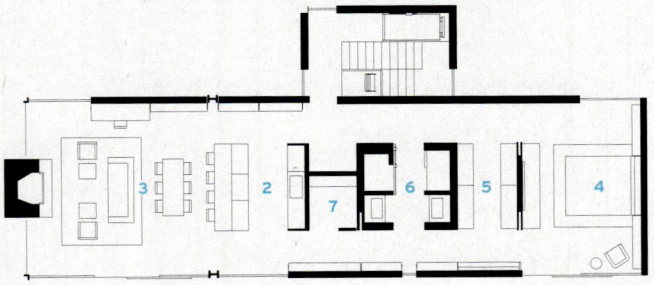
PHOTOGRAPHY BY MAÍRA ACAYABA

"I'VE ALWAYS been that kid who would rather be outside than inside," Tom Kundig says. This explains why the Seattle-based architect of the firm Olson Kundig—an avid mountain climber—was so excited by his first commission in Brazil. His clients, a couple, wanted an intimate home, as small as possible for themselves and their dogs to enjoy a spectacular property high in the mountains of the Tijuca rainforest near Rio de Janeiro. "These clients would rather be outside, and I felt a real kinship with that agenda," says Kundig.

To enhance the dialogue between the building and its setting, the architect decided to elevate the structure. The rectangular steel-and-glass volume, just 1,500 square feet in size, is lifted above the ground and supported on two poured-in-place board-formed concrete piers (one of which contains the fireplace at the house's south end; the other, at the center of the plan, accommodates the bathrooms and storage). The concrete, seen often in Brazilian architecture, also is used to enclose the elevator and a steel and wood

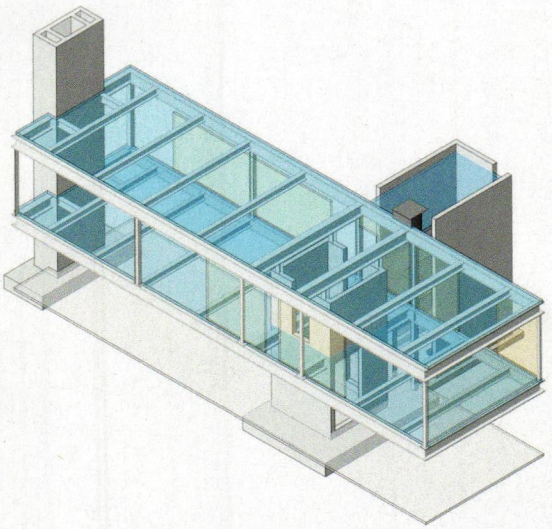


UP IN THE AIR Complete with a rooftop solar water-heating system, the elevated building (this page) is supported by poured-in-place concrete piers at the center and on the south end of the house, while board-formed concrete encloses the elevator and staircase (left) on its west side.

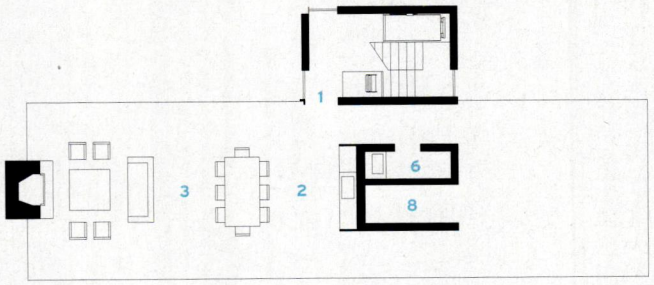


UPPER-LEVEL PLAN

0 16 FT. 5 M.

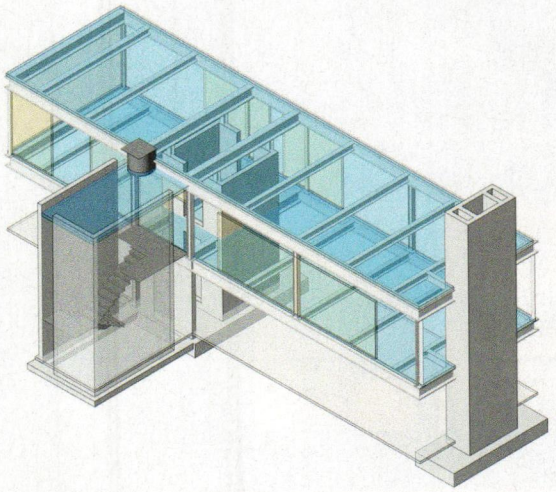


AXONOMETRIC, LOOKING NORTHWEST



LOWER-LEVEL PLAN

0 16 FT. 5 M.



AXONOMETRIC, LOOKING SOUTHEAST

1 ENTRANCE
2 KITCHEN
3 LIVING/DINING
4 BEDROOM
5 DRESSING ROOM
6 BATHROOM
7 STORAGE
8 MECHANICALS

credits

ARCHITECT: Olson Kundig – Tom Kundig, design principal; Edward Lalonde, project manager/project architect; Fergus Knox, architectural staff; Phil Turner, special design elements

ENGINEERS: MCE Structural Consultants, Mauro Jorge (structural); WSP, GreenWatt (m/e/p)

CONSULTANTS: Isabel Duprat Landscape Architecture; O-Lighting Design; Front (facade); Eleve (steelwork); 12th Avenue Iron (custom fabrication)

GENERAL CONTRACTOR: Construtora São Bento

PROJECT MANAGER/OWNER'S REPRESENTATIVE: Jose Luiz Canal

CLIENT: João Moreira Salles and Branca Vianna Salles

SIZE: 1,500 square feet

COST: withheld

COMPLETION DATE: August 2018

SOURCES

GLASS: Ornilux

HARDWARE: Tom Kundig Collection, KB Architectural Services with Phil Turner

LIGHTING: Lutron, Lightworks by Airton José Pimenta, Tom Kundig Collection

PLUMBING: Deca

AROUND THE HEARTH A chimney, located within the structural pier at the south end of the house, serves two fireplaces: one in the living room of the upper story (opposite, top) and another on the ground-level screened porch (opposite, bottom).

staircase protruding from the west elevation.

The steel framework, which includes perimeter beams extending the length of the house, supplemented by cross beams and columns, forms a linear box that emerges like a promontory from the steep hillside at the rear of the three-acre property. Because of the forest's humidity, the architects selected a corrosion-resistant marine-grade stainless steel as the main material. Little used in Brazilian residences, it is strong and light enough to foster a sense of elegant simplicity.

Extensive glazing (with bird-protection glass) means that a spectacular setting is present wherever you are in the house. On the west is a jungle canopy; on the east, the glass window-walls frame stunning vistas of the Tijuca National Park. Standing there, you have the feeling of floating in the park's lush splendor. The large panels are retractable in some cases, or can manually pivot in others. Breezes flow through

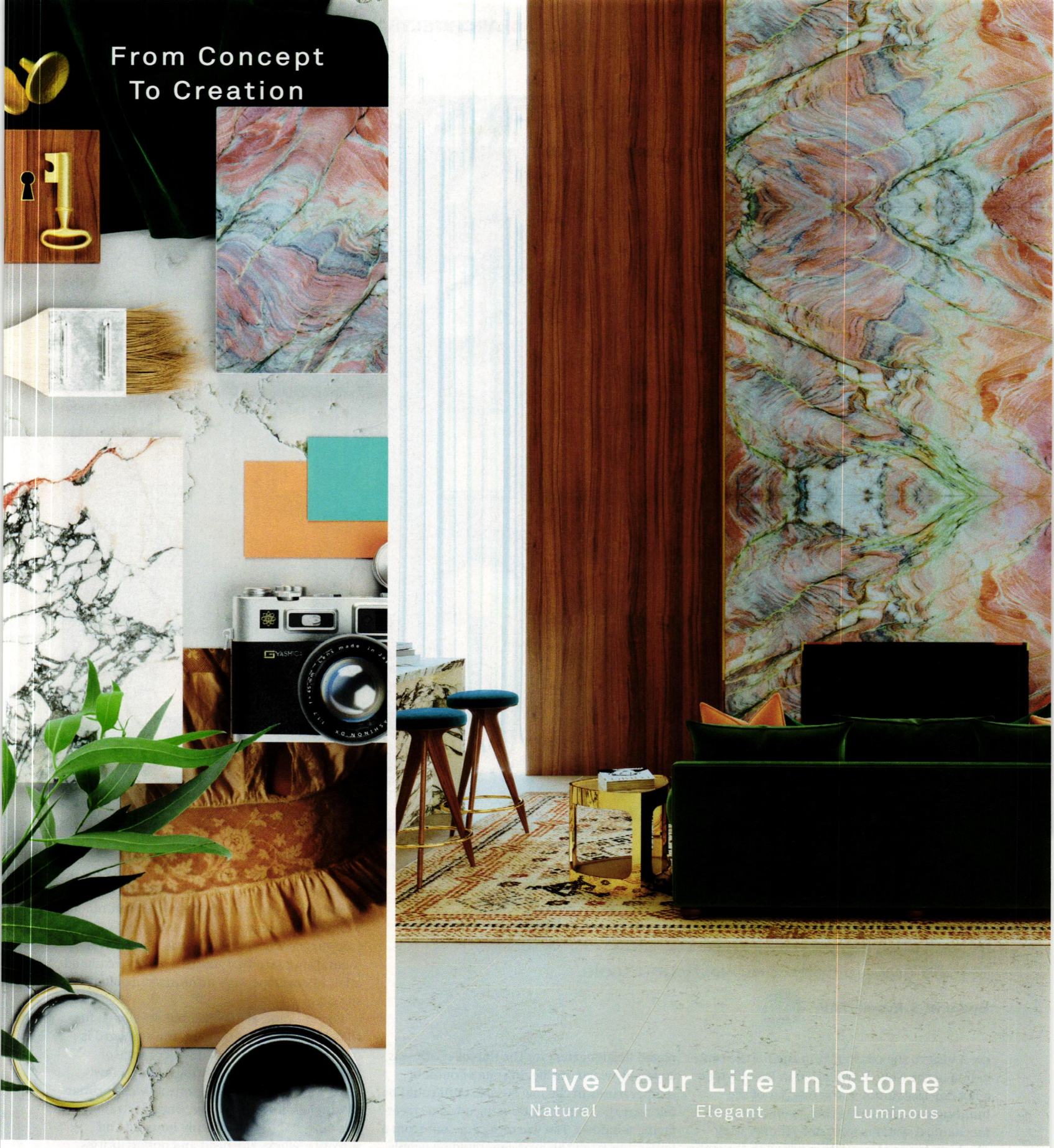
NURTURED BY NATURE Open to the landscape, the ground-level living and dining area (below) connects with the main level via an enclosed staircase and elevator (left).

the house, and hot air is siphoned off by a roof hatch on the stair block. "By lifting the structure, you are actually pulling it away from some of the insects and humidity," notes Kundig. "We are picking up on traditions of our ancestors."

On the main level, the architect placed the single bedroom on the north, closest to the hillside. At the opposite end is the living/dining area, oriented toward the fireplace, where the room's glazed corners open up views of the landscaped garden and the Atlantic Ocean. Because corridors run the length of the house along both the north and south edges, you can stand in the bedroom and see the ocean to the south.

Below the main level is a generous covered patio with its own kitchen that creates a well-proportioned outdoor living area. A vermelhão-stained concrete covers the patio's floor, whose deep red color recalls Brazil's iron-oxide-rich soil. Another local touch is the warm Brazilwood appearing on the patio's ceiling, as well as on the walls, ceilings, and shelves of the main level. In typical Brazilian fashion, many interior walls are terra-cotta block with a plaster finish. With this mixing of local and foreign elements, Kundig has created a home that sits very lightly on its land, fulfilling his clients' desire for an intimate living space from which to enjoy the magnificent natural setting. ■

Tom Hennigan is the South America correspondent for The Irish Times, *based in São Paulo.*



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Coming of Age

Projects relying on a stringent standard imported from Europe grow in both complexity and scale.

By James S. Russell, FAIA CEU

ON A visit to the construction site for the renovation of the NoVo Foundation in Brooklyn on a hot day last summer, the interior of the building was pleasantly cool, even though the mechanical systems were not yet operating. The high levels of insulation added to the walls enclosing the 1920s concrete-framed structure had kept the heat out.

On a return visit in February, the now-completed headquarters for the not-for-profit was agreeably warm inside, in spite of outdoor temperatures in the low 30s. No chill could be felt near the monumental triple-glazed street-facing windows. The warmth came not from a boiler, but from the heat generated by people, lights, and appliances. It was harvested from the ventilation exhaust and redistributed.

NoVo supports the well-being of girls and women worldwide, and its low-energy, 25,000-square-foot new home supports its future-focused mission. The headquarters, a former YMCA training center, has been renovated to consume very little energy in compliance with Passive House, the environmental standard that unites a highly insulated airtight envelope with minimized mechanical systems.

Born in central Europe, and developed for that relatively mild climate, the standard is now adapted to the much wider range of American regional conditions. Only a few years ago, Passive House projects were primarily single-family dwellings, but the strategy has moved into multifamily housing and retrofits, where the need and opportunities are great. The examples that follow—a 709-unit apartment complex in the Bronx, a 20,000-square-foot mixed-use development in

Ryall Porter Sheridan renovated a former YMCA training center for the NoVo Foundation, a Brooklyn-based nonprofit. Bringing the building up to Passive House standards involved replacement of deteriorated facebrick and creating a new high-performance envelope (opposite). Much of the original cast-in-place structure has been left exposed on the interior (right).

Boston, and NoVo—demonstrate how Passive House can be applied to larger, more complex building types, and how it can be used in the Northeast United States, with its challenging combination of cold winters and warm, humid summers.

There are two Passive House–certifying organizations in the U.S. The Passive House Institute (PHI), based in New York, closely emulates its sister institute in Darmstadt, Germany. The Passive House Institute US (PHIUS), based in Chicago, meanwhile, has a somewhat separate standard, though both follow similar principles, and certification entails many of the same exacting construction practices.

To achieve Passive House's airtight-envelope requirement, both standards stress the importance of continuous enhanced insulation. This means that every thermal bridge (any element that can conduct heat through the building envelope) is eliminated or wrapped by an insulating layer. A concrete slab can't penetrate the envelope as an exterior balcony without a thermal break, for example. Even small voids around windows must be sealed. Most assemblies demand a waterproof barrier to keep water and air out, as in conventional construction, and another air barrier behind interior finishes. The practice eliminates air flow across the wall or roof section, yet permits vapor flow out of the assembly, preventing condensation and rust or mold from forming within the wall system.

Passive House buildings tend to have a higher proportion of wall to windows than conventional construction. Those windows, as well as glass doors, are generally specified with exceptionally low U-values (a measurement of heat transfer), achieved in cold climates with triple glazing and thermally robust frames and seals. Operable windows allow natural ventilation when conditions permit, further lowering the demand for mechanical tempering.

Building orientation that optimizes daylight for minimal use of electric lights, as well as limiting summer heat gain and harvesting solar warmth in winter, are essential to meet Passive House requirements.

Similarly, internal loads from equipment, appliances, lighting, and mechanical heating and cooling must be lowered. An energy-recovery ventilator (ERV) recycles the warm or cool exhaust air. Projects often use variable refrigerant flow (VRF) units or small, high-efficiency, air-source heat pumps called mini-splits. Both convey heating and cooling via refrigerants rather than using air or water.

These tactics, taken together, shrink the required capacity of heating and cooling systems by as much as 90 percent. Overall, the standard aggressively reduces energy use, by as much as 75 percent when compared to conventional building stock. If adopted widely, Passive House could become an important tool in reducing carbon emissions and combating global warming. And, because interior temperatures are relatively stable, Passive House structures are likely to remain habitable for days and even weeks in the event of a grid failure.

In addition to resilience and savings (especially important to affordable-housing developers), Passive House designs are unusually comfortable and quiet, with their thick insulation and much-lowered noise from mechanicals. Air quality is excellent (only code-minimum 100 percent fresh air is moved through spaces), with drafts eliminated be-

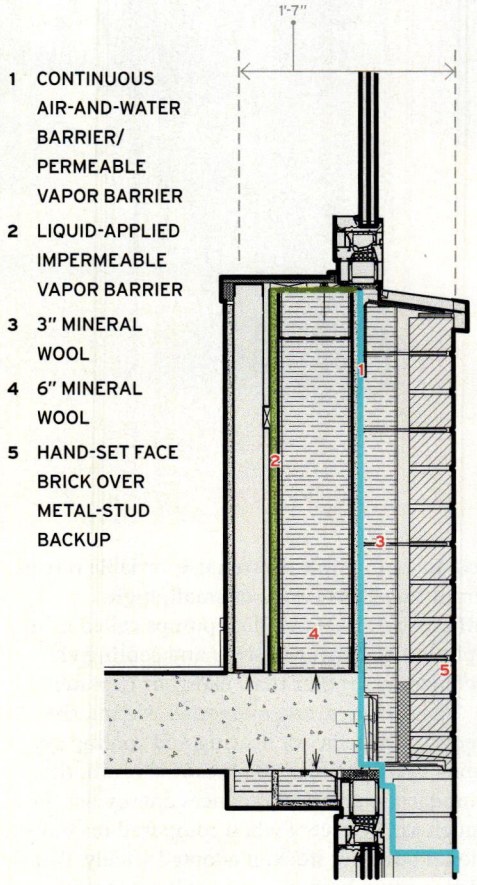
PHOTOGRAPHY: COURTESY RYALL PORTER SHERIDAN ARCHITECTS

Sendero Verde, a three-building mixed-use complex rising in New York's East Harlem, aspires to be a model of low-energy housing. Its tallest structure, a 37-story apartment building (foreground, far left), is expected to be the largest multifamily Passive House project in the world.

cause of the high-performance windows and scrupulously detailed sealing of joints.

The three following projects are achieving Passive House standards in a variety of ways. **NoVo**, as a retrofit, faced unique challenges. Tapping the expertise of consultants that included Zero Energy Design, ADS Engineers, and the Levy Partnership, architects Ryall Porter Sheridan (now Ryall Sheridan) designed the headquarters to comply with the EnerPHit Passive House Institute standard, which recognizes the obstacles encountered in upgrading existing buildings. The maximums for heating- and cooling-energy consumption and air infiltration are set higher for such projects than for new Passive House construction.

One challenging aspect of the project was the deteriorated condition of the existing exterior walls. The team was forced to strip them to the cast-in-place concrete structure, including removal of the face brick and decorative facade elements. While the west elevation that opens to a narrow courtyard was refaced with an exterior insulation and finish system (EIFS), using expanded polystyrene insulation (and now painted with a spectacular mural by Katie Yamasaki), the street-facing side was more challenging. An all-new brick facade with decorative elements reproduced in cast stone was designed, but because of its proximity to the property line, most of the insulation had to be applied to the inside of the concrete



SENDERO A – WALL SECTION

envelope. Beams intersecting with exterior walls were coated with a nanogel product that controls condensation, since the beams could not be cut to accommodate a thermal break.

A thick layer of cellulose (a renewable paper-based insulation) was blown into a cavity framed inboard of the concrete walls and sheathed with an air barrier that allows migration of moisture out of the wall. A special metal batten holds the air barrier and finishes to the studs without the use of fasteners that would penetrate the membrane. Outlets and other penetrations were minimized so that each could be protected by a box impervious to the passage of air. The building has a target energy use intensity, or EUI (a measure of BTUs consumed per square foot per year) of 24.1. By contrast, the EUI of New York's existing building stock exceeds 200.

The main floor is devoted to several meeting rooms that can be united as needed, while the fourth floor, which opens to a roof terrace, accommodates receptions. (Semi-private offices are on the floors between.) Because the assembly spaces sometimes will be occupied by large numbers of people, the rooftop ERV and a cooling tower that feeds heat pumps must manage widely varying loads, yet these loads are much less than in a conventional building because exterior temperature swings barely impinge. Occupants appreciate the acoustical isolation, too, which banishes the shouts of children outside an adjacent school and the sirens of a nearby fire station.

Neither the contractor nor subcontractors had previously built to Passive House standards. Although the workers received training, at first they struggled to meet the exacting requirements. The taping of membrane edges and intersections to achieve absolute airtightness "is not high skill," says Ted Sheridan, a Ryall Sheridan partner. "It just requires conscientiousness." Passive House certification is pending.

On a vastly different scale is **Sendero Verde**, a three-building 752,000-square-foot complex rising in East Harlem that aspires to be a model of low-energy housing. Its tallest structure is Sendero "A," a 37-story, 348-apartment tower that is expected to be the largest multifamily Passive House building in the world when complete in 2022. The design, by Handel Architects, with Steven Winter Associates as the Passive House consultant, incorporates a rich menu of educational, recreational, and social-services spaces.

IMAGES: COURTESY HANDEL ARCHITECTS

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ARCHITECTURAL RECORD

Boston-area firms Placetailor and Generate are combining Passive House strategies with the carbon-storage capacity of mass timber to create a 14-unit apartment building (left) for the city's Roxbury neighborhood. The building will include co-working space on the ground floor (bottom).

The challenges of Passive House were multiplied by the variety of exterior wall types deployed by the developers (Jonathan Rose Companies and L+M Development Partners) for each of the complex's three buildings. The two shorter structures use different combinations of EIFS, concrete block, and metal studs. The tallest building, meanwhile, is clad in brick over a metal stud backup. The assembly's external mineral wool insulation passes outside the edges of the floor slab to avoid a thermal bridge. Additional mineral wool is used in an interior stud wall with both insulation layers coordinated to ensure a continuous thermal and air barrier at the window frame. The wall assembly has thermal resistance of R-20, about double a well-performing conventional wall.

The interior side of the tower's wall assembly includes a "service cavity" so that conduit and electrical outlets are accommodated inboard of the insulation and vapor barrier. Otherwise, each wall penetration would have to be painstakingly wrapped to prevent air infiltration. Mechanically, the building combines heat-recovery ventilation with VRF condensers linked to air-handling units in each apartment. The project is designed to an EUI of 38.1, compared with the current New York multifamily median of 130.

Marrying the emerging technology of cross-laminated timber (CLT) with the Passive House standard will multiply the climate benefits of **201 Hamden**, a 14-unit, five-story apartment building and co-working space slated to start construction this summer in Boston's Roxbury neighborhood. Developed by the local design-build firm Placetailor, the project deploys Passive House tactics to reduce operating energy and emissions, while the wood stores carbon, avoiding the significant embodied emissions that would have been generated by steel or concrete construction.

The project's CLT expertise comes from Generate, an architecture firm created at MIT with team members from Harvard, and support from a Wood Innovation grant. The group developed a system with timber panels forming the floors, walls, and roof, providing structural strength through the continuous attachment of the panel edges, so that they work like a line of extra-hefty plywood boxes fastened together. From a building-code standpoint, the system is akin to heavy timber framing long used in construction. The structure will be fully sprinklered, and also protected by char that would form on the panels' outer layer, preserving their structural integrity in the event of a fire.

The construction system is well suited to Passive House because of the low heat conductivity across the wood exterior panels, compared to masonry or light-gauge metal or wood stud-wall assemblies. Inboard of the metal rainscreen cladding, insulation is installed on both sides of the CLT panels.

The strategy is also expected to speed construction. Through BIM, the design will be translated into instructions to shop-cut the CLT members, explains John Klein, the CEO of Generate. Modular bathrooms will also be fabricated off-site. "There is a higher first cost but incredibly fast building erection," he says. The surface of the CLT panels is appealing, so some wall and ceiling surfaces will be exposed in the finished units. But the interiors will also include drywall-and-stud cavities, allowing the concealment of electrical conduit, plumbing, and other services. The project's angled roofs

IMAGES: COURTESY GENERATE ARCHITECTURE + TECHNOLOGIES/PLACETAILOR

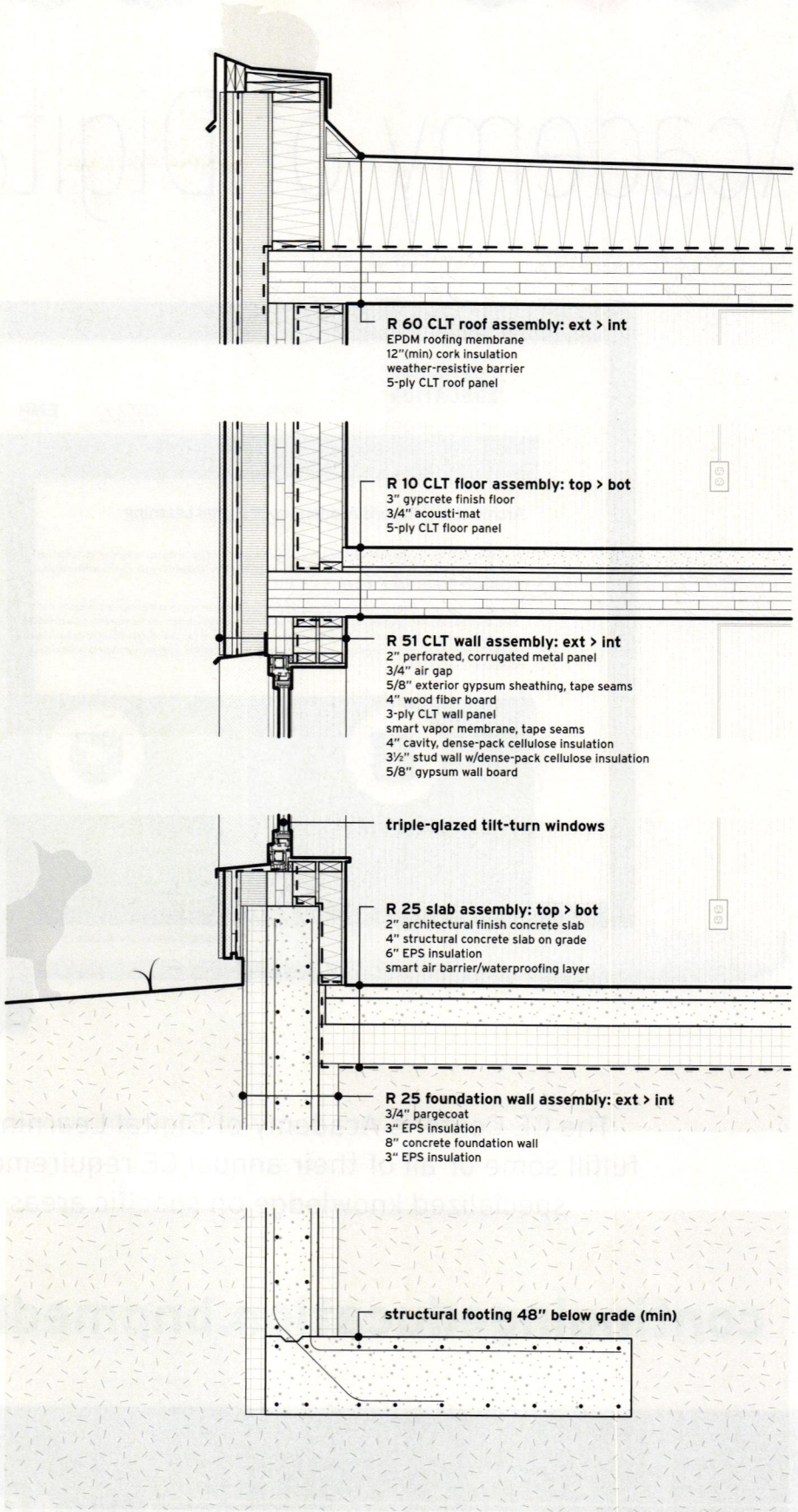
are designed to accommodate solar panels, which will help it achieve carbon neutrality.

Some skeptics have wondered if Passive House would work in America. But as the inventiveness and ambitions of projects like 201 Hampden, Sendero Verde, and NoVo demonstrate, the standard is taking hold in a variety of structures. "It is dominating the conversation around low-energy buildings," says Yetsuh Frank, the managing director of the New York nonprofit the Building Energy Exchange. It has developed a track record of operational savings, says Frank, while other methods too often fail to meet promised performance. He sees Passive House envelope requirements migrating into building codes in such cities as New York, Seattle, and Vancouver.

The growing number of Passive House projects has spurred the development of materials and equipment that make compliance easier. Architects designing to the standard point, by way of example, to products from triple-glazed windows to mini-split mechanical systems, once exotic in the U.S. and now readily available.

Clearly, Passive House is an outlier no more. ■

James S. Russell, FAIA, a journalist who often focuses on sustainability and resilience, is the author of The Agile City: Building Well Being and Wealth in an Era of Climate Change *(Island Press, 2011).*



201 HAMPDEN - WALL SECTION

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Learning Objectives

1 Explain the concepts behind the Passive House standard and its benefits.

2 Discuss the application of Passive House to large-scale projects, including new buildings, retrofits, and mass-timber construction.

3 Describe some of the challenges of designing and building to the Passive House standard.

4 Discuss the compatibility of the Passive House standard with other low-operational-energy approaches.

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Photo courtesy of Neolith®


p115

Specifying Flooring from the Bottom Up

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IN PM ST

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Photo: Jack Hutcheson Photography


p121

Designing for the Contemporary Custom Home

Sponsored by Cascade Architectural, Humboldt Redwood, and Rocky Mountain Hardware

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Photo courtesy of WATTS Water Technologies, Inc.


p128

Water Safety and Backflow Prevention

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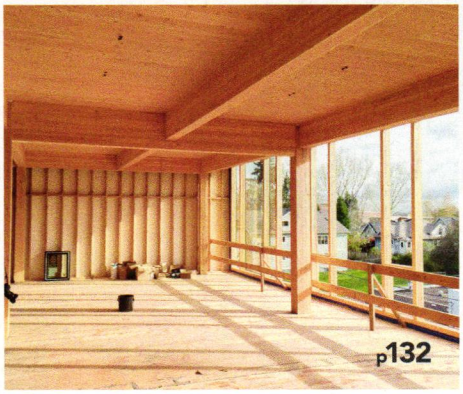
p132

Mass Timber in North America

Sponsored by Think Wood

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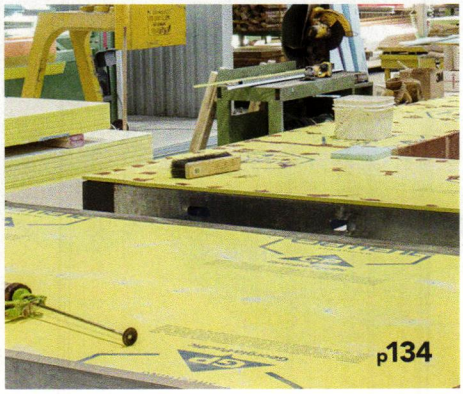
p134

Changing the Way We Think of Prefabrication: New Solutions for Your Building Envelope

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BE PM LS

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CATEGORIES

- **EM** ELECTRICAL AND MECHANICAL
- **IN** INTERIORS
- **LS** LIFE SAFETY AND CODES
- **PM** PRODUCTS AND MATERIALS
- **PMD** PRACTICE, MANAGEMENT, DIGITAL TECHNOLOGY
- **RE** RESIDENTIAL
- **ST** STRUCTURAL
- **SU** SUSTAINABILITY

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

Specifying Flooring from the Bottom Up

A holistic approach helps create spaces that look as good as they perform

Sponsored by Neolith® and New Millennium Building Systems | *By Peter J. Arsenault, FAIA, NCARB, LEED AP*

Flooring is one of many parts of building design that is multifaceted. Choosing the right type of flooring for a project is important for both the overall interior design and long-term resistance to wear, but these considerations are only half the task. All floor coverings need to rest on something, and often it is the structure and materials below the visible surface that determine the success of a flooring installation. This course addresses each of these aspects of flooring design and specification: the visual design choices, the product options that influence the performance of the flooring, and some options for the structural support systems that can make such a significant difference.

DESIGN CONSIDERATIONS

The design of floors, particularly in multistory buildings, is a combination of understanding the structural design options, the choices of available flooring materials, and the best ways for them to two work together. We look at some of the design considerations of floor systems and floor coverings first.

The design of interior spaces is affected directly by the flooring surfaces that are visible and equally by the surfaces underneath.

Photo courtesy of Neolith®

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Learning Objectives

After reading this article, you should be able to:

1. Identify and recognize the design aesthetic and performance significance of floor surfaces as part of the overall interior design of a building.
2. Assess the health and safety performance aspects of floor surfaces as they relate to indoor environmental quality and durability.
3. Explain the importance of floor structure design to enhance space planning, acoustics, and flooring integrity.
4. Determine ways to incorporate the principles presented into building designs as shown in case studies.

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AIA COURSE #K2004C

Floor Structure

The structural floor system of a commercial building provides multiple attributes for a building. In addition to tying into the rest of the building structure, it creates a solid separation between building stories to prevent the passage of sound, air, light, and fire. It is also the platform or substrate that supports everything placed on the floor, including the finish flooring. As such, it can either create favorable conditions for the finish flooring to function or, alternatively, cause problems. In fact, most finish flooring problems come about not because of problems with the finish material itself but rather the material or structure underneath it. Therefore, the attributes of the structural floor system can directly affect the real or perceived attributes of the finish flooring, regardless of what is selected.

In many commercial, industrial, and institutional buildings, steel and concrete are commonly used to create the structural floor system. However, the selection of a specific type of steel or concrete floor system can greatly affect the overall performance outcomes of a construction project. There are a variety of types and range of capabilities of floor systems that can be both complex and versatile. The final selection can directly influence the unsupported span length, acoustic attributes, vibration control, and fire-resistance ratings. Further, the integration of mechanical, electrical, and plumbing systems and even the ultimate height of the building itself can be dictated by the structural floor system selected for a project.

There are at least three common structural floor system choices considered for many commercial buildings. The first is a conventional, lightweight system using steel girders, beams, or trusses to support a metal floor deck that is topped with concrete. This steel-based system is known for its speed of erection, lighter weight, and versatility. Second is an all reinforced concrete system, whether precast or poured-in-place, which is usually thinner in overall height compared to a steel floor system. However, all concrete systems need to be assessed for the amount of additional dead weight that they create compared to other systems. A third and innovative alternative is the use of long-span composite floor systems that combine the lighter weight and erection ease of steel with the strength and durability of concrete. They achieve a thin-slab advantage characterized by a narrow floor structure, longer unobstructed floor spans, and a range of under-floor aesthetic ceiling options.

Photo courtesy of New Millennium Building Systems

Long-span composite floors blend in with the rest of the building construction and can create a finished ceiling appearance in addition to providing a strong, economical floor structure option.

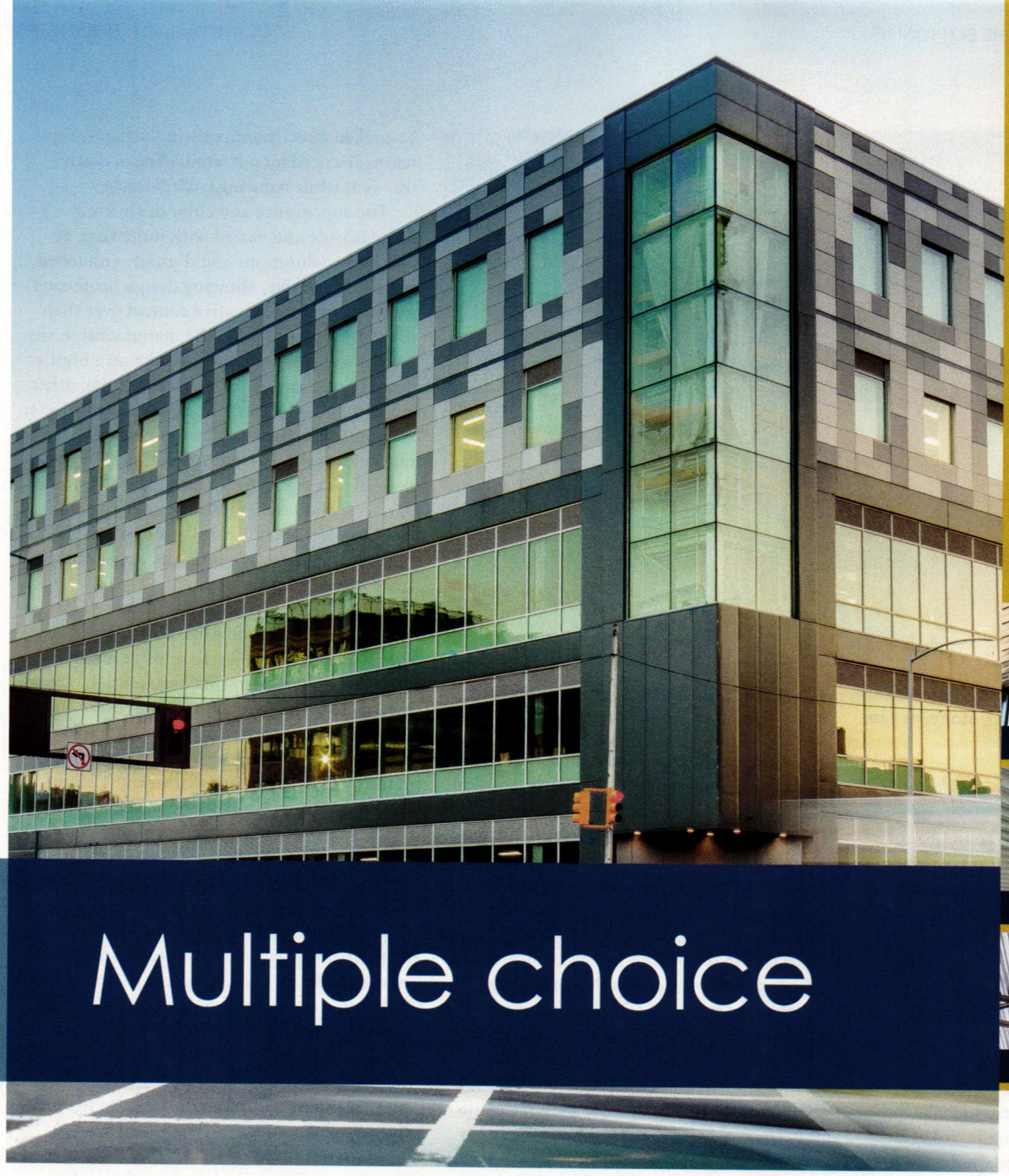
Long-Span Composite Floor Systems

Composite floor systems not only provide economy for the structural system, but they also address the economy of room space, allowing for longer, unsupported spans. They also help by providing a finished ceiling design, including the efficient integration of acoustical treatments, controlled sound attenuation, and fire resistance. Long-span composite floor systems can weigh up to 40 percent less than comparably utilized cast-in-place concrete floors, provide fire-resistance ratings up to 4 hours, and achieve clear spans up to 36 feet.

All of these design attributes of composite flooring systems make them very well suited for a full range of new and renovation/retrofit building projects, including multistory residential, commercial, health-care facilities, parking garages, specialty platforms, and high-rise structures. From a budgeting standpoint, less steel and less weight in these composite systems contribute to lower overall project costs. As part of an integrated structural system, they can enhance the structural performance of the rest of the building, whether those other portions are based on steel, concrete, masonry, or framed bearing walls. Composite flooring systems can also be constructed faster, safer and more cost-effectively than alternative systems.

The flexibility and design attributes of a composite floor system can change the way architects and engineers view a project. The system is no longer just a floor—it is an evolved structural floor and ceiling system that is integral to better building design.

A recent hospital renovation project is a good example of how these systems can help provide better solutions. The design program called for wide, open floors designed to accommodate unique serviceability requirements. Thirty-three-foot spans between beams, combined with overhangs as long as 14 feet, provided a unique design challenge. The solution was found in a composite floor slab approach. Since the floor system also supported operating room equipment and an outboard curtain wall system, controlling deflection was a critical and successful function of the composite design. The long-span composite floor system was designed to address all of these unique project conditions, and it did so very well.



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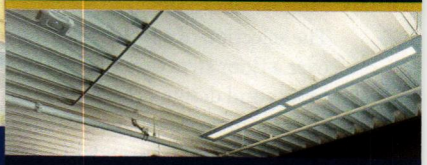

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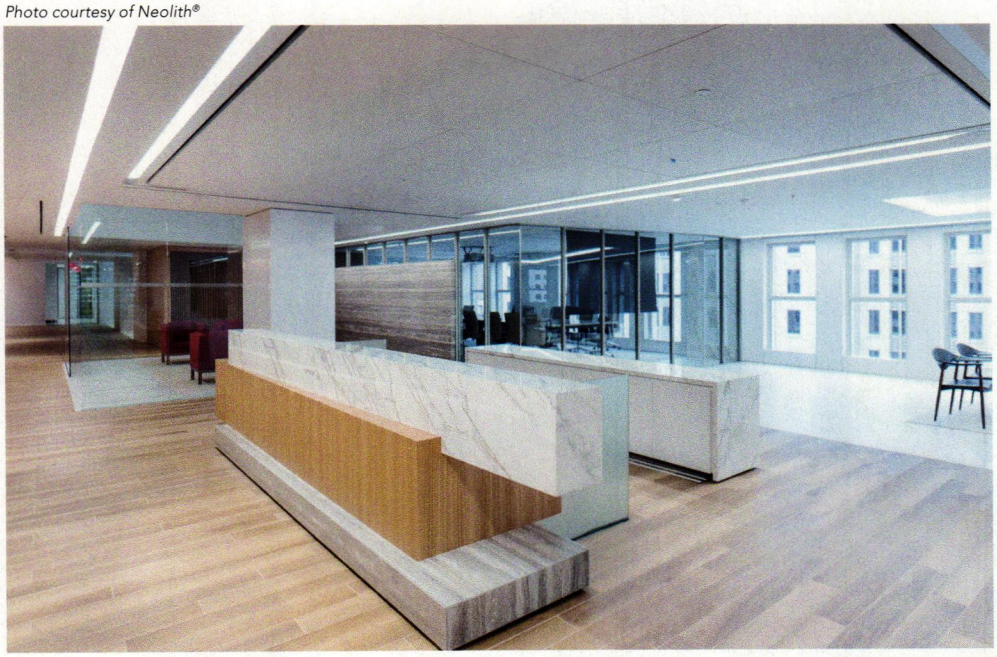

Sintered stone is a very durable, versatile flooring product that can also be used on other surfaces to provide the look of wood, stone, or tile.

FINISH FLOORING

The selection of a finish flooring to be applied over a floor structure is based on a variety of inputs and design criteria. The shape and size of an interior space will be a determinant of things like pattern, scaling, and visual presence of the flooring. The other surfaces in the spaces (such as walls, ceilings, etc.) will influence the choice of materials, colors, and textures used for flooring in the same space, either to extend a particular visual effect or complement the interior design. When considering what to select, there are often multiple choices to pick from in terms of flooring types, but ultimately it comes down to the judgment of the design professional to make the preferred recommendation. In that regard, it is always good to be up to date on relatively new materials that can meet a variety of design conditions and still perform well at a competitive cost.

An example of such a new material is called sintered stone. Sintering is a manufacturing process that uses natural mineral materials in powder form and processes them under heat and pressure to create a product similar to porcelain tile. However, the properties of sintered stone are generally superior to porcelain tile in that it is denser, which makes it stronger, more durable, and generally more resilient. In the case of sintered stone made for flooring products, minerals and other natural materials are ground into a powder and subjected to specific heat and pressure to produce a uniquely broad combination of design characteristics. Sintered stone flooring is resistant to stains, scratches, chemicals, and heat. Additionally, its high density makes it virtually waterproof—it has a porosity less than 0.09 percent, meaning no sealers are required. Those who maintain the building find the dense, nonporous surface easy to clean, including graffiti removal, so the appearance and color are maintained over time. It is even resistant to harsh chemicals.

From a purely design standpoint, sintered stone flooring can provide the look of other familiar materials, such as stone, tile, or wood, with surfaces that are either smooth or textured and available in a variety of colors and hues. Of particular interest to many designers, it is available in larger sizes than conventional porcelain or ceramic tile. Sintered stone product sizes range from 12-inch by 24-inch tiles up to 60-inch by 60-inch tiles, or full slabs that are 4 feet by 12 feet or 5 feet by 10.5 feet. Larger sizes mean minimal grout lines for more elegant visual designs and less concern about keeping those lines clean.

In addition to the variety of size formats, sintered stone is also available in different thicknesses. Because it is so dense, it can be manufactured down to a thin $^1/_8$ inch, although ¼-inch and ½-inch products are more commonly used. Regardless, the thinner, denser products are more lightweight, coming in at only 1.1–1.5 pounds per square foot for a $^1/_8$-inch-thick panel. This lighter weight makes it ideal for renovation projects in addition to new construction. The floor slabs can be applied directly onto existing surfaces, eliminating the need for gut remodeling or costly tear-outs while reducing landfill waste.

The appearance and color of sintered stone is wide and varied with more than 50 full-body colorations and digitally enhanced patterns available, allowing design professionals to exercise full creative control over their projects. Depending on the manufacturer, sintered stone can be created to take on a highly accurate appearance of marble, granite, other stone, wood grain, or tile. For sizable projects, some manufacturers can work with designers on custom patterns and colorations to be used not only for flooring but also for walls, work surfaces, and other applications. This total combination of choices means that designers have a full palette of colors and appearances from which to choose.

When used specifically for floor surfaces, sintered stone is suitable for all types of spaces, from large hotel lobbies, to midsize retail or restaurant settings, to small residential or commercial bathrooms, and just about everything in between. The degree of wear resistance needed in any of these spaces can be accommodated by picking the proper thickness of sintered stone to suit the situation. The thickness choices can also help provide smooth transitions with adjacent floor finishes. Grand spaces can have thin sintered stone floors that look like marble, granite, or other dramatic stone. For restaurant and retail spaces, the colors and textures can be selected to complement the rest of the decor, creating spaces that are either bold and strong or soft and intimate depending on the situation. For bathroom and kitchen spaces, surfaces that look like marble or create contrasts of colors, including the creation of tubs and other items, can be designed to meet the intended results.

Once installed and in use, sintered stone flooring can be an ideal design solution for large-format tiling in high-traffic commercial and residential project applications. As a product solution, it overcomes some of the most common issues with traditional large-format tiles, including weight, expense, and installation difficulty.

Continues at ce.architecturalrecord.com

Peter J. Arsenault, FAIA, NCARB, LEED AP, *is a nationally known architect, consultant, continuing education presenter, and prolific author advancing building performance through better design.* ***www.pjaarch.com, www.linkedin.com/in/pjaarch***

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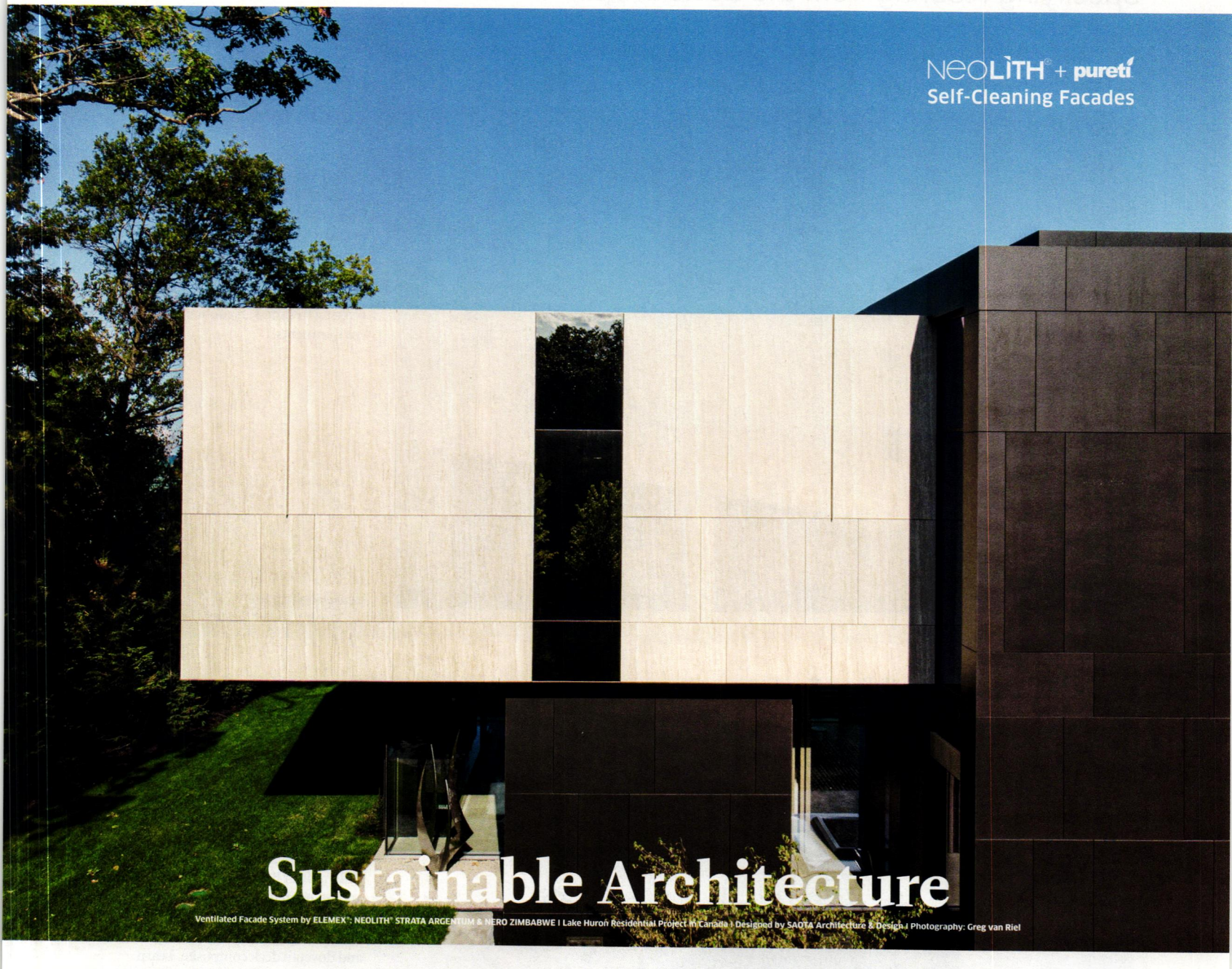

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PRODUCT REVIEW

Specifying Flooring from the Bottom Up

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Phedra by Neolith®

Phedra is an elegant variation in Neolith's grey palette and a popular choice within the Fusion Collection, an innovative range inspired by natural stones and composites. This beautiful surface is available in a variety of slab and tile formats in a satin finish, offering freshness in contemporary environments.

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New Millennium Building Systems

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Long-Span Composite Floors

Long-span composite floor systems are the space-saving answer for optimizing the design of multistory hotels, offices, schools, and more. Only New Millennium Building Systems engineers and manufactures all three leading types of long-span composite floors: composite joist, deep-deck composite, and dovetail deck composite. Learn more at www.newmill.com/3ways.

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Redwood timbers add organic beauty and warmth to indoor and outdoor rooms.

Photo: Jack Hutcheson Photography

Designing for the Contemporary Custom Home

Integrating design choices into a cohesive aesthetic while satisfying performance and sustainability goals

Sponsored by Cascade Architectural, Humboldt Redwood, and Rocky Mountain Hardware | *By Juliet Grable*

The contemporary custom home can trace its origins to the Modernist movement of the early and mid-20th century, and to trailblazing architects such as Frank Lloyd Wright, whose designs cultivated a deep connection between indoors and outdoors.

Contemporary homes tend to reflect a blend of styles, and while each design is an original, these homes tend to embrace several general strategies. The connection with the outdoors is paramount, and many contemporary home designs include ample windows and skylights that connect occupants with views, fresh air, and sunlight.

Open plans facilitate daylighting and encourage a more casual living pattern. Gone are the formal dining room and confined kitchen; instead, the kitchen connects to the living area and, just as importantly, to outdoor rooms and patios, where grilling and dining can occur. These open rooms must flow seamlessly into the outdoors, where outdoor rooms and landscaping complement the aesthetic of the main structure.

Contemporary home designs also tend to emphasize simplicity and function: narrow sightlines and an absence of ornament. But far from being austere, the contemporary home

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Learning Objectives

After reading this article, you should be able to:

1. Discuss the many design goals that elements in a contemporary custom home must satisfy, and which features can improve energy performance while contributing to the home's overall aesthetic.
2. List criteria that can help designers select products and materials that are sustainable, ecologically responsible choices for a custom home.
3. Explain the role that various third-party certification programs and labels such as the Forest Stewardship Council and Declare can play in making sustainable choices.
4. Describe how various elements of a custom home can contribute to biophilic design.
5. Illustrate how manufacturers can work with design professionals to create individualized solutions for custom home projects.

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aesthetic is characterized by a preference for organic and "unprocessed" materials that work harmoniously with each other to create a sophisticated, modern look that is simple but warm. Often designers and clients show a preference for wood, metal, and stone, as well as an earth-toned or neutral color palette.

Of course, many of these choices play a role beyond simple aesthetics. Clients of custom homes often have many goals for their project, including energy efficiency, safety and security, health, and comfort and convenience. Some are also concerned about the environmental footprint of their home and want to do what they can to minimize negative impacts.

Designers and homeowners have never enjoyed such a variety of choices in nearly every design category, from windows and doors to flooring and finishes. With so many brands, styles, and finish options, the designer has the rewarding but undeniably challenging task of integrating all of these disparate elements into a harmonious whole and ensuring that these elements perform other required functions.

Fortunately, designers can rely on some timeless combinations and materials. Stone, wood, and metal never go out of style; these materials also tend to be durable and strong. Classic combinations include wood doors and cabinetry with metal pulls and hardware; exposed wood beams and metal roofing; and wood- or metal-clad windows and metal fabric shades.

Some specific examples show how durable, timeless materials can help create a harmonious aesthetic while contributing to other design goals.

Natural Warmth and Beauty: Redwood Timbers and Uppers

Wood is a classic design choice and one of the oldest building materials. It is beautiful, strong, and versatile, with an array of possible applications. It can be used indoors and outdoors, and in both structural or nonstructural applications.

Of all the domestic wood species, coast redwood is among the most desirable. One of the lightest softwoods found in North America, redwood is also structurally strong, making it ideal for a wide range of structural applications where large timbers are required.

Timbers are the largest pieces of solid sawn lumber produced by sawmills, typically 5 inches thick and larger. Cut from the center of the tree, redwood timbers are a rich, reddish-brown tone. Being a natural product, each piece displays a unique grain pattern.

The use of redwood timbers for timber framing and exposed beam construction can produce dramatic results and lend natural beauty and strength to custom home projects. Redwood timbers can be used as posts and beams, in arbors, barns, shade structures, and trellises as well as the main home structure.

Upper grades are high-value appearance products used in finish applications, such as fascia, millwork, paneling, siding, trim, and wainscoting. Redwood upper grades can add natural warmth, beauty, and long-lasting durability to a custom home project. These uppers also exhibit Class B flame spread and are approved for use in California's Wildland Urban Interface fire-hazard severity zones for exterior siding and decking.

When sourced from sustainably managed forests, redwood is an environmentally responsible design choice that sequesters carbon. Whatever the application, redwood can complement a variety of other materials and help create a distinctive aesthetic.

Versatile Style and Functionality: Coiled Wire Fabric Panels

Coiled wire panels are made by weaving strands of stainless steel wire into strong but flexible panels. These panels are highly decorative and versatile. They can be used both inside and on exteriors as cladding facades, solar shading, window and ceiling treatments, room dividers and partitions, and for architectural lighting effects. These panels are ideal for porches, patios, and other outdoor gathering spaces, as they enable air circulation and preserve views while controlling glare and heat gain.

Coiled wire fabric is highly customizable. Available in a range of weave sizes, gauges, and finishes, the panels can reflect and complement a range of architectural styles. The systems are operable; panels can be retracted to allow in more light or closed when the sun is at a lower position and prone to glare.

Coiled wire fabric can help reduce energy costs by controlling solar gain. The material is also easy to maintain, durable, and 100 percent recyclable, making it a good choice for clients striving to reduce the environmental impact of their projects.

Architects, interior designers, and custom homebuilders can take advantage of the design and engineering support offered by manufacturers of these systems, using the basic building blocks to create original designs tailored to the particular aesthetic of the home.

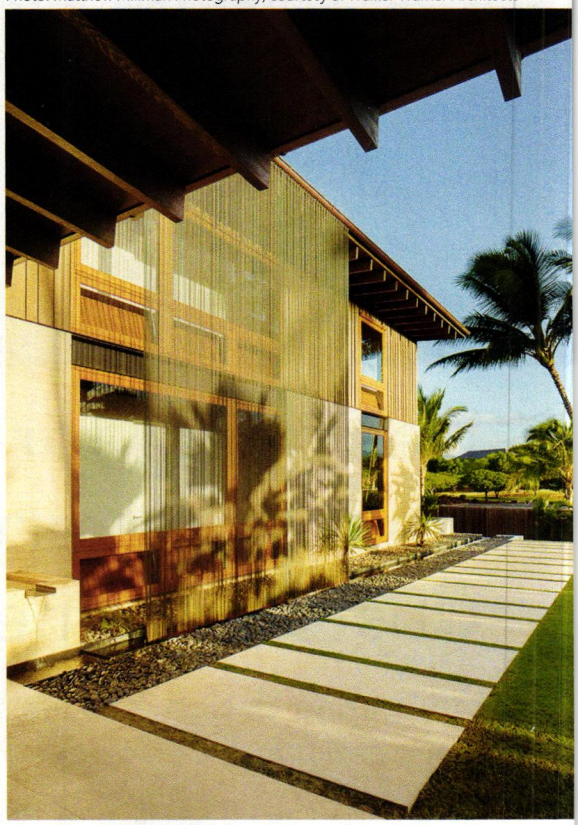
Timeless Appeal: Hand-Cast Bronze Hardware

The selection of door and cabinet hardware can serve as a consistent design element that ties different parts of the home together. This is an especially important consideration with today's open plans. Often such hardware is made of metal, which is strong and durable and can take on a variety of styles and finishes.

Photo: Jack Hutcheson Photography

Warm and versatile redwood is a material that can be used inside and outside the home in both structural and "appearance" products, such as tongue-and-groove ceilings.

Photo: Matthew Millman Photography; courtesy of Walker Warner Architects



Coiled wire fabric makes a striking design statement while performing the important function of controlling solar gain and glare.

Bronze is an alloy of copper and tin; it is made by melting the two metals together and then pouring the molten material into molds. The resulting alloy is extremely durable and corrosion resistant.

Bronze was first created by human hands as early as 5000 BC. Over the millennia, it has been used for everything from coins, tools, and weapons to bowls, figurines, and fittings.

Today, bronze still has many applications, including the creation of versatile and durable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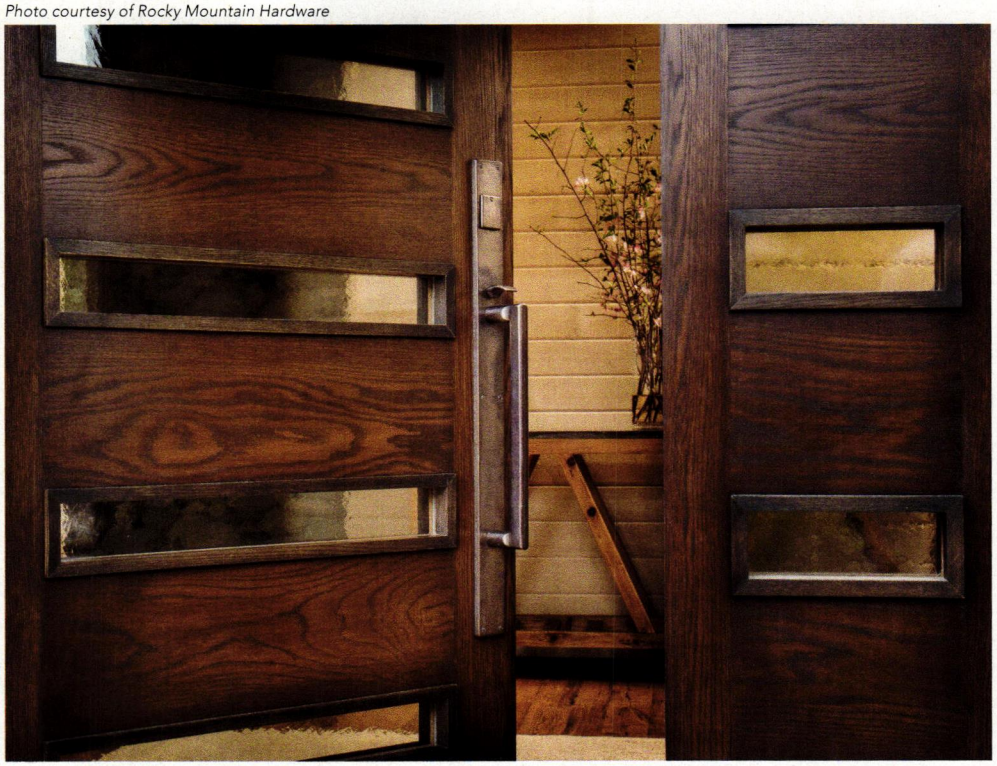
hardware for custom homes. Truly a timeless material, bronze can be molded into a range of shapes, from simple to intricate, and is well-suited to contemporary, modern, and transitional styles. Bronze hardware adds an organic element to modern designs and is a classic complement to wood.

Highly skilled artisans draw on time-honored traditions to handcraft hardware and accessories for contemporary homes. However, these hardware products also benefit from digital technology. Computer numeric control (CNC) machines are used to fabricate lock mechanisms and other components. Locksets may look like art pieces from the outside, but they can house digital "smart locks" that can be opened using a digital code or voice control and/or controlled by a smartphone. At least one high-end manufacturer also offers extensive custom capabilities, with master craftsmen on staff who can create original patterns and 3-D modeling software that enables the user to perfectly match the finish and style with the materials of the door or other substrate.

Such products are inherently durable not only because of the raw materials used but also the care and craftsmanship that go into making them.

Photo courtesy of Rocky Mountain Hardware



Contemporary bronze pieces brighten up the custom wood entry doors and design elements in this updated Rocky Mountain A-frame home.

CUSTOM HOMES AND BIOPHILIC DESIGN

Increasingly, the contemporary custom home is designed to connect occupants to the natural world. This connection is inherent to our well-being and health. Cycles of daylight and darkness, for example, help "tune" the body's natural rhythms and affect several physiological processes, from sleep to digestion.

Biophilic design is a design approach in which architectural elements reflect people's innate connection to nature. Biophilic design can be demonstrated through the use of natural materials, such as wood and metal; organic shapes, colors, and patterns; and through features that connect building occupants with outside views, sunlight, and fresh air.

The Natural Warmth of Wood

Wood is obviously a natural material. The colors, textures, grain patterns, and even the way it feels to the touch helps connect people to the trees and forests from which the lumber was sourced.

Redwood adds a timeless warmth to custom homes, and can help provide balance to the crisp lines and neutral palette exemplified in many contemporary homes. Wood is frequently used as an accent to bring warmth and natural beauty to the interior in the form of nonstructural beams, tongue-and-groove ceilings, wainscoting, flooring, cabinetry, and other nonstructural elements.

Photo: T.S. Whalen

An outdoor room, protected by a structure made with redwood, encourages people to spend more time outside.

Of all the materials you specify, Humboldt Redwood may be the most beautiful and sustainable, derived from Forest Stewardship Council® (FSC® C013133) certified timberlands in Northern California.

Humboldt Redwood®

getredwood.com/architects

Photo courtesy of Rocky Mountain Hardware

A properly scaled hand-cast bronze handle pairs with this weathered-wood entry door to make a strong statement about connecting with the natural world.

Photo courtesy of Cascade Architectural

Coiled wire fabric connects occupants with views and fresh air while controlling glare and solar gain.

Redwood can also be used to create outdoor rooms, decks, and railings, and other elements, that invite people to step outside and reclaim their relationship with the natural world.

Finally, wood is extremely versatile and a natural complement to many other materials, from stone and metal to fabric and glass.

Hand-Cast Metal and the Human Connection

We live in a time of increasing automation, where it is hard to see the connection between human hands and most manufactured products. Bringing hand-crafted elements into a custom home reminds us of the timeless relationship between humans and our precious natural resources.

Hand-cast bronze hardware adds a sophisticated but humane element to a contemporary custom home. These pieces are made using ancient techniques and raw materials mined from the earth. Biophilic designs can take the form of shapes, colors, and patterns inspired by nature. Some manufacturers offer collections that have a deliberately organic aesthetic: rounded edges, earth-toned finishes, and naturalistic shapes. These forms not only appeal to us on a deep level but also feel good to the touch. In addition, bronze hardware is a natural complement to other biophilic materials and shapes, whether crisply painted cabinetry or a reclaimed wood entry door.

Facilitating the Indoor-Outdoor Connection

Custom home clients often request generous windows, especially for framing views of natural features such as mountains. Architects and designers are also increasingly recognizing the value of daylighting and carefully balancing the desire for glazing with energy-efficiency goals.

Coiled metal drapery, which is made from a weave of stainless steel, facilitates the indoor-outdoor connection in several ways. The panels can be used to control solar gain and glare and modulate daylighting; in this way, sunlight is filtered and diffused into spaces and views are preserved. Because the panels are retractable, they can be adjusted throughout the day as light conditions change.

People often gravitate to windows or outdoor rooms and patios; however, these spaces can be uncomfortable if they are not protected from extreme temperatures, glare, and wind. Depending on the gauge and thickness of the wire, coiled wire fabric panels can be used on the exterior to mitigate sun, wind, wind-borne debris, and insects, thus creating a more comfortable outdoor environment that encourages people to stay outside longer.

Finally, coiled metal drapery is visually versatile. The fullness, gauge, and thickness of the wire can be adjusted to create everything from rigid architectural panels to billowy, transparent drapes. The repetitive pattern of the weave itself suggests a natural pattern or process, such as the cellular structure of beehives. The panels can be finished with a wide range of colors and effects if a more naturalistic effect is desired.

▶ Continues at ce.architecturalrecord.com

Juliet Grable *is an independent writer and editor focused on building science, resilient design, and environmental sustainability. She contributes to continuing education courses and publications through Confluence Communications.* ***www.confluence.com***

PRODUCT REVIEW

Designing for the Contemporary Custom Home

Cascade Architectural

Photo courtesy of Walker Warner Architects

Natural Finishes and Modern Designs with Fabricoil® Coiled Wire Fabric

In all market segments, designers are taking advantage of natural metals for a wide variety of functions and applications. When specifying Fabricoil® coiled wire fabric, architects have virtually unlimited colors and styles from which to choose. For those looking to achieve earthy or neutral tones, stainless steel or cooper-clad steel can be used to achieve the desired effect.

www.cascade-architectural.com

Humboldt Redwood

Jack Hutcheson Photography

Redwood Timbers

Humboldt Redwood timbers may be used in any application where cedar has traditionally been used, including shade structures, posts, beams, and exposed timber frame construction, to name a few. Humboldt Redwood timbers are a renewable resource from Forest Stewardship Council (FSC C013133) certified timberlands in Northern California.

www.getredwood.com

Rocky Mountain Hardware

Photo courtesy of Rocky Mountain Hardware

Element Collection

Rocky Mountain Hardware introduces the Element collection, featuring a minimal profile that allows the beauty of art-grade bronze handles to elegantly punctuate the thoughtful design of any custom door. Available in a range of 12 finishes, this collection is compatible with all mortise lock functions, from entry through passage.

www.rockymountainhardware.com

All images courtesy of WATTS Water Technologies, Inc.

Cross-connection controls are critical to the protection and conservation of drinking water. The health, safety, and welfare of the public depend on the appropriate design and planning of cross-connection controls in buildings and landscape projects.

Water Safety and Backflow Prevention

Protecting drinking water, conserving water resources, and providing resilience to all buildings

Sponsored by WATTS Water Technologies, Inc. | *By Celeste Allen Novak, FAIA, LEED AP*

Informed design professionals who understand the basics of backflow prevention are able to successfully manage regulations and safely deliver fresh drinking water in their projects. The common response from several architects when asked about the importance of backflow protection was that they "left that up to the mechanical engineer." These professionals were experts in green design and knowledgeable about the basics of best practices for water conservation. Among them, only a few mentioned their concern for the placement of plumbing controls, maintenance schedules, the locations of access panels, fire safety systems, and cross-connection controls. Reviewing the basics of cross-connection and backflow controls will allow them to partner with their mechanical and plumbing engineers and create strong design teams that will protect drinking water.

CONTINUING EDUCATION

AIA Continuing Education Provider **1 AIA LU/HSW**

Learning Objectives

After reading this article, you should be able to:

1. Identify the basics of backflow prevention regulated to provide safe drinking water.
2. Describe cross-connection controls and the importance to total backflow protection.
3. List backflow preventer selection criteria and the appropriate types of systems for various applications.
4. Describe typical faults and failures associated with backflow preventers that can be averted from schematic design through construction administration and commissioning.

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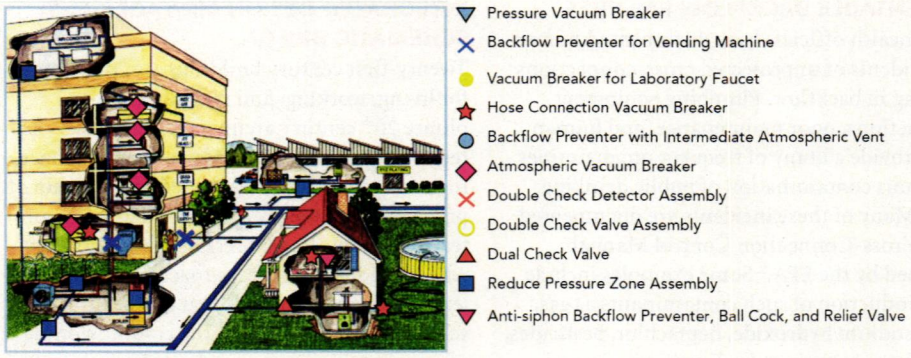
AIA COURSE #K2004E

The resiliency and safety of a drinking water system may be assured through a basic understanding of the cross-connection controls. These mechanical controls provide the barrier between pollutants and the public supply of fresh drinking water. This course will review the basics of these important mechanical devices, from simple vacuum breakers to detector assemblies for fire sprinkler systems. These devices are usually specified by engineers and added to a project manual with little understanding as to how a lack of knowledge can lead to an overly complicated project delivery.

The early analysis of cross-connection controls includes many advantages to the design professional. These include improved designs for mechanical rooms, better project scheduling, safer site infrastructure, easier permitting, and proper equipment maintenance. An architect who assembles complete project delivery teams will include civil (site infrastructure), mechanical, and plumbing engineers. These professionals should be involved in project planning from initial programming through construction documentation and commissioning.



Shown are typical locations of check valves and appropriate backflow prevention systems in a commercial building.

PROTECTING DRINKING WATER FROM CONTAMINANTS

The public water supply is distributed by a series of pipes, storage facilities, and conveyance components. Since the 20th century, these distribution systems are designed and regulated to provide an uninterrupted supply of pressurized safe water to consumers. According to the U.S. Environmental Protection Agency (EPA), public distribution systems span almost 1 million miles in the United States, representing the clear majority of physical infrastructure for water supplies. In addition, public water systems meet fire protection needs for cities, homes, schools, hospitals, businesses, and industry.

Cross-Connection

A cross-connection, as defined by the EPA, is "any actual or potential connection between the public water supply and a source of contamination or pollution." Such cross-connections constitute a hazard to the building occupants and can jeopardize the cleanliness and potability of the public water system in the event of a backflow or backsiphonage event. An actual connection is a direct connection to a source of contamination, such as an unprotected boiler connection. An example of a potential connection could be as simple as a hose bib, which could potentially be connected to a pesticide sprayer.

Backflow

Backflow is the unwanted and potentially dangerous reverse flow of liquid, gas, or another substance into a potable water distribution system. According to the EPA, "most backflow incidents are generally detected and reported to the local authority only if customers detect an irregularity in their water supply...but not all contamination that produces illness and disease can be detected by taste, color, or odor." Each plumbing system is unique, and often contamination is not identified until serious symptoms occur. Backflow can occur outside from hoses, pools, and other exterior equipment, as well as from equipment inside buildings.

Backsiphonage

Backsiphonage is a condition that occurs whenever there is a negative or subatmospheric pressure in the potable supply piping. These conditions typically occur during periods of very high demand in the public water main, which lowers the supply pressure. In some cases, demands imposed by firefighting operations (or in the event of a water main break) will suddenly and significantly lower a city's water pressure below atmospheric pressure. This pressure change results in a partial vacuum being drawn on the non-potable system. This vacuum will siphon the pollutants or contaminants into the potable water system through an unprotected cross-connection, such as a hose bib or hydronic system make-up connection.

Backpressure

Backpressure is a push from the demand side. This occurs when pressure in a non-potable system is elevated above that of the potable supply, resulting in reverse flow. The installation of pumps, boilers, or other water heating equipment that may cause thermal expansion can results in reverse flow.

Cross-connection controls are critical to the protection and conservation of drinking water. The health, safety, and welfare of the public depend on the appropriate design and planning of cross-connection controls in buildings and landscape projects. This primer will provide an overview of the equipment, testing and permitting processes for cross-connection protection to ensure that public water systems will stay safe.

DEGREES OF HAZARD

Backflow into the public water distribution system can be prevented by eliminating cross-connections or adding backflow preventers. According to the EPA, backflow is not only a threat to the health of our community, but it can also cause damage to our environment. The EPA recognizes that backflow incidents can cause issues such as corrosion of equipment, harmful microbial growth in our distribution systems, and changes in taste, odor, and color of the water supply. Chapter 3 of the EPA's Water Quality Standards Handbook provides definitions and guidelines for water quality criteria.[1] Backflow risks are described as one of two types of hazards. A "pollutant" is any substance that may affect the color, taste, or odor of the potable water but does not pose a direct threat to human health through exposure or consumption of the water. Pollutants may impose an objectionable odor or appearance to the water, but they do not in and of themselves pose a health threat and therefore are considered to be a low hazard, or non-hazard, when compared to contaminants.

A "contaminant" is any substance that, when introduced into the potable water system, constitutes a direct threat to life or health of a human. This can occur through consumption or if the substance is in contact with the skin. A contaminant can be a caustic chemical, a fluid containing bacteria or disease, or any other substance that could threaten human health. Contaminants compose the highest degree of hazard to the potable water system.

The initial stage of an architect's project is programming. During programming, design professionals analyze the proposed or future uses of a facility and possible connections to water supplies. This is particularly important when reviewing the cross-connections to public water supplies. The selection of backflow prevention system depends on whether the programmed use within a project is considered a low hazard, a non-hazard, or a hazard.

PREVENTABLE BACKFLOW FAILURES

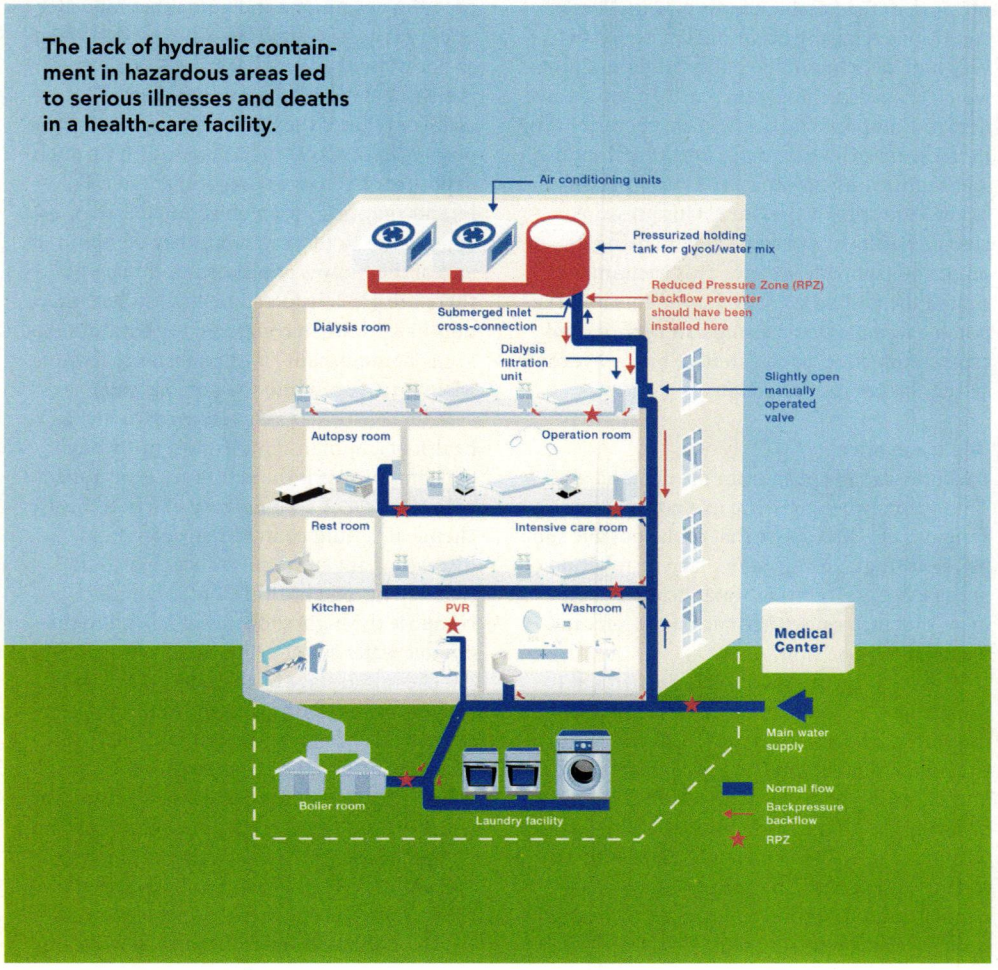
Public health officials have documented numerous incidents of unprotected cross-connections resulting in backflow. Plumbing equipment malfunctions, poor maintenance, and human error provide a litany of frequent opportunities for serious contamination of public drinking water. Many of these incidents are documented in the Cross-Connection Control Manual published by the EPA.[2] Some examples include the introduction of such contaminants as gas, blood, sodium hydroxide, heptachlor, pesticides, hexavalent chromium, and antifreeze in incidents that include the poisoning of the potable water in schools, hospitals, and large residential areas. The culprits include improper industrial tank pumping, broken water mains, community water main pressure reduction, frozen backflow preventers, hoses left in swimming pools, and improper gate valve installation. Contamination can occur at any point of connection between a potable water pipe and a source of non-potable water. Legionnaires disease can be caused by contamination from pathogens and bacteria introduced from cooling towers that have been installed or maintained improperly. The case study on the following page is an example of one incident of a preventable backflow failure.

INTEGRATED DESIGN MANAGEMENT: SCHEMATIC DESIGN

Twenty-first century buildings are "machines for living, working, and playing," to paraphrase 20th century architect Le Corbusier. As technology advances, building design management requires a sophisticated, complex team of professionals. Integrated design management teams include all members of the design team who provide a holistic approach to the challenges and opportunities that can occur from schematic design through the commissioning of a project. Teams that include the architect and engineers from the beginning of a project have the advantages of predicting any scheduling issues, from the delivery of components to regulatory delays.

The key elements to a cross-connection control program include the isolation of the domestic water supply and containment at the meter, resulting in total backflow protection through the use of backflow preventers. Isolation requires an analysis of any cross-connections in the project. The appropriate backflow prevention devices will be selected to isolate any hazard to that location and protect the owner's potable water system from contamination.

The lack of hydraulic containment in hazardous areas led to serious illnesses and deaths in a health-care facility.



Total backflow protection is governed and regulated by The Uniform Plumbing Code (UPC) in Chapter 6, Section 608: Isolation Protection & Containment.[4] "Containment" is the containment of a property's private water system from the city's drinking water supply system. This is done downstream of a property's water service connection (the water meter) and achieved by installing a backflow prevention device immediately after the water meter. The water distribution system, fixtures, and piping are also governed by this code. Distribution flow rates and flow pressures are identified in Table 604.3 of the plumbing code.

In schematic design, the regulatory overview of cross-connection controls will impact the size of mechanical rooms, ceiling plenums, and fire safety controls. Regulatory overview will impact scheduling. In the schematic design phase, a review of the key cross-connection controls and permitting requirements will assist with project design and planning.

Agency Approvals and Code Compliance

There is a long history to the regulatory overview of plumbing systems. Although the complex overlapping of authorities may seem confusing, they provide a public water safety net. Design professionals need to understand who the Authority Having Jurisdiction (AHJ) is, as well as regulatory industry standards, particularly critical when the project includes fire safety systems. Typically, the property line divides whether the system is governed by the plumbing code or the AHJ. The American Water Works Association provides a list of some of the responsible water safety enforcement authorities.[5]

- Local plumbing and building officials enforce all provisions of the applicable plumbing and building codes relative to installation, repair, maintenance, and operation of all plumbing system devices.
- Fire marshals are responsible for regulating fire protection systems (e.g., fire sprinkler systems) downstream of the potable water system supply connection entering the premises.
- Safety inspectors (Occupational Safety and Health Administration [OSHA]; Workers' Compensation Board [WCB] [Canada]; Mine Safety and Health Administrators [MSHA]) are responsible for inspecting potable water systems (plumbing) for worker safety.
- Health officials are responsible for inspecting restaurants and other food preparation facilities (e.g., dairies), health-care facilities (e.g., nursing homes), etc.
- Agricultural inspectors are responsible for the safe handling of chemicals (e.g., pesticides) used in growing and processing agricultural products.

LACK OF HYDRAULIC CONTAINMENT IN HAZARDOUS AREAS

Often failures in cross-connection systems can be caused by maintenance failures combined with the inadequate design of the plumbing systems for a hazardous area. According to one case study highlighted in the EPA Cross Connection Control Manual, maintenance failures combined with the inadequate design of the plumbing systems led to serious illnesses and deaths in a health-care facility.[3]

Ethylene glycol entered the dialysis equipment through a series of events triggered by a valve being left slightly open. This valve permitted water to flow into a holding tank used to replenish a mix of glycol and water to the air-conditioning system. Glycol is customarily used in air-conditioning water to keep it from freezing in cold weather. With the valve partially open, water continually flowed slowly into the holding tank until the pressure in the holding tank equaled the pressure in the water supply.

Investigators theorized that someone in the medical center flushed a toilet or turned on a faucet, which dropped the pressure in the water pipes, allowing the glycol-water mixture to drain from the holding tank and into the medical center's water pipes. Consequently, the contaminated water entered the dialysis filtration system used to purify water for the dialysis machines. This filtration system takes out trace chemicals, such as those used at the city water treatment plant; however, the system could not handle the sudden heavy load of chemicals.

Patients were sickened and all were moved promptly to intensive care, where their blood samples revealed a buildup of acid. Although ultimately the courts found that the company was not liable for the death of two patients, the emotional cost and actual costs of this tragic disaster may have been prevented.

Tests of the water supply to the dialysis filtration system confirmed the presence of "an undesirable chemical in the water purification system." Investigators located the defective valve that had permitted the glycol-water mix to drain from the air-conditioning holding tank into the medical center's potable supply lines and then into the dialysis filtration system equipment. If the water supply to the glycol tank had been air-gapped or protected with a reduced pressure principle backflow preventer, the dialysis machines would not have been contaminated.

This incident highlights the need for hydraulic containment of hazardous areas in hospitals and medical centers. Mortuary rooms, autopsy rooms, laundry rooms, boiler rooms, air-conditioning units, and pharmacy rooms should all be isolated and contained with the use of backflow preventers on their potable supply lines.

Early design coordination between the architect, mechanical, and plumbing engineer will determine the necessity for isolating hazardous chemicals from contaminating a drinking water supply.

Water purveyors deliver drinking water to customers and will have jurisdiction over water supply systems. These entities are public utility, water companies, county water districts, or municipalities that deliver drinking water to customers. The mechanical or plumbing engineer with local knowledge may be the first source for information as to code compliance for cross-connection controls. As a condition of being connected to the public water supply, the municipality or water purveyor will typically have jurisdiction over the containment backflow. A device might be allowed in one county but not the adjacent county, and in one state but not the other. These professionals will also have relationships with the local plumbing inspectors, avoiding misinformation and delays. The basic guiding principles for specifying cross-connection controls depend on the answers to the following questions.

- Is the building area or equipment device considered a health hazard or a non-health hazard?
- Is a testable or non-testable device required?
- Will a pressure vacuum breaker versus a reduced pressure principle device be required for irrigation?
- Is a "not lead-free" system allowed as with certain non-potable applications, such as irrigation or hydronic heating systems?

The answers to these questions will save money, time, and potentially avoid an inspection failure or the installation of a more expensive device when a more economical one would have satisfied the requirements.

The major standards in the industry are: The International Association of Plumbing and Mechanical Officials (IAPMO), the American Society of Sanitary Engineers (ASSE), the University of California Foundation for Cross-Connection Control and Hydraulic Research (USC-FCCCHR), the American Water Works Association (AWWA), and NSF International (formerly the National Sanitation Foundation). These organizations provide information, education, product testing, product evaluations, and certifications.

Backflow preventer installation requires the services of a licensed professional engineer (PE) and licensed master plumber (LMP). A licensed professional will determine if a project requires a backflow preventer or multiple devices, or if the project qualifies for an exemption. The law also typically requires annual testing and inspection by a certified tester, and a report submitted to the Department of Environmental Protection (DEP) or AHJ. Failure to comply can lead to penalties and termination of water service. Backflow preventer devices are made up of moving parts, seals, and springs and are subject to corrosive substances, wear, and fatigue. Selecting the correct device and understanding annual testing and maintenance are just the beginning of a system that will require meeting the regulatory requirement that protects public health, safety, and welfare.

CONSTRUCTION DOCUMENTS AND SPECIFICATIONS

Engineers recognize that there are several major considerations for specifying backflow, including the importance of code compliance and agency approvals. The main elements include flow performance, calculated building flow, and hazard conditions. The resiliency of these devices for future maintenance, repair, and replacements depends on their serviceability, valve size, weight, installation options, shutoff options, and testing ability.

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Celeste Allen Novak *is an architect and author whose Michigan practice focuses on sustainable and universal design.*
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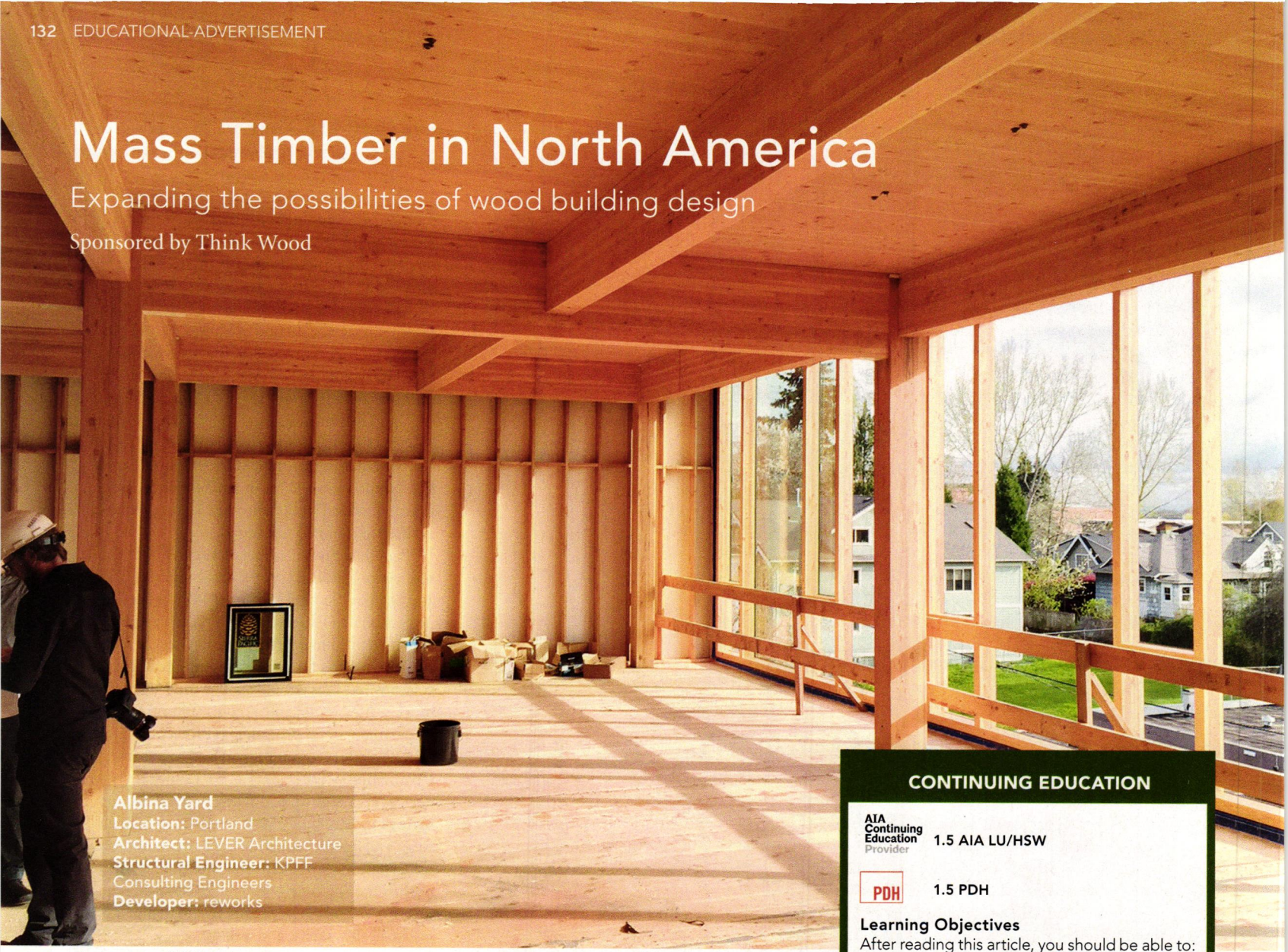
Mass Timber in North America

Expanding the possibilities of wood building design

Sponsored by Think Wood



Albina Yard
Location: Portland
Architect: LEVER Architecture
Structural Engineer: KPFF Consulting Engineers
Developer: reworks

Photo courtesy of LEVER Architecture

It has been a while since a major category of building materials inspired the kind of widespread enthusiasm currently being shown for mass timber. Around the world, designers are leveraging the strength, stability, and design flexibility of products such as cross-laminated timber (CLT) to push beyond wood's perceived boundaries, achieving building heights and spans that would have once required concrete, steel, or masonry for structural support.

For many, it is the combination of aesthetics, structural performance, and opportunity for innovation that have proven irresistible. But mass timber also offers a host of other advantages:

Lighter carbon footprint: Mass timber products allow the use of a renewable and sustainable resource as an alternative to more fossil fuel-intensive materials. Designers of 'tall wood' buildings have been especially focused on the reduced carbon footprint achieved by using wood, which aligns with the goals of Architecture 2030. Reducing carbon is also a priority for many public buildings and schools.

Construction efficiency: Mass timber construction is fast, and speed correlates to revenue, whether the project is an office, school, student residence, condominium, or hotel. Bernhard Gafner of structural engineering firm Fast + Epp says that, in his firm's experience, a mass timber project is approximately 25 percent faster to construct than a similar project in concrete. Noting the advantages for urban infill sites in particular, he says it also offers 90 percent less construction traffic (trucks delivering materials) and requires 75 percent fewer workers on the active deck, making for a much quieter job site.

The fact that mass timber weighs less than other materials also has a number of potential benefits, including smaller foundation requirements and lower forces for seismic resistance. Discussing the new Design Building at the University of Massachusetts, for example, structural engineer Robert Malczyk of Equilibrium Consulting says, "The seismic force is proportionate to the weight of the building.

CONTINUING EDUCATION

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PDH **1.5 PDH**

Learning Objectives

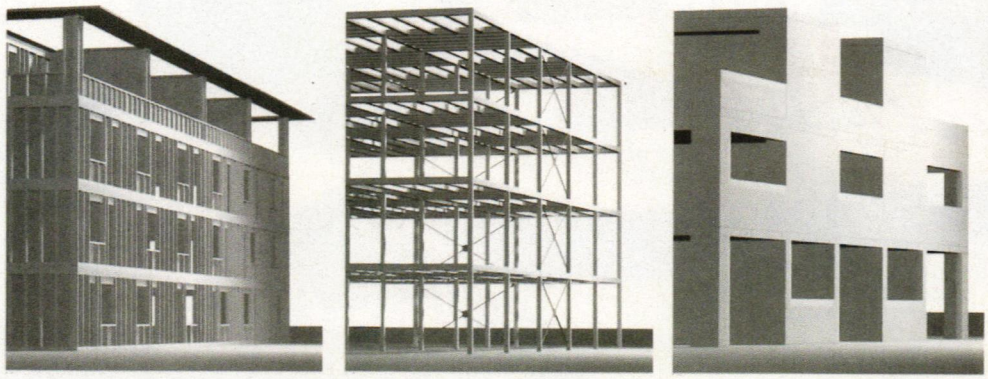
After reading this article, you should be able to:

1. Examine the trend toward mass timber buildings in the context of carbon footprint, construction efficiency, fire and life safety, occupant well-being, and other potential advantages.
2. Identify a range of mass timber products available to North American building designers.
3. Discuss research and resources related to the structural performance and fire/life safety of mass timber products.
4. Based on examples of mass timber buildings either built or under construction, describe how all-wood and hybrid systems are expanding the options for wood design.

To receive AIA credit, you are required to read the entire article and pass the test. Go to ce.architecturalrecord.com for complete text and to take the test for free. This course may also qualify for one Professional Development Hour (PDH). Most states now accept AIA credits for engineers' requirements. Check your state licensing board for all laws, rules, and regulations to confirm.

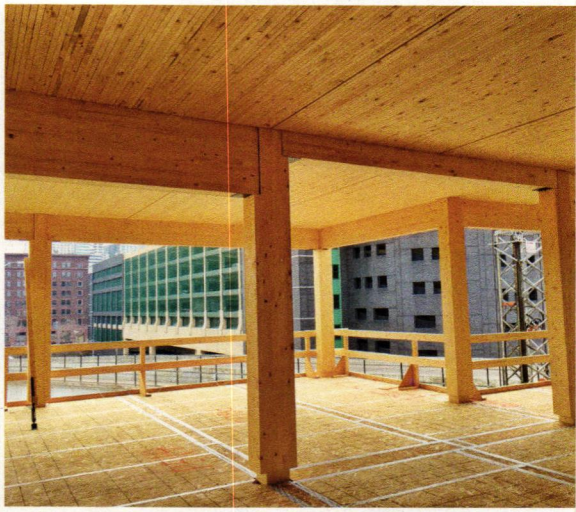
AIA COURSE #K1609D

Image courtesy of Fast + Epp



Mass timber systems are a complement to light wood-frame and post-and-beam construction.

Photo courtesy of StructureCraft



Designed by MGA, the seven-story T3 building in Minneapolis includes glulam columns and beams, and NLT floors.

If this building were designed in concrete, which was considered, the weight would be six times more than the mass timber design."

Fire and life safety: Structurally, mass timber offers the kind of proven performance—including fire protection and seismic resistance—that allows its use in larger buildings. It also expands the options for exposed wood structure in smaller projects.

Occupant well-being: An increasing number of studies focused on wood's biophilic aspects have linked the use of exposed wood in buildings with improved occupant health and well-being.[1,2]

This course is intended for architects and engineers seeking current information on mass timber, including products, research related to structural performance and life safety, and available resources. It answers common questions regarding strength, fire protection, and durability, and highlights examples of mass timber buildings in different occupancy groups to illustrate both design trends and the extent to which mass timber has captured the imagination of North American building designers.

WHAT IS MASS TIMBER?

Mass timber is a category of framing styles typically characterized by the use of large solid wood panels for wall, floor, and roof construction. It also includes innovative forms of sculptural buildings, as well as non-building structures formed from solid wood panel or framing systems of 6 feet or more in width or depth. Products in the mass timber family include:

Cross-Laminated Timber (CLT)

CLT consists of layers of dimension lumber (typically three, five, or seven) oriented at right angles to one another and then glued to form structural panels with exceptional strength, dimensional stability, and rigidity.

Panels are particularly cost-effective for multistory and large building applications. Some designers view CLT as both a stand-alone system and product that can be used together with other wood products; it can also be used in hybrid and composite applications. CLT is well-suited to floors, walls, and roofs, and may be left exposed on the interior for aesthetics. Because of the cross-lamination, CLT also offers two-way span capabilities.

CLT can be manufactured in custom dimensions, with panel sizes varying by manufacturer. There are several CLT suppliers in North America, with more anticipated. The species of wood used depends on the manufacturing plant location.

The 2015 International Building Code (IBC) and 2015 International Residential Code recognize CLT products manufactured according to the ANSI/APA PRG-320: Standard for Performance Rated Cross-Laminated Timber. Under the 2015 IBC, CLT at the required size is specifically stated for prescribed use in Type IV buildings. However, CLT can be used in all types of combustible construction (i.e., wherever combustible framing or heavy timber materials are allowed). The National Design Specification (NDS) for Wood Construction is referenced throughout the IBC as the standard for structural wood design, including CLT.

The 2012 IBC does not explicitly recognize CLT, but the 2015 IBC provisions for CLT can be a basis for its use under alternative method provisions.

For more information on CLT, the *U.S. CLT Handbook* is available as a free download at www.rethinkwood.com.

Nail-Laminated Timber (NLT)

Nail-laminated timber (NLT) is created from individual dimension lumber members (2-by-4, 2-by-6, 2-by-8, etc.), stacked on edge, and fastened with nails or screws to create a larger structural element.

NLT is far from new—it has been used for more than a century—but is undergoing a resurgence as part of the modern mass timber movement. Commonly used in floors, decks, and roofs, it offers the potential for a variety of textured appearances in exposed applications, and wood structural panels can be added to provide a structural diaphragm. NLT has also been used to create elevator and stair shafts in midrise wood-frame buildings.

NLT naturally lends itself to the creation of unique roof forms. Because panels are comprised of individual boards spanning in a single direction, both singly curved and freeform panels can be created by slightly offsetting and rotating each board relative to the others. This allows the complex geometry of curved roof and canopy structures to be realised with a simple system.

Continues at ce.architecturalrecord.com

Photo courtesy of Georgia-Pacific Gypsum

Canam Group rapidly builds panels to specification in an off-site controlled environment.

Changing the Way We Think of Prefabrication: New Solutions for Your Building Envelope

Integrated sheathing is a key component

Sponsored by Georgia-Pacific Gypsum | *By Peter J. Arsenault, FAIA, NCARB, LEED AP*

Prefabricated construction is advancing in vertical segments from hospital to government, hospitality to office, and beyond. Prefabrication firms are expanding, and new design-build business models, including their own prefabrication factories, are disrupting traditional building approaches with significant success. The benefits of prefabrication, including time savings and improved quality over traditional on-site construction methods, are now being extended to larger components of construction projects, including interior and exterior walls and the building envelope. This session will explore how prefabrication can address common issues associated with traditional building envelope construction, including weather delays, crew safety, quality control, labor shortages, and subcontractor scheduling. We will examine how traditional methods of WRB-AB application in prefabrication impact lean manufacturing productivity objectives. We will explore the impact that integrated sheathing solutions have on prefabrication productivity due to the integration of the WRB-AB during product manufacturing. Because transport and delivery of undamaged prefabricated building envelope panels is a notable challenge, we will compare the risks associated with externally applied WRB-ABs and integrated sheathing options.

Continues at ce.architecturalrecord.com

Peter J. Arsenault, FAIA, NCARB, LEED AP, *is a nationally known architect, consultant, continuing education presenter, and prolific author advancing building performance through better design.* ***www.linkedin.com/in/pjaarch, www.pjaarch.com***

CONTINUING EDUCATION

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Learning Objectives

After reading this article, you should be able to:

1. Discover how prefabrication offers productivity and management advantages for the building envelope.
2. Discuss how prefabrication can address common project management issues at the job site, including weather delays, crew safety, quality control, labor shortages, and scheduling.
3. Explore how traditionally applied WRB-AB and integrated WRB-AB sheathing solutions are impacting lean manufacturing productivity goals.
4. Compare WRB-AB integrated sheathing solutions transportability from prefabrication factory to the job site.

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AIA COURSE #K1903D

New and Upcoming Exhibitions

2020 AIANY Design Awards
New York
April 16–June 27, 2020
The exhibition at the Center for Architecture features winning projects from AIA New York's annual Design Awards program, recognizing outstanding architectural design by members, other New York–based architects, and work in the city by architects from around the world. The purpose of the awards program is to honor the architects, clients, and consultants who have achieved design excellence. Details at centerforarchitecture.org.

In Sparkling Company: Glass and Social Life in Britain During the 1700s
Corning, New York
May 9, 2020–January 3, 2021
Designed by Selldorf Architects, this exhibition at the Corning Museum of Glass will present glass-embroidered costumes, lighting and tableware, mirrors, and dressing-room accessories of the 18th-century British elite. See more at cmog.org.

Tomás Saraceno: Particular Matter(s)
New York
May 6–August 9, 2020
The installation by the Argentinian artist features new and earlier works, including spiderwebs, in the McCourt space at the Shed. For more information visit theshed.org.

Scandinavian Design and the United States, 1890–1980
Milwaukee
May 15–September 7, 2020
At the Milwaukee Art Museum and co-organized by the Los Angeles County Museum of Art, this exhibition presents the exchange of design ideas between the United States and Nordic countries between 1890 and 1980. It features furniture, textiles, drawings, ceramics, jewelry, glass, and other product designs, organized into six themed sections: Migration and Heritage, Selling the Scandinavian Dream, Design for Diplomacy, Teachers and Students, Travel Abroad, and Design for Social Change. More at mam.org.

Serpentine Pavilion
London
June 11–October 11, 2020
The program's 50th annual structure in Kensington Gardens is designed by Johannesburg-based firm Counterspace. The Pavilion will include movable small parts that will be displaced to neighborhoods across London. Following community events at these locations, the parts will be returned to the structure, completing it over the summer. The seasonal structure will host events, performances, debates, discussions, and symposia linked to this year's exhibition, *Back to Earth*, which invites artists' responses to climate emergency. See serpentinegalleries.org.

Ongoing Exhibitions

Public Works: Reflecting on 15 Years of Project Excellence for New York City
New York
Through April 4, 2020
The exhibition at the Center for Architecture highlights the NYC Department of Design and Construction's "Project Excellence" program, established to elevate the design of public spaces in New York. Established in 2004, the project works in partnership with experienced design and construction professionals to provide enduring, accessible, and community-

oriented spaces that can shape the city's neighborhoods. Details at centerforarchitecture.org.

McCormick AfterParti
Elmhurst, Illinois
Through April 12, 2020
Visitors to the exhibition by architects and educators Joseph Altshuler and Zack Morrison are invited to explore Mies van der Rohe's McCormick House, with its original 1952 floor plan, for a series of interactive events throughout the space. Open discussions about past and future preservation efforts will take place. See elmhurstartmuseum.org.

Arabesque
New York
Through April 18, 2020
The exhibition by Beirut-based artist Rayyane Tabet juxtaposes the work of American architect Julia Morgan and French architectural historian Jules Bourgoin to reflect upon notions of appropriation and context. This is the third installation in Building Cycles, a year-long program that examines "building" as both a place and a process at the Storefront for Art and Architecture. More at storefrontnews.org.

New Circadia
Toronto
Through April 30, 2020
The interactive exhibition at the University of Toronto's Architecture and Design Gallery, curated by professor Richard Sommer and design firm Pillow Culture, is made of three spaces where visitors disconnect from their phones, store their belongings, and explore dreamlike rooms where they can rest and meditate. It aims to address the question: "how can architects counter the over-mechanization of everyday life?" See more information at daniels.utoronto.ca.

Access for All
New York
Through May 16, 2020
This exhibition, at the Center for Architecture, highlights public and private projects in São Paolo that improve the life of its citizens by creating inclusive places for urban society. Through commissioned drawings, films, interviews, archival materials, and "infographics," the exhibition illustrates the city's rich architectural history. Visit centerforarchitecture.org.

Neri Oxman: Material Ecology
New York
Through May 25, 2020
Neri Oxman, a professor of media arts and sciences at the Massachusetts Institute of Technology's Media Lab, coined the term "material ecology" to describe techniques and objects that are informed by and directly engage with the structures, systems, and aesthetics of nature. The seven projects in this exhibition are "demos" for a library of materials and processes that might someday be available to all architects and designers. The objects and structures blend biology, architecture, engineering, and design. More at moma.org

Boro Textiles: Sustainable Aesthetics
New York
Through June 14, 2020
At the Japan Society, this exhibition (designed by architecture firm SO-IL) explores traditional Japanese folk textiles and their continued influence on creative practices today, featuring Japanese avant-garde fashion designers Rei Kawakubo for Comme des Garçons, Issey Miyake, and Yohji Yamamoto.
More at japansociety.org.

Cairo Modern
New York
Through July 11, 2020
The exhibition at the Center for Architecture, curated by Mohamed Elshahed, Practitioner-in-Residence, Hagop Kevorkian Center for Near Eastern Studies at NYU, features 20 demolished, extant, and proposed projects from Cairo dating from the 1930s to the 1970s. The exhibition also serves as a call to action, asking audience members to rethink the impact and importance of global Modernism. Visit centerforarchitecture.org.

Eileen Gray
New York
Through July 12, 2020
On view at the Bard Graduate Center Gallery, this exhibition explores Gray's career not only as an architect and designer, but also as a painter and photographer. Nearly 200 of her works will be featured, including furniture, lacquer works, architectural drawings, and archival materials. See bgc.bard.edu.

Countryside, The Future
New York
Through August 14, 2020
Architect and founder of Rotterdam-based firm OMA Rem Koolhaas created this exhibition for the Solomon R. Guggenheim Museum to explore Earth's rural areas. The installation, which occupies the museum's rotunda, is premised on original research by AMO (the firm's research and design studio), Koolhaas, and with students at the Harvard Graduate School of Design, the Central Academy of Fine Arts in Beijing, Wageningen University in the Netherlands, and the University of Nairobi. For more information see guggenheim.org.

Making Architecture
Bellevue, Washington
Through September 13, 2020
This exhibition displays American architect Steven Holl's work at the Bellevue Art Museum, which he designed. It includes watercolor drawings, material fragments, models, sculpture, photographs, and writings both by and about Holl. See more at bellevuearts.org.

Lectures, Conferences, and Symposia

Vectorworks Design Summit
San Diego
April 22–24, 2020
Professionals, educators, and students in architecture may attend the annual event, hosted at the Omni La Costa Resort & Spa. The conference includes workshops, product training, keynotes, networking opportunities, and a party. More at vectorworks.net/design-summit.

2020 Wright Plus Housewalk
Oak Park, Illinois
May 16, 2020
The all-day annual architectural experience presented by the Frank Lloyd Wright Trust is held in the Chicago suburb that is home to more Wright buildings than anywhere in the world. For one day, homeowners invite guests into the private living spaces of their houses, restored but reimagined for today's lifestyles. Guides will be on hand with details about the history and architecture that give each house its character. See flwright.org/wrightplus.

Atlanta Design Festival
Atlanta
May 30–June 11, 2020
The annual week-plus event, held since 2007, will include a series of architecture tours, showroom presentations, talks, and installations around the city. For more information go to atlantadesignfestival.net.

Young Architect Conference
Portland, Maine
July 24–26, 2020
This three-day event is for architecture students and graduates within the first 10 years of receiving their license. Programming includes speakers and workshops. To learn more, see conference.youngarchitect.com.

Competitions

Urban Confluence Silicon Valley Open Design Competition
Deadline: April 3, 2020
International artists, architects, urban planners, landscape architects, lighting designers, and students may submit ideas for a structure intended to be a symbol of Silicon Valley. The competition seeks a transformative design complete with dramatic lighting, a net zero energy approach, and an impressive physical presence. Three finalist teams will each be given a $150,000 stipend to refine their proposals. See urbanconfluencesiliconvalley.org.

DETAIL Prize
Deadline: April 30, 2020
This prize, awarded every two years by DETAIL, goes to projects that are notable for outstanding architectural-design and technical qualities. Any building types completed anywhere in the world after January 1, 2017, are eligible to win.Construction projects for new buildings, renovations, conversions, and extensions may all be submitted; open to architects, civil engineers, structural engineers, and students. The three best submissions, according to overall design concept and detailing, will be chosen as prize-winners. See detail-online.org.

Landslide 2020
Deadline: May 1, 2020
The Cultural Landscape Foundation (TCLF) released a call for project nominations for the foundation's annual report about threatened and at-risk landscapes. This year's theme, Women Who Shaped the American Landscape, coinciding with the centennial of women's suffrage, will focus on at-risk landscapes created by or associated with female landscape architects. The report will be released in September, along with a website and a travel-

ing photographic exhibition that will debut at the Boston Architectural College, September 8. For more information, go to tclf.org.

Architecture at Zero
Deadline: May 11, 2020
This competition—which is open to students, architects, landscape architects, urban planners, engineers, and designers anywhere in the world—is to create a zero net energy library for the San Benito County Free Library in Hollister, California. The preferred design will not include natural gas and instead use electric power. Up to $25,000 in total prize money will be awarded to student and professional winners. Learn more information at architectureatzero.com.

Healthier Design Innovation Contest
Deadline: May 18, 2020
Th fourth annual competition is presented by the Healthy Materials Lab at Parsons School of Design. To be eligible, you must be currently enrolled in an undergraduate or graduate-level degree-seeking program, but may live outside the U.S. Winners will be chosen on the basis of healthy material innovation and advocacy in design. Entries can include models, prototypes, artwork, or visual media. Documentation of the design process through pictures, drawings, or short videos is also required. Another submission requirement is an annotated life-cycle diagram summarizing the carbon impact of your design. More at healthymaterialslab.org.

San Francisco Affordable Housing Challenge
Deadline: June 1, 2020
This competition was created to help solve the San Francisco housing crisis. There are no specific requirements to submit, so participants are encouraged to be as creative as possible with their proposed solutions. Project designs should be flexible, enabling them to accommodate people in varied situations. The jury will also be looking for designs that challenge typical ideas of housing and the community as a whole. Winners will not only receive prize money, but will also be featured in the next ARCHHIVE BOOKS publication on the topic of affordable housing, scheduled for publication in Winter 2020. For more, see sanfranciscochallenge.beebreeders.com.

Low-Cost House Design Competition
Deadline: June 1, 2020
This competition aims to promote alternative solutions to housing, coming up with affordable and sustainable units of limited size and budget to meet urgent demands for housing urban and low-income residents. Entrants are challenged to conceive a new and original concept for a low-cost house with expandable units or local materials. Each submission must be for no more than two floors (including the ground floor) with a maximum 500-square-feet single-floor plan. Winners receive cash prizes totaling $1,000–including $500 for the first-place winner–and will be posted on the official website. More at low-costhouse.com.

2020 Architecture & Film Symposium Call for Papers
Deadline: June 7, 2020
Hosted by the University of Cincinnati School of Architecture & Interior Design, the symposium uses cinematic representations of the built environment as a basis for theoretical debate. The symposium, titled "Of movement," will focus on a number of questions that explore the intersections of film and architecture. See architectureandfilm.org.

Airport of the Future Design Competition
Deadline: July 1, 2020
Students and recent graduates from around the world are invited to submit to Fentress Global Challenge's competition as they create a new airport-terminal concept. Entrants are encouraged to utilize forecasts for population, environmental conditions, modes of travel, and potential destinations in the creation of their concept. Submissions will be judged on innovation and creativity, responsiveness to the site, sustainability and resiliency, and functionality. First place will receive $15,000 in cash and prizes, and four additional entries will also receive awards. For more information, see fentressglobalchallenge.com.

Pour
Deadline: July 21, 2020
The purpose of this competition is to design a modern-day winery that provides a consumer experience that drives the socio-economic development of the community around it. Entrants must deliver an architectural design based on the given site specifications. Anyone over the age of 18 may submit proposals, either individually or in groups of up to four. For more, see uni.xyz.

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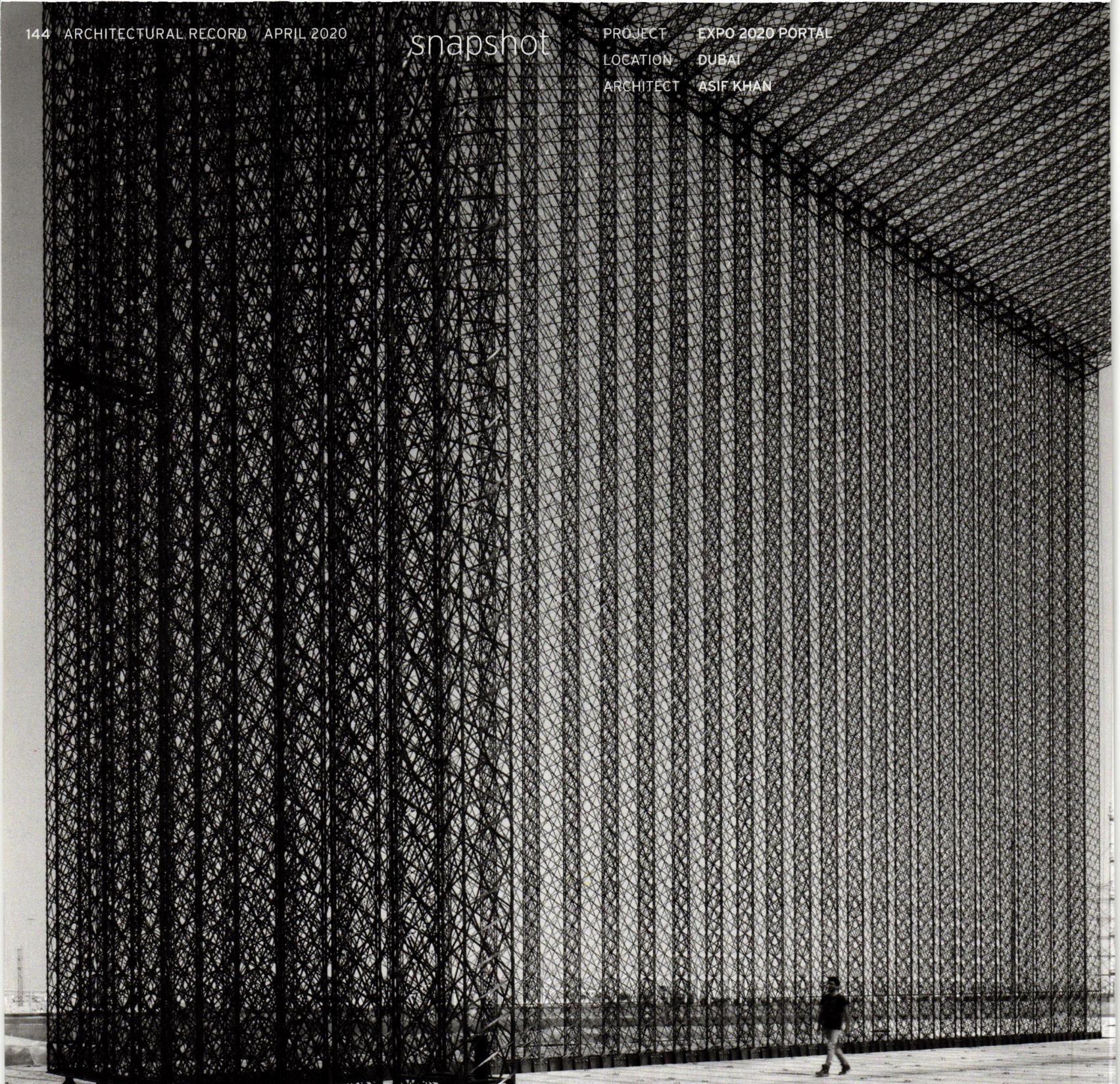

IT COULD be said that British architect Asif Khan is the unofficial welcoming committee of next fall's Expo 2020 in Dubai. For the three mammoth carbon-fiber entryways he imagined on the exposition site, Khan drew inspiration from the region's traditional architectural elements and describes his design as "an exploration of the traditional *mashrabiya*"—a common Arabic lattice-work window enclosure that helps control sunlight and airflow. "I wanted the portals to appear from a distance like paper-thin screens," he says, "like ethereal drawings in the sky." The lightweight structures—69 feet high and nearly 100 feet wide—each have a 34-foot-wide door that will open for visitors every morning during the World Expo, scheduled to run from October 20, 2020, through April 10, 2021. *Kara Mavros*

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