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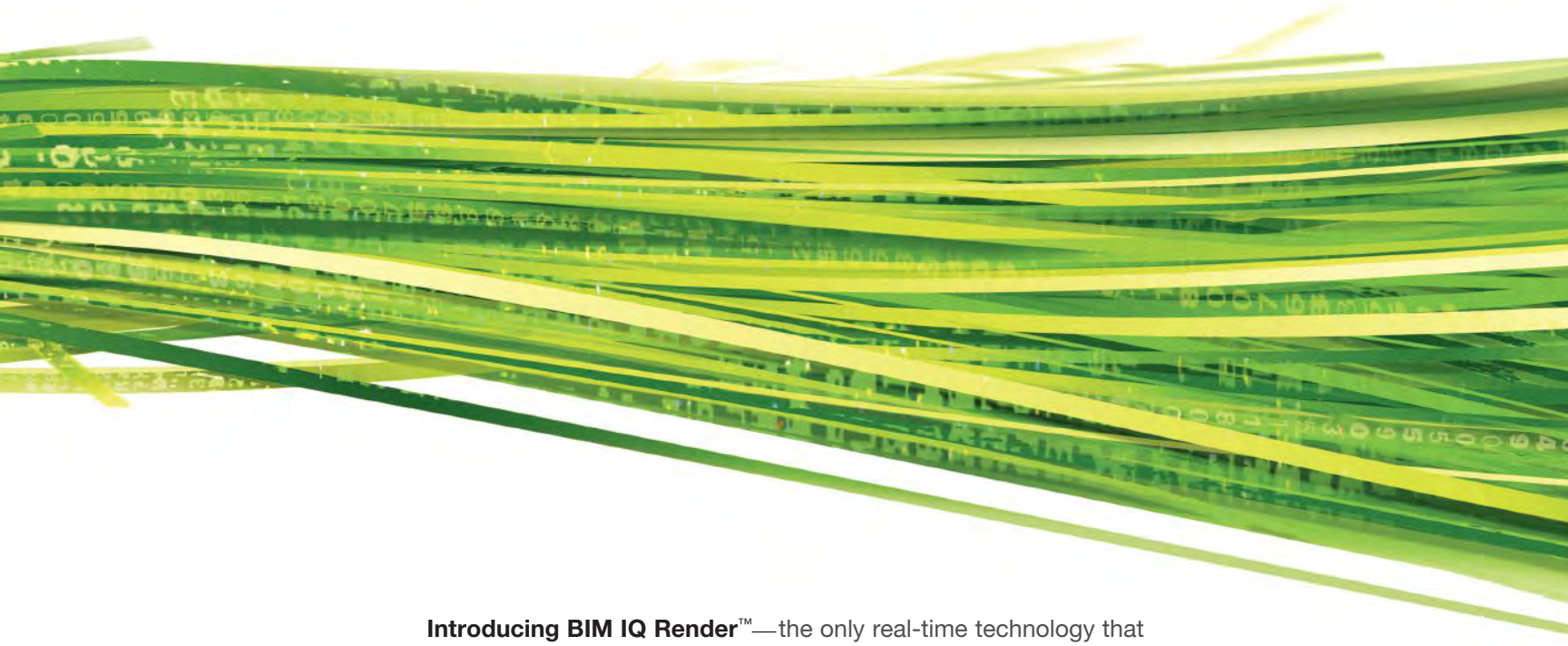

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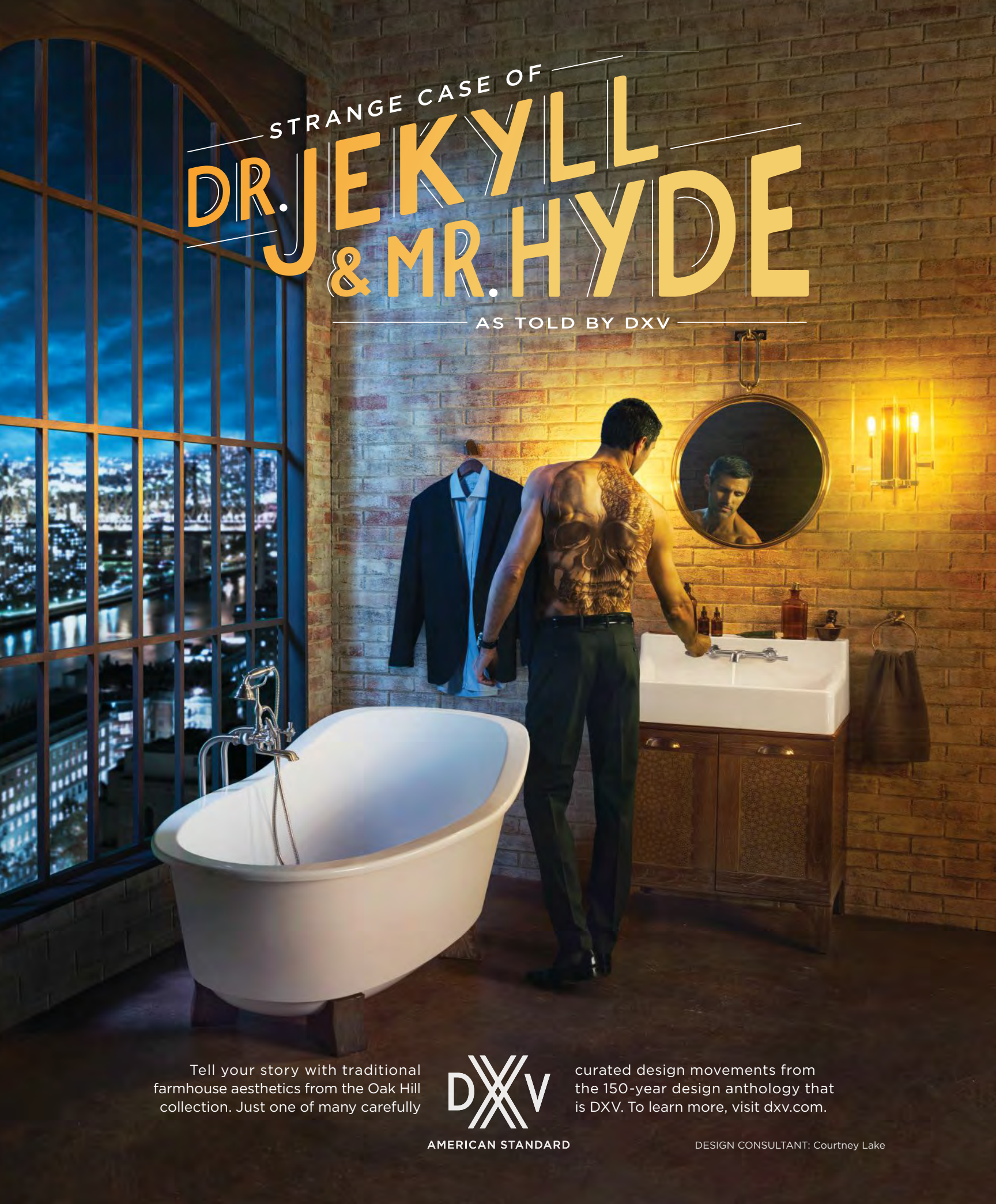
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Attack of the 40-Foot Printer

Italian engineering company WASP (World's Advanced Saving Project) debuted its 40-foot-tall BigDelta 3D printer in September. Measuring 19.6 feet wide and fitted with a rotating nozzle that also functions as a mixer, WASP's BigDelta can extrude a range of materials including clay reinforced with chemical additives, and even concrete. The company hopes that the printer can eventually fabricate individual dwellings using locally sourced materials, particularly in regions lacking robust construction supply chains or as a part of disaster-relief efforts. —HALLIE BUSTA

> *Want more cool stories? Find a full rundown of the latest and greatest in design technology each Friday online in This Week in Tech.*

Green Apple

The Vallco Shopping Mall in Cupertino, Calif., was facing the same sad fate as many other dead malls. So developer Sand Hill Property bought the mall in 2014 and hired Rafael Viñoly Architects and OLIN Landscape Architects to turn the dying structure into the Hills at Vallco, a new center for Apple's hometown, with 2 million square feet of office space, 680 market-rate and 120 affordable and senior housing apartments, movie theaters, bowling, ice skating, and more. The roof will be a 30-acre park, with a 3.8-mile trail network, which will be the largest green roof in the world. The plan should go before the city planning board for review in 2016.

> *See more renderings of the Hills at Vallco project at bit.ly/HillsAtVallco.*

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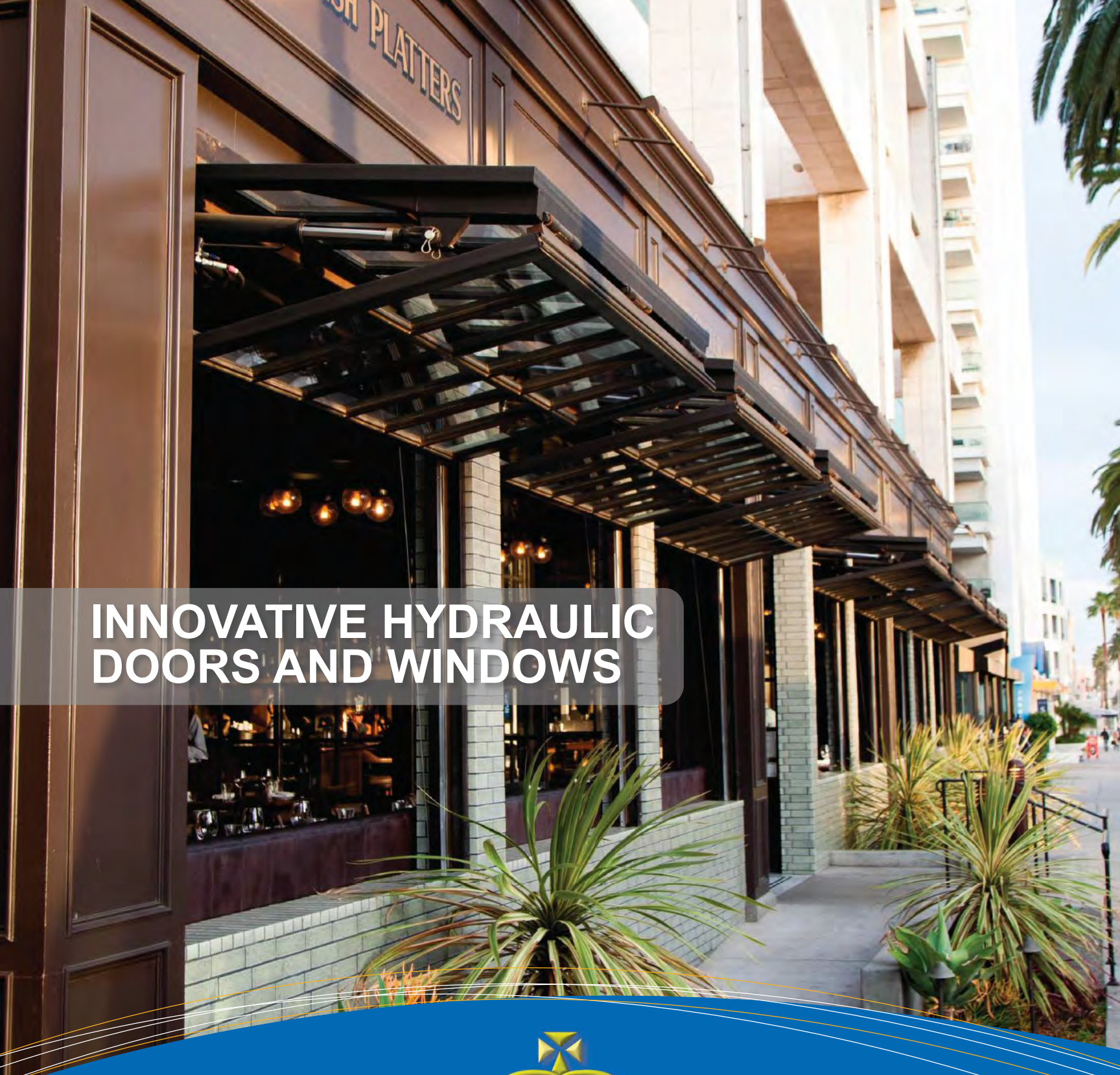

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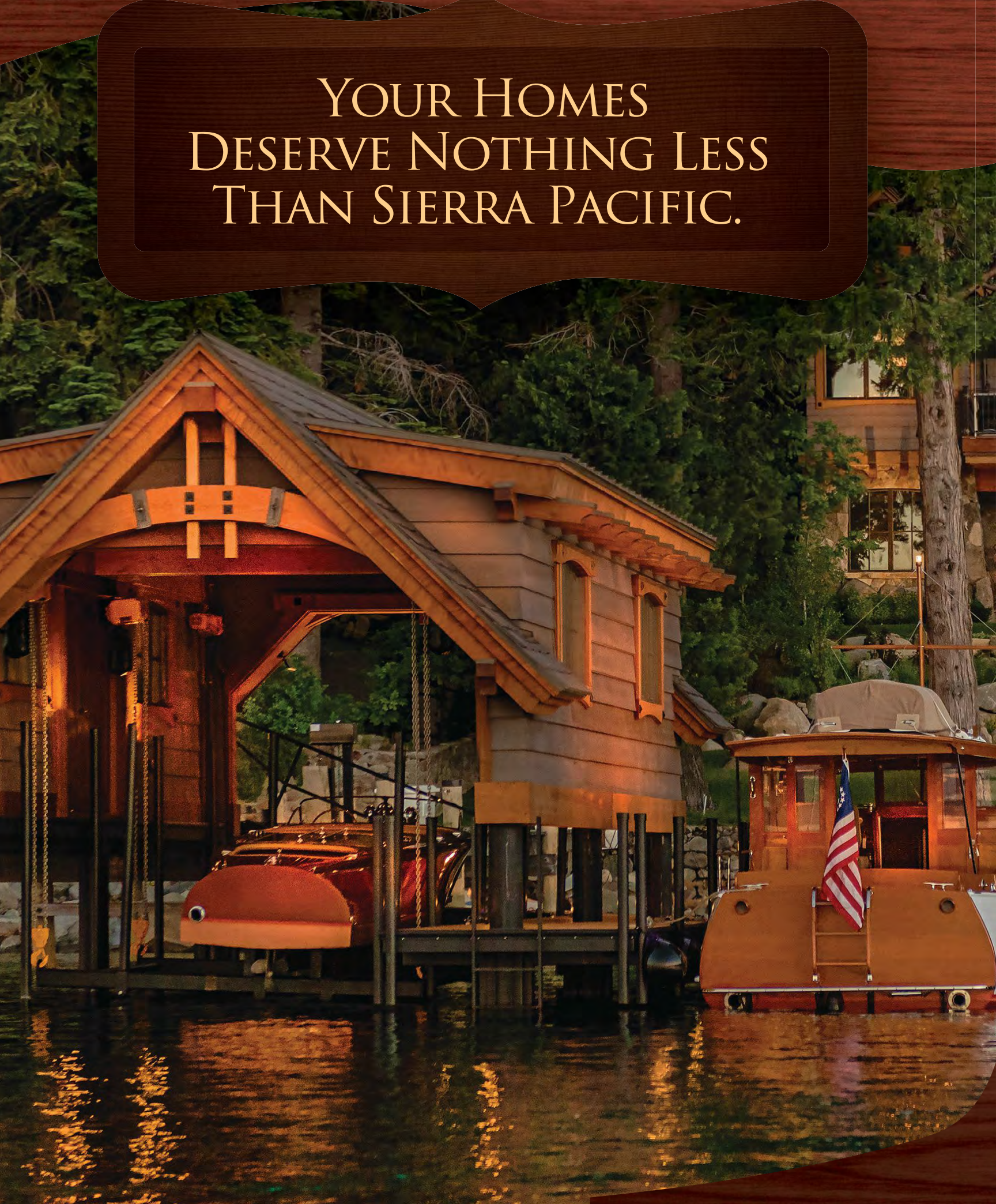

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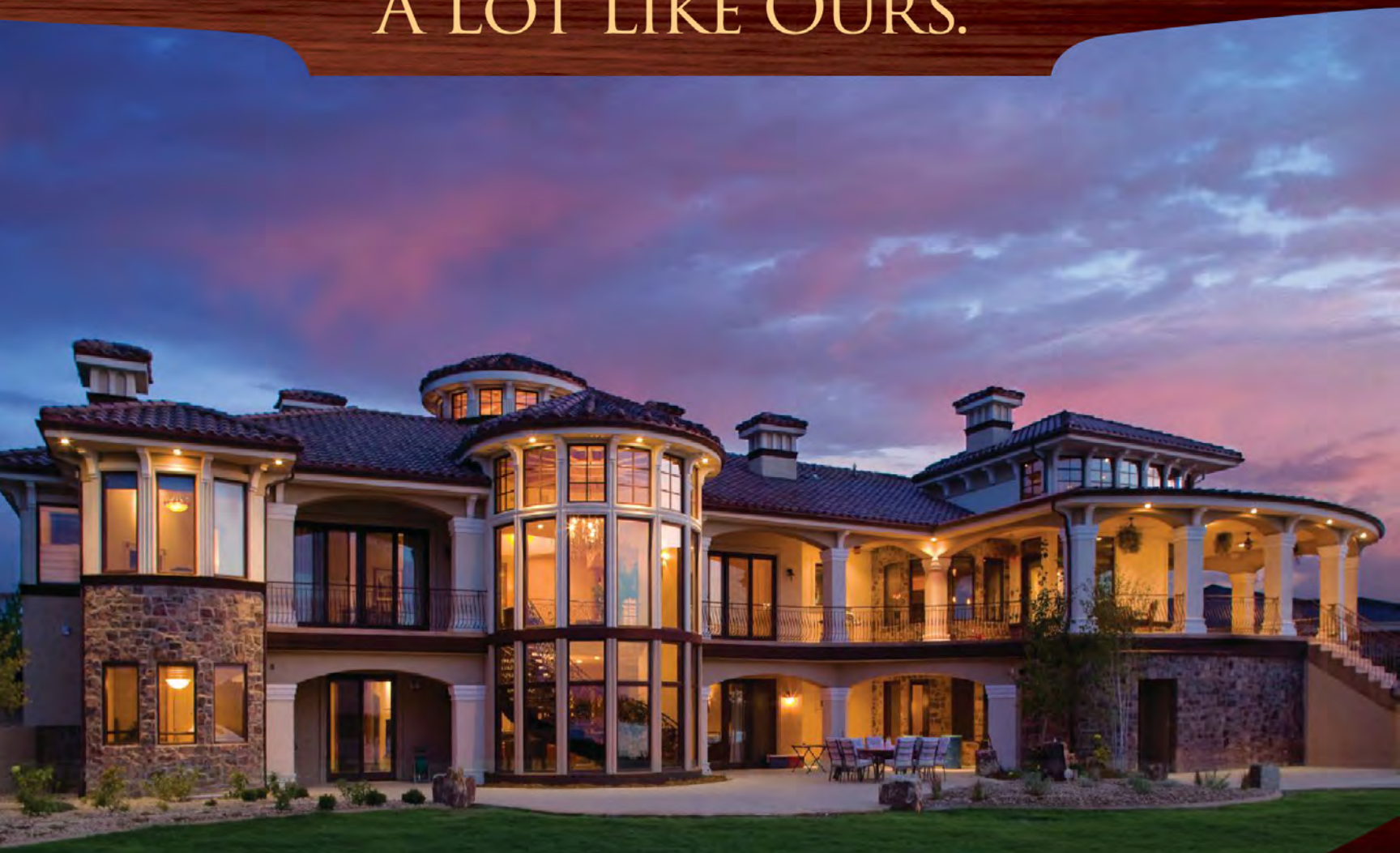

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DEADLINES

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DETAILS

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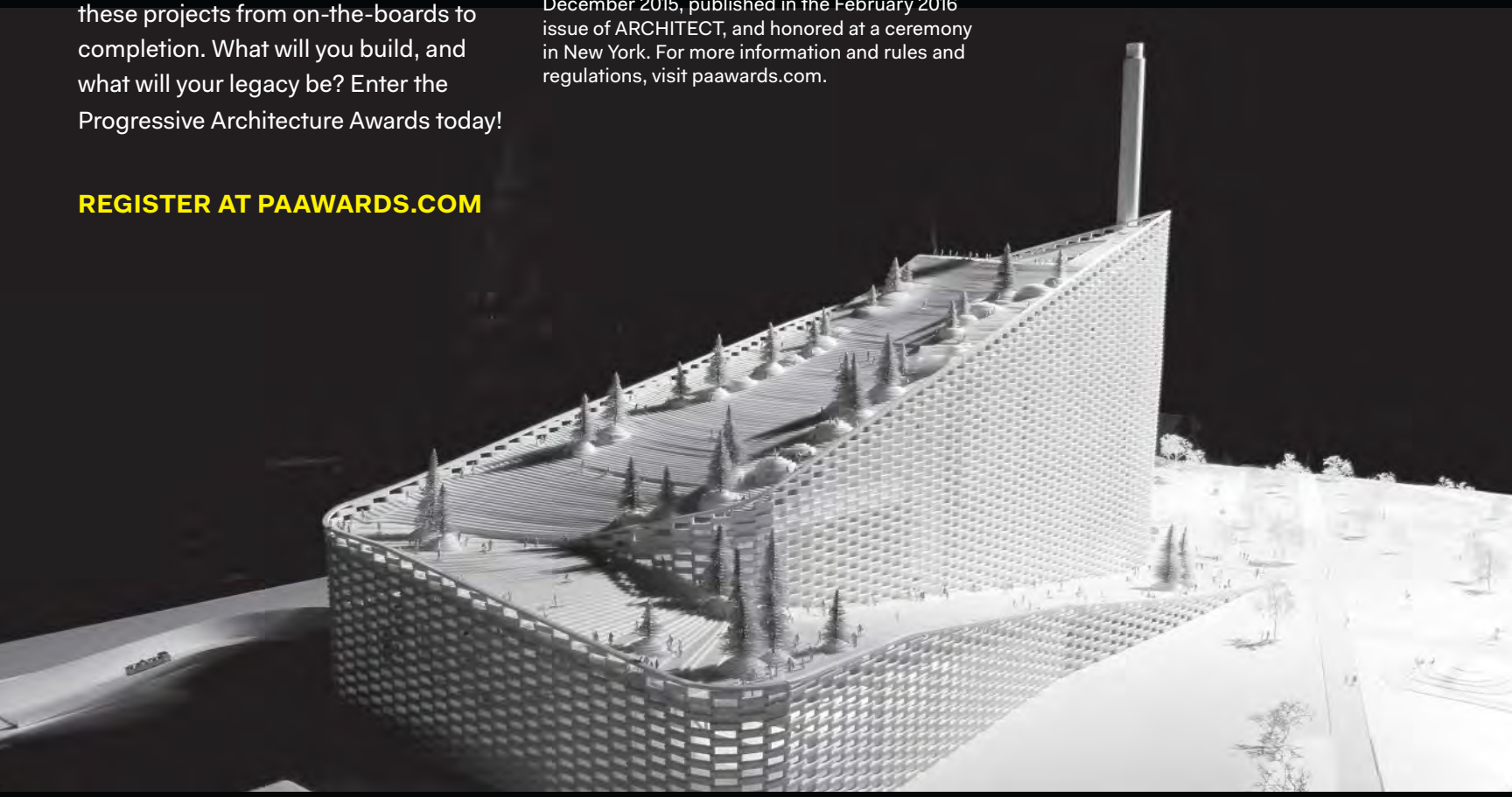

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Back to Life

The $175 million renovation of St. Patrick's Cathedral in New York finished just in time to welcome Pope Francis, who led evening prayer there as part of his first U.S. visit. James Renwick Jr.'s 1879 landmarked Gothic Revival church had cracked columns and a crumbling exterior which propelled a restoration by roughly 170 specialists and consultants. The marble façade was cleaned with a Rotec system, the ceiling with a chemical latex peel. The stained-glass windows were cleaned, restored, and given UV-filtering laminated glass. And, still under construction, geothermal wells, as deep as the Empire State Building is tall, will provide heating and cooling. —EMILY HOOPER

> *To read the full story of the restoration with complete details of what was fixed and upgraded, visit bit.ly/StPatricksRestoration.*

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native colors & fluid curves

The Cherokee Nation's new Casino Ramona stands in the Oklahoma town where the first commercial oil well was drilled in 1897. "The curved building form relates to the fluidity of oil, while breaking down the general rectangular floor plan to create a more appealing look from the highway."

- Selser Schaefer Architects

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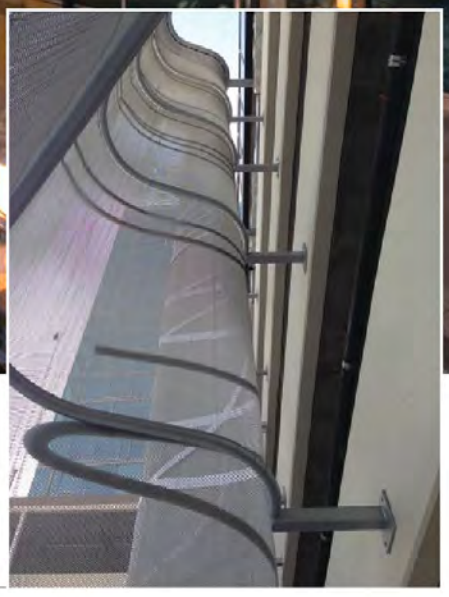

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Sky High with Timber

Last month, the U.S. Department of Agriculture, the Softwood Lumber Board, and the Binational Softwood Lumber Council awarded two projects with their U.S. Tall Wood Building Prize. To be considered, the projects needed to be at least 80 feet tall and source their engineered-wood materials from U.S. producers. The winners are Framework—a mixed-use high-rise in Portland, Ore., by local firm Lever Architecture—and 475 W. 18th—a residential high-rise in New York City by SHoP Architects with Arup and Atelier Ten (shown). The two teams will split $3 million to support research and development. —HALLIE BUSTA

> *To learn more about the awards program and the two winning projects, visit bit.ly/TallWoodBldgPrize.*

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Drones for Peace

Responding to Africa's severe lack of reliable roads, Foster + Partners' Droneport is designed to support cargo drones that will deliver supplies to remote areas. At each outpost, two drone networks would work together, one using smaller drones for medical and emergency supplies and the other moving larger payloads. Part of the École Polytechnique Fédérale de Lausanne's Afrotech initiative, the pilot will begin in Rwanda in 2016. Its three buildings, scheduled to be completed by 2020, will be able to supply 44 percent of the country. Forty more Droneports that follow could allow expansion of the drone network to neighboring countries such as Congo.

> *For more images and a complete project description, visit bit.ly/Droneport.*

Inspiring Minds

When Entheos Academy announced a plan to build a new school, they invested not only in the building but also in the community it serves. The new structure utilizes an array of metal roof and wall panels to create a functional space designed to inspire the curiosity of young minds.

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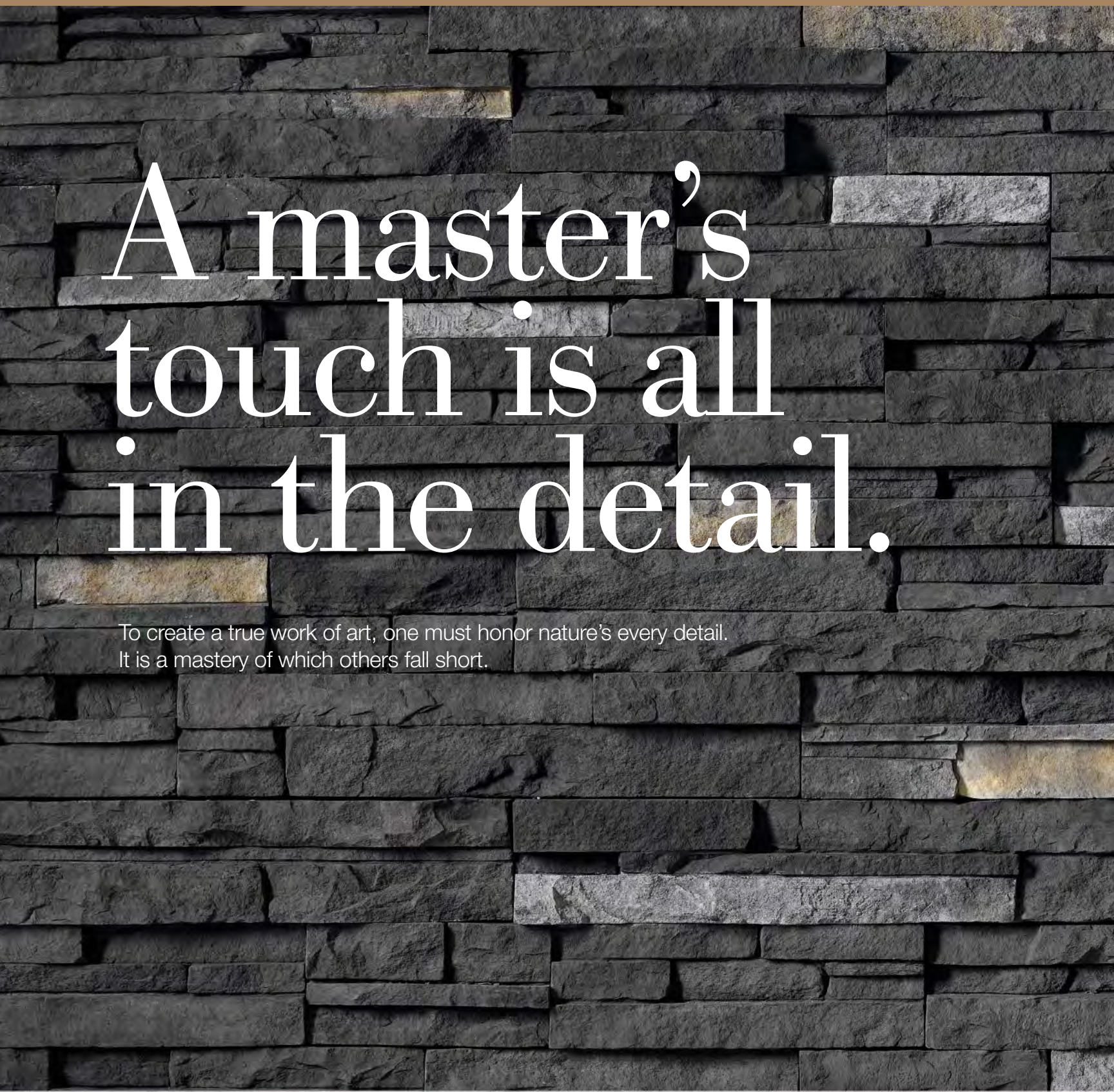
Mid-Atlantic Merits

In September, AIA Maryland announced the 22 winners of its 2015 Excellence in Design Awards Program. The winning projects include the renovation of a 1920 Colonial-style home, the rehab of the White House Visitor Center, and the conversion of a former tobacco-processing complex into a university building. The jury gave out 12 honor awards, six merit awards, and three citations. The Interdisciplinary Science and Engineering Laboratory at University of Delaware by Ayers Saint Gross (shown above) took home a merit award. In the same announcement, AIA Maryland revealed the 12 winners of its Student Design Awards. —CHELSEA BLAHUT

> *To see all 22 winners and 12 student winners in the AIA Maryland Design Awards, visit bit.ly/AIAMarylandAwards.*



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Best Practices: Handling a Breakup

TEXT BY ALICE LIAO

Even when amicable, the breakup of a partnership can quickly come off the rails if it is not meticulously planned and negotiated with diplomacy and goodwill. To ensure a smooth transition, all parties must communicate openly to resolve issues including legal and financial settlements, project allocation, and messaging to clients.

Discuss the Reasons for Separating

First, firm partners should be clear on the grounds for splitting up. "I like people to get a big picture so they don't lose the underlying reasons [for why they are going through the process] when they start getting caught up in the details," says Peter Piven, FAIA, principal consultant of Peter Piven Management Consultants, in Philadelphia. He advises establishing a detailed vision for life post-separation.

> "It's never too late to do a partnership agreement or redo an existing one."
>
> —Warren Friss, partner, Ingram Yuzek Gainen Carroll & Bertolotti

Consult an Attorney Immediately

A lawyer can help translate provisions in the original business contract that address departures or firm dissolution. In the case of one partner leaving a practice, Piven and Larry Gainen, a founding partner of New York–based law firm Ingram Yuzek Gainen Carroll & Bertolotti, suggest the departing leader speak to an attorney independent of the firm to avoid a conflict of interest.

Establish a Robust Agreement

Work with an attorney to develop an agreement that "reflects the nature of your firm and partner relationship," says Dan Maginn, FAIA, principal of Draw Architecture + Urban Design in Kansas City, Mo., who left El Dorado in February. "It's never too late to do a partnership agreement or redo an existing one," says Warren Friss, also a partner at Ingram Yuzek.

Develop a Sunset Plan

Whether winding down a firm or a partner role, Maginn recommends "design[ing] the transition from beginning to end." The sunset plan should address everything from the transfer of contracts and division of assets to assignment of rights, and to attribution of projects. Attach a timetable to the plan and as decisions are made, memorialize them in a termination agreement.

Transitioning clients and ongoing projects requires open communication and a desire that all parties "come out with their fair share," says Michael Farewell, FAIA, principal of Princeton, N.J.–based Farewell Architects. If firm leaders cannot reach an agreement on a client, designate a separation date after which a departing partner or the partners may solicit them, Gainen says.

Notify Staff and Clients

Employees often sense that change is afoot prior to the formal announcement, so inform them once a sunset plan is in place. Exercise "diplomatic care" because "you're dealing with people's emotions and expectations," Farewell says. "You don't want key people leaving to work elsewhere," but employees, as well as clients, do have the right to work with whomever they wish.

Firm leaders must also decide whether all partners will be present to tell the clients or if the partner with the working relationship makes the call. Clients should be informed soon after the staff are notified, and a consistent message should be delivered to reassure them that their projects will not be negatively affected.

Control the Message

Consider hiring an expert to craft a media plan. When Maginn shifted from El Dorado to Draw, both firms hired a public relations specialist and reviewed a draft of the press release before it was issued. "I truly believe change is good but messages can be easily interpreted in different ways," he says.

According to El Dorado principal David Dowell, AIA, having a history of honest communication among partners helped ease the departure of Maginn, who cofounded the firm. Equally important, Dowell says, is acknowledging that separation "is part of life and it's going to happen at some point."

> *Read the full story, with more tips on how to delicately break up a partnership, at bit.ly/businesspartnerbreakup.*

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Detail:
Kaeng Krachan Elephant Park Shell

TEXT BY EMILY HOOPER

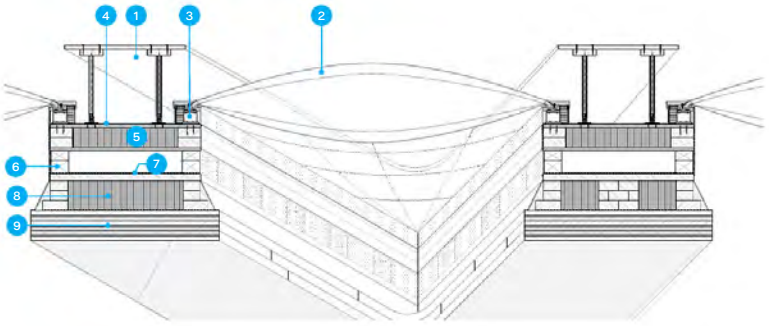
The Kaeng Krachan Elephant Park compound at the Zurich Zoo is capable of withstanding the 15-ton force generated by a charging occupant, but that didn't stop local firm Markus Schietsch Architekten (MSA) from imparting an aesthetic delicacy to the 90,900-square-foot structure, completed in 2014. The nature-inspired habitat is topped by a 73,200-square-foot shell roof made primarily from wood.

From a distance, the undulating, free-form shell looks like a giant tortoise shell with its intricate patterning and silver-hued patina. Spanning 260 feet, the assembly comprises 550 uniquely shaped, cross-laminated spruce panels stacked in three layers connected by more than 600,000 21-centimeter-long nails. Each panel layer is offset at a rotation of 60 degrees to divide the force distribution along the wood grain. The panels were pre-scored to guide the on-site assembly process in which the Bremen, Germany–office of Metsä Wood CNC-milled and bent the panels over scaffolding-pipe structures to a radius between 40 meters and 80 meters.

The shallow roof also features 271 apertures, creating the dappling effect of a tree canopy. The openings were pre-cut in the top panel layer, but hand cut in the bottom two layers in situ. Overall, 30 percent of the shell is open. ETFE cushions form raised skylights in each aperture. The edges of the skylights are clamped into an integrated aluminum gutter. Rainwater and snow runoff is harvested from the roof to irrigate plants and fill the elephants' pools.

An outermost layer of laminated veneer lumber (LVL) panels protects the entire roof assembly. The panel faces were left unfinished to showcase the wood's natural patina, which appears silver in sunny, dry conditions, and black when the roof is wet, says MSA partner Philipp Heidemann, who served as the project architect. "We like that the material is almost like a living thing."

ANDREAS BUSCHMANN



1. 33mm Kerto Q LVL protective panel
2. ETFE cushion, three-ply with hail-proof layer
3. Integrated aluminum gutter
4. Sarnafil TG 76-18 Felt roof membrane
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8. Box girder wood and insulation
9. Cross-laminated spruce panels, three layers

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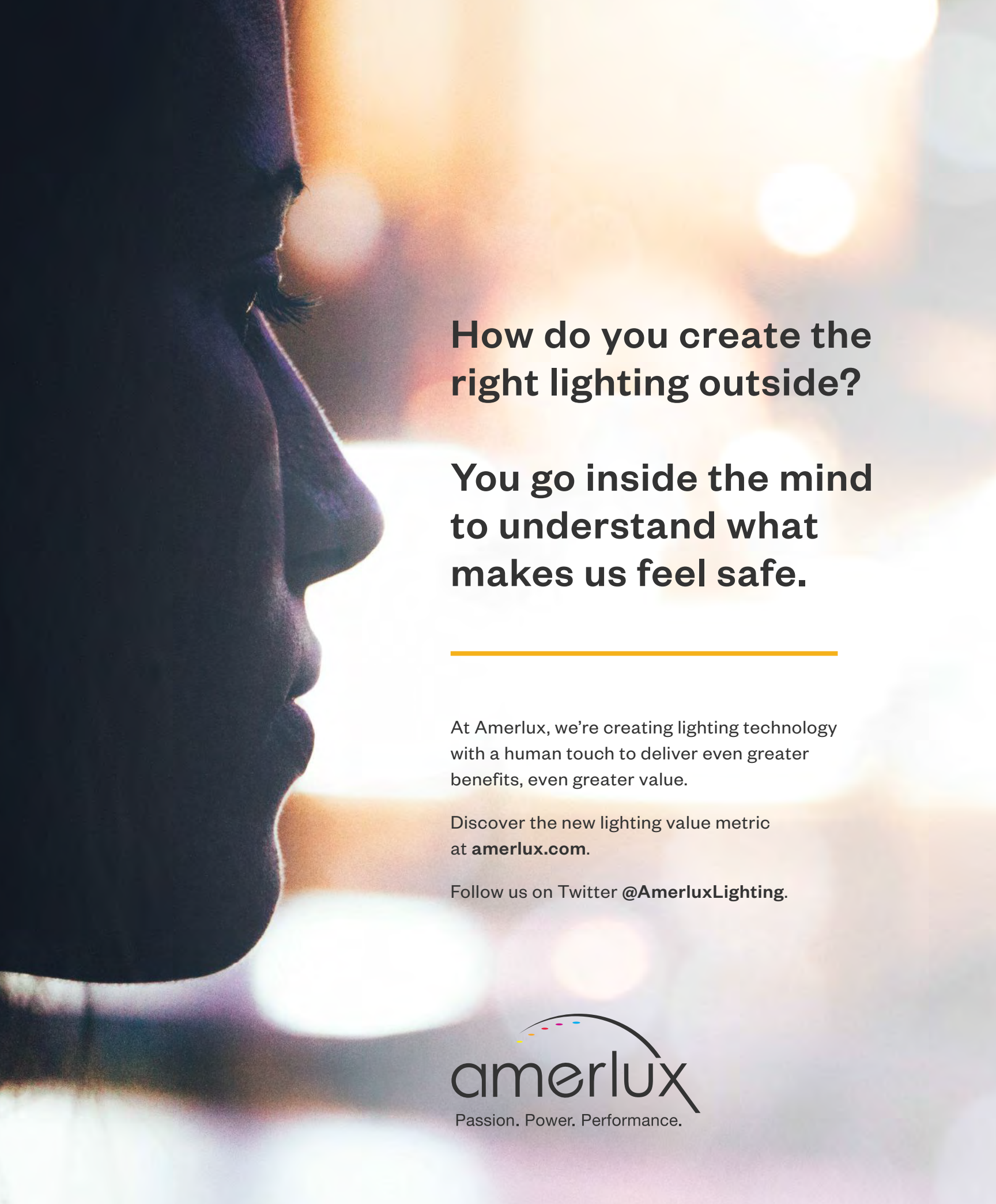

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Next Progressives: Thinktank Design Group

TEXT BY DANIELLE RAGO
PORTRAIT BY ERIC SCHMIDT

Established in 2009 by Erik Nelson, AIA, and Brian Caldwell, AIA, Thinktank Design Group is a collaborative partnership that mediates between architectural practice and real estate development. Based in Bozeman, Mont., Thinktank strategically employs its setting to establish geographical and cultural context for its work. The small office focuses the majority of its efforts on local design and development projects that range from residential work to civic and commercial projects.

Bozeman's "sense of place and inspiring landscape for architecture" were big draws for the firm, Nelson says. Because of their focus on working within the city, Caldwell and Nelson remain attuned to the needs and wants of local residents while instilling modern ideals and contemporary thoughts about architecture in their community.

In Bozeman, like many other cities, there is a constant struggle between infill—and the compact living conditions that accompany it—and sprawl development. Thinktank's experience as developers allows them to identify properties or infill lots that can be reinvigorated. By seeing a project through from its start to finish, Thinktank has been able to enhance the vernacular of the city. "The amount of rigor and self-restraint you need to be a successful developer is difficult to balance with the desire to constantly promote a higher quality and better vision for architecture," Caldwell says.

Taking critical regionalism as a point of departure, Thinktank interprets trends in architecture and applies them with materials that reflect their projects' respective sites as well as the regional climate and landscape. One recent project, Shotgun Modern, reinterprets the shotgun house typology by keeping the downtown Bozeman structure's original form and footprint, but redistributing the program through a modern addition. Another project, dubbed Live Big Small Lot, activates its 30-foot-wide lot by placing the living spaces on the second floor to capture views of the surrounding mountains.

For Caldwell, architecture is about placemaking more than it is about making spaces for people to occupy: "It's not merely an exercise in how cool the building looks," he says. "So it's very important to take that [ideal] into account as we look to the future in what we're creating."

These strategies have also been implemented in commercial projects such as the Lark, a motel renovation in downtown Bozeman that Thinktank both developed and designed. "It's the first time we were able to pull our approach into a single project," Nelson says.

The old motel, originally slated for redevelopment as a conventional office/retail complex, was rife with the potential to address "a tremendous need for hospitality downtown, where people visiting Bozeman could enjoy how great it is," Nelson says. Thinktank carried out the project from its infancy in land development and permitting, introduced it to the creative partnerships who acquired the property, and ultimately carried out Thinktank's design vision for a quirky, boutique hotel.

Brian Caldwell and Erik Nelson

Thinktank's architectural pedigree helps to fuel smart growth in Bozeman, often in places where the ability to think creatively gives the firm an edge: "We've found the ability to look at a problem from a number of perspectives is a skill set that is unique to architecture," Caldwell says. "That is an advantage when thinking about opportunities that might otherwise be overlooked by those looking for the straightforward and simple development scenario."

While the firm does pursue projects in other locations, it considers Bozeman its home base. "It's a really great time to be in Montana," Caldwell says. "We're able help craft what its future looks like and give reasons for people who come here to remain."

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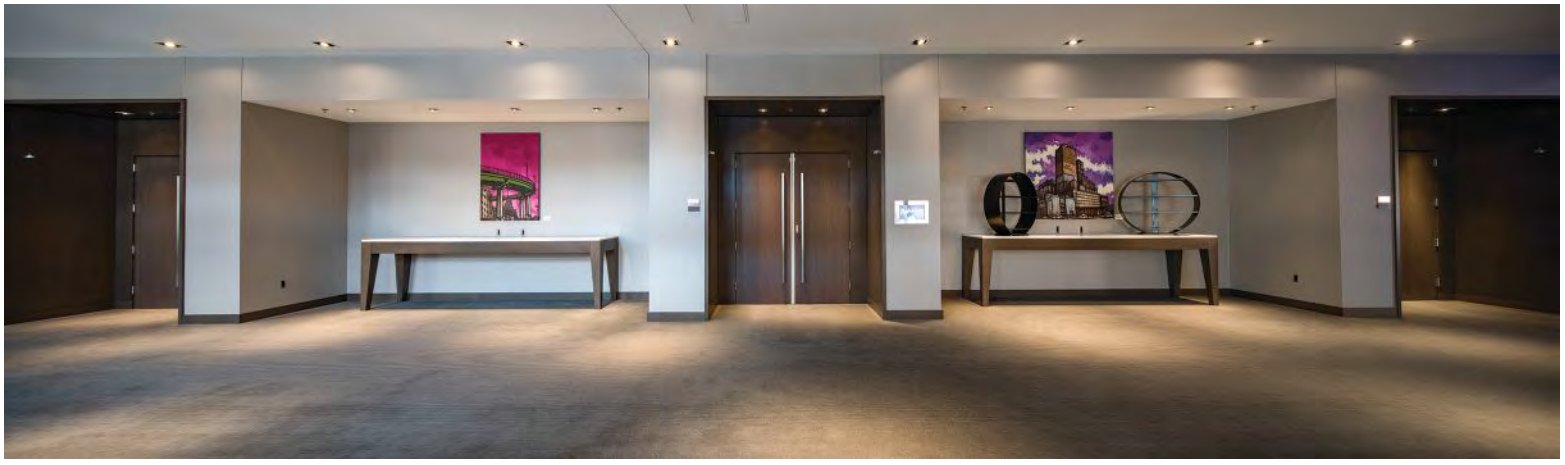

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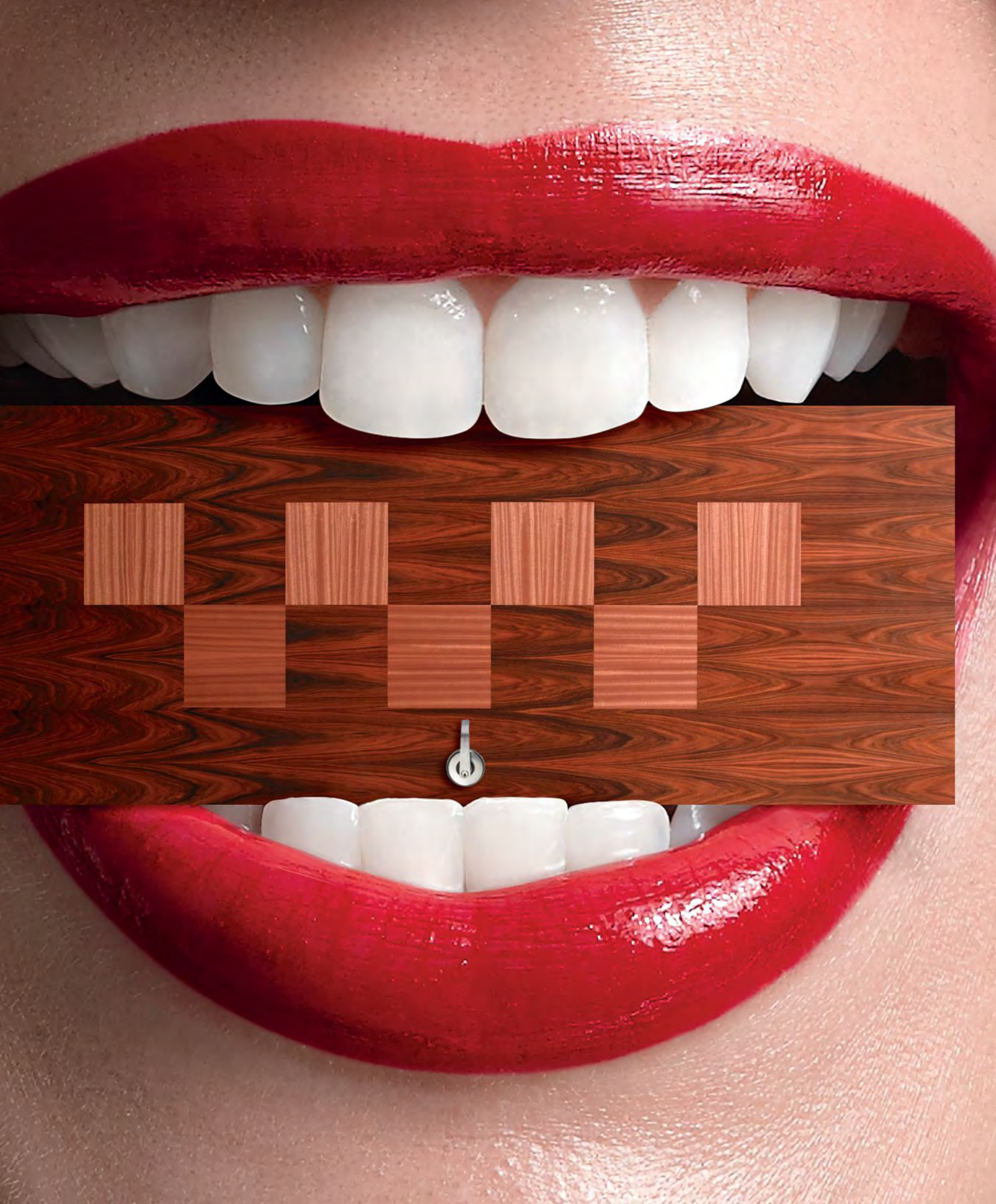

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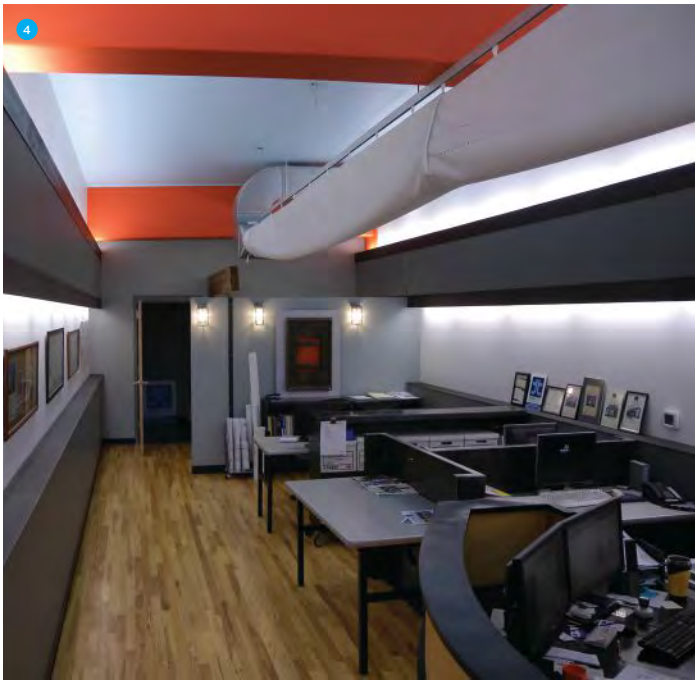

DAN ARMSTRONG

1. Situated at the bank of the Gallatin River in Montana, Geode turns its rough, timber-clad back to the road and opens up its crystalline glazing to views of the river. **2–3.** The predominant feature of the Hill House in Bozeman is its long, bow-truss roof, which allows panoramic views of the valley below. **4.** Thinktank's own office blends clean lines with an industrial feel in its downtown Bozeman digs. **5.** Live Big Small Lot was not merely the name of this single-family home tucked into a 30-foot-wide site, but was also the architects' mantra for the project. **6–10.** Thinktank's involvement with downtown Bozeman's Lark began in land development, continued through creative partnerships that acquired the property, and culminated in executing the firm's vision, from room-specific graphics to the design of the bathroom trashcans.

Products: Wood Finishes

TEXT BY SELIN ASHABOGLU

Rising Table, Robert van Embricqs
Dutch designer Robert van Embricqs crafted the Rising Table from a sheet of pressed bamboo with an eye-catching lattice base that folds on integrated hinges for storage. *robertvanembricqs.com*

Circlet Chandelier, Grain
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Hank, Jory Brigham Designs
The California furniture designer's Hank chair counters its lack of right angles with a sweeping, bent-wood back and angled legs. In walnut and white oak with a standard or rocker base. *jorybrigham.com*

Zebrawood, TerraMai
Water-reclaimed to preserve live forests, TerraMai's Zebrawood is one of five such tropical hardwoods from the company. The ⅝"-thick planks are 5" wide and 7' long. For floors, decks, and panels. *terramai.com*

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Technology: 3D-Printed Components

TEXT BY HALLIE BUSTA

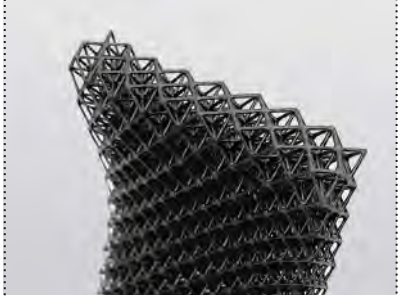
A 3D-printing arms race is pushing makers to build bigger and better with ever-more-resilient materials and increasingly precise extrusion techniques. That could change, however, as the mark of success shifts from size to scale and architects and designers take it upon themselves to hone the technology at the component and systems levels and bring their results to market.

The Block

"Architecture has always been made of components—bricks and chunks and pieces and panels," says Ronald Rael, CEO and co-founder of San Francisco studio Emerging Objects, a 3D-printing-focused offshoot of the design practice he runs with co-founder and chief creative officer Virginia San Fratello. Earlier this year the studio built Bloom, a 9-foot-tall, 12-foot-wide temporary pavilion comprising more than 800 3D-printed iron-oxide-free cement blocks attached using stainless steel hardware to form an undulating, structural enclosure. It was displayed at the University of California, Berkeley, where reflecting light highlighted a floral design printed in its skin. "Bloom demonstrated that we can produce high-quality structural 3D-printed blocks with the process we're using right now," Rael says. "We need to think about how that moves into the market."

The Grid

Chattanooga, Tenn.–based architect Platt Boyd, AIA, and his startup Branch Technology are also going to market with a 3D-printed component: an open-matrix lattice made from carbon-fiber-reinforced ABS plastic that can serve as the core of a modular wall system that integrates common building materials like spray-foam insulation, spray-applied concrete, and cladding. "We're using that matrix as a formwork or scaffold," Boyd says. "The materials become the strength." Initially designed for internal and nonstructural uses, the team is now working on a version of the lattice that can handle loads. "The true value of this is the geometry it enables," he says. "It's something that allows a flexibility of design that before was not even approachable except at a huge cost."



The Joint

Arup senior designer Salomé Galjaard is improving structural joints through 3D printing. The idea came following work on a tensegrity structure whose amorphous form required thousands of nodes that had to be individually drawn and hand-welded. By enlisting additive manufacturing, however, such a system could be readily fabricated as well as applied to a variety of applications. "We thought, if we're going to print a complex part, [we should] make it a little more complex so we can integrate functionalities of other parts of the system," she says. The resulting stainless-steel node (shown above) swaps a pin-and-fork connector and spanners for a series of integrated bolts to join and stabilize components. Each node, in the latest iteration, is about ¼-meter tall and weighs roughly 11 pounds. The next challenge, Galjaard says, is applying the 3D-printed joints to projects. "It does feel like you're opening up to the world solutions that you weren't able to use before," she says, "and that's very inspiring."

TOP RIGHT: DAVID GALJAARD

> *To read more about each of these 3D-printed parts, visit bit.ly/3Dprintedcomponents.*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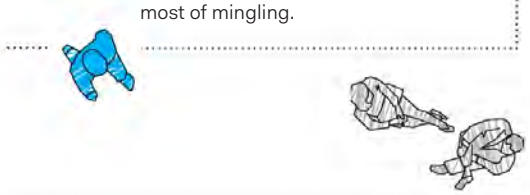
Professional Development: How to Work a Room

TEXT BY WANDA LAU

Networking reception: That one line on the agenda of trade shows, conferences, and professional gatherings is enough to trigger a sense of apprehension in even the most accomplished architect. But what may sound like a dreadful experience actually makes for an amazing opportunity for professional growth and meaningful relationships. Here are strategies from seven emerging to established designers for making the most of mingling.



1. Check Your Goals at the Door

Oscia Wilson, AIA, CEO and founder of San Francisco–based Boiled Architecture used to stress about impressing every person at an event. She now views the room as a place for exploration, to find out whom people are and what she can learn from them. "It's much easier and more natural," she says.

Eric Corey Freed, the International Living Future Institute's vice president of global outreach and founder of OrganicArchitect, in San Francisco, believes that setting explicit goals—for example, collect five business cards and then leave—limits its potential. "When I go in, I'm open to possibilities," he says.

Think of the event as a "dating opportunity," says Richard Pollack, FAIA, managing principal of Pollack Consulting, in Sonoma, Calif. "Everyone is there to meet new people."

As Nader Tehrani, founding principal of Boston firm NADAAA and current dean of architecture at the Cooper Union, in New York, succinctly put it: "It's probably best to go for pleasure and then leave if there is none to be had."

2. Enter with Confidence

Walking into a room where everybody seems to know everybody else is "not for the faint of heart," Freed says. "Try not to look at the [crowd] as a monolith," but rather as a gathering of individuals, each with a different story to tell, says Hadley Arnold, executive director at the Arid Lands Institute at Woodbury University, in Burbank, Calif.

Though networking has become easier for Bob Borson, AIA, a partner at Malone Maxwell Borson Architects, in Dallas, because of his popular blog, Life of an Architect, he still recalls its awkwardness. "When I first started, I tried to find someone who looked as uncomfortable as I felt," he says.

"Everybody has an aura about themselves," says Jing Liu, principal of Brooklyn, N.Y.–based SO–IL. "You want to find person where a more productive conversation can take place, in order to have a fruitful relationship."

If you can't find another singleton, look for a friendly looking group of two or three people who aren't engrossed in a discussion. Tehrani, who is also often recognized, suggests, "Make yourself known by establishing eye contact. If the recipient does not [acknowledge] you, you should stop stalking them—or wait patiently off to the side."

3. Make Small Talk Worthwhile

Honesty is a good way to start a conversation. "I say, 'I'm mingling and meeting people I don't know and you guys look friendly,' " Wilson says.

Pollack concurs. "Walk up, say, 'Hi,' while extending your hand, and use that time to read the person's name and company." Wearing your name tag on your right side will help the other party read it during the handshake, he notes, as will writing your first name in large letters on the badge. "And then ask the other party about themselves."

"[Networking] is the art of being a service to everyone else," Freed says. His go-to questions are: "What can I do to help you?" and "What is the biggest challenge that you're facing right now?"

Local issues and current events are "topics with the most potential" for Liu, while Arnold says, "[I]f it comes from an honest place of curiosity ... and wanting to share thoughts, it works for me."

To become more than another body in business attire, Pollack recommends volunteering some personal information, such as your hometown. "This allows the other person to open up also, allowing me to get to know them as a person."

4. Ditch the Design Talk

Memorizing a firm's monograph is not a prerequisite for approaching a designer you admire. "If people know us, great; if

> *For more advice on how to successfully network at an event, visit bit.ly/ARnetworktips.*

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Professional Development: How to Work a Room

they don't, that doesn't mean that they don't want to know us," Liu says.

Tehrani also prefers discussing things other than his firm's portfolio. "If someone goes straight to your work, I think, 'Oh god, not another discussion about architecture,' " he says. "I just want to interact with people in a normal way. Wouldn't you rather talk about topics of personal interest or anything that has gravity and, through that, get a broader sense of who they are?"

Likewise, leave your "architectural ego" out of the conversation, Pollack advises. "Never launch into a dissertation on your design philosophy or why you're a great architect."

5. Keep an Eye on the Long Game

Though Freed is open to most conversation topics—including politics and religion—he does draw the line when students ask him for career advice in mid-event. "I only have a limited time to work that room," he says. Arnold is similarly turned off by direct requests. "If the topic is utilitarian—do you have a [job] position or an internship?—then the conversation goes dry very fast."

The goal, Pollack says, is to "build a large and wide-ranging network without an immediate ROI."

6. End the Conversation Elegantly

Sometimes you hit it off with someone, and sometimes you don't. If you find yourself at a lull, it's time to move on. Freed employs three tried-and-true modes of escape: "I say, 'I got to get a drink and I'll be right back,' and then never come back," he says. "Or, 'I see someone leaving that I want to talk to—please excuse me.' " And finally: "Give me a card. I want to talk more, but not when it's crazy."

Tehrani takes a more direct, but also more tactful, approach to easing out of a conversation. "The most honest way is the best way: 'I apologize, but I'm late for another appointment.' If you are truly bored though, you have to find a way to maintain interest."

7. Don't Do This

Freed advises everyone, but men in particular, to maintain professionalism throughout the event. "You don't want to be weird or flirty, or you'll be that creepy networking guy."

Also, "don't lurk," Borson says. He recounts a time when someone who was obviously interested in meeting him waited just in his periphery for an opportunity to approach him for half an hour, without talking to anyone else in the room. "If they had committed to coming [into the conversation], it wouldn't have been so odd," he says. "They were in the creeper zone."

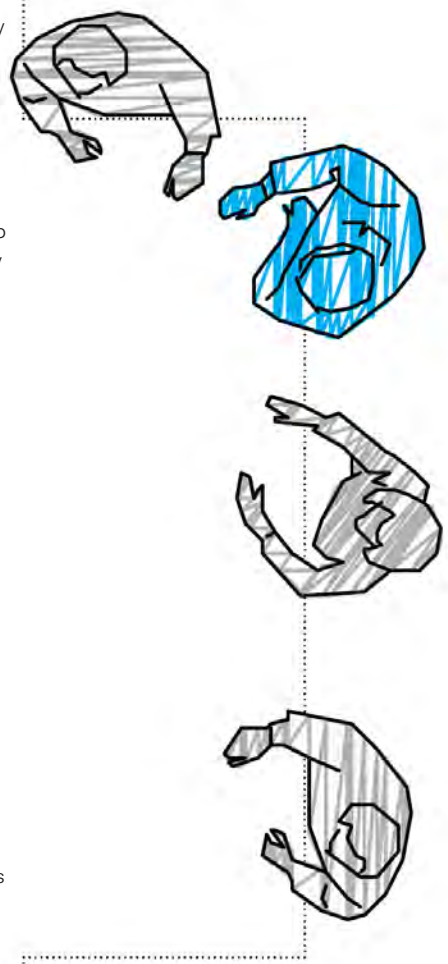
8. Follow Up After the Event

Treat the distribution and collection of business cards with respect. Liu says she initially holds off on handing over her card. "If it seems to be a productive conversation and we want to follow up, we'll give our name card and hope [the conversation] continues."

Freed sees the exchange of business cards truly as an exchange. "I don't give a card without getting one, mostly because I want to retain the ability to contact them," he says. He also makes a show of taking notes on the card, particularly if he promises a follow-up item. He then uses a Dymo CardScan machine to log the card. "I also record the date of when we met, and [make myself] follow up within a week."

Wilson also writes on business cards something memorable about the other party as well as a frequency for following up. Her assistant then enters the card information into her address book along with the person's name as a recurring event in her calendar. "[When they] pop up on my calendar, I'll be reminded to send them a note," Wilson says.

Sending an email within 24 hours is the key to avoid being forgotten, Pollack says. Include in the message that "you enjoyed meeting them, plan a time to [meet] again, and suggest an activity."



And don't stop extending the courtesy there. While Borson replies to hundreds of emailed questions, he often gets radio silence in return. "There should always be three emails," he says. Something as simple as "thank you for this response. It should always be an A–B–A exchange."

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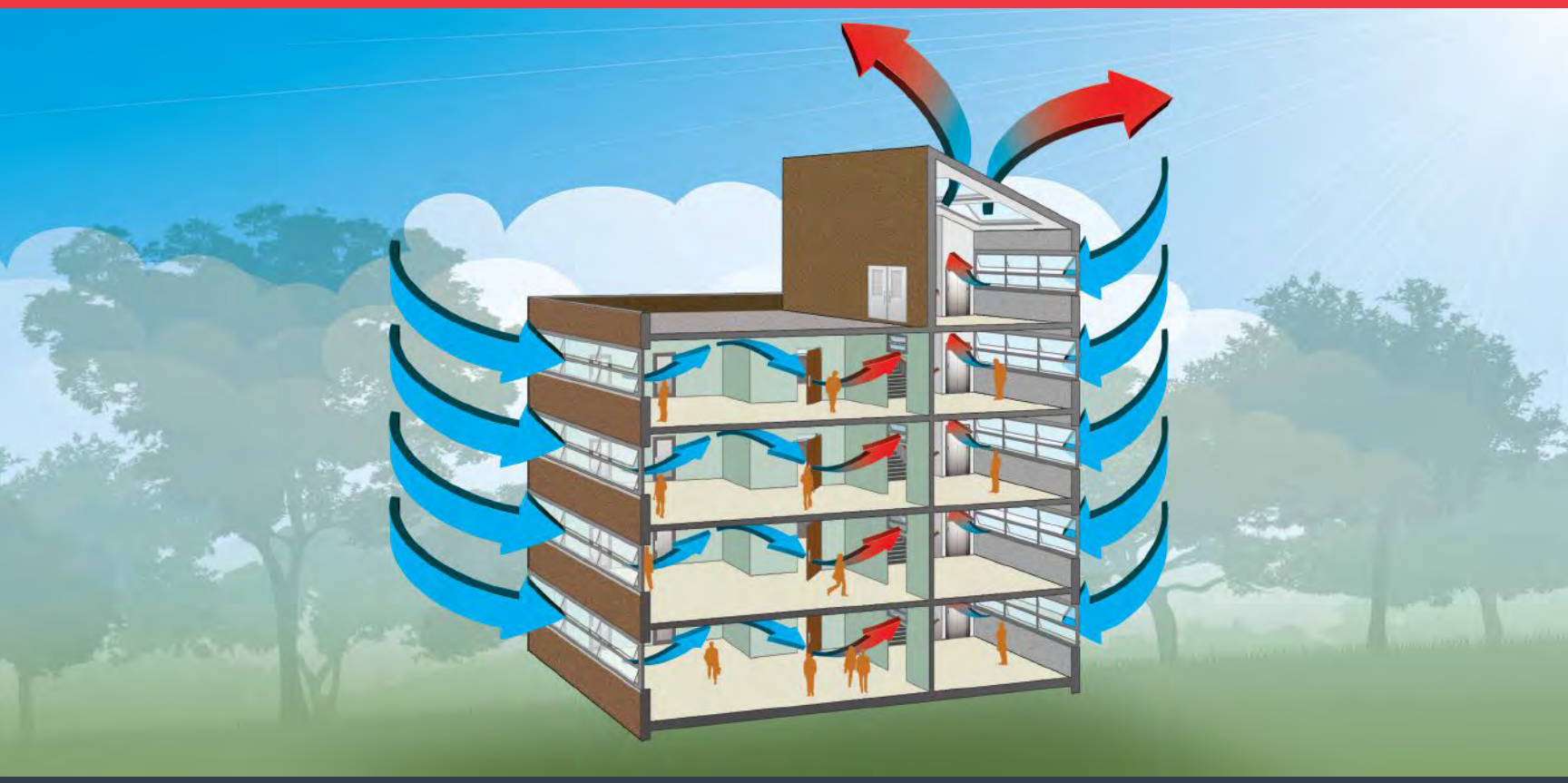

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Technology: Make Your Own Materials

TEXT BY BLAINE BROWNELL, AIA

U.K.-based Studio Swine hits the beach with its plastic-processing equipment.

A growing number of designers are going beyond fabricating new products with existing materials by creating their base materials from scratch. And their work is more sophisticated than that of the typical do-it-yourself (DIY) set. As defined, DIY encompasses design and fabrication activities conducted without the assistance of experts. While many DIY material experiments are playful forays that lack clear application—which is not necessarily a bad thing—an increasing number show promise for the design of buildings and environments.

"This is a new era for design," says Elvin Karana, an assistant professor of design engineering at the Delft University of Technology in the Netherlands, "which suggests a shift from 'materials of design' to 'design of materials.'" One important outcome is the loosening of boundaries between disciplines. Noting that DIY practices have proliferated in architecture, design, and fashion circles alike, the approach often involves intense collaboration. "We see an ever-increasing number of examples that illustrate challenging couplings of materials science, design, engineering, and the social sciences for a common purpose of design for meaningful material experiences," she says. "In other words, the borders between these professional disciplines fade as they work together on the common endeavor [of finding] meaningful applications for a newly developed material at hand."

Although most DIY makers and their designed materials cannot compete with established manufacturers and their products on volume, cost, and code compliance, they bring fresh ideas and innovative ecological practices to industries that can often seem stagnant and environmentally negligent. Moreover, DIY materials promise to change the nature of materials education. "A more hands-on, more tinkering base approach will be encouraged," Karana says—something the design community should embrace.

The following three cross-disciplinary collaborations harness this maker mindset to explore a new frontier for architectural materials.

StoneCycling

The work of Netherlands-based designer Tom van Soest, StoneCycling reclaims masonry materials from demolished structures and grinds them into a fine aggregate, which it uses to form new building blocks. The resulting products bear the mark of the studio's process. Its WasteBasedBricks, for example, exhibit colorful aggregates that bear a striking visual contrast to conventional brick. The company also makes tiles and furniture, both of which are similarly fabricated. Since no artificial binders are used, energy consumption is limited to material transport and processing—a small cost relative to the advantages of saving material that would otherwise be sent to the landfill (which, too, requires transportation and processing).

Sea Chair

U.K.-based Studio Swine also uses salvage—in this case, waste plastic combed from the country's coastal beaches and sourced from the nets of local fishermen—as the basis for its homemade materials. The designers sort their findings by color and crush them into pellets, which are subsequently melted using custom-built equipment that can be moved

STUDIO SWINE

> *To read more about designers who are fabricating the materials used in their products and projects, visit bit.ly/DIYmaterials.*

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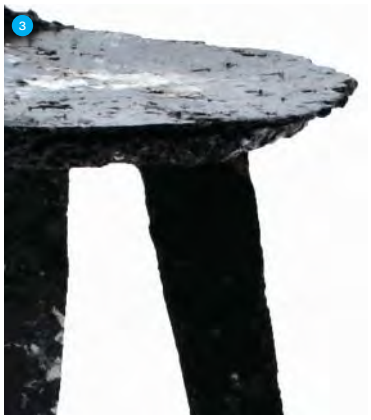
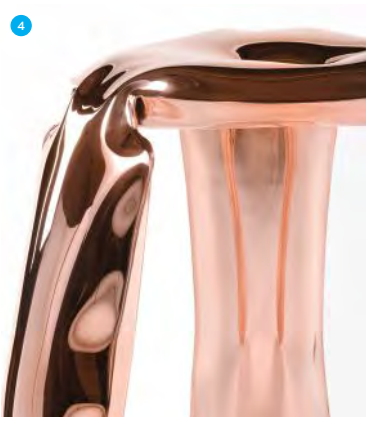
to the source of the materials. The three-legged Sea Chair, the first product that the studio fabricated using the homemade base material, is defined by an ominous black-plastic body that balances incidental swirls of color throughout with intentionally rough edges—evoking the gyres of debris floating in the world's oceans.

Free inner Pressure Deformation

While StoneCycling and Studio Swine reconstitute waste substances into new materials, Polish designer Oskar Zieta is creating a new identity for conventional ones. His Free inner Pressure Deformation (FiDU) technology manipulates sheet metal to give it structural stability. Zieta and colleagues from the ETH Zurich, in Switzerland, weld together thin metal slices before inflating them to form lightweight structural objects. The process is an intriguing combination of control and unpredictability: Designers can specify the initial geometry, but inflation causes the final pieces to bend and deform in unexpected ways under the internal stresses of air pressure. So far, the team has used FiDU to create objects including a stool and chair (shown at right), a bridge, a wind rotor, and a freestanding pavilion. "Not everything that is filled with air is elastic," Zieta writes in a case study of the technology on his studio's website. "The flowing folds and curves so familiar to the eye that clearly bring malleable plastics to mind have actually been transferred to metal."





1. A section through the WasteBasedBrick by Dutch makers StoneCycling shows off the visual contrast of the reclaimed aggregate. **2.** Found plastic objects are melted down by Studio Swine into a base material (shown), which is then used to fabricate design products including the rough-edged Sea Chair (**3**). **4.** A detail of Oskar Zieta's inflated metal as applied in his Plopp stool and Chippensteel 0.5 chair series (**5**) reveals FiDU's aesthetic variability.

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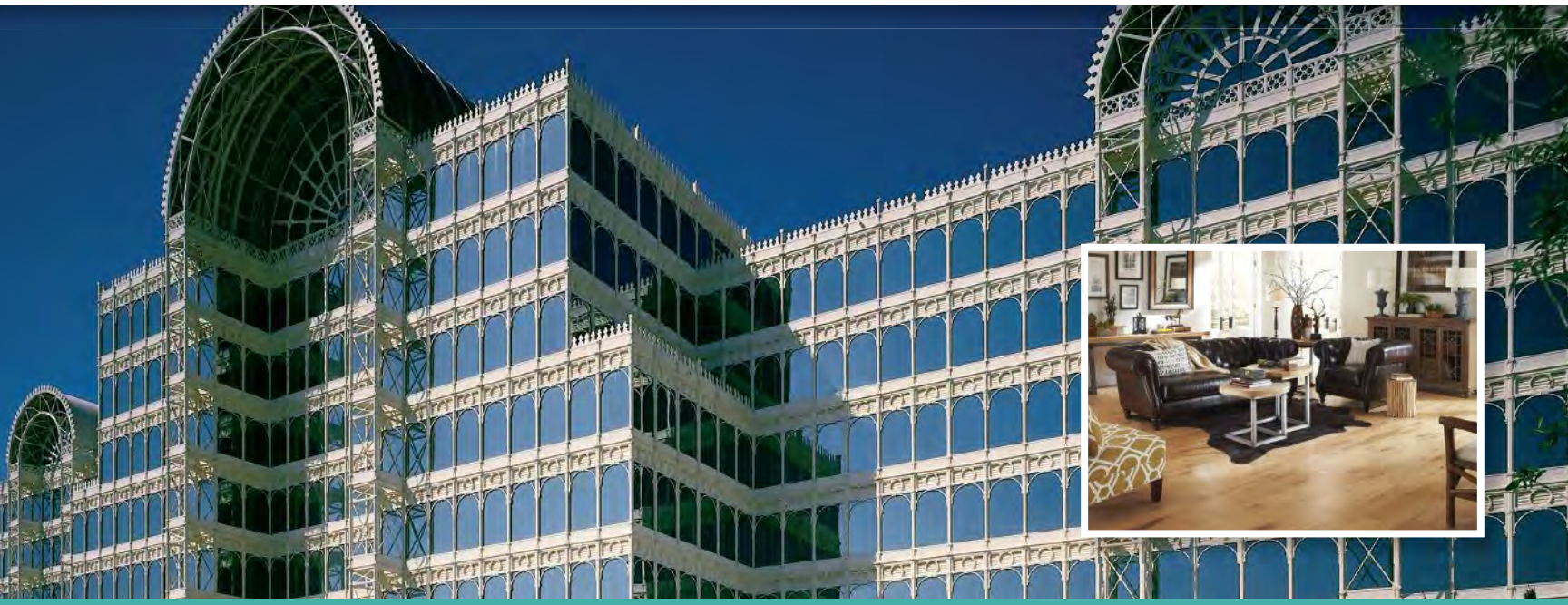

Main Image: INFOMART • Dallas, TX • 1985 | Inset Image: Maple Pine Hardwood Floors

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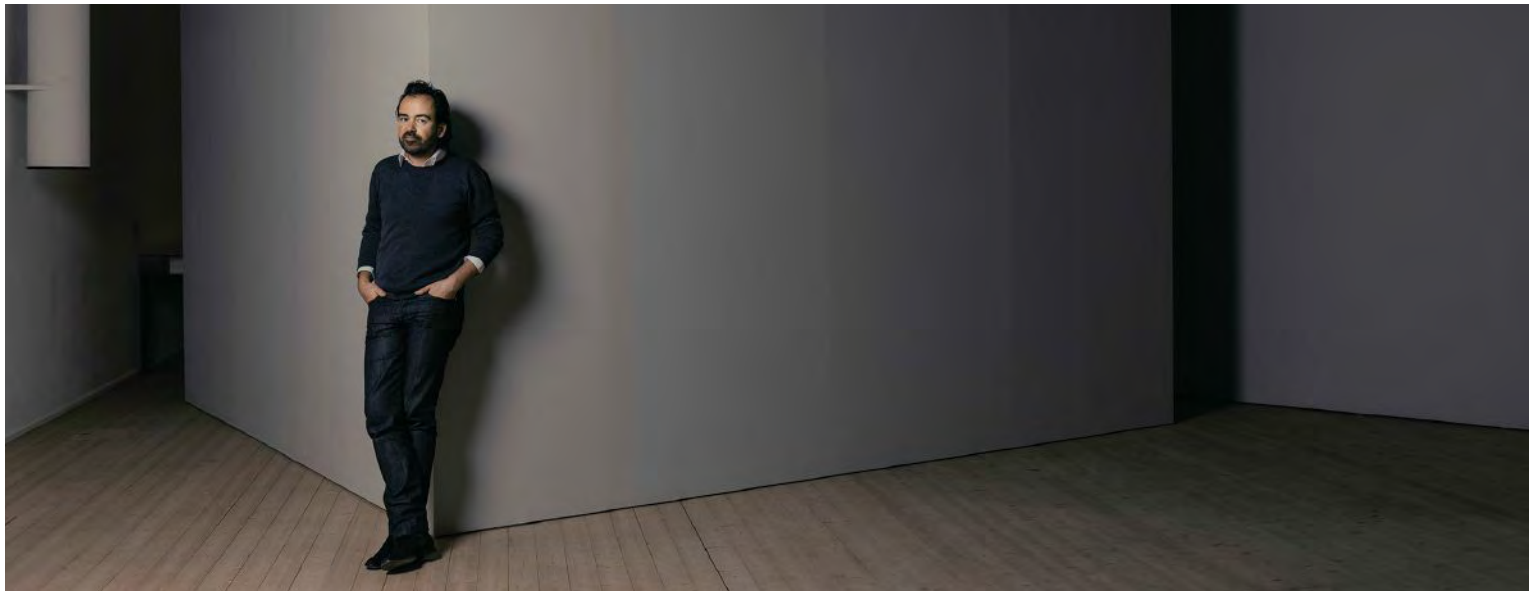


PHOTOGRAPHY: JONAS ERIKSSON

A Rolling Stone

Photographing buildings on an endless trip.

Iwan Baan is one of the most widely published architectural photographers working today, and his commitment to depicting environmental context and human habitation in his work has upended the tradition of cool, detached portraits of buildings. "It's much more interesting for me to see how buildings develop over time, how people take them over, and the messiness of daily life," he says. "Architecture is better when it can sustain these things." Baan, with more than 60 other participants, will be featured at the Chicago Architecture Biennial (Oct. 3, 2015 to Jan. 3, 2016), sponsored in part by the American Institute of Architects.

As a photographer, you struggle to capture the real experience of architecture. It's about space and a place, and it's difficult to communicate in a two-dimensional picture. It's of course something that you try—to represent that feeling of being somewhere. For me, a lot of the things that tell a story about architecture are small moments that happen within and around the architecture.

I'm not sure why architecture was obsessed for so long with pictures that didn't include people. I've wondered for so long why pictures had to be so sterile. Architecture is intended to be a controlled environment, so maybe that has something to do with the legacy—depicting the idea of absolute control, that pristine moment when a building is finished and empty and was the last moment the architect could control the environment. But I'm interested in when the building is taken over by its inhabitants, what happens after.

I like to travel light, a hard thing to do with camera equipment, which adds a layer between the moment you're capturing and yourself, so the phone camera these days is a nice option. With Instagram, I treat it as a small diary of the things I see and experience—all the things that don't make it into books or magazines. It's a different approach that very much supplements my other photography. It's also a chance to curate moments and places that I have encountered—often very fleeting moments where you don't have your camera with you—and it frees you from the bulk and the technical aspects of a regular camera and camera equipment, the filters, and lights.

I try to keep everything with me all the time—I don't send equipment ahead to other shoots, because of shoot schedules that shift all the time. I plan a week or two weeks ahead, but beyond that it's hard to say. Basically we travel with everything all the time—literally our whole life, including my partner, who is a writer, and our newborn son.

As the technology gets better and smaller, it will redefine photography. I can't wait for the day when I don't have to carry bulky equipment anymore. AIA

As told to William Richards

AIANow

Sourcing the City

As told to William Richards
Art Direction by Jelena Schulz

1. Jean Nouvel: 40 Mercer Street

Over the years, the Landmarks Commission has approved a large number of buildings in historic districts—and it's very difficult to insert a new building into a historic streetscape. Jean Nouvel really understood what cast iron was about, for instance—a post-and-lintel aesthetic. He likes that dark somber aesthetic, and it really works with what's around it. It's beautifully detailed and an early 21st century response to what was an important trend in the 19th century.

2. Heatherwick Studio: Staircase at Longchamp La Maison Unique

If you're a merchant, ground-floor real estate is very expensive—and if you want to be in SoHo, there are limited choices if you're trying to save money. Longchamp found this 1930s building, leased the second floor, and established a very narrow storefront. The idea is: Let's get people in the door and up the stairs, and if this leather-clad staircase doesn't do that for you, nothing will.

3. John P. Gaynor: Haughwout Building

If there's one cast-iron façade to visit in SoHo, this is the one. It's modeled on the Venetian Renaissance and actually has two full cast-iron façades—designed by John P. Gaynor and produced by Daniel Badger (whose foundry was near the East River). It was also the first building in the world to have an elevator, installed in 1857 by the Otis Elevator Co.

4. Louis Sullivan: Bayard-Condict Building

Sometimes when I take students to this building, I don't know where to begin: It's just so good, and one of the most exquisite examples of how terra-cotta can be used to create ornament. Louis Sullivan frequently worked with the same manufacturers, but the modeler who took the drawings and converted them to clay—which was then used to make the mold—is really the person who deserves the credit here. It has a handmade quality unparalleled in the city.

5. Skidmore, Owings & Merrill: Pepsi-Cola Building

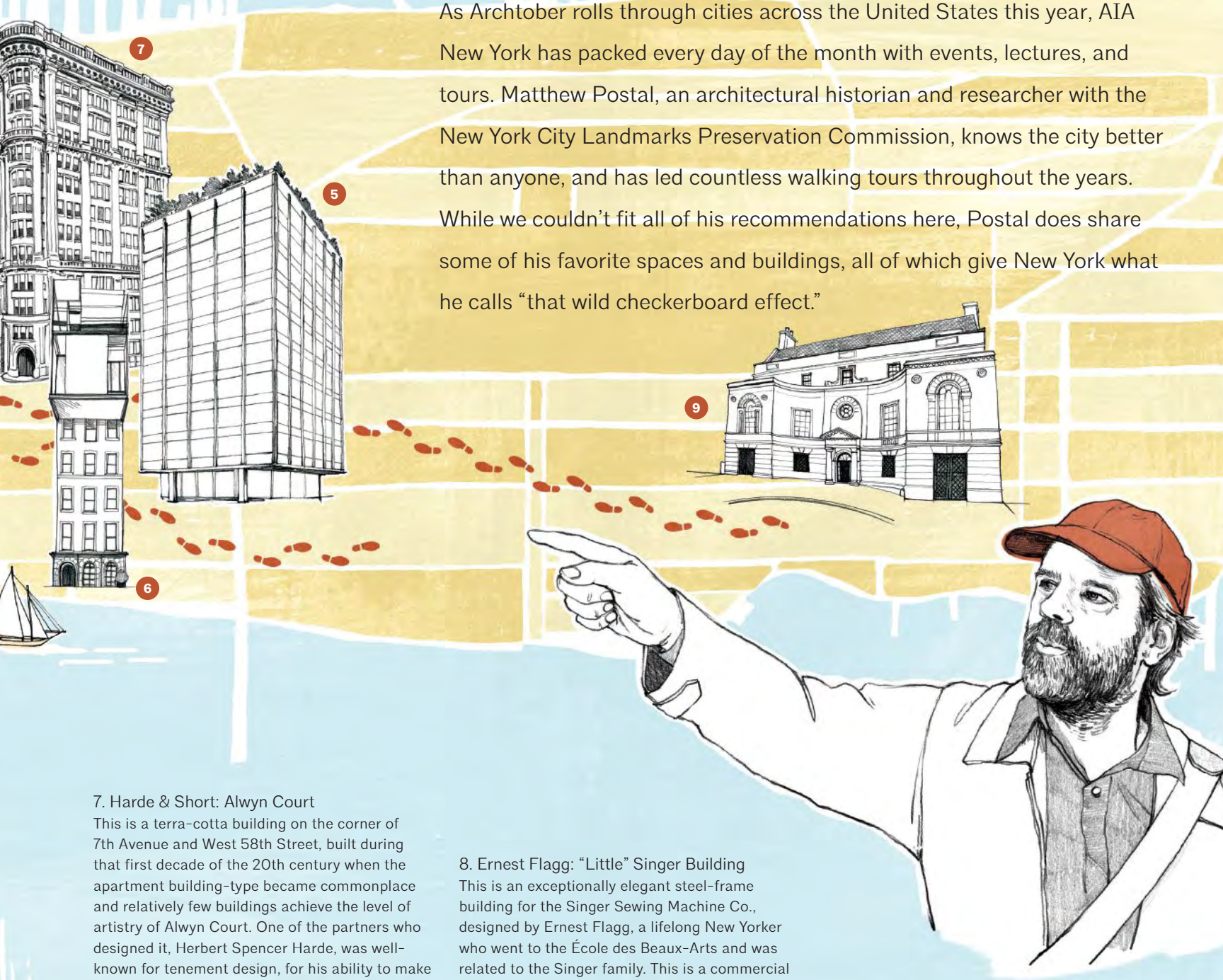
Skidmore, Owings & Merrill is such a fascinating firm—and Gordon Bunshaft usually gets all the credit at midcentury. But the architect in charge of this project was Natalie de Blois, one of the first women hired by the firm. The building has gone through a lot of different owners. The remarkable thing is that it adjoins an apartment tower that, I believe, had the same owner. Polshek Partnership (now Ennead Architects) came in a couple of decades ago and designed an appropriate backdrop to the building—making the two buildings work together.

6. Paul Rudolph: 23 Beekman Place

Sadly, after Paul Rudolph died and his foundation wanted to preserve his penthouse, they were financially unable to do so—but it always made me think that this could have been New York's John Soane house. It's been cleaned up a little bit—the infamous Plexiglas bathtub is gone, for instance. But Rudolph, one of the most inventive architects of his time, took a conventional rowhouse on an elegant street and turned it into his laboratory for more than three decades.

ILLUSTRATION: LAUREN NASEF

As Archtober rolls through cities across the United States this year, AIA New York has packed every day of the month with events, lectures, and tours. Matthew Postal, an architectural historian and researcher with the New York City Landmarks Preservation Commission, knows the city better than anyone, and has led countless walking tours throughout the years. While we couldn't fit all of his recommendations here, Postal does share some of his favorite spaces and buildings, all of which give New York what he calls "that wild checkerboard effect."



7. Harde & Short: Alwyn Court
This is a terra-cotta building on the corner of 7th Avenue and West 58th Street, built during that first decade of the 20th century when the apartment building-type became commonplace and relatively few buildings achieve the level of artistry of Alwyn Court. One of the partners who designed it, Herbert Spencer Harde, was well-known for tenement design, for his ability to make low-cost housing function and look better; the other partner, R. Thomas Short, was a designer of vaudeville houses. For a brief time, they worked together and produced a few apartment buildings, but each one is a gem.

8. Ernest Flagg: "Little" Singer Building
This is an exceptionally elegant steel-frame building for the Singer Sewing Machine Co., designed by Ernest Flagg, a lifelong New Yorker who went to the École des Beaux-Arts and was related to the Singer family. This is a commercial project, but it was not the factory for the company, and one thing not to miss is that it has two virtually identical façades, one on Broadway and one on Prince Street. It was built at a time when architects were first exploring how to deal with the skin of a building.

9. Walker & Gillette: Loew House
Buildings in New York are rather predictable in that they often fill the entire lot. This one has a deep, dramatic concave façade that feels very un–New York. It was designed by a firm that did a lot of banks and commercial buildings in the city, so that may be part of its uniqueness. Regardless, this former residence defies our expectations and defies the city's grid. Built in 1930, it feels vaguely like something you'd find in London, but on a scale that is still early–20th-century Manhattan.

AIAFeature

Besting Venice

The Chicago Architecture Biennial draws on architecture's art to chart a course for the Windy City's future.

Zach Mortice

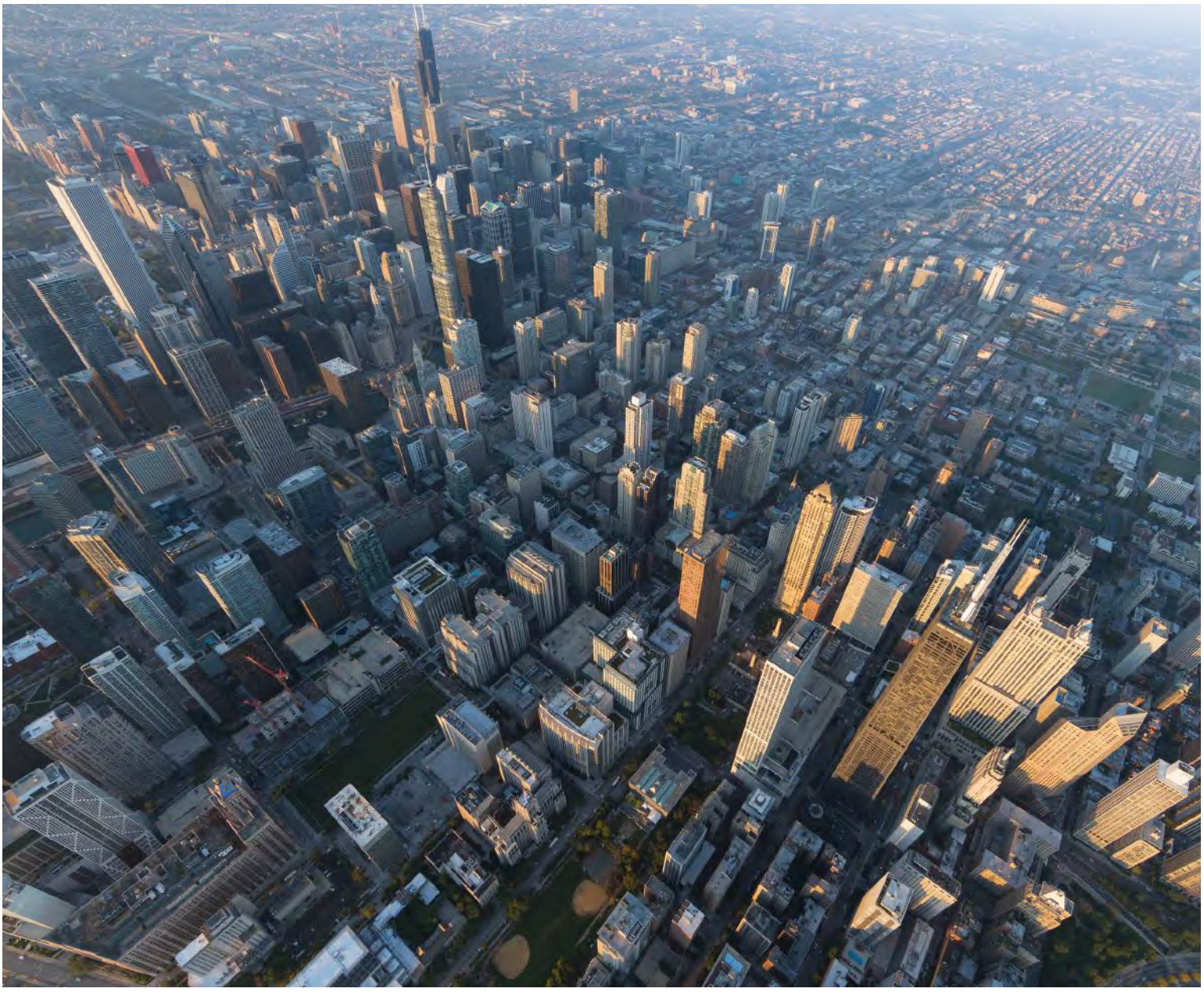


PHOTO: IWAN BAAN

In 1977, deep into architecture's sectarian manifesto wars in the run-up to Postmodernism, the Graham Foundation invited architects from the avant-garde establishment to Chicago to participate in "The State of the Art of Architecture," a conference organized by Stanley Tigerman, FAIA, and his Chicago Seven (not to be confused with Abbie Hoffman's Chicago Seven).

The speakers, which included Frank Gehry, FAIA, Michael Graves, Richard Meier, FAIA, and John Hejduk brought with them position papers, project drawings, and verbal daggers honed during various turf skirmishes in Modernism's eventide. In 1977, there was the mutating abstraction of the Whites versus the context and narrative of the Grays; there was a breakaway Los Angeles insurgency; there was the high-tech London set; there was also an advocacy-design movement, born out of the nationwide social and political protests from a decade earlier.

"The State of the Art of Architecture," then, was a chance for Tigerman to throw gasoline on several competing brushfires.

"There was discussion and debate and, ultimately, name-calling," Tigerman says. "It was exciting to have all those people in one room yelling at each other. That had never happened before."

For one, Helmut Jahn, FAIA—"a product of both Germany and [Mies'] IIT," points out attendee Robert A.M. Stern, FAIA—was called out on the carpet for his reticence to leave right angles behind. At the conference, Stern presented his Lang House and a renovation of Columbia University's Jerome Greene Annex, both projects that had him piping on delicate Classical molding like an indulgent baker. He also presented his Subway Suburb project, a history of the garden suburb that has since culminated in the publication of *Paradise Planned: The Garden Suburb and the Modern City (Monacelli Press, 2013)*

This battle between International Style Modernism and more traditional Classicism baffled Craig Hodgetts, FAIA, who had only then recently arrived in Los Angeles to become the associate dean of the California Institute of the Arts. His West Coast brand of improvisational architecture, outside of the two dominant design camps, was infused with the canny realization that technology would ultimately redefine architecture. Hodgetts talked about proto-3D printing and how wireless transmissions could change the way we think about conventional spaces, and he presented a design for a mobile inflatable concert venue, delivered on site by truck—Archigram meets the Merry Pranksters. For him, the whole thing seemed to sag with the weight of the past—a declining empire trying to hold onto converts. And he told them so.

"The message I was conveying was not the message anybody was very interested in hearing, like a court jester," says Hodgetts, who felt a little patronized. "It made me dismiss the whole group. I did feel that I was in the midst of a very conservative group of thinkers."

If you zoom out a bit, you can see Hodgetts' point. The conference represented an insular monoculture of establishment values with little room for variation, despite the aesthetic and philosophical feuds Hodgetts, Stern, and Tigerman recall.

Architecture today still has its ideologies, but nearly 40 years later its practice is defined more by its variety and interdependencies than warring factions. More than ever before, architects are expected to speak to wider audiences about how their work engages with regional ecologies, demographic shifts, resilience, and equity. It's a profession in transition, to the point where disciplinary boundaries have softened—which is the crux of the Chicago Architecture Biennial, which opened this month and runs through Jan. 3, 2016; its title (in a nod to Tigerman's 1977 conference) is "The State of the Art of Architecture."

The biennial's co-artistic directors—Sarah Herda, director of the Graham Foundation, and Joseph Grima, former editor of *Domus*—chose that title because Tigerman had asked all of the participants to come prepared to present a polemical (and provocative) position and a project that demonstrated their ambition. "The directness of letting the ideas come from the architects themselves drew us to the 1977 event," Herda says.

"It challenged architects to articulate what was at stake in their practices, and to show how they were fulfilling their ambitions," she says of the biennial, which is the first of its kind in North America. "It suggests a more open-ended dialogue and coexistence between radically different architectural practices across the world, without the constraints of a specific overarching theme."

Participants hail from more than two dozen countries and represent a higher level of diversity, both in terms of race and gender, than is usually found at design conferences and events. Even if architecture, by the numbers, struggles to be a more diverse profession than it was in 1977, the decision by

AIA Feature

CONTINUED

Herda, Grima, and other biennial organizers to pursue diversity and balance represents an ideal as well as a mandate.

It's also recognition that architecture, writ large, is not a function of the East Coast or West Coast axes of influence. Amanda Williams and Theaster Gates, two Chicagoans who blur the line between art and architecture by revitalizing disused and derelict properties in impoverished neighborhoods on Chicago's South Side, see the biennial as an opportunity to show people their version of an iconic city. At the other end of the spectrum, Diébédo Francis Kéré designs community buildings in African villages with unskilled labor that use vernacular traditions far outside the Western canon. Based in Lagos and Amsterdam, NLÉ/Kunlé Adeyemi is most well-known for a floating classroom that addresses both rapid urbanization in Nigeria and flooding driven by climate change.

Most of the participants are younger than the attendants at Tigerman's event were in 1977, still operating at the scale of small buildings and pavilions. In recognizing a diverse set of voices and approaches, some of the attendees of the 1977 event see the 2015 biennial as an opportunity to expand the agency of architecture.

"It will introduce, firsthand, a whole new set of both social issues and social and political understandings of architecture into the mix," says 1977 attendee and Chicago Seven member Stuart Cohen.

Entrance to the biennial is free (unlike the Venice Biennale), and the organizers have selected venues in both prosperous and struggling neighborhoods of Chicago. The hope is that a diverse group of participants attracts a wider audience outside the traditional design public. Peter Eisenman, FAIA, the 2015 AIA/ACSA Topaz Medallion recipient, 1977 conference participant, and veteran of more than a half-dozen Venice Biennales, says this goal will have an ally in the city of Chicago.

"Anybody that goes to Chicago is interested in the 'urban,'" he says. "Whoever is going there anyway is already preprogrammed to understand what the [biennial] is about. Chicago is a very unselfconscious manifestation of what is best about American urbanism—the grid, tough external materials, the scale. Where is the best urban place in the United States? It's Chicago. It's Michigan Avenue. It's the Loop. It's a very condensed urban setting, with the prairie on one side and the lake on the other. Chicago is the place, if you're a foreigner, to feel what urbanism in America can be."

The year 1977 also represents a transitional period in architecture in ways not covered by that year's Graham Foundation conference. The 1973 oil crisis raised serious questions about our management of natural resources, and even if the 1979 energy crisis was two years away, energy analysts of the period were already issuing warning signs. Environmental design gathered together architects, ecologists, engineers, land use experts, and social scientists much in the same way that resilient design today gathers together architects, hydrologists, landscape architects, seismologists, and social equity activists.

Architecture is at another crossroads, professionally and publicly. Add the aspect of digital media coverage to the diffusion of talent surrounding resilient design, and "The State of the Art of Architecture" is a curatorial challenge for Herda and Grima. The well-defined factional blocs that defined 1977 have been subsumed into an ocean of disparate design approaches, all sorted through hundreds of niche media platforms online.

"Today, I don't think we have a very clear sense of what direction or another architecture is taking," Stern says. "There are so many different points of view."

The 1977 event wasn't set up to yield a consensus, and Tigerman says the 2015 biennial has a greater potential to crystallize a new generational awareness among architects. Fueling this potential is the vast generation gap between younger architects who reach for a computer for the first sketch of a building, and more seasoned architects who still remember paper and pencils.

"I feel an enormous dislocation from the younger generation," Eisenman says. "It's up to [them] to seize the ground and make of it what they can. I don't think there's anything standing in their way."

Though landmark exhibitions are popularly described as marking the beginning of an era (like the Hitchcock/Johnson-curated International Style exhibition at the Museum of Modern Art in 1932), Eisenman says they more often mark the end of one. "The hope is that Chicago will end a period of time and move on to another period."

In other words, the young designers who see their stars rise after their exposure at the biennial won't be refining patterns recognizable today; they'll be looking for new points of departure. And the true "State of the Art of Architecture" that will be remembered after the design circus leaves town might not be what's on the stage in Chicago; it might instead be whatever comes next. AIA

"Chicago is a very unselfconscious manifestation of what is best about American urbanism—the grid, tough external materials, the scale."
—Peter Eisenman, FAIA

→ The Chicago Architecture Biennial, sponsored in part by the AIA, runs through Jan. 3, 2016. Learn more at *chicagoarchitecturebiennial.org*

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Slow Train

Home design trends as a barometer for change.

In a mere decade, the AIA's Home Design Trends Survey has seen it all: a glut of luxury and vacation homes, a staggering housing collapse, and a protracted recovery.

But looking forward, the AIA's Home Design Trends Survey shows continued reason for optimism. Business continues its rise to levels not seen since before the housing collapse, the sector has enjoyed 13 straight quarters with billings and inquiries on the uptick, and the demand for larger homes is growing once again.

A sibling of the monthly Architecture Billings Index, the survey, conducted quarterly among a panel of about 500 firms, tracks broad trends in key areas such as size and layout, features and systems, and communities, while touching on business conditions among residential architecture design firms across the country.

"Each quarter we're looking at a different set of features. Even now we've found that, annually, many of these trends don't change a lot, particularly since a good chunk of those years we've looked at over the last decade have been recessionary," says AIA chief economist Kermit Baker, HON. AIA, who has steered the survey since it began collecting data in 2005. "Those are not times you see a lot of innovation or a lot of new and exciting ideas. It's a period of entrenchment."

While innovation may have stalled in those tumultuous 10 years, trends have shifted quite a bit when it comes to what features homeowners want in the extra square footage they seek. More opulent specialty spaces like home theaters and gyms, doomed by smaller home sizes resulting from the recession era, have fallen by the wayside, says Baker. As remodeling continues to greatly outpace new construction, homeowners are looking for accessible environments—indoors and out—as they hope to enter the next chapter of their lives in their homes and maintain the lifestyle they've cultivated.

"I'm quite sure aging in place will become a big deal because we've got a huge generation of folks that are moving into that stage of their life with the money to make it happen," Baker says. "Baby Boomers did come through this last housing downturn in pretty good shape."

ILLUSTRATION: MICHAEL KIRKHAM

"The notion and respect toward craft has really surfaced, most importantly with our younger clientele." —James Walbridge, AIA

Digging In

The desire to age in place is holding true in the Detroit suburbs, hit particularly hard by the recession, says sole practitioner Dawn Zuber, AIA, of Studio Z Architecture in Canton, Mich. Zuber, who is a regular survey respondent, reports that business is nearly back to 2005 levels. She recently engaged two draftspeople as consultants, and is fielding an increased number of inquiries from potential clients who are getting on in years or preparing to welcome their elderly parents into their homes.

But as a one-person operation whose work is mostly completed within a 30- to 45-minute drive from her home and office, Zuber says plotting design trends can be a fickle matter. Her projects (which have ranged from small kitchen remodels to $500,000 additions) may not always align with the survey's findings. For instance, while sustainability has appeared as an emerging trend for several years, and her clients enjoy the cost savings of energy efficiency built into her process, they've yet to buy in completely.

"I've never really had clients ask for sustainable features," Zuber says. "It's something that I push, but it's not something I have people coming and asking me for—which is disappointing."

While Zuber's feedback may not fall in line with what many other residential architects are reporting, it's still valuable input, according to James Walbridge, AIA, president of the San Francisco–based design/build firm Tekton Architecture. He says he uses the survey to get a holistic view of what's important to clients across the country.

Practicing in difficult and expensive San Francisco—what he calls "49 square miles surrounded by reality"—Walbridge is in a situation similar to Zuber's since the results of the survey aren't necessarily commensurate with what his firm experiences.

Different Generation, Different Preferences

While the upper end of the market was the first to bounce back, and largely included the Baby Boomers with the equity to weather the housing crisis, Tekton's clients skew toward the late 20s and 30s and are more interested in less formal, open floor plans and

AIAKnowledge AIAPerspective

CONTINUED

a midcentury modern aesthetic. While they're keen on California's stringent energy efficiency requirements and low-VOC healthy home components, they might not be ready to pull the trigger on an 8-kilowatt solar panel array. And, Walbridge adds, as a consequence of the rise of maker culture, his clients have an eye for craftsmanship.

"The notion of and respect toward craft has really surfaced, most importantly with our younger clientele," he says. "We find that very appealing. Because for us, as both architects and builders, to be able to execute at a high level, have appreciation for it, and have clients that are willing to pay for that is a highly unique situation that is probably not present in a lot of other markets."

But as the Bay Area welcomes so many potential clients who move there from other markets, Walbridge says it's important for him to keep the survey in his back pocket in order to better anticipate their desires.

The value of that information presented in the survey extends beyond architects, too, says the AIA's Baker. When it was envisioned, the Home Design Trends Survey was meant to be a tool for AIA members, but it's become a valuable tool for journalists whose pieces primarily focus on housing trends. The survey—and, as a corollary, architects—have been featured in the hallowed pages of *The Wall Street Journal* and in Associated Press dispatches. It even landed Baker a spot as a talking head on CNBC's morning market program *Squawk Box* in February.

"It's an amazing tool for a public relations professional who is trying to get publicity for the AIA and architects," says Matthew Tinder, the AIA's senior manager of media relations. "There's really nothing else quite like it out there in terms of data."

When reporters call and want to discuss the changing dynamic of the family home, Tinder says, the survey allows him to provide accurate, data-backed information that confirms that many families working with an architect are indeed investigating multigenerational accommodations. When the recession hit in 2008, the media was quick to pick up on the decrease in the square footage of homes, he notes, but the survey was the only place with quantifiable information that proved that home sizes were getting smaller.

"From a media perspective, what's going on in the market is really never a huge surprise," Tinder notes, "but we have the data that coincides with it and really backs it." AIA

Dominic Mercier

PHOTOGRAPHY: CARL BOWER

Prosperous Conditions

Business is an art and a science.

It's time to reset expectations regarding the financial return for our work. To attract the best and brightest—and keep them—employers need to offer emerging professionals a return for their work that approximates the value of their education, experience, and creativity.

What gets in the way? Uncertainty about revenue, one quarter to the next. It's easy to point to clients and other members of the design and construction industry. But, before we hand the responsibility of our prosperity to others, we need to ask what factors may have contributed to the situation.

As participants learned at last July's Entrepreneur Summit, architecture students are typically exposed to very little about the business of architecture. They are supposed to pick this up in practice, post-graduation. But given the competitive global market, can we afford to allow prosperity to be an afterthought?

We have to get over thinking that reasonable compensation is something secondary to what it means to be an architect. A well-managed practice is an art, as well as a science. Keeping a sharp eye on business doesn't lessen the dignity of what it means to be a professional.

The fear that any discussion of fees will earn us unwanted attention from the Justice Department has made us gun-shy about advocating for policies that compensate architects fairly. Take the 6 percent fee cap on federal projects. Imposed almost 80 years ago for the procurement of AE services, the cap is inconsistently applied across agencies and is outdated. Further, for design/build competitions, architects may need to provide up to 40 percent of the design up front.

The AIA is pushing back. We have the right under the First Amendment to petition government to redress a grievance. We're working with agencies like the General Services Administration and the Army Corps of Engineers to revisit regulations and procurement policies, while developing an education program for firms and the government. These efforts will have impact beyond the federal level as we shore up the value of our knowledge and skills.

For those who still feel reluctant to talk about how we're compensated, let's be clear: To unleash our potential, we have to be financially robust. There's a lot we can do, working together to create the conditions for prosperity. However, we must also rethink what we hold up and value within our profession and the academy. AIA

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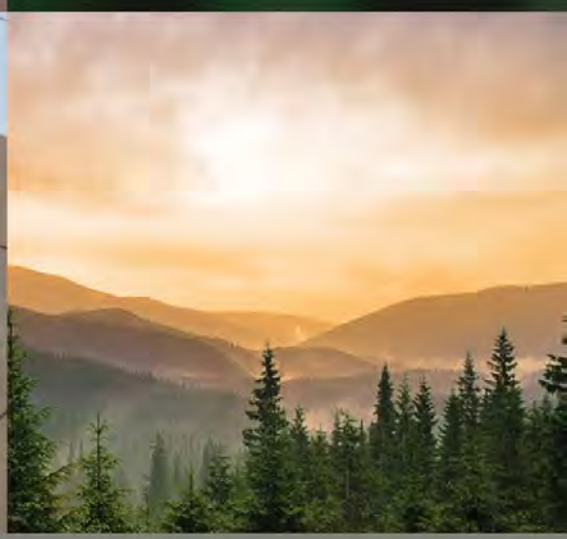

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FLUID-APPLIED ROOF COATINGS

SUBSTRATES, SELECTION, AND APPLICATION

Presented by:

covestro

Photos courtesy of Neogard, a part of the Hempel Group.

LEARNING OBJECTIVES

At the end of this program, participants will be able to:

1. Identify the different types of fluid-applied roof coatings.
2. Explore the advantages and applications of fluid-applied roof coatings.
3. Examine appropriate substrates and surface preparation techniques for fluid-applied roof coatings.
4. Describe reflective roofing requirements and how fluid-applied roof coatings can be used to achieve a reflective roof.

CONTINUING EDUCATION

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By Paige Lozier and Steven Reinstadtler

INTRODUCTION TO FLUID-APPLIED ROOF COATINGS

Note: The terms liquid-applied and fluid-applied roof coatings are often used interchangeably.

Though there are many different types of liquid roofing products on the market, this course is going to focus on those products that qualify as a roof coating. It is important to note that a liquid-applied roofing membrane or coating can itself be the exterior weathering surface, or it may be coated with another UV and weather stable layer.

The National Roofing Contractors Association (NRCA) draws a distinction between what is considered a coating and a liquid-applied roof membrane. According to *The NRCA Roofing Manual: Membrane Roof Systems—2015:*

> *Liquid-applied roof membranes are constructed in place from a liquid resin and reinforcing material. The liquid resin is available as a one- or two-component product and is typically applied in two coats. Depending on resin chemistry, a catalyst or hardener may be added to induce the curing process. In most instances, a primer is required. Liquid-applied roof membranes typically are reinforced with polyester fleece or fiberglass mat. Reinforcement typically is set into the resin base coat. The reinforcing material provides the membrane's crack-bridging ability and much of its mechanical strength. Liquid-applied roof membranes may be surfaced with aggregate (e.g., sand, mineral, ceramic granules), coatings or sealers. The liquid material cures to form a monolithic weatherproof membrane. Single-component resin eliminates the need for combining products at the job site. Two component materials require proper mixing at the job site and have a limited pot life after mixing.*

The NRCA Roofing Manual also says:

> *Liquid-applied roof membranes are more widely known to be used as waterproofing systems but have gained in popularity as roof systems, especially in reroofing situations. However, if a liquid-applied roof membrane does not have reinforcement, it typically is considered a coating system. A reinforced liquid-applied roof membrane is considered by NRCA to be a roof system.*

Therefore, a one or two coat liquid-applied roof membrane or a roof membrane with a weatherable topcoat can both be considered a roof system. A liquid roofing product with reinforcement such as fleece or other geotextile material is considered a membrane; if there is no reinforcement it is considered a coating. While reinforcement can be important to a roof system, it is worthwhile to consider the physical properties of liquid-applied roof coatings with and without reinforcement, as the physical properties can help determine what products are best suited to a specific application.

Reflective coatings are often applied over darker colored or aged reflective existing roofs to help reduce energy costs.

Benefits of Fluid-Applied Roof Coatings

Fluid-applied roof coatings can be applied as a new roof system on a new roof deck or in a maintenance situation as a re-roofing system over an existing deck. They have many benefits, but they are most commonly used to prolong the life of an existing roofing system whether it is an EPDM or TPO sheet membrane or another fluid-applied roofing system.

These systems contribute to the sustainability of the building structure by extending the life of the existing roof surface and preventing unnecessary roof tear off's, which contribute a great deal of waste to landfills. If properly maintained, you may never have to tear off the existing roof membrane and a renewable coating can be reapplied every 5 to 15 years.

In addition, reflective coatings are often applied over darker colored or aged reflective existing roofs to help reduce energy costs. Fluid-applied coatings provide a seamless, monolithic surface that is fully adhered so that water cannot migrate beneath the surface. These coatings are lightweight, often less than 1/3 pounds per square foot, are self-flashing, and may qualify for immediate tax advantages based on prevailing tax code in your region related to energy saving building upgrades.

Liquid-applied coatings can be installed over virtually any type of existing roof substrate.

Potential Substrates

When choosing a liquid-applied coating for your project, it is important to consider the existing substrate. Liquid-applied coatings can be installed over virtually any type of surface, from thermoplastic single-ply membranes such as PVC or thermoplastic polyolefin (TPO), to thermoset single-ply membranes such as ethylene propylene diene terpolymer (EPDM), or chlorosulfonated polyethylene (CSPE-Hypalon). They can also be installed over metal, concrete, built-up roof (BUR), modified bitumen (MB), or spray polyurethane foam (SPF).

SURFACE PREPARATION FOR SUCCESSFUL APPLICATION

While fluid-applied coatings can be applied over almost any substrate, it is important to note that surface preparation is critical for their success and longevity. Fluid-applied coatings are not to be installed over failed or failing roofs. Deficiencies such as blisters, wrinkles and ponded water conditions must be repaired, as a clean, dry, sound, and secure surface is required prior to the installation of a fluid-applied coating.

An infra-red (IR) roof scan or core cuts can help to determine if the roof is a good candidate for a fluid-applied coating, as they can identify problems that are not readily visible to the naked eye. Wet and/or damaged areas identified by an IR scan or core cuts must be removed and replaced with like insulation and coating. Each substrate should be washed with a bio-degradable detergent and appropriate power washing or scrubbing equipment. Be sure to consult the manufacturer of the sheet goods to determine how long you should wait to install a fluid-applied coating over new sheet goods.

Primers can be used to darken substrates to reduce small amounts of residual moisture, as the darker surface will absorb more heat and dry faster.

Priming Substrates

While priming is not required on all surfaces, it can be a critical component to a successful fluid-applied coating installation. Primers are often used to enhance adhesion between the fluid applied coating and the substrate, as well as bind small amounts of dirt, seal porous substrates, and inhibit corrosion of metal substrates. Finally, primers are used to darken substrates to reduce small amounts of residual moisture, as the darker surface will absorb more heat and dry faster. Be sure to consult the manufacturer to determine whether or not a primer is required.

Seam Treatment

For granulated cap sheets and some single-ply membranes, it is good practice, and sometimes even required, to pre-treat the seams with a

layer of base coat and a reinforcement fabric before the liquid-applied system is installed. An additional flood coat may also be required to encapsulate the granules on the roof before building the liquid-applied system.

Self-adhered flashing tapes may also be used for detailing penetrations and seams. Whether to use a self-adhered tape or extra base coat and reinforcement is typically the contractor's choice.

There are many different types of liquid-applied roof coatings and choosing the right product for a project deserves careful consideration to avoid problems or premature failures.

SYSTEM SELECTION CRITERIA

System selection criteria is probably the most important discussion for a specifier, as there are many different types of liquid-applied roof coatings and choosing the right product for a project deserves careful consideration to avoid problems or premature failures. The liquid-applied coatings that we will cover here include aluminum, acrylic, asphalt emulsion, polyurea, silicone, SEBS, and polyurethane.

Aluminum Coatings

Aluminum roof coatings are typically formulated with asphalt, aluminum paste, moisture scavenger, fillers, hydrocarbon solvents, and in some cases, fibers. The overall quality of aluminum roof coatings can be judged by the total quantity of leafing aluminum pigment content per gallon. While aluminum roof coatings are relatively easy to install and provide good sun protection to the existing roof membrane, they come with very limited warranties, no real waterproofing capacity, minimal solar reflectance, and must be regularly maintained every two to three years in order to function properly.

Acrylic Coatings

Acrylic coating systems are based on acrylic resin and are generally a latex-based system that cures by air drying. Acrylic coatings are amongst the easiest to apply. They are low odor, low cost, and have excellent color retention, as well as UV and weather resistance with very good initial solar reflectance.

Multiple coats can be applied on hot days, but on the down side, they cannot be applied below 32 degrees or if rain or dew are imminent. Acrylic coating systems have low tensile strength and are not appropriate for high traffic areas or where ponding water is a problem. They are also not chemical resistant, cannot be applied in heavy mils, and have extended cross linking time. However, when used appropriately, acrylics can greatly enhance the appearance of a roof.

Asphalt Emulsion

According to the *Handbook of Accepted Roofing Knowledge (HARK) Manual*, asphalt emulsion is, "A mixture of asphalt particles and an emulsifying agent such as bentonite clay and water. These components are combined by using a chemical or clay emulsifying agent and mixing or blending machinery."

Emulsions are user friendly and provide good water resistance. However, they are also temperature dependent, cannot resist the high movement of modern buildings, have somewhat of an odor and require protection and reinforcement for superior longevity. They are also dark in color so they will cause the roof to heat up when exposed to sunshine.

Polyurea Snap Cure Systems

Polyurea coatings are either solvent based or 100% solids, depending on the formulation, are typically two-component, and cure to form films with limited elongation and high tensile strength.

Polyurea coatings can be applied in heavier single passes up to 40 mils thick and can be applied to vertical surfaces with significant film build. Spray-applied base and top coats can be applied the same day, providing quick return to service with very durable physical properties and low VOCs. These coatings can be rained on or walked on often within minutes of application.

However, polyureas can have adhesion issues and suffer significant loss of physical properties over time due to UV degradation. Plural component equipment is very expensive and a good application is heavily dependent on the applicator, more than with other fluid-applied coatings. There is potential for an off-ratio mix if the equipment experiences issues, and there is significant overspray risk.

Silicone Inorganic Coatings

Silicone is an inorganic coating derived from silicone polymer that is available in single or plural components. Silicone inorganic coatings have high moisture vapor permeability and are classified as breathable coatings.

Silicones provide excellent weathering ability and UV resistance and retain their physical properties well. The biggest issue with silicone is compatibility with other coatings, as it will only stick to silicone and is therefore not a good candidate for re-coats. Granules may be added for abrasion resistance, mechanical activity and aesthetics. Silicones have good initial solar reflectance, but due to their surface tackiness can pick up dirt from the atmosphere relatively quickly and lose reflectance.

Styrene Ethylbutylene Styrene (SEBS)

Styrene ethylbutylene styrene (SEBS) is a single component elastomeric coating made from rubber polymer that cures when the solvent evaporates and leaves a rubber film. They offer excellent adhesion, high elongation at 600 to 800 percent, and are good in ponding water conditions. SEBS may be applied on a variety of substrates, but primer is only required on modified bituminous and BUR roofs.

SEBS are limited by low solids content in the 50 to 60 percent solids range, meaning they have a high concentration of solvents, which is required to reduce viscosity to a workable level. Additionally, they have a strong odor, high cost, and are difficult to apply in low temperatures or high humidity.

Polyurethanes have faster curing times, allowing for increased productivity and driving their widespread acceptance across the protective markets.

POLYURETHANE COATINGS OVERVIEW

During the late 1930's, Otto Bayer pioneered the chemistry of polyisocyanates, a technology

that led to the advent of polyurethanes for a variety of applications. Due to their ability to vary physical properties such as hardness, elongation, abrasion resistance, and modulus, polyurethanes are widely used in a variety of materials such as foams for building insulation and seating, adhesives for construction and specialty applications, textile fibers for clothing and consumer products, thermoplastics for automotive and general industrial parts, and coatings for a variety of substrates and applications. Polyurethane coatings used in the building, infrastructure, and architectural markets, which we are discussing here, fall under this category.

Polyurethane Performance Attributes

Polyurethanes are one of the most durable coatings on the market today and have found application in the corrosion and construction protection markets because they provide a unique combination of flexibility, weatherability, as well as chemical, abrasion, and corrosion resistance. These coatings also provide reduced VOC emissions, superior coating thickness, and edge retention. A well formulated coating provides the advantage of fewer required coats, reducing cost per application by reducing labor, and the higher level of performance requires less surface preparation and the ability to self-prime. Furthermore, polyurethanes have faster curing times, allowing for increased productivity and driving their widespread acceptance across the protective markets.

Polyurethane coatings come in both single component (moisture cure) and plural component (chemical cure) systems with different speeds of reactivity. Single component polyurethanes are moisture cured and offer longer working life, while plural component products have a standard-to-fast cure time, limiting the window of opportunity when installing. However, the faster cure time provides a faster finish, which limits defects due to rain or environmental contaminants such as leaves or insects.

The solids content of polyurethane coatings is typically medium to high. High solids coatings have little to no solvent in their composition and were first introduced to comply with increasingly stringent VOC regulations. Due to this increased solids content and lack of solvent, these coatings needed to be formulated differently than those coatings with low solids. The removal of solvents, which are used in traditional coatings to compensate for viscosity, flow and curing, require the new coatings to have different characteristics and methods of handling.

In many cases, catalysts as well as other modifiers such as flow and leveling agents, solvents, and anti-corrosion and extender pigments may also be used to formulate a complete commercial coating. Raw material suppliers have developed lower viscosity resins and methods for coating formulators to employ to allow for user-friendly roof coating systems.

QUIZ

1. True or False: A liquid-applied roof coating that does not have reinforcement is typically considered a coating system.

2. True or False: A liquid roofing product with reinforcement such as fleece or other geotextile material is considered a membrane.

3. Which of the following is a characteristic of fluid-applied roof coating?
   a. Provide a seamless, monolithic surface
   b. Self-flashing
   c. Can be a reflective roof
   d. Lightweight
   e. All of the above

4. Which type of coating can be applied in heavier single passes up to 40 mils thick and can be applied to vertical surfaces with significant film build?
   a. Aluminum
   b. Acrylic
   c. Polyurea
   d. Polyurethane

5. Which type of coating has found application in the corrosion and construction protection markets because they provide a unique combination of flexibility, weatherability, as well as chemical, abrasion, and corrosion resistance?
   a. Aluminum
   b. Silicone inorganic
   c. Asphalt emulsion
   d. Polyurethane

6. True or False: Polyurethane coatings only come in single component (moisture cure) systems.

7. Which polyurethane system has a faster cure time?
   a. One-component
   b. Two-component

8. The solids content of polyurethane coatings is typically _____.
   a. Medium to high
   b. Low to medium

9. Which of the following is more light stable and therefore offers excellent UV resistance?
   a. Aliphatic coatings
   b. Aromatic coatings

10. True or False: Reflective colored roofs typically have an initial solar reflectance 0.30 to 0.55, compared with around 0.10 for conventional dark steep-sloped roofs.

SPONSOR INFORMATION

As an innovation leader in the development of high performance coating raw material technologies, Covestro, LLC enables architects, designers, and building owners by providing real world solutions for built environment challenges. Covestro, LLC develops coating solutions for flooring, interior and exterior walls and trim, and fluid applied roofing with high performance and sustainability in mind.

This article continues on http://go.hw.net/AR1015Course2.
Go online to read the rest of the article and complete the corresponding quiz for credit.

HEALTHCARE INTERIORS

CHOOSING FURNISHINGS AND FINISHES THAT AID INFECTION CONTROL

Presented by:

CRANE

LEARNING OBJECTIVES

At the end of this program, participants will be able to:

1. Review the importance of healthcare interior design from the standpoint of both aesthetics and function.
2. Examine the threat of Hospital Acquired Infections and mandates for cleanliness, safety and security.
3. Identify furnishings and materials that can support infection control efforts.
4. Describe how FRP wall and ceiling panels are used in healthcare facilities for both aesthetics and infection control.

CONTINUING EDUCATION

CREDIT: 1 LU/HSW

COURSE NUMBER: ARoct2015.1

Use the learning objectives above to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR1015Course1 and complete the quiz for free as you read this article. If you are new to Hanley Wood University, create a free learner account; returning users log in as usual.

By Paige Lozier

A JUXTAPOSITION OF GOALS

Healthcare design is very complex, as healthcare settings run the gamut from private doctor's offices to massive regional hospitals. In addition, there are numerous disparate spaces to consider, from patient rooms and waiting rooms to exam rooms, nurses stations, corridors, lobbies, and restrooms. While beautiful, comfortable and tranquil spaces are desired for the well-being of the patient, designers are also faced with the reality of designing with strict requirements for cleanliness, safety, and security that aid infection control. Planning and design teams must be acutely aware of the regulations and guidelines of various governing agencies, local codes, and best design practices that can directly affect selection of finishes and furnishings. Architects and interior designers should work closely with healthcare providers and facility managers to create healthcare environments that strike a balance between aesthetics and function.

In the past, healthcare settings were typically viewed as sterile, utilitarian environments and generally lacked aesthetic appeal. The patient and visitor waiting rooms were probably outfitted with overhead lighting, a suite of furniture, and a bit of generic artwork, but after passing through to the patient care environment, the walls were bare, light was harsh, and colors were stark and bland. Think clinical white walls and overhead fluorescent lighting.

But, today's healthcare designers are stepping beyond this lackluster version of design and thinking more about the aesthetics that will not only aid in patient care and recovery, but very important safety matters such as infection control. They are also considering the needs of visitors, who must spend a great deal of time in those ubiquitous waiting rooms, often overnight and for numerous days, while their loved ones are undergoing treatment. This recent focus on patient-centered care attempts to create an appropriate familiarity and comfort level with the environment for the patient and family.

Incorporating open space and nature into the patient environment can provide patients with a more tranquil, healing atmosphere.

BRINGING LUXURY INTO HEALTHCARE DESIGN

There is now a movement in healthcare design to bring a warmer, residential look to healthcare facilities so that patients and visitors feel more at home. This can go far in improving a patient's well-being, which can translate into faster recovery. Many healthcare facilities are taking cues from the hospitality industry, which has been successful in providing the luxuries of home to their clients, whether it is through furnishings, artwork, noise reduction methods, ambient light levels, natural lighting, or sophisticated yet soothing color palettes.

Designers may want to use varied materials such as stone, glass and dark wood, as well as a combination of textures and patterns, all of which can inject a sense of luxury into a space. Key areas where such materials might be used are lobbies and waiting rooms, which won't see as much heavy traffic as exam and patient rooms. That being said, you can easily infuse some color, texture, and pattern into patient rooms through paint, wainscoting, case goods, and upholstery.

In addition, incorporating open space and nature into the patient environment can provide patients with a more tranquil, healing atmosphere. This can be accomplished through courtyards and meditation gardens, roof gardens on lower roofs that can be seen from above, large expanses of glass that allow views to the outdoors, or surfaces and finishes that mimic natural materials. Public spaces such as lobbies and atriums are a great place to maximize daylighting and provide views to the outdoors.

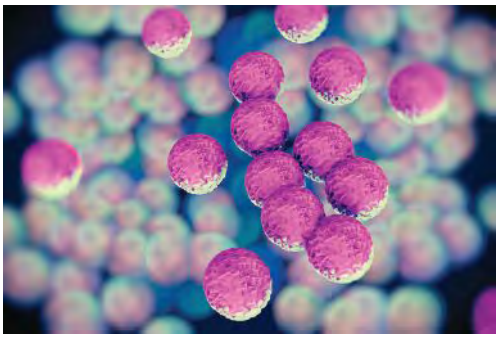
In healthcare settings it is important that furniture has a small footprint and is easy to move, so as not to interfere with patient care.

BEAUTIFUL AND FUNCTIONAL FURNITURE SELECTION

In order to satisfy the needs of all patients and visitors, the furniture selection for healthcare spaces should be carefully considered. Furniture manufacturers are now carrying multi-purpose furniture such as a sleeper sofa with an attached, solid surface side table equipped with data and electrical access as well as storage compartments. There are also hybrid products such as patient chairs that recline into a bed for overnight visitors, or sofas that flip down into a full-length sleeper without encroaching on the footprint of the room, and without any mechanical operation. Modular furniture is another simple way to add functionality to a space, as it can be quickly and easily moved, re-installed, added onto, or reconfigured into a different layout. In healthcare settings it is important that furniture has a small footprint and is easy to move, so as not to interfere with patient care.

Facilities are also increasingly designating certain rooms for bariatric patients, which incorporates furniture and design solutions that improve their comfort, mobility, and safety while maximizing space and functionality. Bariatric furniture is subject to very intensive use; it provides the scale, strength and mobility to accommodate larger patients and guests by incorporating heavy duty locking casters so patients can be safely moved, numerous positions including full recline, and special foam that provides additional support and durability.

Furniture manufacturers are now carrying multi-purpose furniture such as a sleeper sofa with an attached, solid surface side table equipped with data and electrical access as well as storage compartments.



HAIs such as MRSA, staph, ventilator associated pneumonia, central line-associated blood stream infections and urinary tract infections are on the rise throughout healthcare facilities nationwide.

IMPROVING INFECTION CONTROL

Beyond pure aesthetics and function, the safety and cleanliness of a healthcare facility is the highest priority. One of the most important topics in healthcare environments today is the control of healthcare acquired infections (HAIs). Architects and interior designers can play a significant role in infection control by specifying textiles, furnishings, finishes, and equipment that aid in controlling the spread of infectious disease. In addition, building product manufacturers are creating innovative new technologies for materials that can be used in healthcare design to mitigate the spread of pathogens and HAIs. What if there was a solid surface material that could kill bacteria on contact? Would you specify this material for high touch surfaces such as bed rails and over-the-bed tables in patient rooms?

According to the World Health Organization, healthcare acquired infections, or "nosocomial" and "hospital" infections, affect patients in a hospital or other healthcare facility, and are not present or incubating at the time of admission. They also include infections acquired by patients in the hospital or facility that appear after discharge, and occupational infections among staff. HAIs such as MRSA, staph, ventilator associated pneumonia, central line-associated blood stream infections, and urinary tract infections are on the rise throughout healthcare facilities nationwide.

As is the case for many other patient safety issues, healthcare acquired infections create additional suffering and come at a high cost for patients and their families. Infections prolong hospital stays, create long-term disability, increase resistance to antimicrobials, represent a massive additional financial burden for health systems, generate high

costs for patients and their families, and cause unnecessary deaths.

With the emergence of multi-drug-resistant organisms, HAIs now pose a more serious threat to healthcare facilities. For example, the drug-resistant Gram-negative bacteria threatens hospitalized patients whose immune systems are weak; the bacteria can survive for a long time on surfaces in the hospital and enter the body through wounds, catheters, and ventilators. The Centers for Disease Control and Prevention (CDC) estimate that in the United States, HAIs account for nearly 1.7 million infections and 100,000 deaths each year. A 2009 CDC study estimated the annual direct costs of HAIs to be between $35.7 billion and $45 billion.

The travel path of infection is unique to each environment and can affect numerous areas and elements in a hospital, including furniture, sinks, restrooms, and textiles such as privacy curtains and bedding.

MITIGATING RISK FACTORS

Several factors put patients at risk of infection in healthcare settings, including prolonged and inappropriate use of invasive devices and antibiotics, high-risk and sophisticated procedures, immuno-suppression and other severe underlying patient conditions, and insufficient application of standard and isolation precautions.

It is of utmost importance to combat the spread of pathogens known to contribute to such HAIs. The travel path of infection is unique to each environment and can affect numerous areas and elements in a hospital, including furniture, sinks, restrooms, and textiles such as privacy curtains and bedding. As a result, the healthcare industry is taking measures to control the severity of these epidemics by preventing and suppressing the growth of infection-causing agents.

The primary prevention tool is frequent handwashing and the use of waterless, antibacterial hand sanitizers by patients and staff. Architects and designers certainly can't stand watch over nurses, doctors and visitors to make sure they properly wash, but they can put measures in place to make it easier for this to happen. For example, they can lay out the sink in an optimal place for frequent use and specify hands free faucets. In addition, the proper design of a facility's plumbing and HVAC system can diminish the spread of waterborne and airborne pathogens. But, despite aggressive monitoring, hand-washing campaigns and other infection control measures, HAI rates, especially those caused by antibiotic-resistant pathogens, are unacceptably high not only in the United States, but worldwide.

The furniture and surface materials used in patient, waiting, and exam rooms should have high performance properties such as durability, moisture and mold resistance, chemical and stain resistance, as well as scratch and impact resistance.

SELECTING FURNITURE AND FINISHES FOR INFECTION CONTROL

In addition to handwashing measures, furniture, textile, and finish selections can have a major impact on infection control. The choice of materials for everything from privacy curtains to wallcoverings to handrails can play a significant role, and designers must stay on top of the building product research to specify materials that are extremely durable, sanitary, or those with antimicrobial properties.

Designers can help stem infections by incorporating furniture that is easy to clean and disinfect, such as products with rounded corners and clean lines, and avoiding pieces that hide dirt and dust. Consider selecting furniture that is manufactured so that is can easily be taken apart in order to be thoroughly cleaned and disinfected, then re-assembled. In addition, the furniture and surface materials used in patient, waiting, and exam rooms should have high performance properties such as durability, moisture and mold resistance, chemical and stain resistance, as well as scratch and impact resistance.

Public spaces such as lobbies and atriums are a great place to maximize daylighting and provide views to the outdoors.

Incorporating Antimicrobial Finishes

Some materials used in furnishings, textiles, and surfaces are even antimicrobial. Furniture is available with antimicrobial finishes such as a silver ion in wood or copper-infused solid surface that inhibit the growth of microbes. Silver is a highly effective, natural antimicrobial agent, with the silver ion technology already present in everyday products such as cell phones, touch screens, textiles, and clothing. This technology resists and inhibits the growth of microorganisms by forming a protective surface against microbes, pathogens, and bacteria such as E. coli and Staph. It also suppresses the growth of harmful mold, mildew, and fungus, which are stain and odor causing microorganisms that can also cause disease.

Tests have shown that on unprotected surfaces, bacteria can double in number every 20 minutes. Mitigating the effects of this rapid escalation, silver ion technology inhibits bacterial growth by 99.94%, keeping surfaces cleaner, longer. A silver ion exchange occurs when moisture such as humidity, perspiration or a sneeze is introduced. This moisture contains ions such as sodium or potassium that exchange positions with the silver ions. The silver ions disrupt vital cell functions of the harmful microorganisms, therefore inhibiting their growth.

Wood furnishings featuring silver ion technology that is embedded into the wood finish to form an antimicrobial surface, as opposed to a separate topcoat, inhibit the growth of harmful microorganisms and ensure

that the silver's inherent microorganism-fighting action continues to work throughout the product life.

In a similar fashion, solid surfaces are also available that are infused with antimicrobial materials such as biocidal copper-oxide, which can be used not only on counters and sinks but in linens and touch surfaces including bed rails, foot boards, over-the-bed tables in patient rooms, vanities with integral sink bowls, and shower pans.

Copper is biocidal and effectively kills a broad spectrum of microbes through their exposure to copper ions; a multi-targeted attack results in rapid cell death in a matter of minutes. In addition, copper alloy surfaces contain an almost unlimited source of high concentration copper and are not selective in their kill, making biocidal resistance highly unlikely. This is opposed to antibiotics, which are typically designed to be selective and to inhibit the growth of targeted bacteria, but not the cells in the body.

Biocidal, copper oxide-infused solid surfaces are a non-porous, fully tested surfacing material with all the inherent benefits of solid surface such as integral bowls and backsplashes and virtually seamless applications, all with the added biocidal benefits of copper. In textiles, the microscopic oxide particles are polymerized into nylon and polyester fibers so that they are woven throughout the matrix of the material, rather than just acting as a surface coating. This surface kills greater than 99.9% of bacteria* within two hours and continues to kill 99% of bacteria* even after repeated contamination.

*Testing demonstrates effective antibacterial activity against Staphylococcus aureus (ATCC 6538), Enterobacter aerogenes (ATCC 13048), Methicillin resistant Staphylococcus aureus (MRSA-ATCC 33592), Escherichia coli O157:H7 (ATCC 35150) and Pseudomonas aeruginosa (ATCC 15442).

The inclusion of these antimicrobial products into the healthcare environment is critical, as they are all heavily touched by patients, nurses and visitors.

This article continues on http://go.hw.net/AR1015Course1. Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. Which category of furniture provides the scale, strength and mobility to accommodate larger patients and guests?
   a. Multi-purpose
   b. Hybrid
   c. Bariatric
   d. Modular

2. Which of the following constitutes a Healthcare Acquired Infection?
   a. Affects patients in a hospital or other healthcare facility.
   b. Not present or incubating at the time of admission.
   c. Acquired by patients in the hospital or facility that appear after discharge.
   d. Occupational infections among staff.
   e. All of the above

3. True or False: The drug-resistant Gram-negative bacteria can survive for a long time on surfaces in the hospital and enter the body through wounds, catheters, and ventilators.

4. The Centers for Disease Control and Prevention (CDC) estimate that in the United States, HAIs account for nearly 1.7 million infections and _____ deaths each year.
   a. 1,000
   b. 10,000
   c. 100,000

5. What is the primary prevention tool for HAIs?
   a. Handwashing
   b. Furniture selection

6. Which of the following is an antimicrobial material with a multi-targeted attack that results in rapid cell death in a matter of minutes?
   a. Silver ion
   b. Copper-oxide

7. Which of the following is considered a high-touch surface?
   a. Walls
   b. Bed rails
   c. Over-bed tables
   d. Thermostats
   e. Both B and C

8. True or False: FRP wall panels have very low abrasion and impact resistance.

9. True or False: Sealing the FRP trim to the FRP panel contact points provides a surface that can be easily cleaned and markedly reduces the potential for penetrating moisture, bacteria, mold, viruses and other causal agents that can be harbored in fissures and seams.

10. True or False: FRP panels with a film finish are considered a Cleanroom Suitable Material and can pass ISO Clean Room Standards.

SPONSOR INFORMATION

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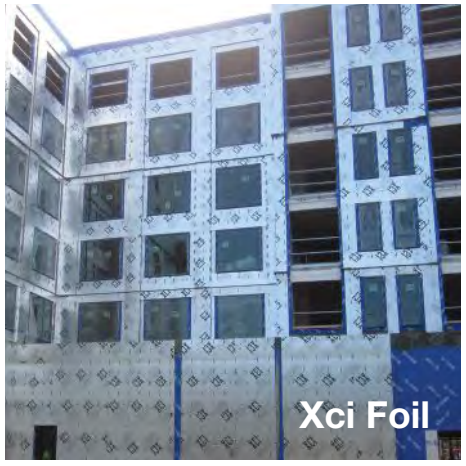

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Living Building Certification; The Bullitt Center – Seattle, Washington; Architect: The Miller Hull Partnership; *WoodWorks Multi-Story Wood Design Award, 2014.* Photo by John Stamets

Presented by: reTHINK WOOD®

LEARNING OBJECTIVES

After reading this article you will be able to:

1. Discuss the sustainable aspects of wood products.
2. Describe how wood contributes to credits under various green building rating systems.
3. Articulate the importance of life cycle assessment and how it can be used to evaluate the environmental performance of buildings at the design stage.
4. Describe how green building certification, sustainable forest certification, and Environmental Product Declarations complement each other to provide a more complete picture of a building's environmental performance.

CONTINUING EDUCATION

AIA CREDIT: 1 LU/HSW
GBCI CREDIT: 1 CE Hour

AIA COURSE NUMBER: ARoct2015.3
GBCI COURSE NUMBER: 920004911

Use the learning objectives above to focus your study as you read this article.

Visit http://go.hw.net/AR1015Course3 to read more and complete the quiz for credit.

With growing pressure to reduce the carbon footprint of the built environment, building designers are increasingly being called upon to balance functionality and cost objectives with reduced environmental impact. Wood can help to achieve that balance.

The choice to use wood as a green building material is intuitive. It's abundant, renewable and recyclable, and has a lighter carbon footprint than other construction materials.[1] Wood is also the only structural building material with third-party certification systems in place to verify that products have come from a sustainably managed resource.

In addition to its environmental benefits, wood's natural beauty and warmth have a positive effect on building occupants. In two studies conducted at FPInnovations and the University of British Columbia, for example, the use of visual wood was shown to lower sympathetic nervous system (SNS) activation, which is responsible for physiological stress responses in humans.[2] As a result, an increasing number of architects are incorporating wood in their designs as a way to achieve goals such as improved productivity and performance in schools and offices, and better patient outcomes in hospitals.[3]

With all of these attributes, wood is well positioned as a key component of environmentally superior structures. Yet, early efforts to promote green construction resulted in highly variable treatment of wood in green building rating systems—which, at the time, were largely based on long lists of prescriptive standards, typically focused on single attributes such as recycled content. Such variability can still be seen in many of the green building programs in use today. However, these systems are increasingly moving away from prescriptive standards and toward reliance on systematic, multi-attribute assessment of building products, assemblies, and completed structures through life cycle

Three Green Globes; Terrena – Northridge, California; Architect: TCA Architects; Developer: Northwestern Mutual Life Insurance Company. Photo by 360° Virtual Visions

assessment (LCA). The result is greater uniformity between programs and far greater robustness in evaluation, both of which serve to leverage the environmental advantages of wood.

This continuing education course examines key green building rating programs and how wood building materials and components are rated within each. Increased reliance on LCA and environmental product declarations (EPDs), and the implications for wood construction, are also explored.

GREEN RATING SYSTEMS, CODES, AND WOOD

Of the more than 42 green building programs currently in use in the U.S. and Canada, 12 of the most prominent are examined in this article; the UK BREEAM program—the world's first comprehensive green rating system and basis for many systems worldwide—is also included.

Approaches to Rating Green Buildings

Early green building rating initiatives in North America were based on lists of prescribed measures for reducing energy consumption and various environmental impacts. Among these were Built Green, Earthcraft, Leadership in Energy and Environmental Design (LEED), and the NAHB Model Green Home Building Guidelines—precursor to the National Green Building Standard. Arranged within categories such as Energy, Water, Indoor Air Quality, Materials and Resources, and Site, prescriptive lists of recommended or required measures outlined the path toward environmentally better buildings. Each measure typically addressed a single concern or attribute such as recycled, recycled content, rapidly renewable, and sourcing. Recommendations for improving environmental performance of buildings and construction practices varied among the initiatives, as did recommendations for the use of wood and wood products.

EPDs AND FOREST CERTIFICATION

The wood industry has been a leader in the development of Environmental Product Declarations (EPDs).

An EPD is a standardized, third-party-verified label that communicates the environmental performance of a product, is based on LCA, and is applicable worldwide.

An EPD includes information about both product attributes and production impacts and provides consistent and comparable information to industrial customers and end-use consumers regarding environmental impacts. The nature of EPDs also allows summation of environmental impacts along a product's supply chain—a powerful feature that greatly enhances the utility of LCA-based information.

In the case of wood products, sustainable forest management certification complements the information in an EPD, providing a more complete picture by encompassing parameters not covered in an LCA—such as biodiversity conservation, soil and water quality, and the protection of wildlife habitat.

EPDs for wood products are available from the American Wood Council (www.awc.org).

LEED Gold; Federal Center South, Building 1202 – Seattle, Washington; Architect: ZGF Architects; *WoodWorks Commercial Wood Design Award, 2014.* All of the wood used in this project was salvaged from a 1940s-era warehouse that previously occupied the site – a total of 200,000 board feet of heavy timber and 100,000 board feet of 2x6 tongue and groove roof decking. Photo by Benjamin Benschneider

In more recent initiatives, there has been a noticeable shift away from prescriptive measures and toward systematic, performance-based assessment using LCA. This shift is reflected in the latest version of LEED, Green Globes and several other rating systems, and is discussed later in this article.

Green Building to Code

Given broad interest in reducing the environmental impacts of buildings and their construction, it is not surprising that provisions of voluntary green building rating systems are beginning to find their way into building codes. The State of California became the first state to codify green building provisions with its *California Green Building Standards Code* (CALGreen), which applies to all occupancies within the state. Model code language has also been developed in the form of ASHRAE 189.1 and the *International Green Construction Code* (IgCC). Washington, D.C., for example, has adopted the 189.1 standard as part of its city building code, while Florida requires compliance with the IgCC in the construction of state-owned buildings. Other states and municipalities, such as Maryland, Rhode Island, Phoenix, and Scottsdale, have endorsed the use of the IgCC on a voluntary basis.

CALGreen provisions and model code language within the ASHRAE and IgCC standards are similar to those in voluntary green building rating systems. However, a comparison of all three shows greater incentive for wood use under the IgCC than CALGreen or the ASHRAE standard. For example:

- The Materials Selection section of the IgCC standard specifies that at least 55 percent of the total materials used in each building project (based on mass, volume, or cost) must be any combination of used, recycled-content, or recyclable materials, or bio-based materials, where the bio-based content is not less than 75 percent and where wood materials are environmentally certified.
- ASHRAE 189.1 contains a similar requirement, specifying that at least 45 percent of materials must be low-impact materials, with low impact defined as recycled content, regional, or bio-based materials; bio-based materials are required to comprise a minimum of 5 percent of the total cost of materials.
- CALGreen awards voluntary credits for the use of bio-based materials.

All of these initiatives emphasize use of rapidly renewable materials, defined as materials that renew in 10 years or less, rather than 11 years or more (i.e., they favor materials other than wood), although they also reward the use of certified wood. None of these programs require comprehensive environmental certification of rapidly renewable materials or of any construction material other than wood.

SUSTAINABLE FOREST CERTIFICATION

There are four primary forest certification programs operating in North America today: Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI), Canadian Standards Association's Sustainable Forest Management Standards (CSA), and American Tree Farm System (ATFS). All but FSC are endorsed by the Programme for the Endorsement of Forest Certification (PEFC), an independent, non-profit umbrella organization that supports sustainable forest management globally by assessing and endorsing national forest certification standards. Certification in all cases requires third-party verification against a published, transparent standard.

Certification under these programs is separate from the green rating systems that require their use, and different also from the Environmental Product Declarations discussed in this course.

While green building programs encourage the use of certified wood products, there is no such requirement for rapidly renewable materials or products such as steel, concrete, or plastics.

LEED Certified; Biomass Heating Plant, Hotchkiss School – Lakefield, Connecticut; Architect: Centerbrook Architects and Planners
WoodWorks Green Building with Wood Design Award, 2014. Faced with the replacement of an aging fuel oil heating plant, Hotchkiss school chose to build a LEED-certified biomass facility that burns wood chips from sustainably managed forests nearby. Wood was used in the building's construction and the facility is covered with a rolling, vegetated roof that changes colors with the season. Photo by David Sundberg/Esto

NEW DEVELOPMENTS IN GREEN BUILDING RATING SYSTEMS & CODES

The following developments within major green rating systems demonstrate the shift toward LCA-based tools and data.

LEED v.4. In the Materials and Resources category of LEED v.4 (2013), optional prescriptive measures that were part of the previous version of the system—for material reuse, recycled content, and rapidly renewable materials—have been replaced with optional credits related to LCA, LCA-based environmental product declarations (EPDs), material ingredient verification, and raw material extraction (see chart below). EPDs need only be collected to gain credit; there is no requirement that they be understood or acted upon, though there is an optional credit rewarding project teams that prioritize products whose EPDs show reduced environmental impacts.

According to Dr. Jim Bowyer, director of the Responsible Materials Program at Dovetail Partners, "The two rating systems that have long incorporated systematic assessment into their programs—BREEAM and Green Globes—have more robust LCA provisions."

Changes in Materials and Resources Portion of LEED Programs – LEED 2009 to LEED v.4

LEED (2009)	LEED v.4
Building and material reuse credits (walls, floors, roof, interior elements)	Moved to Building Life Cycle Impact Reduction credit
Building life cycle impact reduction (pilot credit)	Added option for whole building LCA of structure and enclosure
	New credit, MR Credit – Building Product Disclosure and Optimization – Environmental Product Declarations focuses on selecting products with improved life cycles; rewards material optimization, disclosure, products with EPDs, and use of local products (with local now defined as a 100-mile radius)
Recycled content, rapidly renewable materials, certified wood	Moved into Building Product Disclosure and Optimization – Sourcing of Raw Materials
	New credit, Building Product Disclosure and Optimization – Sourcing of Raw Materials, rewards products from manufacturers that provide information on land use practices, extraction locations, labor practices, etc.

Green Globes v.1.3. The newest version of Green Globes (version 1.3, 2014) offers two paths to satisfying material selection requirements. One option is to conduct LCAs in the conceptual design phase of at least two building designs (core and shell including envelope), with selection of the lowest impact option. Alternatively, EPDs that comply with standards put forth by the International Organization for Standardization (ISO), third-party certifications to multi-attribute consensus-based standards, and/or third-party-certified, ISO-compliant life cycle product analyses focused on appropriate characteristics for the building system or application must comprise 10% of the selected products in order to earn credit.

BREEAM. Within the Materials section of BREEAM, credits are awarded on the basis of a building's quantified environmental life cycle impact through assessment of the main building elements—i.e., exterior walls, windows, roof, upper floors, internal walls, and floor coverings and finish. Impacts can be quantified either through use of an ISO-compliant LCA tool (wherein building designers must demonstrate that they know how to use the LCA tool and document how the building design has benefitted from its use), or through selection of building components based on either an LCA-based Green Guide developed and maintained by BRE, and/or ISO-compliant EPDs. Life cycle greenhouse gas emissions (in kilograms of carbon dioxide, or CO_2 equivalent) for each element must also be reported based on a 60-year building life.

The shift toward performance-based assessment is also reflected in ASHRAE 189.1, the IgCC, and CALGreen.

Visit http://go.hw.net/AR1015Course3 to read more and complete the quiz for credit.

SPONSOR INFORMATION

reTHINK WOOD®

The reThink Wood initiative is a coalition of interests representing North America's wood products industry and related stakeholders. The coalition shares a passion for wood products and the forests they come from. Innovative new technologies and building systems have enabled longer wood spans, taller walls and higher buildings, and continue to expand the possibilities for wood use in construction. www.rethinkwood.com/CEU

QUIZ

1. Which of the following is not an intuitive reason to use wood as a green building material?
   a. Renewability
   b. Recyclability
   c. Carbon footprint
   d. The potential of innovative new products to achieve longer spans
   e. Ability to purchase products as third-party certified as having come from a sustainably managed resource

2. Supporting the concept that wood has a positive effect on building occupants, one study concluded that the use of visual wood:
   a. made occupants want to go outside and be in nature.
   b. elevated the heart rate of occupants, leading to stress activation.
   c. lowered occupants' sympathetic nervous system activation, which is responsible for physiological stress responses.
   d. lowered occupants' cholesterol levels, but only if they spent more than six hours a day in the room.

3. By moving away from prescriptive standards and toward reliance on systematic, multi-attribute assessment of building products, assemblies and completed structures through LCA, the result is:
   a. greater uniformity between programs.
   b. higher green building ratings.
   c. greater robustness in evaluation.
   d. a faster certification process.
   e. a and b
   f. a and c

4. Which building code(s) reference life cycle assessment as a way to achieve their environmental objectives?
   a. Green Globes
   b. *California Green Building Code* (CALGreen)
   c. *International Green Construction Code*
   d. All of the above
   e. b and c

5. In prescriptive rating systems, wood can often earn points in all but which category:
   a. siting.
   b. recycled/reused/salvaged materials.
   c. certified wood.
   d. indoor air quality.
   e. waste minimization.

6. Of the following codes and standards, which provides the greatest incentive for wood use under a Material Selection credit?
   a. *International Green Construction Code*
   b. *California Green Building Code*
   c. *International Building Code*
   d. Model Green Home Building Guidelines
   e. ASHRAE 189.1

7. Which of the following are helping to make LCA a viable option for any building designer?
   a. Low-cost or free tools that provide LCA information for generic building assemblies
   b. Environmental Product Declarations
   c. Availability of LCA experts for full building analysis
   d. All of the above

8. When comparing buildings made from different materials, LCA studies consistently confirm what attribute of wood buildings:
   a. lower cost.
   b. low embodied energy.
   c. renewability.
   d. value of carbon stored in wood products.

9. When the Athena EcoCalculator was used to evaluate three configurations of a simple building (in wood, steel and concrete) based on life cycle assessment, it found that:
   a. impacts associated with the steel design were higher in all cases than the impacts associated with the wood building.
   b. impacts associated with the concrete building were higher in all cases than the impacts associated with the wood building.
   c. each of the three hypothetical buildings had their merits and outperformed the others in at least one category.
   d. a and b

10. In an environmental context, the use of mass timber products such as CLT offers a way to:
    a. create a broader range of lower-impact structures.
    b. meet the siting requirements of green building rating systems.
    c. meet the strength requirements for LEED Platinum buildings.
    d. reduce transportation costs.

SUSTAINABLE CHOICES IN LUXURY FENESTRATIONS

Presented by:

Loewen

Windows create a unique opportunity for the architect to create a luxury living space that is both comfortable and energy efficient.

LEARNING OBJECTIVES

After reading this article you will be able to:

1. Discuss the main attributes and relevance of windows in sustainable (green) building design
2. List the critical aesthetic and functional roles of fenestration in the design of luxury residential projects
3. Evaluate windows according to the key performance criteria such as base material, cladding, and hardware
4. Select a superior window for luxury home projects that will be long lasting, durable, and aesthetically pleasing

CONTINUING EDUCATION

CREDIT: 1 HSW/LU

COURSE NUMBER: ARjune2014.2

Use the learning objectives above to focus your study as you read this article.

Visit http://go.hw.net/AR614Course2 to read more and complete the quiz for credit.

By Andrew Hunt

Luxury homes offer the architect, builder and buyer a unique opportunity to create dwellings that are distinctive, comfortable and aesthetically pleasing. Increasingly, sustainable design is becoming more important to luxury home owners. Opulence does not need to be wasteful of natural resources. Even large floor plans can prove to be conservation-minded if the architect, builder and homeowner decide to pursue a "green" route.

Designing a luxury home that is environmentally responsible must take into account many aspects of the building process including design, construction practices, air sealing and insulation, and material selection. Windows sit at the crossroads of sustainable material selection and luxury design. The right window can reduce energy use, contribute to green building goals and also provide the touch of quality and beauty a luxury home requires.

WINDOWS AND GREEN BUILDING

Concerns about climate change, rising energy costs, and a general trend towards environmental responsibility have created a homebuilding market where sustainable goals are increasingly important to both buyer and builder.

A report from the U.S. Department of Energy (DOE) shows that residential buildings consume 22 percent of all the energy used in the United States annually. In addition to this, according to the USGBC (United States Green Building Council) buildings in the United States account for 39 percent of total carbon dioxide emissions. Beyond energy conservation, sustainable design can also increase comfort, save material costs, create a more healthful living space and produce a more durable building. The positive qualities of sustainable or green building make it especially attractive in the luxury home market where homes are often built in unique and environmentally attractive or sensitive areas.

Sustainability and green building design are not new concepts in the practice of architecture. The principles have existed for decades. There have always been designs that take advantage of natural systems, from tepees to the Capitol Building, but the materials and forms were not technically advanced. Today, construction materials and building science technologies have evolved enough that they can support sustainable building goals, and windows are no exception.

GREEN BUILDING AND BEYOND

Green building programs can support and architect's goal of creating a sustainable design while also satisfying the aesthetic needs of the project.

Green building is a very popular trend today but goes beyond simply improving insulation and recycling construction waste. Today green building also takes into account many other more subtle metrics. Here are a few of the important ones to consider:

Embodied Energy (EE): the quantity of energy required to manufacture and supply (to the point of use), a product, material, or service.

Life Cycle Assessment (LCA): the total environmental impact of a material or product through every step of its life—from the raw material extraction, to transport, manufacturing, assembly, installation, use in a building, and finally through its disassembly, deconstruction and/or decomposition. This term is also known as a cradle-to-grave analysis.

Windows have evolved from single-pane light sources to the high tech fenestrations now recognized as an integral part of the green built environment. Modern windows have the ability to lower energy bills by reducing, or allowing, solar gain, depending on the climate zone. Understanding the main attributes of windows and how these characteristics apply to green or sustainable building goals is an important first step in matching the right window with a luxury home.

As popular as green building is, it remains subjective. Identifying processes and products that are green is an extremely difficult task. It is not always scientific and there may not be a definite yes or no answer. The answer is often relative. However, there are a number of programs and organizations available to assist with assessments. When it comes to windows, being able to identify a high-quality product that will satisfy sustainability, comfort, and luxury aesthetic goals is critical. The following are some of the more common programs and organizations that help define green or sustainable building products and practices.

Energy Star

Energy Star is a joint program of the U.S. Environmental Protection Agency (EPA) DOE designed to help save money and protect the environment through energy efficient products and practices.

Energy Star qualified windows have met a series of energy efficiency guidelines set by the EPA and the DOE. It does not measure/evaluate materials or their sources.

National Fenestration Rating Council (NFRC)

As a non-profit organization, the NFRC administers a uniform, independent rating and labelling system for the energy performance of windows, doors, skylights, and attachment products. Their goal is to provide fair, accurate, and reliable energy performance ratings so that architects, builders, code officials, contractors and homeowners can compare different products and make informed product choices.

Ratings provided by the NFRC also help building officials, state government employees, and others involved in code development and enforcement to determine if products meet local codes. The NFRC is also one of the industry standard rating organizations that help manufacturers have a fair and level playing field to compare products and an accurate method of showing the energy benefits of new designs or technology.

American Architectural Manufacturers Association (AAMA)

The AAMA is a material-neutral organization, comprised of members from window, door, and skylight manufacturers, component and supply manufacturers, and service and consulting companies. Established in 1936, AAMA represents all sizes of companies, from all across the USA and internationally. Addressing issues of critical importance to its members, it provides a forum for sharing experiences and knowledge, while participating in efforts to shape the future for its members.

AAMA is a primary source for performance standards, product certification and educational programs for the window, door and skylight industry. AAMA proactively and effectively influences codes, construction and specification issues.

Window and Door Manufacturers Association (WDMA)

WDMA is a trade association for the window, door and skylight industry with members in Canada and the USA. The organization offers a Hallmark Certification program to ensure that fenestration products are manufactured in accordance to their standards. In addition, they develop industry standards and test methods, certify products to industry standards.

As a trade organization WDMA represents the industry before building code and regulatory bodies, conducts research and collects data on the fenestration industry, provides educational programs and training for members, and serves as an information clearinghouse for specifies, architects, builders, contractors and consumers.

The Sustainable Forestry Initiative

Founded by the American Forest & Paper Association in 1994, the Sustainable Forestry Initiative (SFI) was originally designed as a code of conduct for the forest products industry in the United States, the SFI program has become one of the world's largest sustainable forestry and certification programs.

In 2007, a new, fully independent organization, the Sustainable Forestry Initiative, Inc. was created to direct all elements of the SFI program. They developed a comprehensive third-party certification procedure for participants to document and communicate their compliance with the SFI Standard.

To be certified, an applicant must undergo a review of its operations by an audit firm accredited by an independent body, such as the American National Standards Institute (ANSI) or the Standards Council of Canada. Auditors must meet educational and professional criteria established by SFI, Inc.

Forest Stewardship Council (FSC)

The FSC is an international not-for-profit membership-based organization that accredits certification organizations (such as Rainforest Alliance–SmartWood) in order to guarantee the authenticity of their claims. Their goal is to promote environmentally responsible, socially beneficial, and economically viable management of the world's forests by establishing a worldwide standard of recognized and respected Principles of Forest Stewardship.

Founded in the early 1990s, FSC was created to change the dialogue about the practice of sustainable forestry worldwide. The FSC standards represent the world's strongest system for guiding forest management toward sustainable outcomes.

In addition to these specific product certification programs, there are several green building

programs that can validate the overall design and construction of the building. These programs can be especially helpful when selecting windows as they can suggest attributes or certifications a window must have to be considered part of an overall sustainable design package.

The following are a few of the more recognized green building programs available today for sustainable design for residential homes.

NAHB's Model Green Home Building Guidelines

The National Association of Home Builders designed the program as a tool kit for individual builders looking to engage in green building practices. It also aims to assist homebuilder associations looking to launch their own local green building programs.

The Model Green Home Building Guidelines are for the mainstream homebuilder and is designed to systematize green design and the construction process. The program highlights the methods a mainstream homebuilder can effectively include to introduce environmental solutions into new homes.

Leadership in Energy and Environmental Design (LEED)

LEED Green Building Rating System is the nationally accepted benchmark for the design, construction, and operation of high-performance green buildings. LEED provides building owners and operators with the tools they need to have an immediate and measurable impact on their buildings' performance. It promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

In the United States, LEED is administered by the U.S. Green Building Council; in Canada, it is operated by the Canada Green Building Council.

While these certifications and programs can help point the architect toward a window that can satisfy sustainable design goals, it is important to understand the basic criteria that these programs use to evaluate windows. There are two general areas to be familiar with when evaluating the sustainable aspects of a window, energy efficiency and what the materials used to produce the window.

While some green building programs focus strictly on commercial buildings, more opportunities are being created for residential sustainable project.

HOW WINDOWS CAN BE ENERGY EFFICIENT

Windows impact the energy efficiency of the house by reducing the heat transfer from the outside environment to the inside of the home. To determine how well a window operates at reducing heat transfer, there are three factors that can be evaluated: direct heat transfer, solar gain, and air tightness.

To evaluate the direct heat transfer of a window is to determine how well a window blocks heat from directly conducting through the unit. To measure this, windows are given a U-factor. U-factor is the rate at which a window, door, or skylight conducts non-solar heat flow. It is usually expressed in units of BTU/hr-ft^2-oF. For windows, skylights, and glass doors, a U-factor may refer to just the glass or glazing alone. NFRC U-factor ratings, however, represent the entire window performance, including frame and spacer material. The lower the U-factor, the more energy-efficient the window, door, or skylight.

The second evaluation of energy efficiency for windows is how well the product performs at blocking solar radiation, or sunshine, from passing through the glazing. This rating is called the solar heat gain coefficient (SHGC). The SHGCis the amount of solar radiation admitted through a window, door, or skylight—either transmitted directly and/or absorbed, and subsequently released as heat inside a home. The lower a product's SHGC, the less solar heat it transmits and the greater its shading ability. A product with a high SHGC rating is more effective at collecting solar heat during the winter. A product with a low SHGC rating is more effective at reducing cooling loads during the summer by blocking heat gain from the sun.

The third rating to consider when evaluating a window for energy efficiency is the air leakage rating. This is the rate of air movement around a window, door, or skylight in the presence of a specific pressure difference across it. It is expressed in units of cubic feet per minute per square foot of frame area (cfm/ft^2). A product with a low air leakage rating is tighter than one with a high air leakage rating.

These three primary energy efficiency ratings can be found on the NFRC label attached to the window, although the reference to the air leakage is optional in many regions. For windows, Energy Star bases its qualification only on U-factor and solar heat gain coefficient ratings.

Historically, single pane windows did very little to reduce the amount of energy that passed between the outside environment and the inside of the home. Glass by itself is highly conductive, so to improve energy efficiency a second and then third pane of glass was added to the window frame. The spaces between the panes greatly reduce heat transfer and are filled with argon or a similar inert gas with a low heat transfer property. The gas works to both reduce heat transfer and also eliminate fogging from humidity between the panes.

The other aspect of energy efficiency in windows is the coating put on the glass panes. Low-emissivity (low-e) coatings on glazing or glass control heat transfer through windows with insulated glazing. A low-e coating is a microscopically thin, virtually invisible metal or metallic oxide layer deposited directly onto the surface of one or more of the panes of glass. The low-e coating lowers the U-factor of the window. Different types of low-e coatings have been designed to allow for high solar gain, moderate solar gain, or low solar gain.

Windows manufactured with low-e coatings typically cost about 10% to 15% more than regular windows, but they may reduce energy loss by as much as 30% to 50%. This significant reduction in energy loss can be especially advantageous for luxury homes, which are generally larger and have more windows than traditional homes.

A final consideration when evaluating low-e windows for luxury homes is the UV, or ultraviolet, protection the window coatings offer. Blocking UV light is important because it can protect furniture, art, carpet and décor from the fading effects of UV exposure. Low-e windows can block over 70 percent of the UV light coming into the house through the window.

Visit http://go.hw.net/AR614Course2 to read more and complete the quiz for credit.

QUIZ

1. Which of the following is not a benefit of sustainable design in luxury home building?
   a. Improved energy efficiency
   b. A more healthful living environment
   c. Improved home security
   d. Increased durability

2. What does the U-factor rating of a window measure?
   a. The number of panes in the window (singe, double, or triple)
   b. How well the unit blocks the flow of thermal energy or non-solar heat flow
   c. How well the window reflects visible light
   d. The amount of noise the window allows to pass through

3. What does SHGC stand for?
   a. Society of Heating, Glass, and Countertops
   b. Sustainable and Healthy Guidelines Council
   c. Sustainable Home Governance Committee
   d. Solar Heat Gain Coefficient

4. Why is blocking UV (ultraviolet) light an important aspect of luxury home design?
   a. UV rays increase heat within the building, driving up energy bills
   b. Excessive UV rays can lead to house fires
   c. UV rays can fade furniture, carpets, and art
   d. You should not try to block UV light

5. Which of the following should be considered as part of the life cycle analysis of a window?
   a. Initial cost of the product
   b. How easy the product can be recycled at the end of its functional lifespan
   c. Weight and shipping costs
   d. The value, in dollars, of the potential energy savings

6. What are some of the primary benefits of daylighting as an architectural design element?
   a. Improved mood for the occupants
   b. Increased resell value
   c. Reduce energy use through temperature regulation and artificial light use
   d. Improved line of sight for occupants

7. What is the base material of a window?
   a. The glass or glazing type
   b. The type of primer paint used
   c. The exterior of the bottom sill
   d. The material the frame is made from

8. What are some of the attributes of a high quality window base material?
   a. Moisture resistant and dense grain
   b. Sustainable forest certified
   c. Natural smell and pleasing grain tone or color
   d. Low VOC

9. From a quality standpoint, which of the following describe the benefits of extruded aluminum when compared to roll-formed aluminum?
   a. Extruded aluminum can withstand greater impact without sustaining damage
   b. Extruded aluminum can be shaped for more intricate profile details
   c. Provides a more uniform base for high quality paint finish
   d. All of the above

10. True or false. Copper and bronze, as a window cladding material are superior products because they will retain factory finish for the entire life of the window
    a. True
    b. False

HIGH-PERFORMANCE COATING SYSTEMS FOR METAL ROOFING

Presented by:

valspar

LEARNING OBJECTIVES

At the end of this program, participants will be able to:

1. Present the environmental benefits of cool roofing.
2. Discuss how to evaluate a cool roof relative to industry standards and green building program requirements.
3. Identify the components of paint.
4. Describe the continuous coil coating process and the benefits of this pre-painted metal surface treatment.
5. Explain industry test methods of coatings for cool metal roofing.

CONTINUING EDUCATION

CREDIT: 1 LU

COURSE NUMBER: ARoct2015.4

Use the learning objectives above to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR1015Course4 and complete the quiz for free as you read this article. If you are new to Hanley Wood University, create a free learner account; returning users log in as usual.

By Marissa Hovraluck, LEED Green Associate

INTRODUCTION

Metal roofs may not seem like the obvious choice when you are looking for a high-performance roof. However, they offer many benefits that other "green" roofs can't compete with. Not only are they aesthetically appealing, they are also energy efficient, made from recyclable material and will likely be the last roof you will ever need to install. They are durable and can withstand the toughest of the elements while remaining resistant to cracking, shrinking, and many other problems traditional roofing materials struggle with. This article will look closer at the many benefits of selecting a metal roof with a solar reflective coating system for your next project.

WHAT IS A COOL ROOF?

A cool roof is one that reflects the heat emitted by the sun back into the atmosphere, keeping the temperature of the roof lower and thereby reducing the amount of heat transferred into the building below.

The coolness level of a roof is determined by several factors, including geographical location, climate, materials in the building envelope, facility design, and insulation used.

There are two key properties that are important for the temperature that a roof will reach in direct sunlight. They are solar reflectance (SR), the amount of solar energy that is immediately reflected from a surface, and thermal emittance (TE), the amount of heat energy a surface can re-emit in the form of infrared energy into the atmosphere.

A cool roof with a high solar reflectance and a high thermal emittance will have a lower surface temperature compared to that of a roof with a low solar reflectance and a low thermal emittance. A lower surface temperature translates into less heat gain in the structure below, resulting in a cooler building, which means less energy used and lower energy bills. Metal roofs use solar-reflective surfaces to maintain lower roof temperatures. In the summer sun, some standard roofs' surface temperatures can reach up to 150°F. Under the same conditions, a metal roof with a solar reflective coating could remain 50°F cooler.

BENEFITS OF COOL ROOFING

Cool roof requirements appear in national and local energy codes, green building initiatives and energy rebate programs because a cool roof reduces air conditioning use and lowers utility bills. It also mitigates the urban heat island effect while increasing occupant comfort and reducing the occurrence of health issues associated with poor air quality and smog. Cool roofing lowers maintenance costs and extends roof life. It also assists a building project in meeting or exceeding today's energy and building codes.

The remainder of this article will look at ecological and economical ways to finish metal roofing.

Metal roofs are already recognized as sustainable, durable building components and as such are used in a variety of applications. Cool metal roofs, finished with the proper coating system, not only benefit the environment globally and locally, but can also significantly reduce a building's carbon footprint, energy consumption and cooling/heating loads.

In addition to lowering energy costs, there are many benefits to having a cool metal roof.

Sustainability: Metal roofs last much longer than most non-metal roofing products. Conventional roofing products, including asphalt shingles, contribute an estimated 20 billion pounds of waste to U.S. landfills annually. Metal roofs can be installed over an existing roof to help minimize the cost and disposal of tearing off old roofing materials.

Durability: Metal roofs have the greatest ability to perform over a long period of time in a wide range of weather conditions, making them an ideal choice for residential, school, government, commercial, industrial and institutional buildings.

Fire and wind resistance: Metal roofs are extremely fire resistant and can be designed to withstand extreme weather conditions, such as heavy snow loads, hailstorms and even wildfires.

Light weight: Depending on the type of metal used, a metal roof can be 1/8 the weight of other roofing products, placing a lighter load on the structure and foundation and thereby extending the life of the entire building.

Aesthetics: Prior to installation, metal coils can be painted to color-match the roof to the design theme of a structure. Pre-painted metal roofing can achieve nearly unlimited design options. Colors can range from standard to metallic colors, special effects, textured coatings and even prints such as weathered copper or burnished slate. The metal panels can be shaped to look like shingles, clay tiles and other popular roofing types, and the metal can also be embossed or stamped for additional aesthetic purposes if desired.

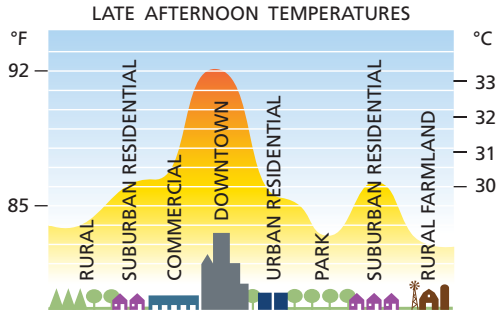
Retains solar reflectance: Oak Ridge National Laboratory research shows that metal roofing retains solar reflectance better over time than any other roofing product. This is because it resists the growth of organic matter and sheds dirt more readily than other materials.

URBAN HEAT ISLAND EFFECT

The term "heat island" is used to describe built-up urban areas that are hotter than their surrounding rural areas. The urban heat island effect is common to cities in industrialized nations where outside air temperatures are five to 10 degrees Fahrenheit hotter than outlying areas. Due to the lack of vegetation and soil moisture in a metropolis, direct sunlight and heat is easily absorbed by dry, exposed man-made structures such as buildings and roads, thus increasing surface and ambient air temperatures in the built-up landscape. The elevated temperatures result in higher energy costs to cool a building.

In addition, urban heat islands:

- change regional weather patterns
- increase photochemical smog and pollution levels
- compromise our air quality



This graph illustrates how the spread of homes and buildings has increased the holding of heat in the center of a metropolis, in this case Atlanta, GA. As seen, the urban heat island is significantly warmer than its surrounding rural areas.

- raise the temperature of our waterways
- impact our health and that of our environment

MITIGATING THE HEAT ISLAND EFFECT

Today's headlines about increased energy costs and environmental concerns are changing how building owners, construction professionals and architects select building materials and how they design for energy performance. The roof can be one of the least energy-efficient components of the building envelope, and metal roofing is one of the most viable solutions to this problem. Technology and advances in coatings and finishes have qualified metal roofing as a recognized "cool roofing" product with the following key national green building initiatives:

- Cool Roof Rating Council (CRRC, www.coolroofs.org)
- U.S. Environmental Protection Agency's (EPA) ENERGY STAR® Reflective Roof program (www.energystar.gov)
- California Energy Commission's Building Energy Efficiency Standard, Title 24 (www.energy.ca.gov/title24)
- LEED® green building certification program, a point-based system developed by the U.S. Green Building Council (USGBC, www.usgbc.org)

WHY BUILD WITH STEEL?

When people think of a green roof, they sometimes assume that a vegetated roof is the best option. However, there are actually disadvantages to selecting a vegetated roof over a cool metal roof. There are increased costs associated with these types of roofs, and on average, vegetated roofs cost twice as much as conventional systems. When you select a vegetated roof, it requires constant

maintenance. While conventional roofing materials may require routine maintenance, a vegetated roof requires landscaping, weeding and many unwanted wildlife or insects to look out for. Not only does this maintenance create a headache, the risk of a leak in the membrane or interior could cause substantial damage to the building.

When looking at metal roofs, both steel and aluminum are used in the manufacture of a cool metal roof, although steel is more commonly used. So, why build with steel? In weight, pound for pound, steel is a very economical metal roofing and siding material. The life-cycle costs of steel roofing make it an attractive investment. Steel is strong and remains durable for the service life of the roof. It is the most recycled material in the world, and 64 percent of all new steel in the U.S. is manufactured from recycled steel.

LEVELS OF SUBSTRATE PROTECTION

A Galvalume® coating for metal roofing is an aluminum-zinc alloy — a mixture of aluminum, 55 percent, and zinc, 45 percent. It is produced in either AZ50 or AZ55 coating weights, where AZ stands for aluminum/zinc and the 50 or 55 means there is 0.5 or 0.55 of an ounce of coating per square foot of the total area, on both sides. Different substrates will vary in weight and composition. Selecting the appropriate substrate and coating system will depend on the building type, location and project requirements.

A galvanized (G) coating for metal roofing is produced in either G60 or G90 coating weights. The numbers indicate how many ounces of zinc are applied to every 100 square feet of surface. "Red Rust" and "Salt Spray" tests measure corrosion resistance. These test are conducted with a salt spray to force corrosion so elapsed time can be measured. The higher the level of zinc, the better the panel performs.

PURPOSE OF METALLIC COATINGS

Corrosion can affect the structural integrity and durability of metals and alloys. Overall metal loss may be insignificant, but localized corrosion can lead to pitting, cracking and eventual fracture, causing leakages or more serious failure of building components.

There are two general types of corrosion protection.

- Sacrificial corrosion protection happens when the protective coating reacts in the corrosive media, meaning that the coating, rather than the steel, is attacked. Eventually, the sacrificial coating will be completely corroded away, leaving the bare steel to rust. Galvanized, Galvalume and Galfan® (5% aluminum-zinc alloy) are excellent sacrificial coatings.
- Barrier corrosion protection happens when the protective coating repels the corrosive media. There is very little attack by the corrosive media on the barrier-type coating. Galvalume and aluminum-coated sheets are excellent barrier coatings.

Galvalume is listed in both the sacrificial and barrier categories, and as such is proving to be a high-performance product for standing seam roofing. The zinc provides protection on exposed edges and places where the coating may become scratched, and the aluminum provides an excellent barrier against corrosive media.

COATING AND PAINT SYSTEMS

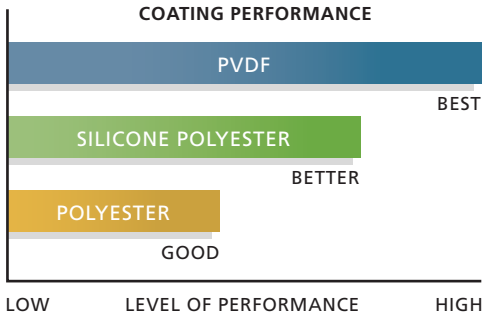
This next section will focus on coating and paint systems. First, it is important to understand what paint really is. There are four main components of paint. Resins are film formers, which is generally how the paint's coating is described. Pigment creates color and opacity. Solvents are diluents that enable us to control application properly. Finally, additives can be used to improve performance characteristics of the paint.

A typical gallon of liquid paint will be comprised of solvent, pigment, resin and additives. Paint is a dispersion of pigment into a resin/binder. A paint manufacturer must suspend the particles as best as possible for an applicator to have a homogeneous product to apply to a surface. A paint mixture is reduced to a liquid or paste form before it is used to protect or color a surface. The paint finish provides the aesthetic qualities that consumers, building owners and designers want to see on their roofs.

Paints used on metal roofs are manufactured using a specific paint technology. In the coil coating process, the roofing material is uncoiled and painted in a flat sheet form. The paint is flexible enough that the metal can be re-coiled, formed or stamped into the final roof form. Coil coatings will be discussed further in the presentation.

Resins

Resins are composed of polymers, extremely large molecules that are assembled from a combination of many small molecules. The primary function of resin is to act as the "glue" in a paint formulation by binding all of the components together. In terms of



This chart compares the performance properties of different types of coatings.

paint, "resin," "binder"and "vehicle" are interchangeable terms.

The resin is the primary source for a coating's durability and physical properties. It increases the physical strength and chemical resistance of the film coating, and allows for the curing process — a chemical reaction — to occur while paint is drying. Common resins used in the manufacture of paint coatings for metal roofing include polyester, silicone polyester (SMP) and fluoropolymer.

Resins differ in their ability to withstand UV degradation, and this criterion should be considered when selecting a roof coating for a specific location and application. UV degradation results in chalking of the coating film, essentially a failure of the coating system. Contact your coating supplier for suggested coating system.

Pigments

Pigments are added to paint to provide color and can be blended to create a desired color to suit the aesthetics of an application. Pigments also provide opacity to UV light by either absorbing or reflecting light, which often ensures a longer life for the coating. Since most resin systems are typically UV transparent, the pigment must provide UV blocking protection for the primer layer. Pigment can also increase hardness and surface roughness, which lowers the coating's gloss level.

The performance properties of the final film are affected by the pigments used in the coating mix. Organic pigments have a very bright appearance, but typically degrade more quickly than inorganic pigments. Inorganic pigments, which generally are made from ceramic or mixed-metal oxide, have a high resistance to fade. Metalescent pigments are composed of tiny metal flakes of aluminum, natural mica or synthetic mica-like material. They can produce coatings that shine and sparkle as a result of the shape and size of the metal flakes. Some

coatings with metalescent pigments also change color depending on the viewing angle and light conditions.

Solvents

Solvents are chosen for their compatibility with the paint system and their evaporation rate. Solvents are mainly used as a thinner, or diluent, to help maintain and control the viscosity of the paint so that it can be applied. However, solvents serve other uses in the coating as well, such as to dissolve and disperse solid resins and to help film coalescence. Solvents are the volatile ingredients in paint. During the bake process of a metal roof coating, the solvents are released and incinerated, leaving the pigment and resins on the substrate.

Additives

Additives are formulated into coatings to enhance the performance of paint. Additives are used to control foam, flow and leveling. They can also provide aesthetic details such as texture or a low-gloss appearance. Viscosity modifiers are used to improve settling and catalysts are used to accelerate a chemical reaction, but are not consumed.

SOLAR REFLECTANCE (SR) AND THERMAL EMITTANCE (TE)

Both solar reflectance and thermal emittance are factored on a scale from zero to one, with one being the most reflective or emissive.

It is important to remember that the greater the amount of solar energy reflected from the roof surface, the less energy the building will need to cool down. This concept is especially important in the South with warmer climates. Also, the greater the emissivity, the greater the ability of a surface to cool itself through radiative heat loss; the faster a surface can cool down, the less energy the building needs to be cool.

Ultraviolet, visual and infrared spectra are components of natural sunlight. A compilation of these three components is measured to determine the reflectance value of a surface (i.e. infrared radiation 42 percent, visible light 52 percent and ultraviolet 6 percent).

As solar radiation strikes the outer surface of a roof, a portion of that energy leaves as reflected radiation. The amount of reflected energy is measured as a ratio and depends on the reflectivity of the roof's surface. For example, if 90 percent of the solar radiation is reflected away, the reflectivity of that roof's surface is 0.90.

QUIZ

1. True or False: A cool roof with a high solar reflectance and a high thermal emittance will have a lower surface temperature compared to that of a roof with a low solar reflectance and a low emittance.

2. In addition to lowering energy costs, which of the following is a benefit of a cool metal roof?
   a. Sustainability
   b. Durability
   c. Fire and wind resistance
   d. All of the above

3. Which of the following is not true of an urban heat island?
   a. Increases photochemical smog and pollution levels
   b. Compromises our air quality
   c. Decreases the temperature of our waterways
   d. Changes regional weather patterns

4. Which of the following is a component of paint?
   a. Resin
   b. Pigment
   c. Solvent
   d. All of the above

5. Which of the following is the primary source for a coating's durability and physical properties?
   a. Resin
   b. Pigment
   c. Solvent
   d. Additive

6. True or False: The greater the amount of solar energy reflected from the roof surface, the less energy the building will need to cool down.

7. In which category do cool roofs contribute toward earning points needed for LEED certification?
   a. Energy and Atmosphere
   b. Innovation
   c. Indoor Environmental Quality
   d. Sustainable Sites

8. True or False: When looking at the paint system, the pretreatment aids provide added corrosion protection and a solid base for the top coat.

9. Coil coatings for metal roofing:
   a. Reflect more of the sun's rays, reducing energy needed to cool a building
   b. Emit heat more rapidly, allowing a building to cool faster
   c. Retain solar reflectance and admittance properties over time
   d. All of the above

10. True or False: Natural exterior exposure is one of the best ways to see how a coating system will stand up to the test of time.

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“Have there been instances where Joe has been too hands on? No doubt about it. But I think he’ll be remembered as a person who really got it. He knew how to make the city.”

The Legacy of Charleston Mayor Joe Riley by Wayne Curtis

Mayor Joe Riley is strolling through Charleston's Waterfront Park, a leafy, 12-acre oasis where this 345-year-old city meets the dappled Cooper River. He stops suddenly, crouches slightly, and gestures ahead. "You see, right there!" he says in a loud whisper. "Someone's got their feet up on the wall."

It's true: a young man in jeans sits on a park bench with his sneakered feet propped on a low retaining wall as he scrolls through his smartphone. It's hardly the sort of thing that would merit notice among other park strollers. But for an urbanist like Riley, this is a sign that the park is working as intended, a clue that the city is on the right track. "Isn't that great?!" he says.

The retaining-wall-as-footrest helps illustrate Riley's close attention to—some might even say obsession with—the minutest details of city life. Prior to the 1990 opening of the park, designed by Sasaki Associates with Edward Pinckney Associates,

Charleston's Waterfront Park

Riley immersed himself deeply in the planning. He wanted benches deeply set enough for comfortable slouching (he instructed they be made 25 percent larger than the city's previous benches), and urged that they be situated close enough to the retaining walls that people could sit with their feet up. He also had opinions about the height of those low walls: he concluded that 14 inches was optimal, high enough to offer an inviting challenge to toddlers, yet low enough not to injure those who fell. ("We studied that," he says. "We wanted a place that once they got here, a parent could let the child's hand go.")

And then there was the gravel lining the park's broad pathways. Riley instructed designers to send 40 gravel samples, making sure the size was right ("You want it so that you can walk in high heels") and the color appropriate. "Charleston's palette is this," he said, nodding to the brick streetscape up the block, "so we made sure it had something called Baldwin Red in it."

In December, Mayor Joe—as he seems to be universally called here—will leave office. Most residents have never known a Charleston without him: He was elected in 1975, and has held office ever since. (He's now 72 years old.) By some accounts, he's the longest-serving mayor presiding over an American city today. But by virtually every account, he's been the key mover in shaping the architectural legacy of this small city (population 133,579).

Riley has long held that the public realm—parks, city buildings, and even the exteriors of private buildings—should always be artfully designed and built with quality materials. All kinds of citizens—wealthy, poor, black, white—will be attracted to these spaces and will be inspired to take ownership of them. And that in turn creates the bedrock of democracy. "Often architecture is thought elitist, that you've got to be schooled or have a special interest," Riley says. "But not long after I was elected, I'd see visitors in town. They looked like they were retired blue-collar workers, and you'd see them admiring buildings. Beauty has no economic litmus test. It's a basic human need and instinct."

"It's not a fetish, it really isn't," Riley says of his penchant for detail. It's just that when the pieces fit together perfectly, he says, you build something bigger.

Which raises the question: Can that something bigger in Charleston survive Riley's departure?

An Era of Urban Decay

Joe Riley is slightly built and soft-spoken with a thatch of gray hair. His owlish glasses seem appropriate for someone who wields intelligence and wryness rather than bluster as tools of persuasion. His perch in the city council chamber is a low platform facing the councilors, as if he were a college teacher in front of students. In his spacious upper-floor office, his desk faces a dozen chairs arrayed in two rows, like a repertory actor hosting a solo show in a small theater. His outsized ears appear to advertise the fact that he's a good listener.

When Riley assumed his seat in 1975 it was at a juncture of opportunity and challenge. The opportunity came with a new system of voting for city councilors, put in effect just before his election, which led to the most black representatives on the council since Reconstruction. He vowed that his office would usher in a new era of openness and broader public involvement across the races, and bring to a close a time when major Charleston decisions involved furtive backroom deals.

The challenge he faced was more systemic and national in scope. At the time, America's cities were


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still on a doggedly downward trajectory. Urban decay, fiscal crises, white flight, and racial strife had hollowed out urban cores. Downtowns were floundering, and many were ill-advisedly struggling for relevance by shoe-horning in suburban amenities—like high-speed arterials, strip malls, and acres of surface parking. Charleston was not immune.

Riley, a fifth-generation Charlestonian, was born here in 1943. He attended the Citadel and the University of South Carolina School of Law, became an active member of the Democratic party, and first tried his hand in politics in 1968, when he won a seat at the South Carolina House of Representatives. He served for six years before he became "the boy mayor," as the local paper called him when he was elected.

Three years after taking office, Riley was invited to travel to Europe on a study trip sponsored by the German Marshall Fund of the United States. His group toured eight cities in Germany and England, studying what worked and what didn't in the civic landscape. "I didn't know what I was looking for until the end of the trip," Riley says, "and then I realized I was seeing cities where the public realm was accorded the highest priority, and that the citizens revered that.

"Every city I went to I studied it—how it looked, how it worked. I read Jane Jacobs. Holly Whyte became a dear friend."

Soon after, he had the opportunity to employ what he'd learned. In the mid-1980s, on five blighted blocks in Charleston's historic downtown, developers proposed building a boxy, 14-story hotel with enclosed commercial complex, a 700-car parking garage, and exhibition space with its windowless exterior walls fronting an important street. Charleston preservationists rebelled; Riley backed them, insisting the project be reconfigured at a scale more suitable to the city and reorient itself toward foot traffic on the street. "That was brutally difficult and tremendously controversial," Riley says. "But it was a key moment in the city's history."

The initial proposal was scrapped. The prominent developer A. Alfred Taubman stepped in and acceded to the mayor's requests. The $75 million project, designed by John Carl Warnecke, had an eight-story tower, which was discretely set back behind four-story buildings with retail fronting the streets, some featuring façades salvaged from 19th-century buildings. An interior passageway connected two major avenues, weaving the project into the urban fabric.

Riley didn't ignore the city's struggling areas either. On a driving tour of the city, Robert Behre, an architecture columnist for Charleston's *Post and Courier* since 1996, slows as he passes one of many scattered public housing projects. Some were designed to look like traditional Charleston singles, narrow and tall; others were inappropriate brick ranchers built in an earlier era that were updated with Craftsman-style porches to better meld with the surrounding housing stock. "Nobody really recognizes them because they blend in so well to the city," Behre says. "But they're so great because they don't stand out."

Other projects in Charleston that benefited from Riley's oversight: a series of municipal parking garages that look nothing like parking garages (for one, he insisted on a stucco exterior and louvers); a sensitive rehabilitation of the 1804 City Hall; and the conversion of a former brick bus shed into a visitor information center. "We created a review committee for anything the city did," Riley says. "This meant affordable housing, parking structures, any fire station, any park, anything the city built—including what the bathroom tiles looked like."

For other projects, Riley constantly prodded architects and developers to learn the city's vocabulary and grammar before submitting designs—"the rules of the public realm and the rules of human scale and the rules of caring about beauty," as Riley puts it. Those who did so tended to have an easier time with the Board of Architectural Review (BAR), which has overseen much of the peninsula's development since 1931, and to which Riley appoints members. Those who ignore this advice often find they have higher hurdles to jump. Steve Ramos, AIA, an architect in LS3P's Charleston office, says he's encouraged clients to scrap their preference for beige or yellow brick before review, since it's well known the mayor considers this inappropriate. (The preferred color? Something locally known as "Riley red.")

> "I think there's a sense that Gaillard is a missed opportunity. It could have been our Sydney Opera House."
>
> —Jennifer Charzewski, AIA, president, AIA Charleston

Riley often attends meetings of the BAR, but isn't there to intimidate, local architects say. "What he tends to do, is that he'll speak and then he'll leave," says Jennifer Charzewski, AIA, president of AIA Charleston. "He won't stay around. I assume that's so people can feel free to speak however they'd like after him. He doesn't strong-arm the room."

As such, the mayor doesn't so much occupy the bully pulpit as the learned professor's lectern. "People who build in this city know you're interested," he says.

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"The citizens know you're interested. Your staff knows you're interested."

And people want to please the professor. Riley tells a story of stopping by a new plumbing supply warehouse out on the urban fringe. "You like my fence out there?" the owner asked Riley when he recognized him. Riley said he did. The owner replied, "Good. I wanted to build something you liked."

The Debate Over Gaillard

If Charleston Place marked the effective beginning of Riley's tenure, the massive rebuild of the Gaillard Center marks the end. The $142 million project, with David M. Schwartz Architects as design architect and Earl Swensson Associates as architect of record, is a grandly Neoclassical pile, unstinting in its use of limestone and columns, which essentially replaces a more modest performance hall that looked a bit like

Gaillard Center rendering

a midcentury high school. The Gaillard, which opens in October with a gala concert featuring Yo-Yo Ma, features an 1,800-seat performance hall, 16,000 square feet of meeting and exhibition space, a handful of municipal offices, and a triumphal entry plaza.

The mayor, naturally, visited the center every week or two while under construction to offer advice. ("They used Indiana granite. I didn't think we should get variegated, but we got variegated from a nice bed.") He views it as a lasting landmark. "It's going to be beautiful, cherished and loved 100 years from now," Riley told *The New York Times*.

Yet in some ways, the Gaillard is out of step with Charleston—in a city without icons, it appears to be straining for iconhood. "It's Versailles," says Whitney Powers, AIA, an architect with Studio A Architecture and an alternate on the BAR. "It's completely ill-conceived. It doesn't matter if it was old looking or new looking. The bottom line is, it was too expensive. Period."

Jennifer Charzewski lets out a small sigh at the mention of the Gaillard. "I think there's a sense among a lot of the architects that it's a missed opportunity,"

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she says. "It could have been our Sydney Opera House." And she worries it may create an untenable stylistic template. "The biggest fear I personally have is that the Gaillard Center will set a model that Neoclassical is the appropriate solution as a style," she says. "But other projects won't be able to match its level of quality."

Indeed, questions of style have infused some recent architectural debates in Charleston. Clemson University this past summer withdrew its plans to build a new city architecture center in the face of neighborhood opposition. The three-story, 30,000-square-foot building—the Spaulding Paolozzi Center—had been designed by Brad Cloepfil, AIA, founding principal of Allied Works Architecture, and was to rise on a prominent intersection several blocks from the historic downtown. With its flat roof and perforated concrete screen, it was, as Powers wrote in a piece in support of the building, "like an exotic, interesting guest at one of Charleston's poshest parties."

Perhaps too exotic. Neighborhood groups hated that it didn't look like Charleston. Clemson

Brad Cloepfil's unbuilt Spaulding Paolozzi Center

eventually withdrew the plan. Ray Huff, director of Clemson's Charleston program, said the building sought to address Charleston-specific challenges—unrelenting sun, potential for floods and hurricanes—but never sought to mimic the city's style. "This was not going to be a background building," he says. "It was going to be an iconic civic building—of extreme high quality, durable, and yet respond to the issues of Charleston."

Charzewski, who supported the proposed structure, says that the debate reflected disagreement about where architectural experimentation is condoned, and where it's not. "Everyone agrees that the historic core should be left alone," she says. "But nobody can agree on the boundary or where the gray zone is." The Clemson

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building fell into that amorphous area. (Riley remained neutral throughout the Clemson debate, but said afterwards of the university's withdrawal that it was "a good decision. We watched the phases of design development, and it just got more harsh in its design. So much so that it just didn't work there.")

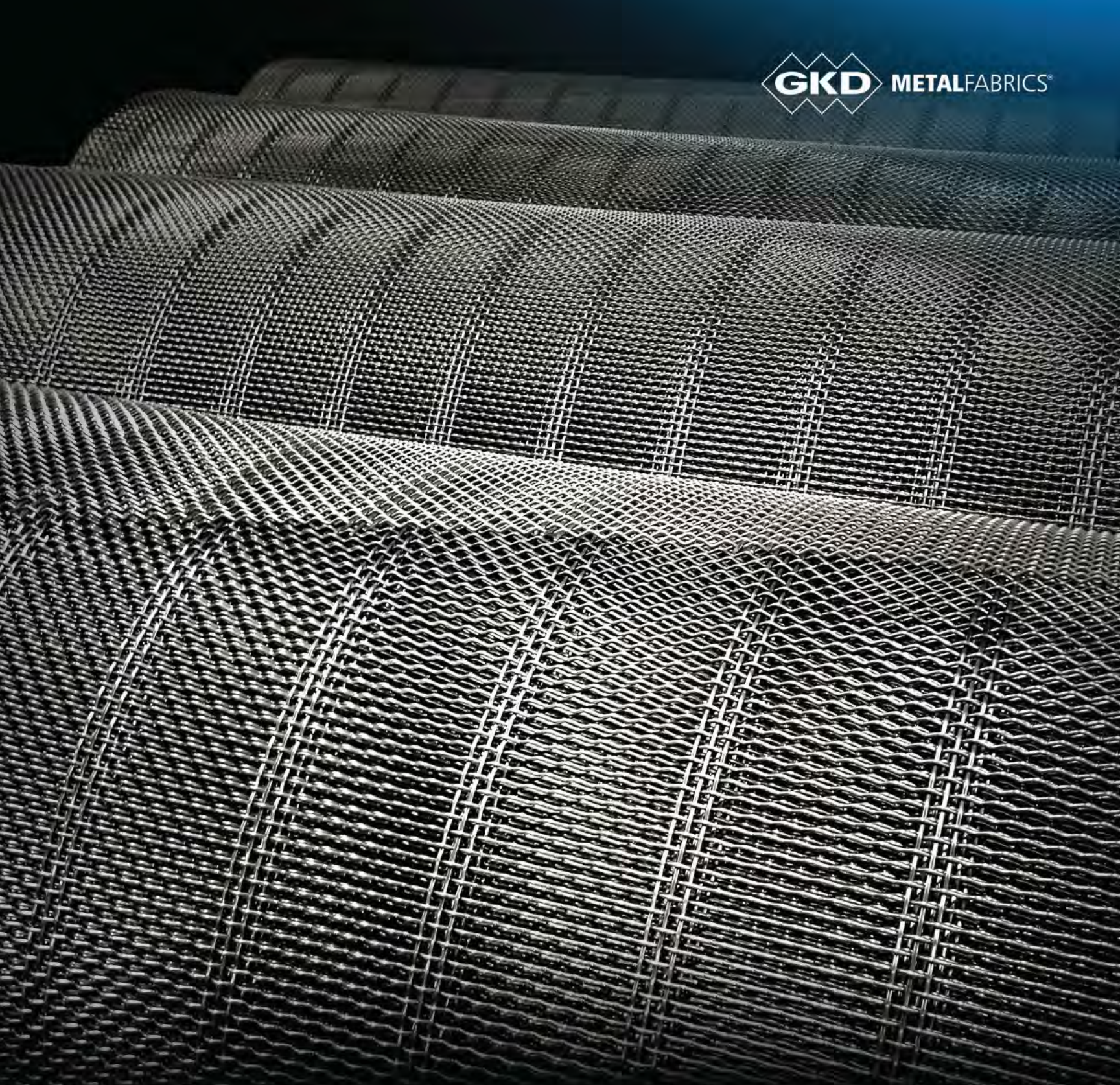
Riley is clearly enamored of traditional 18th- and 19th-century Charleston design, but local architects say he's open to modern buildings when and where appropriate, such as when he championed the South Carolina Aquarium, designed in 2000 by Eskew+ Architects (now Eskew+Dumez+Ripple) with the late firm Clark and Menefee Architects and situated on a reclaimed cargo wharf outside downtown. "He's a pragmatist," Huff says. "He's not someone resistant to change, but he has to feel it's the right thing for the city. I think that what Joe looks for mostly is quality."

Huff adds that Riley's legacy will doubtless include that insistence on top-notch materials and techniques in pubic structures. ("When people complain about cost, I ask, 'How many people know what the Spanish Steps in Rome cost?' " Riley says. "We don't want to waste any money, but don't be embarrassed, don't be defensive.") Huff also credits the mayor for "having the vision to recognize what is truly important—the public space and the scale of the street—and for creating and revitalizing institutions that oversee this, such as the planning department (which didn't exist when he took office) and the Charleston Civic Design Center.

"What's languished," says architecture columnist Robert Behre, "has been the 20th-century suburbs. … What moves do we make in the suburbs to make them more appealing, to make them more viable and walkable?"

Powers says that the focus on urban aesthetics has overshadowed mass transit and other things that would enhance Charleston's livability. "I would say we've been in a city beautification project for a long time," she says, adding that relentless focus has "been how the city has been perceived rather than as an active environment—a place where people live."

What direction will Riley's successor take the city? So far, design hasn't been at the forefront of the political debate among the candidates. But one thing is certain: The new



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mayor, who will be elected on Nov. 3, is not likely to be as attentive to the details of city life.

The Charleston Brand

Earlier this year, Riley invited New Urbanist architect and planner Andres Duany, FAIA, with whom he has had a long working relationship and shared vision of urban life, to make recommendations for improving the city's oversight of planning and design, with an aim of encouraging excellence in new buildings. (Duany's report was released in late September.) "He talked a lot about the Charleston Brand," says Ramos. That brand is not the city's cuisine or its beaches, Duany said in several meetings both public and private, but its built environment—the distinctive architectural style, of course, but also how the homes evolved to adapt to narrow lots and a challenging coastal environment of heat and humidity. Architects should find ways to embrace and modernize that brand. As Duany put it in a meeting with local architects, "Why are we importing when we should be exporting?"

Riley says when he thanked Duany for being a great teacher, the architect responded that the mayor already had had the best teacher: "Your city. Your city and its rules that it has developed."

If that's the case, the city's star pupil is graduating and moving on. He's planning to do some consulting on urban issues, work with the Citadel and the College of Charleston's Riley Center for Livable Communities, and generally remain active in what he calls "his life's work"—improving and advancing cities everywhere.

Yet his "best teacher" will remain, instructing the next mayor and Charleston's citizens on what Riley summarized during his walk through Waterfront Park as "good rhythm, order, respect."

"Have there been instances where Joe has been too hands on? No doubt about it," says Ray Huff. "But at least I knew where he stood. And I think he'll be remembered beyond Charleston's history as a person who really got it. He knew how to make the city—not many people can say that."

In his 1975 inaugural speech, Riley told the assembled crowd that as mayor he hoped to create "unwritten memorials ... graven not so much on stone as in the hearts of people."

By most accounts, he's managed to create both.

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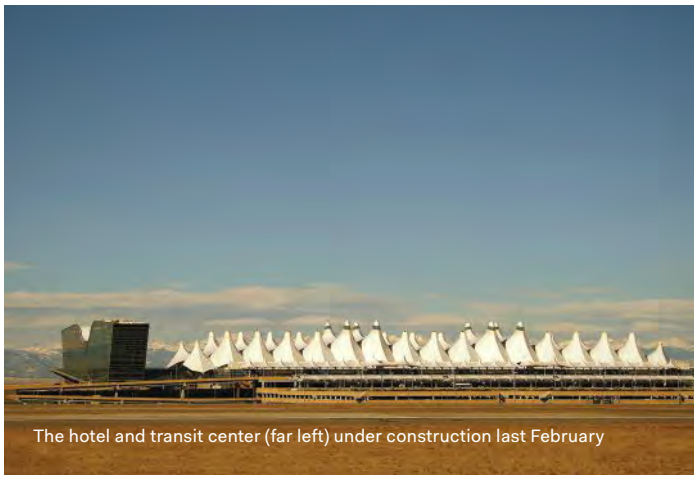
“This is less a story about architecture than it is the emerging 21st-century city, about reconnecting the things we spent the previous century tearing asunder.”

Denver Airport’s New Transit Center by Karrie Jacobs

The Denver International Airport, a wide-open 53-square-mile expanse of tarmac and dust, appears on the horizon like a mirage, an oasis of white tents on an otherwise featureless plain. It opened 20 years ago, built in the middle of nowhere, some 25 miles from the heart of Denver, a long drive on the interstate from pretty much everywhere. In that respect, it's a typical 20th-century undertaking, a monument to urban sprawl. In other ways it's unique. For one thing, the Denver International Airport (DIA) is that rare U.S. airport that doubles as an architectural icon. The main terminal, named Jeppesen (for the pioneering aviation navigator Elrey Jeppesen), with its white fabric roof, a mountain range in miniature designed by Curtis Fentress, FAIA, is truly lovely, especially from the air, especially at sunset.

Now there's a new icon, a combined hotel and transit center intended to usher the DIA into this century. It's a 730,000-square-foot slab of reflective green glass with a pronounced dip in the middle and a notable outward cant at either end. In its way, this gleaming complex, designed by Gensler (in cooperation with Anderson Mason Dale Architects and structural engineers S.A. Miro and Arup) is as eccentric as the tents, yet another Fata Morgana.



The hotel and transit center (far left) under construction last February

JOE AMON/GETTY IMAGES

The hotel, a Westin, which opens in November, and the transit center directly beneath it, which comes to life in spring of next year, are the outgrowth of a master plan conceived by the airport's CEO, Kim Day, and initially drawn up by Santiago Calatrava, FAIA. When it was first announced in 2009, the primary goal of the then-billion-dollar plan was to reconfigure the airport, moving the Transportation Security Administration screening area out of the Great Hall (beneath the Fentress tent) so that screened passengers could fully appreciate the airport's grandest space. When that idea was shelved after meeting political pressure, the focus of the project became the hotel and the rail station, part of the city's $5.5 billion FasTracks project to construct 122 miles of new train service.

For a city shaped by the automobile, the plan is a major step in undoing the urban planning mistakes of previous generations. The airport will finally be linked seamlessly to the rest of the city, with a direct ride to historic Union Station downtown, which has also been redeveloped for commuter rail and topped with a hotel. The new train line will make the airport, in the words of Brad Buchanan, Denver's executive director of community planning and development, "the ultimate transit-oriented development."

Replacing Calatrava

Calatrava, who was brought in by the DIA soon after the airport project went public, left in a huff two years later. His letter of resignation, written by his wife, Roberta, complains of a lack of "sufficient funding" and an "unrealistic schedule," as well as conflicts between the architect and the project manager, Parsons Transportation Group. The DIA had, in fact, scaled back the project budget first to $650 million and then to around $500 million, and the airport authority decided against spending $22 million for its share of a signature $60 million Calatrava rail bridge to carry commuter trains over nearby Peña Boulevard, opting for a more utilitarian approach. Shortly thereafter, Gensler, which had been the hotel architect from early in the project's history, assumed the top position on the design team.

When Calatrava left, a settlement was reached: the DIA could keep the master plan for which it had already paid nearly $13 million in design fees, so long as it stripped away the details that were conspicuously Calatravan. Gensler design director Kap Malik, FAIA, pointed to a circa 2011 rendering of the hotel by the Spanish architect. "You see those elements at the top," he said, indicating a pair of angular overhangs that end in tiny peaks, faintly echoing those on the Jeppesen terminal. "Those are the things that Calatrava said were unique to Calatrava. And those are the things that we had to eliminate."

As for the milky hotel façade sketched by the architect, that also fell by the wayside. The design of the train shed that sits just south of the hotel was also completely changed. Calatrava's platform was covered by a white steel arch, but it was recast as a 300-foot-long diagrid, a highly engineered (by Arup) bonnet of glass and steel that meets the ground at two narrow points. The project architects refer to this feature as the "Pringle."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During its construction, locals have come to regard the building as a curiosity, sometimes referring to it as the "mustache." (One Denver friend insists that it's meant to represent the wings that pilots wear on their lapels.) The architects, however, regard its eccentric form as the embodiment of reason: "The shape that you're seeing is functionally driven," says Tom Ito, AIA, a Gensler principal. First, there is that deep cleft at the center, which the Gensler team calls "the saddle." It's there specifically to allow the Fentress tent tops to be visible over the top of the building. (Since 2000, Jeppesen's view corridor has been protected by a section of the Denver municipal code.) The jaunty outward tilt of the east and west walls looks like a stylistic flourish, but the architects insist the angle is purely functional, bumping the walls out to accommodate more hotel rooms without adding to the building's height.

What's remarkable about the Westin isn't so much its architectural form as the fact that its rooms and public spaces—especially the 11th-floor swimming pool—offer views that are a dazzling combination of big western landscape and airport infrastructure. It's like being in a Richard Scarry book. You can watch planes take off (the windows are triple glazed, to eliminate most noise) or look beyond the hideous parking garages, which sit just west of the terminal complex, to the Rocky Mountains. From the south side of the building, you can see Denver's modest skyline and Pikes Peak, some 90 miles away. And, of course, by spring of next year, you'll see the trains gliding in and out of the station.

At the base of the hotel, on the south side, is the platform where passengers on the Regional Transportation District's (RTD) A Line will arrive from downtown Denver. The tracks are lined with an artwork by Patrick Marold consisting of 236 "beetle-kill" spruces, a rippling array of logs. But everything else is ultrafunctional. The Pringle dominates, forming a great curved opening that will draw passengers into a long escalator that deposits them in the plaza on the north side of the hotel, sheltered from the weather by a second cantilevered potato chip. "You come off the train," says Malik, "and you get a sense of the entire project. It's intuitive design, and at night it all glows."

The plaza between the hotel and Jeppesen Terminal is intended as public space, to be programmed with cultural events by Denver's department of Arts and Venues. The idea, apparently, is that concerts will lure nontravelers to the airport. "It's meant to be next great civic space for the city," says Brent Mather, AIA, Gensler's Denver-based design director. (My Denver friends were dubious: "No one is going to the airport for a concert.") The plaza is also the site of a large kinetic sculpture by Ned Kahn, an array of aluminum strips designed to ripple in the wind like a field of wheat. But what I appreciated was that it was the first space from which you can comfortably examine Fentress' handiwork from the outside. The hotel and transit center has been criticized for obstructing the view of the beloved tents—which it unavoidably does from certain angles—but the plaza compensates by allowing a new, more intimate view of the fabric roof and its underpinnings.

The train shed (aka the "Pringle") under construction last February

COURTESY DENVER INTERNATIONAL AIRPORT

Redeveloping Union Station

In April, when train service starts at the DIA complex, it will replace an infuriatingly poky RTD bus line that runs once an hour. The trip by train to Union Station will take approximately 35 minutes, with departures every 15 minutes for most of the day. Top speed 79 mph. Not exactly a bullet train, but not bad. And this, more than the high-tech sheen of the hotel complex, is the thing that will truly usher the airport into the present millennium.

What's important about the Beaux-Arts Union Station, originally completed in 1914 and radically updated a century later, is not that it was lovingly restored (by local firms Tryba Architects and JG Johnson Architects) or that it reopened last year as a vast food hall lined with restaurants and markets, with a cushy boutique hotel on the upper levels. Rather, it's that the station is now the focal point of an "urban transit district." Skidmore, Owings & Merrill (SOM) master-planned the transit facilities and the surrounding 20 acres—including former freight yards—into what they call "a case study in the power of transit-oriented urban design."

"We inherited a master plan that had all of the transit underground," explains SOM director Derek

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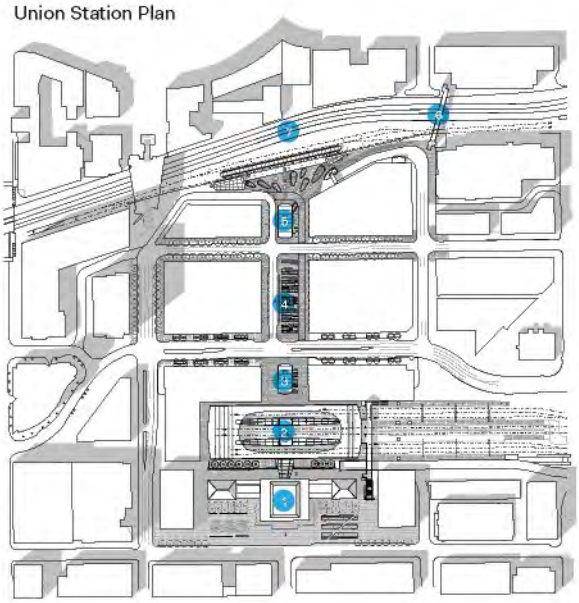
The steel and white fabric "train hall" at Union Station


The restored 1914 station hall

Union Station Plan



1. Union Station
2. Train hall
3. Wewatta pavilion
4. 17th St. gardens
5. Chestnut pavilion
6. Pedestrian bridge
7. Freight rail

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TOP: ROBERT POLIDORI; MIDDLE: SAM HOWZIT;
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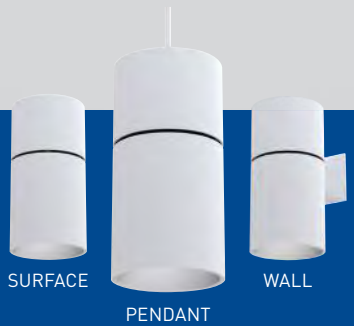

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Union Station Section

Moore, AIA. "Commuter rail, light rail, and the bus station were packed into the area on either side of the historic station in a very compact area." Gradually, SOM's design team figured out ways to bring all the rail above ground, the commuter trains arriving on a platform directly behind the station and the light rail lines a short distance away, integrated into a newly built residential neighborhood. (The bus concourse remains in the basement.) "We realized we were weaving the transportation into the neighborhood and were creating pedestrian ways through the transit," Moore says. "We were domesticating the transit, and we were transiting the neighborhood."

The most conspicuous symbol of SOM's work is the sculptural "train hall" they set above the commuter tracks. Made of white fabric and steel trusses, it's just enough architecture to make the tracks easily visible from a distance and just enough building to give passengers shelter from the elements. But mostly it consists of open space. And because it's essentially a white tent, it has a clear aesthetic kinship with Fentress' icon. SOM associate director Kristopher Takacs, AIA, denies that SOM was inspired by Fentress, but adds: "A lot of people see it as a very happy coincidence."

Denver's Interconnectivity

Still, this is less a story about architecture than it is the emerging 21st-century city, about reconnecting the things we spent the previous century tearing asunder. If you talk to Brad Buchanan, he'll tell you about efforts to cap sections

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of I-70 that ripped old Denver neighborhoods like Globeville and Elyria Swansea in two. And he'll boast about how the A Line has already attracted a Panasonic research and development facility to the first train stop beyond the airport boundary, and how it's also part of a plan to transform the city's former stockyards, just north of downtown, into the National Western Center, a very au courant amalgam of cowboy culture and urban farming mixed with a fashionably multimodal approach to transportation. Gensler's Malik will tell you how the A Line makes the airport into a "civic node, an extension of downtown." And SOM partner Roger Duffy, FAIA, begins to sound like a mystic (or a native of Silicon Valley) when he defines the current approach to urban places as, "That interconnectivity of everything. The kind of seamlessness about how you move from one thing to the other."

The A Line has already attracted a Panasonic research and development facility to the first train stop beyond the airport boundary and is also part of a plan to transform the city's former stockyards.

Duffy may be waxing mystical, but he's also exactly right. In Denver you can start to see this abstract idea take shape. Sure, Gensler's and SOM's train sheds are obvious symbols of seamlessness (four new commuter lines, including the airport train, start running in 2016). More intriguing, though, is the collection of new neighborhoods that have been developed over the past decade on land just west of Union Station, on what had once been freight yards. Linked to downtown by a series of footbridges, these neighborhoods offer a thoughtful, pleasing mix of low-rise and high-rise apartments, cafés, public plazas, transportation infrastructure, recreational amenities, and endless riverside pedestrian and biking trails. Bike share stations are, of course, everywhere.

It's all downright Scandinavian. And it makes me think that Duffy knows of what he speaks when he talks about "the interconnectivity of everything."

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“The show, much like the obscure and curiously gripping legal opinions on architectural copyright, rewards the diligent reader.”

The Surprising History of Un/Fair Use by Amanda Kolson Hurley

Is the design of a finished building protected under copyright law? Before 1990, the answer was no. If you were an architect and someone copied your drawings, you could sue for copyright infringement, because the drawings were protected as your graphic works. But if someone built an exact replica of one of your buildings, too bad—three-dimensional works of architecture weren't covered. You could only sigh and resign yourself to being ripped off.

This gap in the law was exposed to glaring effect in 1988, with a case in the U.S. District Court in the Southern District of New York, Demetriades v. Kaufmann. Cheryl and Nicholas Kaufmann, a couple in Scarsdale, N.Y., admired a large, many-gabled house being built in their neighborhood by Demetriades Developers. The Kaufmanns took photos of the house when it was under construction, were able to get copies of the plans, and asked their contractor to build them the same house. The court found that graphic copying had taken place (the Kaufmanns never denied their intent to replicate the Demetriades design), and ordered that the copied drawings be destroyed. But the house itself was untouchable. It didn't infringe on any laws. The Kaufmanns had new plans drawn up and finished building it.

As it happened, the law was changed soon after. In 1989, the United States signed an international treaty governing copyright, the Berne Convention for the Protection of Literary & Artistic Works. U.S. officials had to make sure our laws were in compliance with the treaty, which required signatories to protect architectural works. But how do you define a work of architecture? And what makes an architectural design original?

Creating the AWCPA

The collaborative effort of legal scholars, architects, and government officials to craft a definition of architecture that would stand up in the courts is the focus of "Un/Fair Use," a smart little exhibition at the Center for Architecture in New York that runs through Jan. 2. Curated by Ana Miljački and Sarah Hirschman—who teach respectively at the Massachusetts Institute of Technology and the University of California, Berkeley—the show tells the fascinating and unknown story behind the creation of the Architectural Works Copyright Protection Act of 1990 (AWCPA), which brought the U.S. in line with Berne and codified the definition of a work of architecture in American law.

The curators conducted extensive interviews with the people who shaped the law, including Michael Graves—interviewed, poignantly, a few months before his death—and Bill Patry, a former U.S. Copyright

The exhibit, mounted at the Center for Architecture in New York

COURTESY CENTER FOR ARCHITECTURE AIA NEW YORK

Office employee who was instrumental in helping to articulate the creative role of the architect, different from the writer's in subtle but important ways. Even after it is finished, a building isn't static; additions and renovations morph the original design to a degree that has no parallel in the literary world (imagine a publisher deciding to do a gut reno of *The Great Gatsby*). Like the writer, however, the architect often seeks originality by combining standard elements—doors, windows, walls—into new and unexpected arrangements. Deploying a common architectural language doesn't make a designer any less original than a novelist stringing together words.

"Un/Fair Use" presents the interviews on a row of wall-mounted TVs; visitors can grab headphones and plop down on the white beanbags to watch them. Each one is several minutes long. The full text is also printed in the broadsheet stacked on a table by the gallery's entrance. This is a wordy show, as befits the topic. A two-page timeline in the broadsheet helpfully sets out the key pieces of legislation and court cases that have affected architectural copyright, Demetriades v. Kaufmann among them.

But the interviews are only one part of the exhibition, which takes up a room and a hallway in the center's basement. The other part is a series of models created in a graduate research workshop at MIT. Fifty-one of them flank the hallway in long, lit cases, white on white except for the small purple carpets on which the models stand. Despite their dainty size, the models are lacking in detail, and deliberately so—this is a gallery of familiar but multivalent forms—or as the broadsheet explains, "common and therefore uncopyrightable architectural tropes and formal themes."

Do you feel like you've seen a lot of stacked boxes, twisting towers, and Jenga buildings lately? Here's proof. The center spread of the broadsheet offers a fun key to the models, listing three or four built examples

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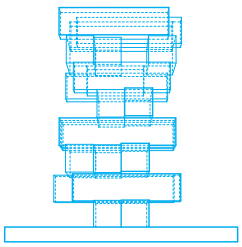
for each trope: Skidmore, Owings & Merrill's Cayan Tower and BIG's Scala Tower for "Smooth Twist," Sou Fujimoto's Final Wooden House in Japan and Herzog & de Meuron's 56 Leonard Street in Manhattan for "Jenga," and so on. In many cases, you can easily name another example yourself, or mentally reclassify buildings that use more than one trope (wouldn't OMA's CCTV Headquarters come under "Pants" instead of "Diagrid"?).

Most of the buildings come from the last 15 years, which ignores the rich classical and neoclassical tradition of imitative architecture celebrated by the former London-based architecture firm FAT with "The Museum of Copying," the firm's homage to Andrea Palladio that was staged at the Venice Biennale in 2012. The whole history of pattern books and plaster casts is elided in "Un/Fair Use." But maybe that's for the best—modernist architects may assume they've broken free from that history, but as model after model shows here, they're just riffing on a different set of conventions.



29.0

Jenga

Nakagin Capsule Tower
Kisho Kurokawa, 1972

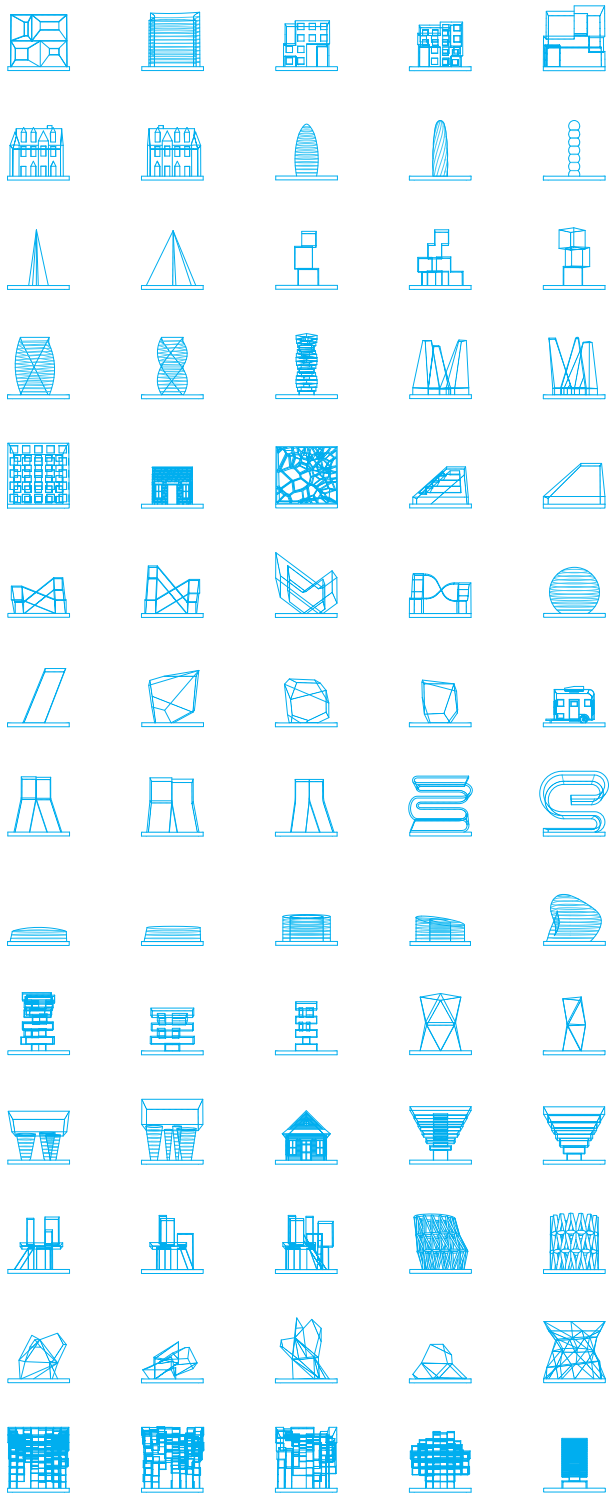
Final Wooden House
Sou Fujimoto, 2008

BUMPS Tower
SAKO Architects, 2009

56 Leonard Street
Herzog & de Meuron, 2016

The Influence of Graves and Wright

The presentation of "Un/Fair Use" is clean, perhaps too much so. The show's two parts never really cohere, and some of the text in the broadsheet could have done useful double duty on the walls. Still, the show, much like the obscure and curiously gripping legal opinions on architectural copyright, rewards the diligent reader. From the videos and interview transcripts, it becomes clear that two architects in particular were central to the creation of AWCPA. One is Graves, who testified on architecture and copyright before Congress, and the other is Frank Lloyd Wright. The Guggenheim



Uncopyrightable tropes and formal themes showcased by the exhibit, plus a few designs contested in copyright cases

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CHICAGO ARCHITECTURE BIENNIAL

Museum was the most important touchstone in the creation of the law, because of its distinctive spiraling form, and because the Frank Lloyd Wright Foundation at one point tried to copyright it.

Where does originality in architecture lie: in a building's overall form, or in its individual features and their arrangement? It's possible to see the AWCPA as an accommodation between Graves and Wright. In his testimony, Graves described architecture as a code of visual and spatial elements that architects develop incrementally, from the inside. "There ought to be a consensus of what architecture is and what it isn't," Graves told Sarah Hirschman in his interview. "It's

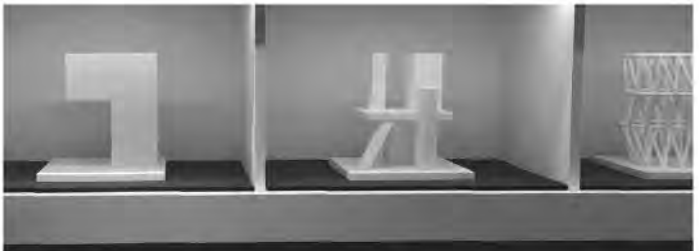

Exhibit models, which were created in an MIT graduate research workshop

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when people go off and do so-called art is when it gets problematic and self-indulgent."

The argument for copyrighting Wright's museum would be just the opposite—that its form departs radically from previous traditions of museum design and is therefore original.

Fortunately, the law stretched to include both philosophies. It reads: "The work includes the overall form as well as the arrangement and composition of spaces and elements in the design." So the Portland Building has just as fair a claim to originality as the Guggenheim.

For Bill Patry, an author of the law, that inclusiveness is key. Patry emerges as the unsung hero of this story, the architecture-loving layman who describes himself as "a huge Louis Kahn fan" and who recognized that Michael Graves was an ideal choice to explain the essentials of architecture to a Congressional committee.

Patry faxed Graves an effusive letter asking him to testify. The story of architectural copyright in the U.S. would no doubt be better known if two other guests Patry invited to Capitol Hill that day hadn't declined. By all accounts, Graves gave an eloquent performance, but imagine both Ada Louise Huxtable and Robert Venturi, FAIA, also holding forth: now that would have been a memorable hearing.

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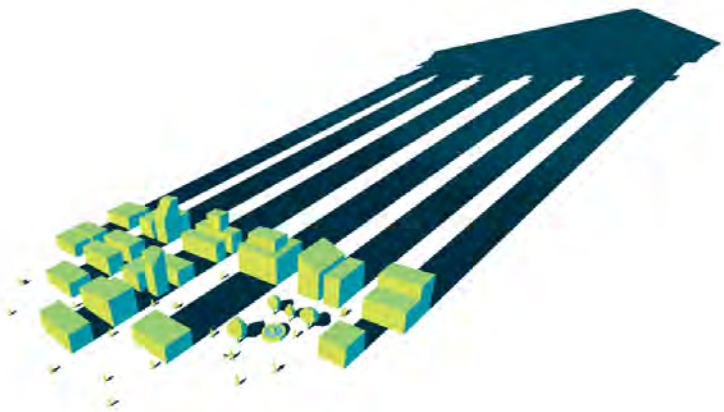

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Media Library Saint-Paul
Saint-Paul, La Réunion
Périphériques Architectes

TEXT BY SARA JOHNSON
PHOTOS BY LUC BOEGLY

Previous Spread: The commune of Saint-Paul sits on the northwest coast of La Réunion, a 193-square-mile French island located roughly 400 miles east of Madagascar. In 2013, Saint-Paul began construction of a new library building designed by Paris firm Périphériques Architectes. The €13.17 million ($14.8 million) building was completed this April. Meanwhile, the city's leadership has changed and the building has been sold. Today, it stands empty and the final program remains unknown, although turning it into a mixed-use facility, including music and dance programming, is one possibility.

This Image: The 49,159-square-foot building's façade takes cues from the initial program. The wavy, aluminum-fin-clad façade is designed to mimic a stack of book pages, and contains 19 scattered eye-shaped openings—four on the west, six on the east, and nine on the north—which come in two sizes. "It's a mix between an eye to overlook the city, and the gesture that you must do to see through venetian blinds," says David Trottin, the partner in charge of the project.

Fifth-Floor Plan

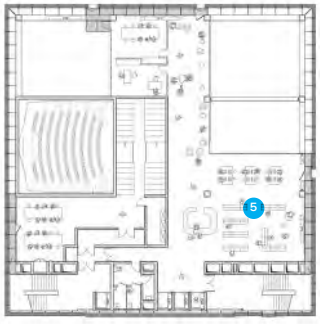
Sixth-Floor Plan

Third-Floor Plan

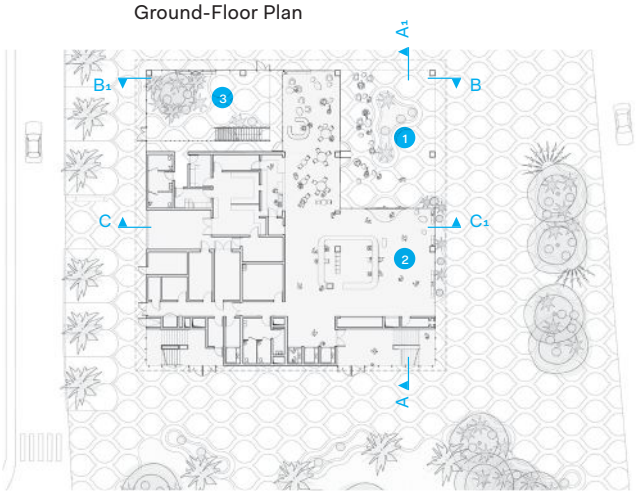
Fourth-Floor Plan

Mezzanine-Floor Plan

Second-Floor Plan



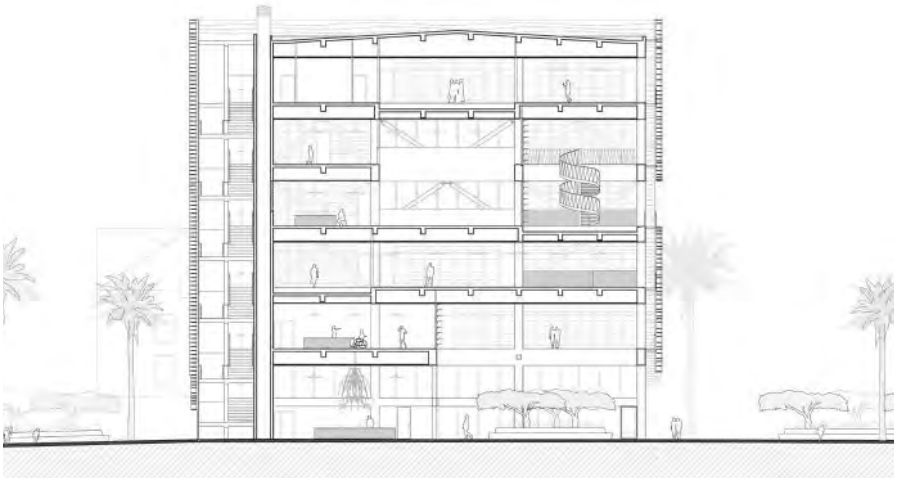
Ground-Floor Plan



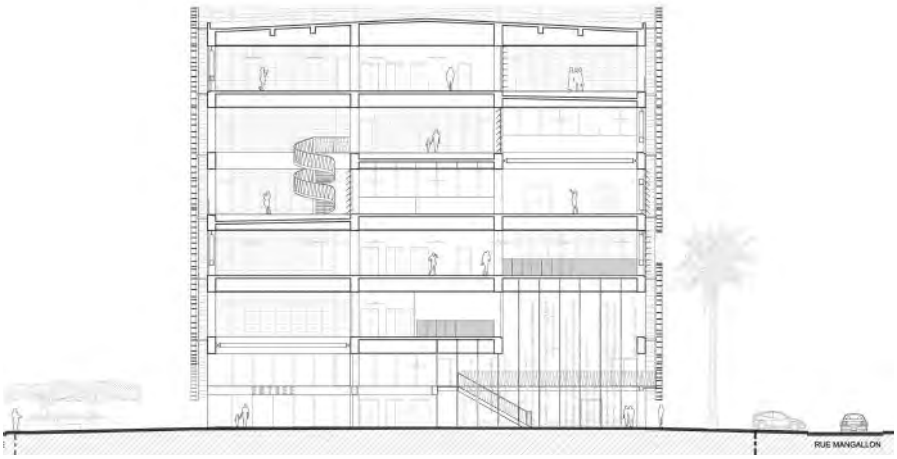
1. Plaza
2. Lobby
3. Garden
4. Auditorium
5. Collections
6. Terrace
7. Offices

0 20 40

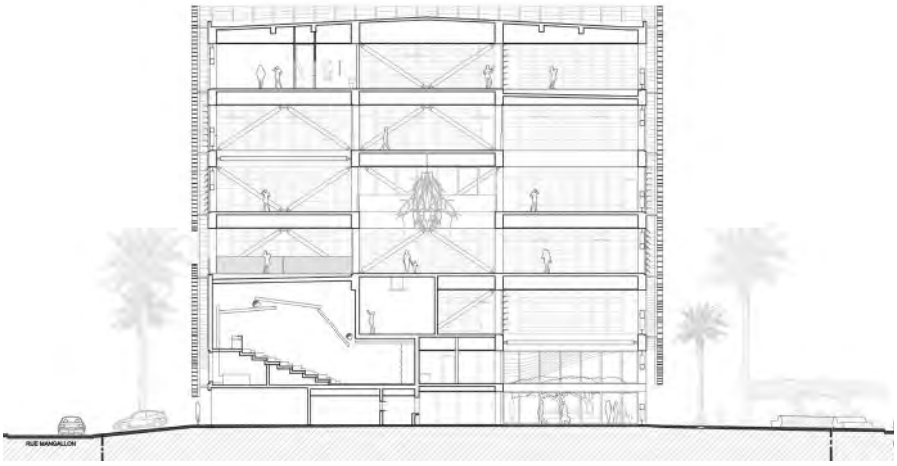
Section A–A₁



Section B–B₁



Section C–C₁



0 20 40

Top: Paris-based Polish artist Michal Batory received the commission to create illustrations for the ceilings, which are printed on removable canvas panels. “He spent two weeks on La Réunion taking a lot of pictures that he reworked as a collage,” Trottin says. The floors are coated in epoxy resin.

Middle: The seven-level structure is a mix of single- and double-height spaces, each with views to the perimeter walls and natural daylight.

Bottom: Behind the fixed sunshades of the outermost façade is an inner layer of steel-framed, operable glass louvers that provide natural ventilation to the interior.

Opposite: Several terraces dot the structure. The perforated, anodized-aluminum fins on the outer façade serve as sunshades that help to regulate the temperature on the open-air platforms, while the eye-shaped openings frame views of the surrounding landscape.

Project Credits
Project: Media Library Saint-Paul, Saint-Paul, La Réunion
Client: La Ville de Saint-Paul
Architect: Périphériques Architectes, Paris · Emmanuelle Marin, David Trottin, Anne-Françoise Jumeau
Project Manager: Juliette Bonnamy
Project Team: Charlotte Lefebvre, Alfredo Luvison, Claire Oiry, Emily Murphy, Timothée Kazmierczak, Pierre Tignon, Karine Bergevin, Camille Isaac-Dognin, Charline Lalanne, Guillaume Guilbert
Engineering and Quantity Surveyor: EGIS Océan Indien
Acoustic Research Department: Peutz & Associés
Landscape Designer: Zone Up
Artist: Michal Batory
3D Pictures: L'Autre Image
Size: 49,159 square feet
Cost: €13.17 million ($14.8 million)

Centro
Mexico City
TEN Arquitectos

TEXT BY IAN VOLNER
PHOTOS BY LUIS GORDOA


LA CIU
ES DE T
En 5 años s
un 86% e
con violenci
de tax

No right-thinking 21st-century design critic can contemplate the coinage of a new "-ism" without a reflexive groan: Styles have long since gone out of style, and contemporary practice is so fluid that most labels just won't stick anyhow. Then again, neither can one deny the evidence of one's senses—and on academic campuses in the United States and abroad, what might have started as a coincidence is beginning to look like a conspiracy.

Deferring the hateful business of actually naming it, here are its distinguishing characteristics: crisscrossing interior sight lines, adaptable workspaces, integration of same with social areas, multiple routes of entry and procession, and stairs, stairs, stairs everywhere the eye can see. In New York, it was last seen in Skidmore, Owings & Merrill's University Center for the New School; a year ago, it was the University of Melbourne's School of Design by Boston-based NADAAA and local firm John Wardle Architects; just this past month, it popped up again at Stanford University in Palo Alto, Calif., where New York–based Diller Scofidio + Renfro debuted its new McMurtry Building.

And now the phenomenon has made the jump to what is certainly its more challenging context yet—in a transitional neighborhood in a developing country—with the completion of Centro, a new design-and-media academy in the heart of Mexico City from bi-national firm TEN Arquitectos. The firm's New York– and Mexico City–based principal, Enrique Norten, HON. FAIA, didn't crib this approach from other designers; he didn't have to. "We're all influencing each other," notes Norten, who founded his office nearly 30 years ago. "Nobody's working in a vacuum." The ideas that have informed Centro have been rumbling though the discourse for a long time, and Norten, 61, has had his ear to the ground for even longer.

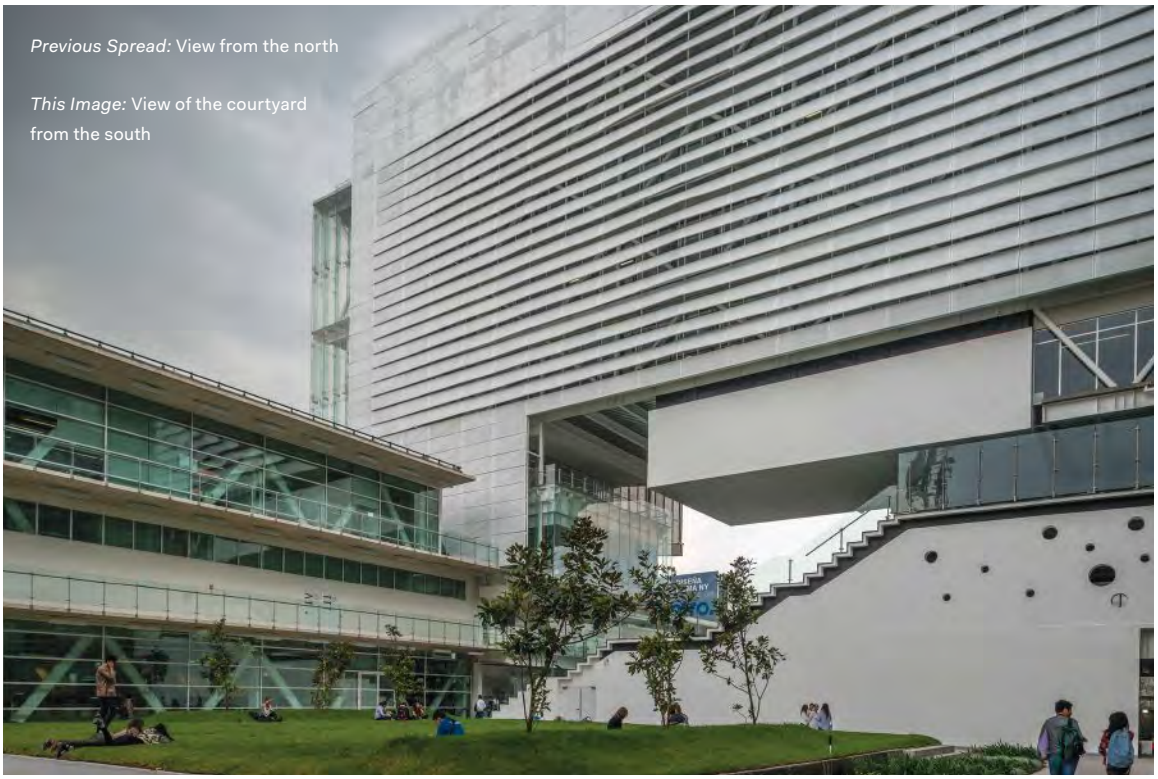
A product of Cornell University and a professor at the University of Pennsylvania, Norten was arguably Mexico's foremost itinerant architecture intellectual for much of his early career, before a rush of high-profile commissions over the last decade turned him into a very busy design entrepreneur. Given his strong grounding in the academy, the Centro project has been an opportunity to exercise (and perhaps exorcise) his own pent-up feelings about the academic built environment. "The building I teach in at Penn is terrible," he says. "This is a place where people can get trained to be free."

The fact that students and teachers are all too often stuck in stuffy barracks has been a key precipitating factor behind the new turn in academic buildings, and with the Centro project Norten had a client who was especially receptive to a new approach. Gina Diez Barroso is the school's founder and chief financial patron; a prominent Mexican real estate developer and philanthropist, she started Centro as a "creative hub," as she puts it. "We think it's very important to teach by example," Barroso says. With a faculty composed largely of professionals, a campus open 24 hours a day, and expansion plans that include student housing and offices, Centro is intended (as the name implies) as an all-in-one educational experience, both a training ground and a model community for aspiring young creatives.

The 78,740-square-foot facility that is the vehicle for this scheme is a hulking white multiplex of steel and glass, punctuated by cantilevers and webbed in walkways that tie together its disparate parts. From the entrance on traffic-clogged Avenida Constituyentes, visitors ascend to an above-grade plinth where the compound enfolds them on three sides. Back toward the street, a tower block of classrooms is topped by a green roof; in front, another block contains workshops and exhibition spaces; and to the left, a taller volume connects and pushes into the other two, with libraries, study rooms, and service elements behind a billowing metal screen. The campus level framed by these variously jutting, overhanging, and terraced structures is centered around a green courtyard and a huge semi-exposed staircase (decorated with the softly floral line drawings of Dutch-born, Mexico-based artist Jan Hendrix) that ascends to the third floor. This is in addition to the steps that go up to the 360-degree viewing platform, the steps that go down into the libraries, and the other steps that zigzag across the interior façades. Here a stair, there a stair. Everywhere a stair.

This feature, no less than the flexible pedagogical program created by Diez Barroso and Centro general director Krestin Scheuch, puts the building squarely in line with the current on-campus trend. "One of the intents was to make a building that doesn't look institutional," says Norten. "We wanted to do something that would be much more porous, much more fluid."

In Mexico City, where the legacy of 1960s Brutalism is nowhere more evident than in the looming buildings of the nearby main campus of the Universidad Nacional Autónoma de México, this typological reset is particularly daring. Norten—whose current client load includes NASA and the New York Public Library—has always been an architect of systems, not monumental aesthetic statements, and that makes him the perfect messenger to bring this



Previous Spread: View from the north

This Image: View of the courtyard from the south

kind of academic building to Mexico. The countless points of personal encounter, the exposure to the city outside, the easy-to-read graphics on the classroom doors (designed, at Centro, by the students themselves): What this project and others like it do is to re-embed education within a complex social system, reminding us that learning and making are first and foremost social acts.

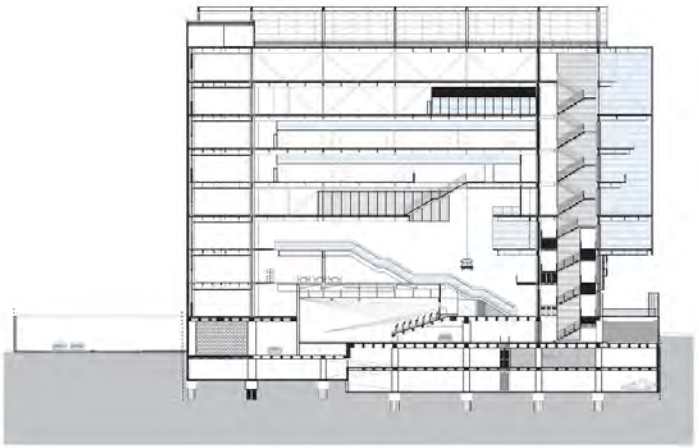
The question, however, is whether the message is right for Mexico. An architecture of systems is a fine thing; but it is not, as it has periodically claimed to be, value-neutral. From the transparent balustrades to the clean metal louvers (some of them, unfortunately, slightly warped), Centro strives in its scrupulous reserve to be didactic without being rhetorical: To create a place for students to think, not tell them what to think. But as Barroso has suggested, part of Centro's goal is to better integrate its graduates into Mexico City's business community, and to draw the business community in turn closer to the city's intellectual sphere.

Such a program can hardly be regarded as sinister, especially when the vast majority of Centro's projected 6,000 students are set to receive scholarship support. But it is categorically a political program, and its implications only become apparent when you step outside the fine, glassy enclosure into the surrounding neighborhood—whose name, poignantly, is América—where countless tiny concrete houses are soon to be joined by other major new developments. (A nearby train station will also be designed by Norten.)

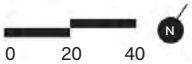
At all events, the project casts a revealing light on the other campus buildings caught up in this New Scholasticism. (Oh, the shame.) Many of them are good—in Centro's case, extremely good, if the countless students hanging around its various balconies and belvederes even on a rainy September day are any measure. But institutions remain institutional, stairs notwithstanding, and the openness and complexity of a school's plan does not necessarily imply that it will produce open and complex graduates. That remains the work of its teachers, and of the students themselves.

Aerial view from the northwest

Section A–A₁

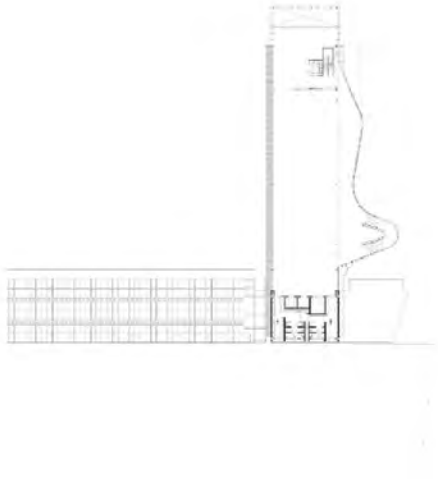


1. Parking entrance
2. Lobby
3. Courtyard
4. Monumental stair
5. Auditorium
6. Café
7. Classroom
8. Office
9. Library
10. Lab
11. Study rooms



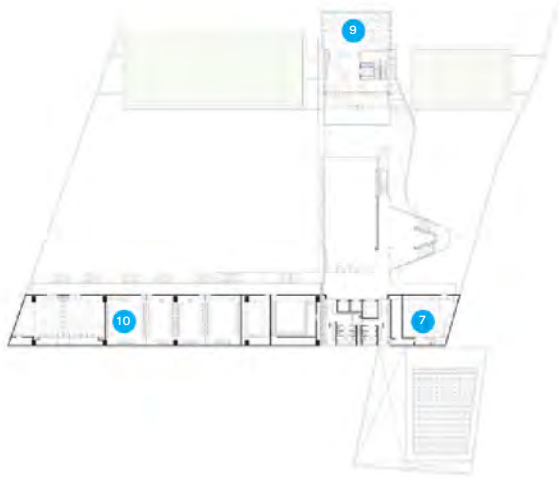
Fifth-Floor Plan

Eighth-Floor Plan



Third-Floor Plan

Fourth-Floor Plan



Ground-Floor Plan

Second-Floor Plan

COURTESY CENTRO

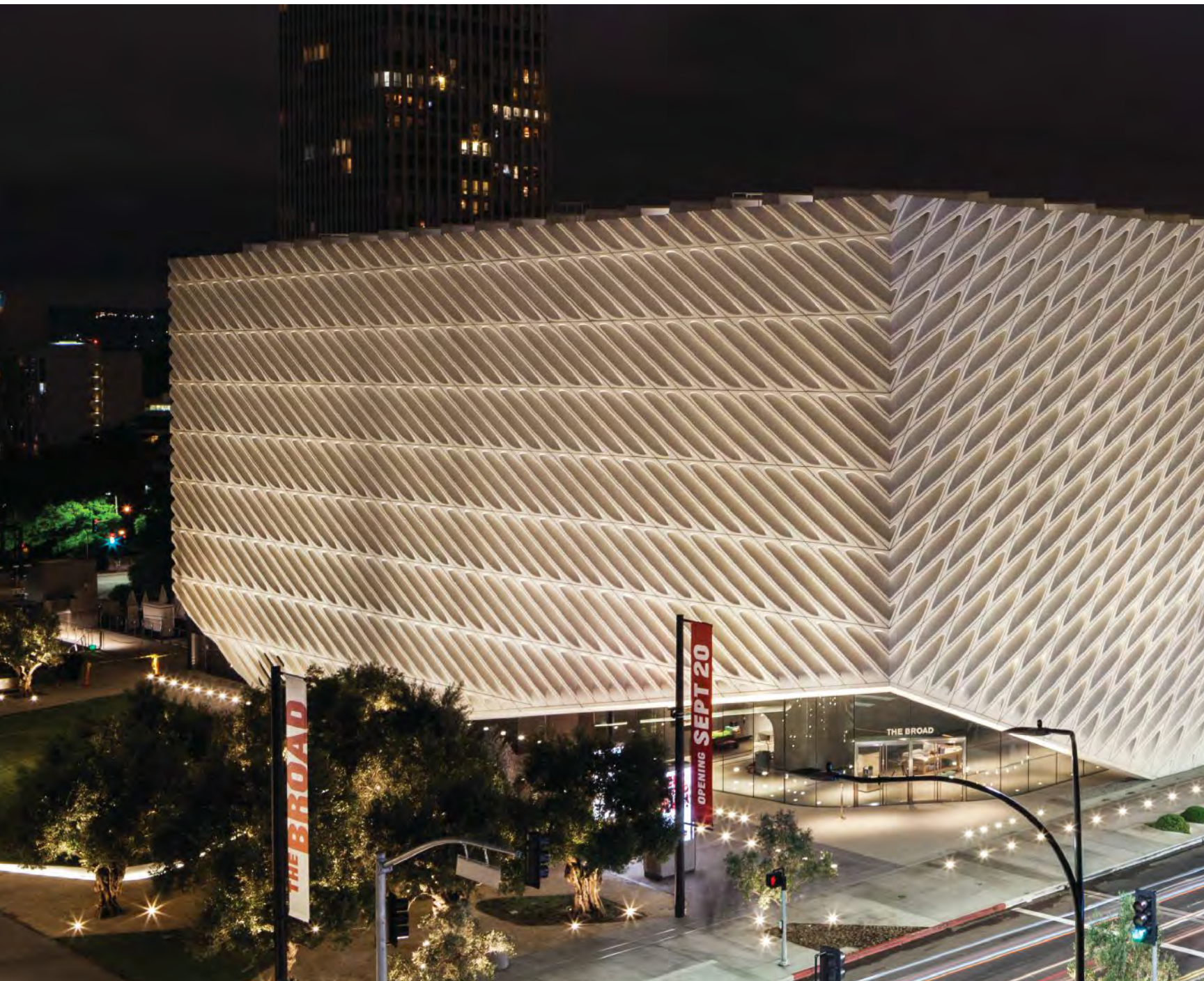
Opposite: Monumental stair leading to third floor, with artwork by Jan Hendrix

Above: Throughout, there are rooms for group or private study

Project Credits
Project: Centro, Mexico City
Client: Gina Diez Barroso
Architect: TEN Arquitectos, New York and Mexico City · Enrique Norten, HON. FAIA, (principal); Melissa Fukumoto, Miguel Ríos, Francisco Lopez Gaona, Ernesto Vázquez, María Vargas, Jorge Nava, Eduardo Ezeta, Lenin Cruz, Vicky Daroca (project team)
Interior Designer: Grupo Diarq
Mechanical Engineer: CYVSA
Structural Engineer: CTC Ingenieros Civiles
Geotechnical Engineer: Ingenieros Cuevas
Construction Manager/General Contractor: Grupo GA&A
Lighting Designer: Ideas en W2
LEED Certification & Comissioning: AKF
LEED Consultant: IBALKA
Size: 78,740 square feet
Construction Cost: $18.975 million

Walkway with view out through
perforated metal skin

The Broad
Los Angeles
Diller Scofidio + Renfro



TEXT BY JOSEPH GIOVANNINI
PHOTOS BY RICHARD BARNES

When it opened last month in Los Angeles, the Broad, a museum of postwar and contemporary art by New York–based Diller Scofidio + Renfro (DS+R), found itself measured against some architecturally competitive company. Its neighbors on Grand Avenue are buildings by Frank Gehry, FAIA, Arata Isozaki, HON. FAIA, Arthur Erickson, Coop Himmelb(l)au, and Bertram Goodhue, among others, which span nearly a century of American architectural history.

The three-story, 120,000-square-foot, $140-million Broad was built on one of the last vacant parcels in one of the country's longest-running urban renewal projects. In 1955, the sorry, sagging Victorian mansions of Bunker Hill, long since turned into boarding houses, were razed in a saga of modernist tabula rasa urban planning that is only now nearing completion.

Several years ago, Los Angeles philanthropist Eli Broad secured the right to a county-owned parcel and held an invited competition to design what, for him, was clearly a special project—a museum for a collection he and his wife, Edythe, have spent half a lifetime amassing. All the architects were caught between a rock, Mr. Broad, and a hard place, Gehry's Walt Disney Concert Hall. A no-nonsense former developer, Broad wanted to pack the permissible envelope with galleries, storage, offices, and parking.

The most efficient way to maximize space on the site was to build a box. But an iconic box: Broad wanted a structure with architectural ambition and cultural reach suitable for his collection. Plus it had to stand up to Disney Hall, icon of L.A. icons and the site's neighbor to the north, a building that Broad helped realize with his fundraising efforts.

Gehry himself might have been the obvious choice for the Broad commission, but given the long and complicated personal and professional history and hard-won friendship between the two men, he demurred when Broad broached the subject, and the two left it at that. Broad proceeded with a competition, asking people, myself included, to contribute pro bono suggestions for firms. Besides DS+R, the final short list included Rem Koolhaas, HON. FAIA, SANAA, Christian de Portzamparc, HON. FAIA, and Herzog & de Meuron.

Finding a New Language

With its churning façade, Gehry's concert hall is a hard icon to follow. DS+R simply changed the subject, creating a contrarian design that is everything the hall isn't: straight versus curved, matte versus reflective, whole versus fragmented, conceptual versus abstract, porous versus flat. The firm established its own arena of invention, eliminating potential competitive friction from a difficult architectural relationship.

A pedestrian in L.A. expecting a conventional streetscape will be surprised at Broad's box, which looks like the conflation of the Titanic with the iceberg at the moment of impact. This Titanic has two prows, however, north and south, and both are upended at an angle, resulting in a gestalt that disturbs the dominant surrounding orthogonality. While Gehry's hall sails above Grand Avenue, which remains a placid datum, the upended Broad challenges the calm horizontal.

DS+R designed the building's skin as a field of 2,500 rhomboidal modular panels of glass-fiber-reinforced concrete, distantly recalling the panelized façades of Marcel Breuer's buildings from the '60s—but distorted. With parametrics, the honeycomb exoskeleton, suspended on a steel frame, was designed so that all panels, acting collectively as a brise-soleil, have orientations calibrated to shield the interior from direct sunlight, regardless of the season or time of day. A wormhole in the skin of the façade creates an exceptional moment, a singularity within the field of subtly differentiated panels that signals an exceptional space inside: the conference room. The rooflines appear to slope, as though in forced, two-point perspective, a perceptual illusion resulting from a grid stretched like pantyhose to guarantee proper solar orientation.

Visitors enter under the glazed, upended corners into a public foyer that traverses the façade along Grand: the architectural language of its swelling compound curves differs from the gridded façade that veils the space with a gentle light. A lateral view north toward Disney Hall reveals that the architects may have avoided Gehry's language on the outside, but they have taken his curves and extended them into their building—perhaps a conscious contextual echo, perhaps a nod to the way computers now easily think in curves, perhaps just because they could.

The curviplanar walls of the Broad create a spatial fluidity that moves visitors toward a 15,000-square-foot gallery on the ground floor and into rounded stairwell and escalator shafts leading to the second and third floors. Unlike many buildings where the façade is the main architectural event, including Disney Hall, here the entrance foyer is also an event; both façade and foyer condition visitors to feel they are entering a special precinct that will deliver a special experience.

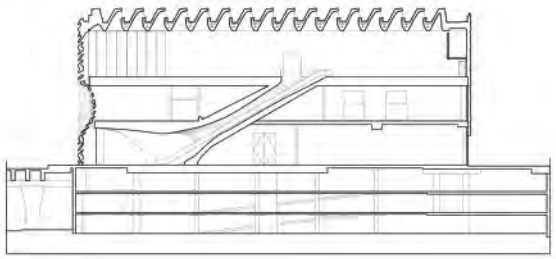
Whether via the escalator, stair, or a glass elevator, visitors making their way to the top gallery floor glimpse into the museum's core, an archive of one of the country's largest private collections of contemporary art, which the Broad intends to act as a lending library.

The diagram of the whole structure, and its section, is very simple: a box within a box on top of a box of parking. (Grand Avenue, like Park Avenue in New York,

Previous Spread: Nighttime view along Grand Avenue, showing the Broad with Gehry's Walt Disney Concert Hall beyond

Third-Floor Plan

Section A–A₁



Second-Floor Plan

Ground-Floor Plan

1. Plaza
2. Lobby
3. Gallery
4. Archive
5. Cold room
6. Prep
7. Office
8. Conference room
9. Mechanical

0 20 40

is actually an elevated boulevard with service roads and parking below.) The architects say simply that the scheme is a "veil" covering a "vault." Because of difficulties manufacturing the rhomboidal panels as designed, they had to be thickened, which regrettably decreases the diaphanous quality of the façades, diminishing the levity of the design and the life of the corners. Still, the concept remains.

The organizational simplicity is deceptive, because the skin plays perceptual tricks on the interior spaces: the eye fools the body into feeling that the wall and ceiling planes are somehow complex, perhaps even warped. Change the angle of vision and the illusion shifts, encouraging visitors to keep moving.

Each panel of the roof is glazed. Natural light bounces off the glowing interior frames, creating a remarkably luminous space. Appearing to slope, the high ceiling over the column-free, 35,000-square-foot third-floor gallery hovers over the art hung on walls below, which are nonstructural and changeable. Track lights ride in barely visible slots between the panels, leaving the ceiling plane clean, and the illusion intact.

The Strong, (but Not Quite) Silent Icon

The architects have used a minimum of means to achieve Mr. Broad's desire for a strong architectural presence, yet it manages to be discreet. This reticence, however, should not be confused for meekness: the design successfully stands up to the lyrical complexity of Disney Hall by rivaling its intensity. With its upended corners, the Broad challenges the geometry of the street with just a couple of moves that make the box iconic; meanwhile, the grid sustains interest by capturing the eye with the distortional lines scripted incrementally into its field. The field is not a one-liner, the eye lingers and wonders.

Inside, the museum proves a Fabergé egg of interior worlds, from the curving walls of the long entry foyer, up through the tunneling staircases to the vast, light-filled hall of shifting illusions.

When Gehry designed Disney Hall, his acoustician recommended the shoebox as the acoustically optimal geometry. Gehry removed corners and curving planes to open the box spatially while retaining its acoustic properties. In a similar way, DS+R used a few deft moves to make its box something more—it doesn't look or behave like a box. DS+R's light touch turns the building into the biggest work of art in the Broad, a piece of conceptual and perceptual architecture. It's not only a contender among the architectural icons of Grand Avenue. With a strong and simple idea, strongly and simply realized, it matches even the indomitable Disney in presence.

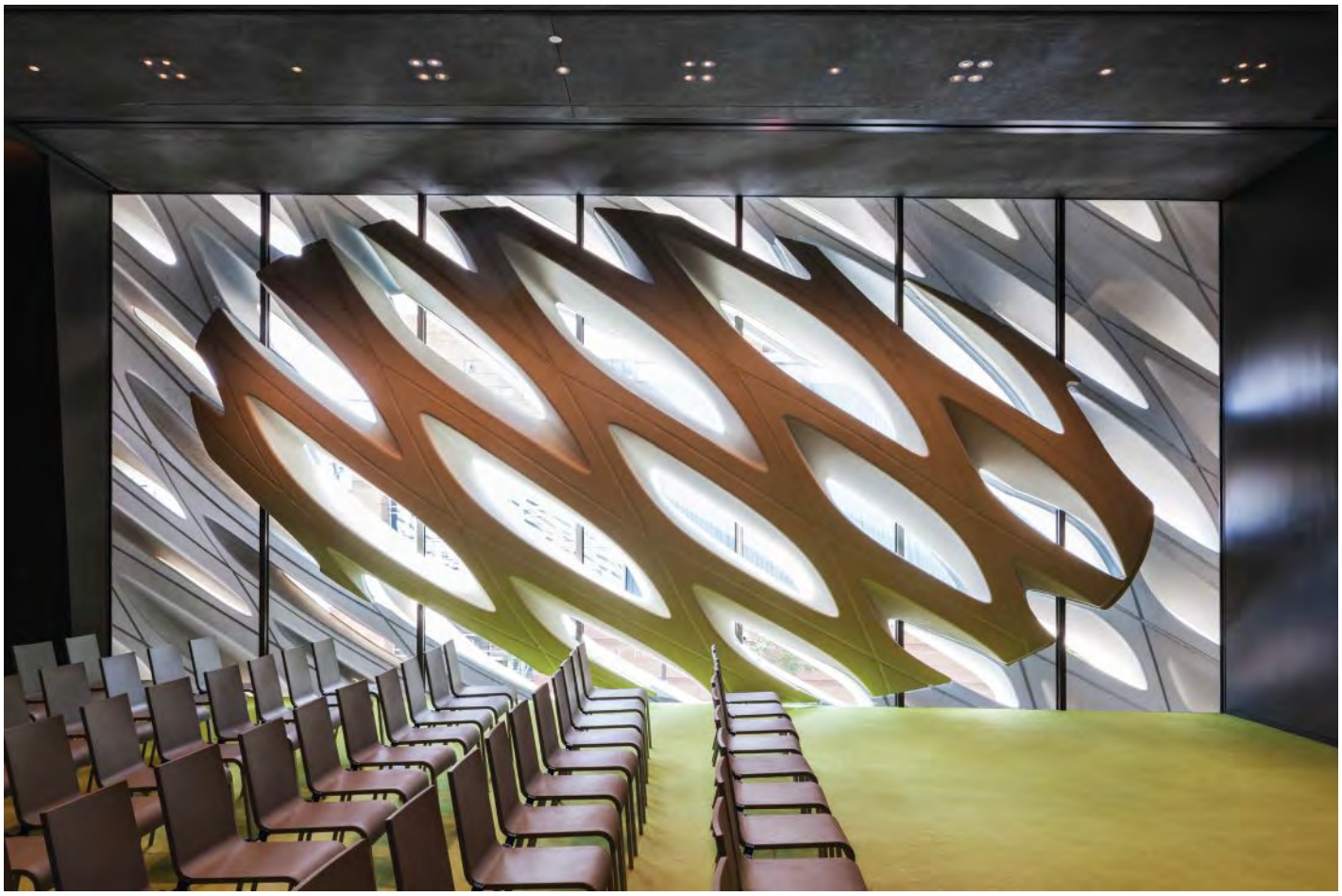
Foyer, with first-floor gallery at left, and escalator to third-floor gallery at right


EXIT

Third-floor gallery, with well in floor for escalator, elevator, and staircase

Opposite: Third-floor gallery showing skylights and perimeter glazing

This Image: View into second-floor archive from stairwell



Above: Second-floor conference room

Opposite: Interstitial space between glass-enclosed foyer, and glass fiber reinforced concrete shell

Project Credits

Project: The Broad, Los Angeles
Client: The Broad Foundation
Design Architect: Diller Scofidio + Renfro, New York · Elizabeth Diller (principal-in-charge); Ricardo Scofidio, AIA, Charles Renfro, AIA (principal designers); Kevin Rice, AIA (project director); Kumar Atre, Oskar Arnorsson, Ryan Botts, John Chow, Gerardo Ciprian, Robert Condon, Zachary Cooley, Charles Curran, Robert Donnelly, Eliza Higgins, Christopher Hillyard, AIA, Michael Hundsnurscher, Matthew Johnson, Robert Loken, AIA, Nkiru Mokwe, William Ngo, Matthew Ostrow, Haruka Saito, Daniel Sakai, AIA, Andrea Schelly, Anne-Rachel Schiffmann, AIA, Zoe Small, Quang Truong, AIA (project team)
Executive Architect: Gensler, San Francisco · Rob Jernigan, FAIA (principal-in-charge); David Pakshong (project director); Wendi Gilbert, AIA (project architect); Brianna Seabron, Nora Gordon, AIA, Greg Kromhout, AIA, Yasushi Ishida, Arpy Hatzikian, Marty Borko, ASSOC. AIA, Philippe Paré, AIA, Robyn Bisbee, Melanie McArtor, Patrice Hironimus, Valentin Lieu, Yupil Chon, Brenda Wentworth, Jae Rodriguez, Robert Garlipp, Jay Hardin, Alexis Denis, Ricardo Moura, Lauren Gropper, Steven Hergert, AIA, Pavlina Williams, AIA, Evangelique Zhao, AIA, Sebastian Mittendorfer, Scott Carter, AIA (project team)
Construction: MATT Construction
Structural Engineer: Nabih Youssef Associates; Leslie E. Robertson Associates
Civil Engineer: KPFF Consulting Engineers
M/E/P/F/Life Safety/Gallery Lighting Design: Arup
Lighting Design (Exclusive of Galleries): Tillotson Design Associates
Vertical Transportation: Lerch Bates
Collection Storage: Solomon + Bauer + Giambastiani
Security: DVS Security Consulting
Waterproofing: Simpson Gumpertz & Heger
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Size: 120,000 square feet
Cost: $140 million

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Residential:
Dune House
Terschelling, Netherlands
Marc Koehler Architects

TEXT BY DEANE MADSEN
PHOTOS BY FILIP DUJARDIN

Terschelling is one of the 14 landmasses that form the West Frisian Islands off the Dutch coast in the North Sea. Its residents are known for their resourcefulness: Legend has it that a barrel of cranberries washed ashore in the 1840s, which they cultivated into a cash crop among the dunes, which were dotted with structures they built from other pieces of flotsam, namely masts and driftwood. More recently, the island has become a popular weekend destination for city folk looking to escape to nature.

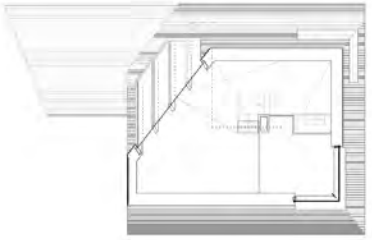
Two brothers, one a journalist and the other a businessman, called upon Amsterdam-based Marc Koehler Architects to build a shared retreat on the island for them and their families. Working within a tight zoning restriction of a 90-square-meter (968-square-foot) footprint, the firm designed the Dune House, a faceted structure that packs remarkable variety into its tiny site. "We had to be very creative about making spatial conditions," director Marc Koehler says. "We had quite a small volume of total space, but a lot of people are able to share it without bothering each other."

The house nods to its beachside surroundings with a neutral materials palette. The chimney acts as a kind of central mast, from which a sequence of living spaces unfold as a progression of platforms that spiral upwards. Three bedrooms share a floor plate submerged partially below grade to take advantage of thermal insulation from the surrounding sand; eye-level windows look onto the dunes. At ground level, the dining and kitchen platforms share a south-facing glass wall that opens to a beachside terrace. A narrow stairway twists around the chimney through a cozy workspace, and culminates in a lounge-like nook at the apex. "The fireplace is at the central core," Koehler says. "All the life turns literally around the fireplace. In a Frank Lloyd Wright kind of way, it's the heart of the house."

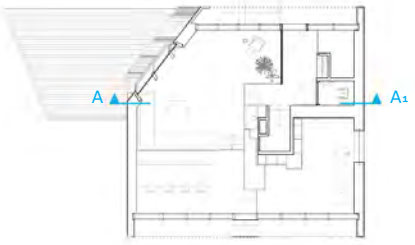
The timber-clad exterior is made from untreated western red cedar, which was chosen for its ability to weather corrosive salt spray. Working in BIM, Koehler envisioned the house as a mass sculpted by environmental forces of sea, sun, and wind, resulting in faceted elevations that echo the geometry of the house's surrounding dunes. "The design is based on careful analysis of the climatological parameters," he says. "The result is a wooden façade look that will change according to the weather conditions." The cross-laminated timber panels that form the skin of the house were fabricated off-site at a factory in Germany before being shipped to the island, where the structure was erected in less than two weeks in order to abide by island building codes that prohibit construction from interfering with local bird breeding season.

Previous Page: The house's form was influenced by wind and wave patterns; its western red cedar skin was selected to resist corrosion.

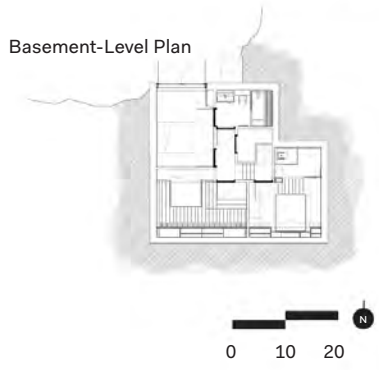
Loft-Level Plan



Ground-Floor Plan



Basement-Level Plan



Section A–A1

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Top: Horizontal windows on the east façade recall the feeling of being in a bird-watching observation tower.

Above: The plane of the roof extends beyond the glazing on the south façade, offering shade during the summer months.

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CLT supports and aluminum mullions frame a large window on the northwest façade. “At night it’s a beautiful place to look at the stars,” Koehler says. “It’s like a glass roof, so you get the feeling you're sitting outside.”

courtesy of Architectural Nexus

THERE'S **ALWAYS** A SOLUTION IN STEEL.

courtesy of Architectural Nexus

Ethan Bedingfield
Architectural Nexus

The AISC Steel Solutions Center is a free service for people who need technical assistance, innovative ideas or tools to make structural steel design easier.

Just ask Ethan Bedingfield, AIA, NCARB who works at Architectural Nexus in Salt Lake City, Utah. Ethan was designing University Place Building One in Orem, Utah for Woodbury Corporation, part of the University Mall being developed by Woodbury Corporation, one of the West's largest and most experienced full-service real estate development firms.

"Building One includes about 26,000 square feet on the ground level, and then approximately 139,000 square feet on levels two to five," he says, "and sits in the parking lot of the existing mall, which meant we had to replace and add parking by going below ground. The changing axis of the building as it rises (the parking level below a level of retail with 4 levels of office space that have a separate axis) is what made the steel design so complicated."

His inspiration came from the site constraint itself. The project used all steel moment framing, affording him extraordinary flexibility. Costs also played a role, and was one of the reasons he reached out to the AISC Solutions Center.

"The base is a rectangle that fills the whole site we had available to us," Ethan explains. "We are within a foot of hitting utilities. We twisted the top of the building rather than following the grid of the immediate context, relating it to the major additions that will happen behind the mall and also facing it to the extremely busy intersection on which the project sits. That's where we landed in our initial studies. Once we had it to that point, I remembered meeting Tabitha Stine, S.E., P.E., LEED AP from the AISC Steel Solutions Center at a conference. I called, and we sent over Revit files and the narrative we had describing our intent. University Place was the first time I used the Solutions Center. I've used it a few times since, but this was the most impactful experience. I will definitely use them again."

Ethan explains that some of the options they received were unexpected, but they all stimulated his thinking, including the one that grabbed their attention the most. "It was the use of SidePlate for our moment frame for the lateral system," he says. "We ended up saving around $70,000 because of it and the aesthetic design was unimpacted."

Ethan says the AISC Solutions Center does two things: adds to creative thinking and validates your own design. "I don't know why you wouldn't call them on every project for the second set of eyes," he adds.

From typical framing studies to total structural systems, including project costs and schedules, the AISC Steel Solutions Center can provide you with up-to-date information and innovative solutions for your project. The AISC regional staff covers eight different geographic regions across the U.S. They give more than 50 presentations a year on various steel topics. Learn how our regional staff can work with your company. Call **866.ASK.AISC (866.275.2472)** or email us at solutions@aisc.org

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Terraced platforms lined with walnut cabinetry form a continuous set of living spaces that spiral around the house's central chimney.

MAKING PLACE: THE ARCHITECTURE OF DAVID ADJAYE

SEPTEMBER 19–JANUARY 3

Making Place: The Architecture of David Adjaye is organized by Haus der Kunst, Munich, and the Art Institute of Chicago.

Major funding has been generously provided by Nancy Carrington Crown and A. Steven Crown and Barbara Bluhm-Kaul and Don Kaul.

The Auxiliary Board of the Art Institute of Chicago is the Lead Affiliate Sponsor.

The exhibition catalogue, *David Adjaye: Form, Heft, Material*, has been underwritten by Nancy Carrington Crown and A. Steven Crown.

Additional support for the exhibition has been provided by the Fellows and Benefactors of the Architecture and Design Department, the Architecture & Design Society, the Leadership Advisory Committee, Cheryl and Eric McKissack, the Graham Foundation for Advanced Studies in the Fine Arts, and Linda Johnson Rice.

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Photo by Steve Hall, Hedrich Blessing.

ART INSTITVTE CHICAGO

The basement walls and foundation are made of cast-in-place concrete colored to resemble basalt deposits.

Project Credits

Project: Dune House, Terschelling, Netherlands
Client: Withheld
Architect: Marc Koehler Architects, Amsterdam · Marc Koehler (director); Carlos Moreira (project architect); Kasia Heijerman, Miriam Tocino, Anna Szcsurek, Jakub Zoha
Interior Guidance: Thomas Welink, Annemarie Swemmer
Technical Implementation: AchterboschZantman Architecten
General Contractor: P.A. Wiersma Aannemingsmaatschappij
Interior Builder: Koen Vleugel
Installations: Bakker Installatietechniek
Façade Builder: Huijberts Gevelbouw
Size: 180 square meters (1,938 square feet)
Cost: Withheld


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Editorial: Freedom of Worship

Remember the explosive debate in 2010–2011 over the so-called "Ground Zero Mosque"? That was nothing compared to what's been brewing in Europe. Islam is the continent's fastest-growing religion, and apparently there aren't enough mosques to accommodate the faithful. This summer, Dalil Boubakeur, president of the French Council of the Muslim Faith, declared that the number of mosques in France needs to double (to roughly 5,000). While such tremendous demand may look like a bonanza for architects, the design brief is politically charged, because neighborliness and the humanitarian needs of Middle Eastern and North African refugees seem to be irreconcilable with security concerns about jihadist extremism and anxiety, exacerbated by demagogues, about cultural change.

Stereotypically placid Switzerland banned the erection of minarets back in 2009, in a national referendum. Just last month, the Lebanese newspaper *Addiyar* reported that Saudi Arabia has volunteered to fund as many as 200 new mosques in Germany to serve refugees. The story hasn't been verified, but that didn't stop pundits from pouncing; Richard Dawkins, the British atheist, called the putative offer "a sick joke." In February, Austria outlawed foreign funding of mosques and imams, fearing the spread of fundamentalism. And in March, conservative leader Marine Le Pen called for an all-out halt to mosque-construction in France.

Imagine Le Pen's consternation when Boubakeur, asked by a reporter whether unused churches should be turned into mosques, replied, "Why not? It's the same God. The rites are similar, fraternal. I think Muslims and Christians can coexist." In a subsequent poll, more than two-thirds of respondents opposed the idea, though just 6 percent of the majority Roman Catholic population regularly attends Mass, and thousands of churches have been shuttered. The idea went over just as poorly when artist Christoph Büchel put it into practice at the Venice Biennale this summer, by temporarily repurposing a deconsecrated 10th-century church as a mosque. Local police hastily shut the place down, using flimsy bureaucratic pretexts.

Such conversions are nothing new. Hagia Sophia in Istanbul is the most famous example: built by Justinian I in the sixth century, adapted into a mosque in 1453, then secularized as a museum in 1935. Now, Turkey's interim minister of culture and tourism, Yalçın Topçu, is proposing a referendum to decide whether Muslims should be allowed to publicly worship there again. "Opening the Hagia Sophia to prayers is my personal dream," he told reporters last month.

Another celebrated example, the cathedral in Córdoba, Spain, began as a church in the sixth century, was used jointly by Muslims and Christians for a period in the eighth century, then served exclusively as a mosque until the *Reconquista* in the 13th century. Now Spanish Muslims are calling for the right to pray there once more, and nearly 400,000 people, including Norman Foster, HON. FAIA, have signed a petition to recognize the building as a mosque–cathedral.

Neither in Spain nor in Turkey, it would appear, is the demand to take the building over for Islam exclusively. And therein may lie a solution applicable in Europe and beyond, a solution with sound political, architectural, and even theological precedents: sharing.

STEPHEN VOSS

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