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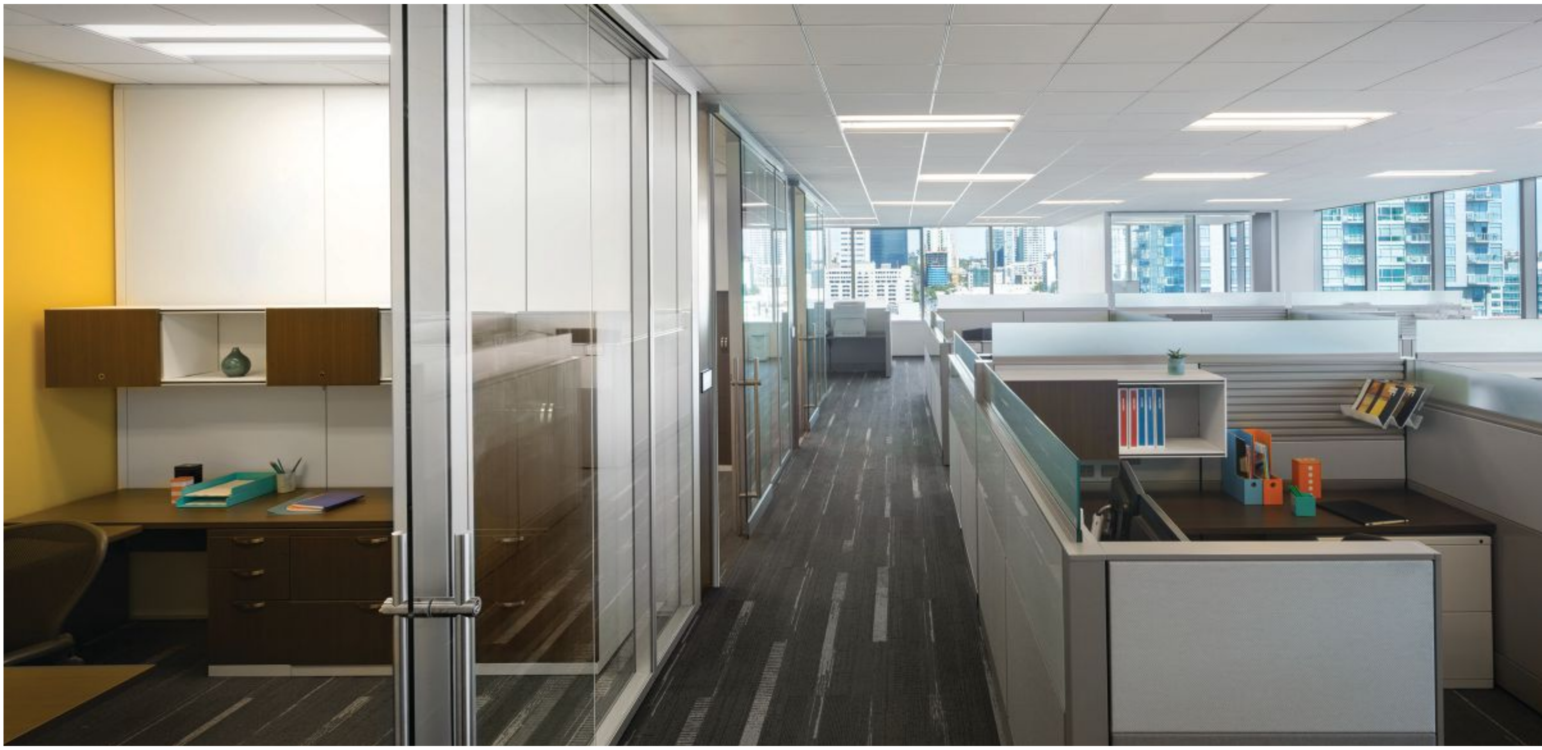


Winning the Audition for Creating Quiet

How the New $165 Million Sempra Energy HQ Reduced Distracting Noise

San Diego architecture, interiors and branding firm Carrier Johnson + CULTURE went to unusual lengths to "get it right" for the 800 Sempra Energy employees bound for a new $165 million, LEED Gold®-certified company headquarters in downtown San Diego.

Right down to a full-scale, off-site mock-up of the headquarters' workspace.

What would it be like to actually work in the new setting? What could the Carrier Johnson + CULTURE design team do to deliver a high-performance workplace experience for Sempra staff?

"The headquarters space had to be versatile. Office walls had to be easy to take down and replaced with workstations and vice-versa," reported the project's interior design lead and Carrier Johnson + CULTURE senior associate and designer Stuart Fromson.

"Acoustics were a central consideration. We had an acoustician as part of our team. We used the mocked-up office to perform acoustical tests with the whole system in place—raised floors, walls, lighting, ceilings, the works."

The idea: Leave nothing to chance. "When you see a manufacturer's acoustical data, it's usually test-room quality. It doesn't represent the real world. We had to be certain in our choice," Fromson explains. "There could be no surprises at move-in."

Or delays.

The nearly 400,000-square-foot, 16-story office tower went from design to staff occupancy in a breathtaking 28 months. "It's the fastest project I've ever worked on," Fromson says. The building was delivered in July 2015.

Armstrong
CEILING SOLUTIONS

Left: Sempra's new headquarters features an Ultima® ceiling with Total Acoustics™ performance that is ideal for closed offices and open spaces. **Above:** Armstrong® Ultima® ceiling panels offer sound absorption and sound blocking in a single panel.

With the delivery stakes sky-high and an owner attuned to every decibel, the pressure was on to select a must-not-fail ceiling panel system that met Sempra's acoustic requirements. "The old headquarters had a demountable wall system from the '70s, which wasn't effective enough." Mock-up testing revealed a winning solution for the new headquarters interiors: Armstrong® Ultima® ceiling panels with Total Acoustics™ performance.

"We selected this ceiling system because it provides two things in one ceiling panel: sound absorption and sound blocking," Fromson observes. "We looked at multiple ceiling panel manufacturers and chose the panels that had the combined benefits of CAC and NRC to meet our needs. The client also liked the fine textured look of Ultima. Getting the right look was very critical too. We used Silhouette® XL® suspension system, so the ceiling panel and grid would be perfectly flush. The connection at the ceiling line with the wall system had to be very good."

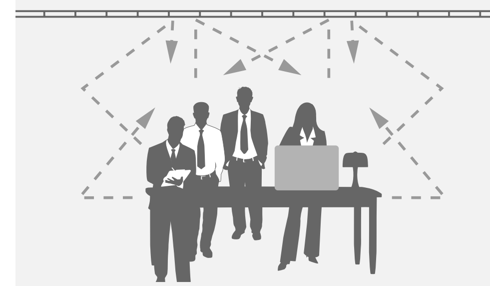
The Armstrong panels feature new technology that enables Total Acoustics™ performance, the combination of sound absorption (noise reduction coefficient, or NRC) and sound blocking (ceiling attenuation class, or CAC) in a single panel. The new system is attuned to speech frequencies. "When you get to a distance of about 15 feet, you may hear people talking, but you don't understand what they're saying. It's harmless background noise," Fromson explains.

The Armstrong ceiling system formed one leg of a three-part acoustic control solution, Fromson says. The other components included an active sound masking system embedded in the ceiling panel and a demountable wall system that included dual glass paneling for extra sound suppression.

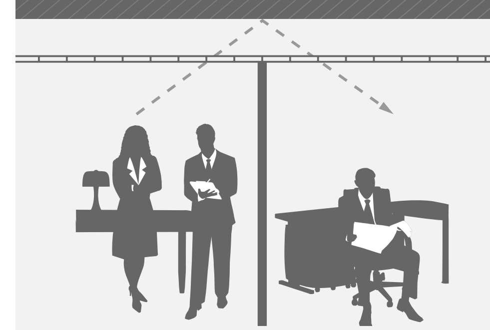
The sound measures provided by the ceiling manufacturer proved right on the mark, and the difference in acoustics, as you might expect, has been transformative.

"Employees really like the space. I was in their elevator one day with a Sempra Energy employee. The person was talking about the new building and I mentioned I was a lead designer. The employee just raved on and on about how happy they were with the acoustics in the space," Fromson says.

"As a designer, that's what you want to hear."



What is NRC?
NRC (Noise Reduction Coefficient) is a measure for rating the overall sound absorption performance of a material when used in an enclosed architectural space such as an office, where sound is being reflected at many angles of incidence.



What is CAC?
CAC (Ceiling Attenuation Class) is a measure for rating the performance of a ceiling system as a barrier to airborne sound transmission through a common plenum between adjacent closed spaces.

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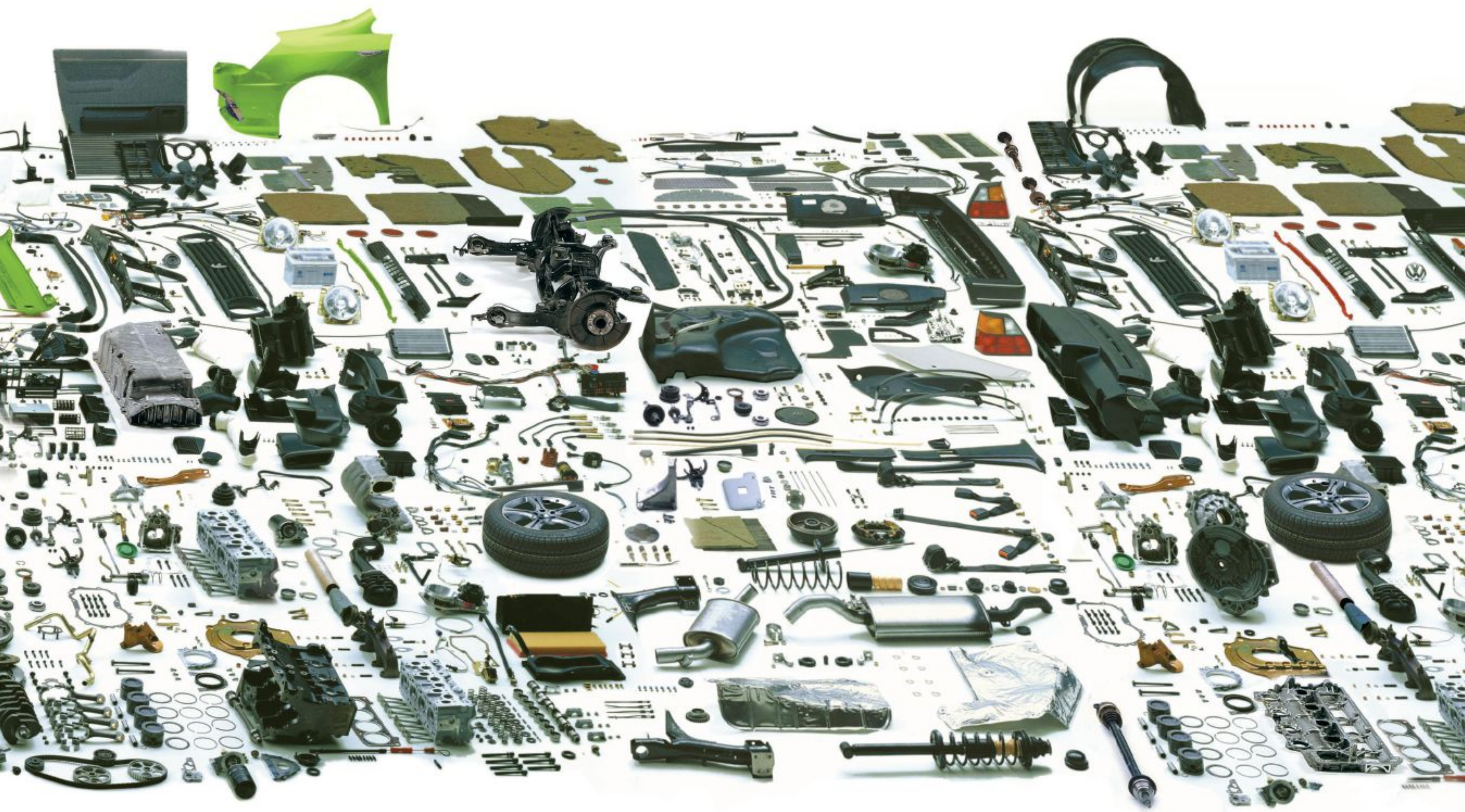

A Contents

Volume 105, number 6. June 2016. On the cover: Machado Silvetti's Center for Asian Art in Sarasota. Photo by Anton Grassl/Esto.

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Ila Bêka and Louise Lemoine

Cleaning Up

The Museum of Modern Art has announced the first film acquisition for its 84-year-old architecture and design department—the 16-film "Living Architectures" collection by Paris-based Bêka & Lemoine. Franco-Italian filmmakers Ila Bêka and Louise Lemoine are known to shed light (and a touch of humor) on the practicality, or lack thereof, of living in iconic architecture. Their most notable, 2008's *Koolhaas Houselife* (above), which showed at the Venice Biennale and launched their film careers, follows the housekeeper who maintains the Maison à Bordeaux designed by Rem Koolhaas, HON. FAIA, for Lemoine's paraplegic father. —CHELSEA BLAHUT

> Read more about Bêka & Lemoine's films and MoMA's acquisition of them at bit.ly/BekaLemoine.


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ROBERT BLOOM

An Aria on Urban Death and Life

The Chicago-based Graham Foundation for Advanced Studies in the Fine Arts has awarded a combined total of $491,500 in its annual Grants to Individuals this round, selected from a pool of 640 submissions from 42 countries. Ninety-four architects, designers, curators, filmmakers, visual artists, musicians, writers, and other creatives are responsible for the 59 chosen projects. One recipient is director and animator Joshua Frankel and his opera about the 1960s urban-planning fight between journalist Jane Jacobs and city planner Robert Moses (above) in Frankel's native New York. —CHELSEA BLAHUT

> *To learn more about this year's recipients of the Graham Foundation for Advanced Studies in the Fine Arts grants visit bit.ly/2016GrahamGrants.*

HENRIK KAM

Bay Area Honors

For 2016, AIA San Francisco (AIASF) named 26 projects, from a field of 150, for recognition in its annual Design Awards at an event in the newly renovated Herbst Theater at the San Francisco War Memorial & Performing Arts Center. One of the Honor Awards, which was also the winner of the Historic Preservation Commendation, was the renovation of artist David Ireland's house in the Mission District by Jensen Architects and Architectural Resources Group (above). "AIASF has so many talented design firms that, each year, the jury has their work cut out for them, and this year was no exception," 2016 chapter president Aaron Jon Hyland, AIA, said.

> *Learn more about all 26 winning projects in AIA San Francisco's 2016 Design Awards at bit.ly/2016AIASFAwards.*


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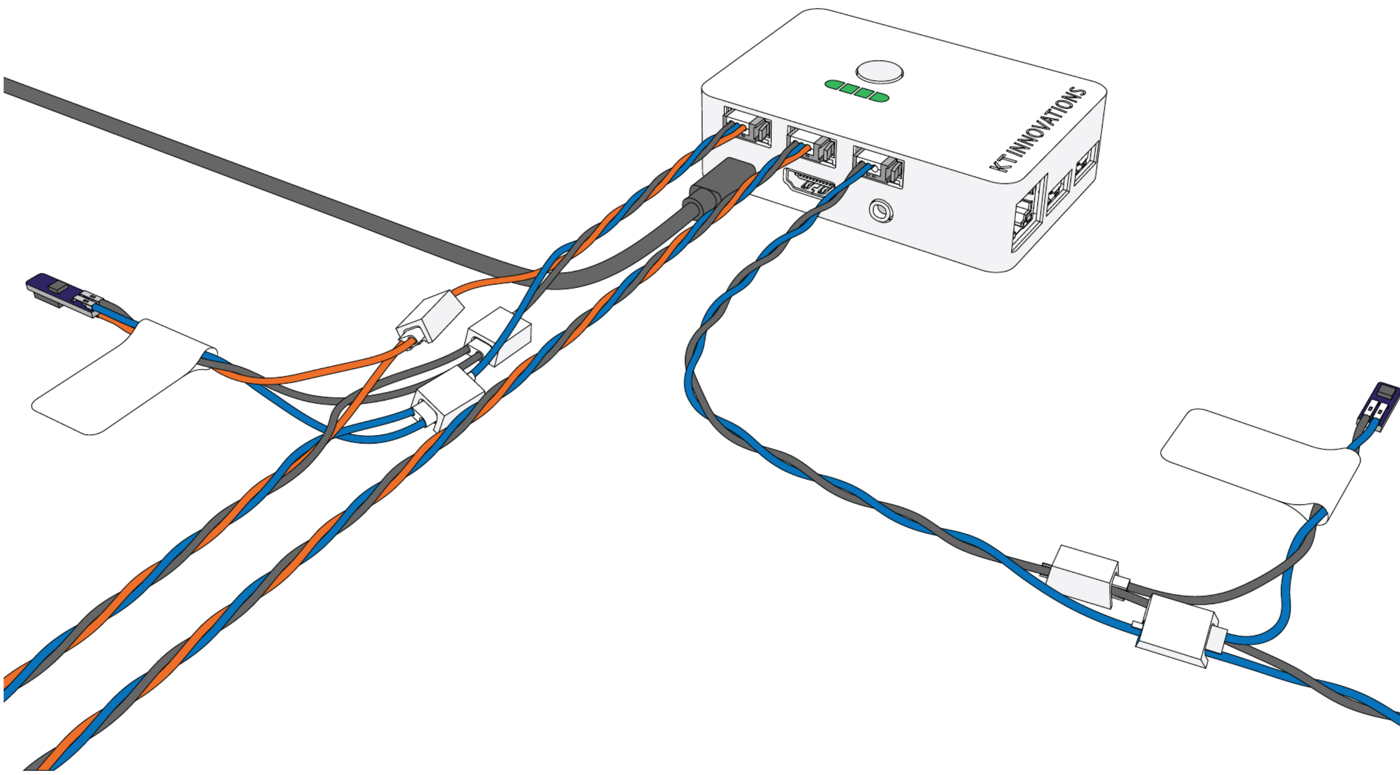

COURTESY KIERANTIMBERLAKE

Harnessing the Internet of Things

Philadelphia-based KieranTimberlake wanted to know whether the typical measures of high-performance design actually work, so after more than a decade of research, the firm developed a plug-and-play network of thermal and moisture sensors that can be affixed to building components. KieranTimberlake has deployed this wireless sensor network about 20 times, one of its largest installations to date (about 300 sensors) being its own office in the city's Northern Liberties neighborhood. The firm recently rebranded the network as Pointelist and is offering 25 kits to anyone, in any discipline, to test-drive free of charge. —WANDA LAU

> *Learn more about KieranTimberlake's research on the Internet of Things and their Pointelist sensor system at bit.ly/KTPointelist.*


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Great Americans

The Cooper Hewitt, Smithsonian Design Museum's National Design Awards recognize excellence and innovation across multiple disciplines and in 11 categories. This year's recipients include Moshe Safdie, FAIA, for Lifetime Achievement; nonprofit Make it Right for the Director's Award; Bruce Mau for Design Mind; Marlon Blackwell Architects for Architecture Design; Studio O+A for Interior Design; and Hargreaves Associates for Landscape Architecture (above, the firm's Crescent Park in New Orleans, a collaboration with Adjaye Associates, Eskew+Dumez+Ripple, and Michael Maltzan Architecture). —CHELSEA BLAHUT

> *To learn about all of the winners of the 2016 National Design Awards, go to bit.ly/2016NationalDesignAwards.*

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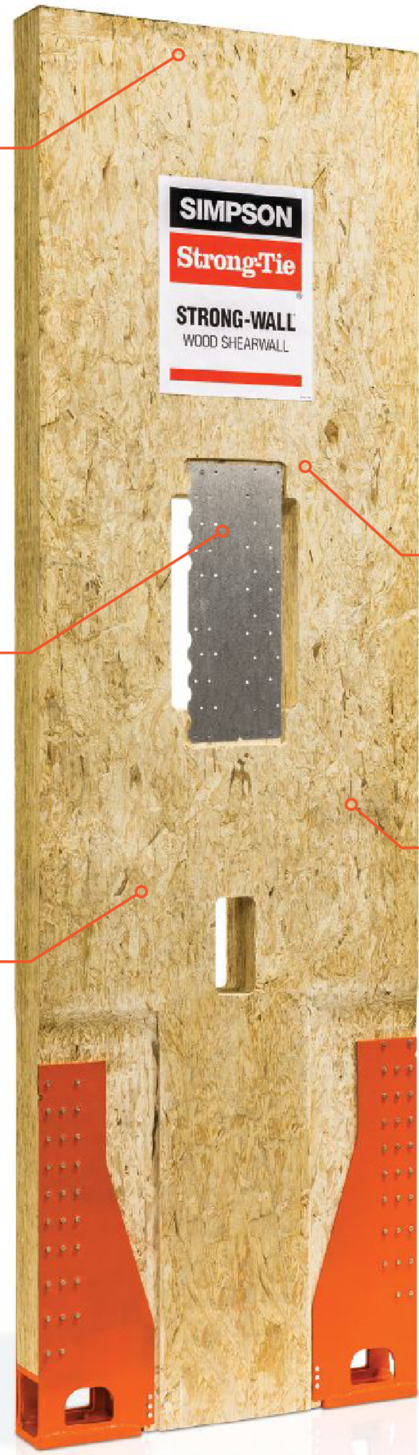

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You Can't Take the Sky from Me

A 1940s-era work by artist and designer Isamu Noguchi is now back in the public view—a plaster and glass lobby ceiling for Harris Armstrong's American Stove Company–Magic Chef offices in St. Louis. U-Haul moved into the building in 1977 and covered the neglected lobby with a drop ceiling, burying Noguchi's work. It's the only surviving example of the "lunars" series of panels done by Noguchi, inspired by his time in a Japanese internment camp in Arizona during World War II. U-Haul decided to restore the work and lobby, and has updated the original recessed lighting with LEDs. —SARA JOHNSON

THE ISAMU NOGUCHI FOUNDATION AND GARDEN MUSEUM

> *See more images of the Isamu Noguchi lobby ceiling at bit.ly/NoguchiUHaul.*

RICHARD BARNES

A Parable of Self-Absorption

Celebrating what would have been Philip Johnson's 110th birthday and the 10-year anniversary of his Glass House's opening to the public, artist Yayoi Kusama's "Narcissus Garden" has been installed next to the New Canaan, Conn., estate's Pavilion in the Pond (a concrete structure consisting of prefabricated concrete arches, roof segments, and base that the architect had built in 1962). Kusama's work, created 50 years ago for the 33rd Venice Biennale, has also been featured at New York's Central Park and Paris's Jardin de Tuileries, and will float in Johnson's pond until Nov. 30. —CHELSEA BLAHUT

> See more photos of "Narcissus Garden" in the pond at the Glass House at bit.ly/NarcissusGlass.


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Best Practices: Bringing 3D Printing In-House

TEXT BY LINDSEY KRATOCHWILL

A new machine is whirring its way into architectural offices. Extruding plastics, ceramics, metals, and more, 3D printers are increasingly used to build models, prototypes, and components in-house. But making the investment in adding a new tool comes with its challenges. Here are a few things to consider before diving in.

Make Room

Unlike a laser cutter or a CNC milling machine, which may require space to mitigate dust, exhaust, and fire hazards, 3D printers are often clean and quiet enough to work alongside designers. Still, many firms prefer to keep them with the other fabrication equipment. "Our [two] MakerBots live in … a separate space where we can keep dust and noise and all the other ugliness that comes with model building," says Scott Dansereau, AIA, an architect at Perkins+Will's Chicago office.

"Understanding that you may have prints that fail may be a bit of a struggle at first."

—Scott Dansereau, AIA, architect, Perkins+Will, Chicago

That fabrication space also houses a wood shop, a laser cutter, and a three-axis CNC machine.

"Just look at it as a walk-in toolbox—nothing but the scale changes," says Ergys Hoxha, who manages the digital fabrication space in the basement shop of NADAAA's Boston office.

Pick Your Gear

New technologies can bring a steep learning curve. But, in Dansereau's experience, many young designers are familiar with 3D printers from their time in architecture school. Tinkerers around the office may also be of help. When MBH Architects, in Alameda, Calif., purchased a new printer, it chose one from Ultimaker based on advice from designers who used the model at home.

Makerspaces, which offer digital fabrication equipment and software for use by members or the public, can serve as a testing ground, too. MBH associate Joe Irwin went to one locally to try out printers. "[We would] actually do some of our projects there and bring them back to our clients to show what service we could provide, prior to making the large investment of buying machines and bringing it in house," he says.

Glitches can—and do—happen. "This is still new territory," Dansereau says. "Understanding that you may have prints that fail may be a bit of a struggle at first." Conceiving models in Autodesk Revit and finalizing them in a 3D printer–friendly software like Rhino or SketchUp is one way to mitigate disaster, as small details like a balcony railing are usually too small to print and thus need to be reformatted. And prints can't go entirely unsupervised. The team may lose valuable time if a six-hour print fails three hours in, but isn't checked until hour five. Newer printers, like the MakerBot Replicator Z18, have a built-in camera for remote monitoring.

Reap the Benefits

Relating 3D printing to billable hours can be a challenge. "My time spent on researching and developing new tools for the practice, whether it is in 3D printing, virtual reality, or BIM management is usually not billable time unless there is a project-specific need to be solved," says Casey Mahon, who manages the Design Technology Center at Carrier Johnson + Culture, in San Diego and Los Angeles.

MBH, for example, created a matrix that ranks print types by level of detail from one to five, which it uses to communicate expectations with clients and to determine internally how much time a print will require. The firm charges for printing time, material, and machine-recovery costs.

Firms that have embraced 3D printing have seen their workflows evolve around the technology. For one thing, using the technology internally can shave days off the process of building models or components, allowing teams to nimbly adapt to a client's changing needs. And lower material and equipment costs have allowed more firms to experiment with 3D printing. "If something is over budget or unrealistic, [designers are] thought of as artists without a grip on reality," says NADAAA principal Nader Tehrani. "In this case, because one is able to connect the dots between the process of imagining something and the process of delivering it, it changes the perception of the actual role of the architect."

> For more tips on making 3D printing a part of your project workflow, visit bit.ly/3DPrintingInHouse.


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Detail:
AISD Performing Arts Center Proscenium

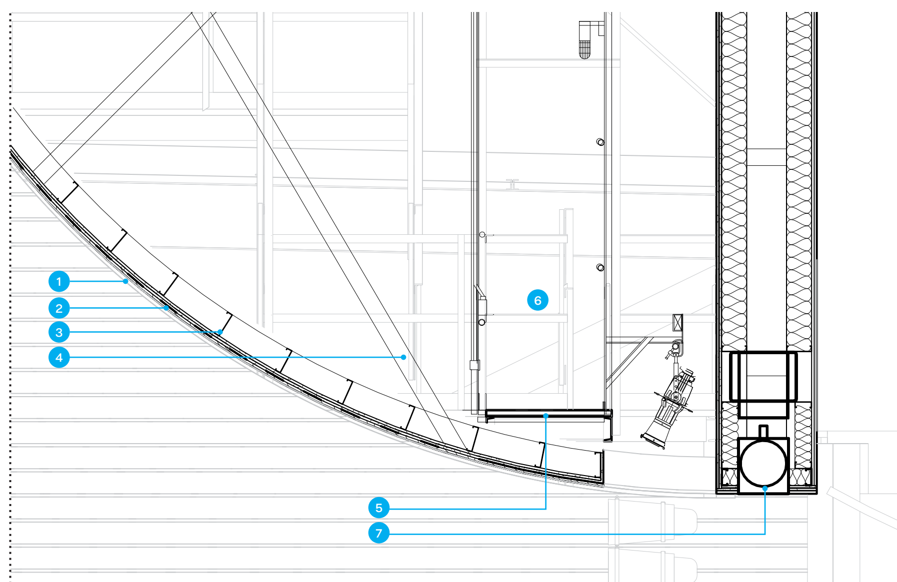
TEXT BY TIMOTHY M. SCHULER

The main auditorium of the Austin Independent School District's performing arts center, in Austin, Texas, exhibits the form and craftsmanship of a violin or cello. Stepping inside the 1,200-seat venue is like slipping into the instrument's body. Nearly every exposed surface is finished in wood—8,600 square feet in all. "When you think about musical instruments, wood is the first thing that comes to mind," says Juan Miró, FAIA, founding principal of local firm Miró Rivera Architects, which designed the 60,000-square-foot center with Pfluger Architects, also in Austin.

And like an instrument, the design of the auditorium was driven by performance. The geometry of its 60-foot-long, 19-foot-tall curved wood proscenium soffit—the venue's showstopper—was informed by the orchestra shell, which reflects the sound out toward the audience during performances.

To create the soffit's 18-foot-radius curve, Keystone Millwork, in Bryan, Texas, had to rout each 1x6 lengthwise. Two 1.75-inch-wide, 0.5-inch-deep gouges cut in the back of the wood slats, like two wide tire tracks, sufficiently weakened the wood, allowing workers to bend it along the framed curve and secure it with glue and nails.

Pfluger project architect Jessica Molter, AIA, says that students who perform at the facility feel like "it's something special for them. ... That's one of the most rewarding things to me."



1. 1×6 maple slat, routed and curved by hand to a 18' radius and secured to framing with glue and nails, holes plugged
2. Two layers of ⅝" gypsum wall board, painted black
3. 6" metal stud framing
4. Metal-framed bracing support to structure above
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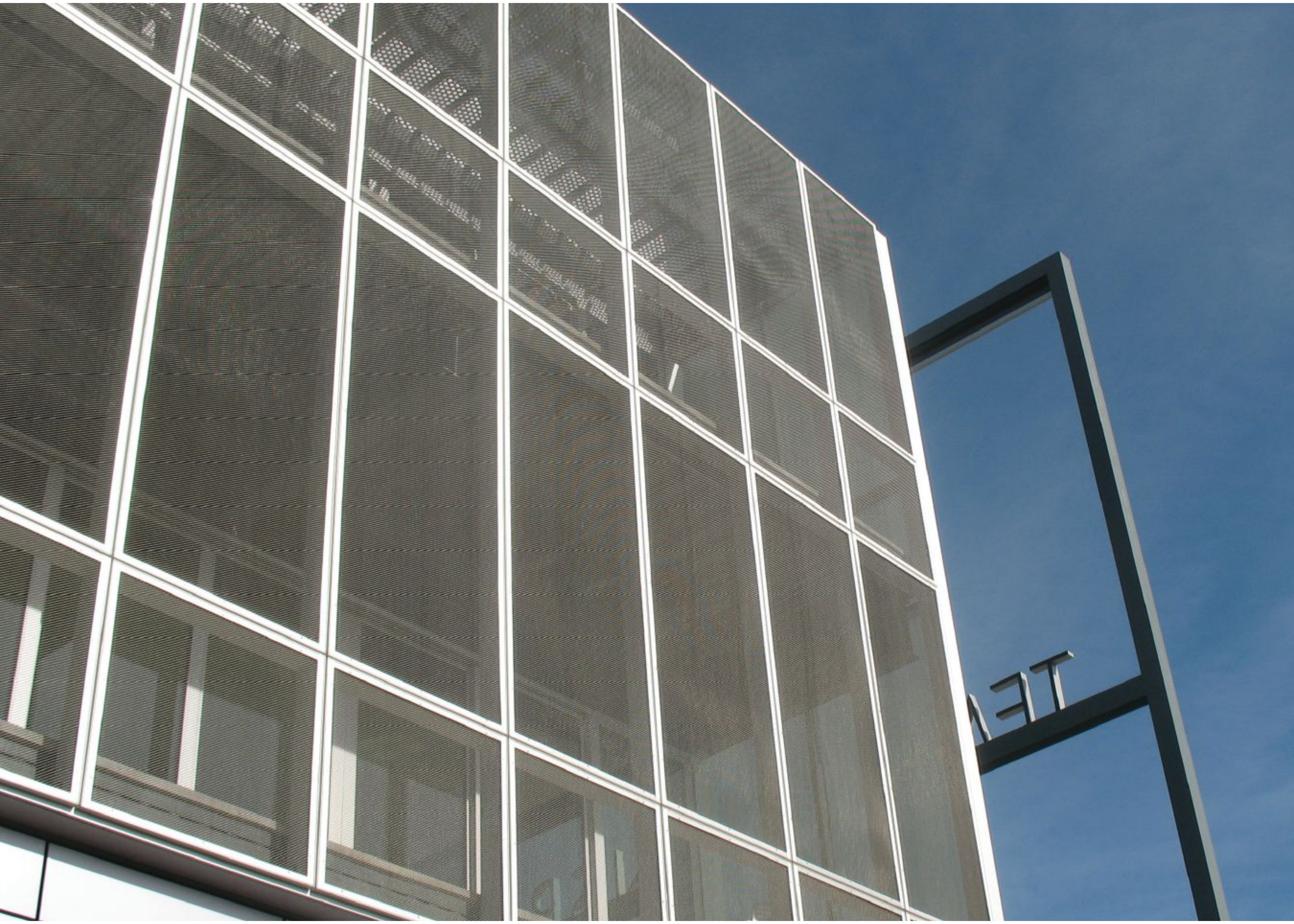

"Finding a product for a specific application was a challenge at the Tempe Transportation Center. Cascade Architectural's Fabricoil system was durable and maintenance free while maintaining an elegant and visually transparent effect. Cascade Architectural, much like Architekton, is client-focused, and came up with a design solution and installation that helped us achieve the goals set forth by the project parameters."

John Kane FAIA LEED AP BD+C, Architekton Principal

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Next Progressives: Hazelbaker Rush

TEXT BY ZACH MORTICE

Dale Rush and Darci Hazelbaker

There may be grander examples of Hazelbaker Rush's commitment to material craft and modernist refinement, but perhaps the most direct distillation of the Tuscon, Ariz.–based architecture firm's design process can be found in the bathroom of Mabel Street Residence, a 1927 Spanish Colonial Revival bungalow that co-founders Darci Hazelbaker, ASSOC. AIA, and Dale Rush, AIA, renovated to become their home and studio. The bathroom is centered around a cabinet-height volume of rich-grained wood—the planks were once laths, covered by plaster, and were recovered from wall demolition. The cabinet conceals plumbing for the toilet and a simple, cubic sink basin with a cylindrical faucet.

Hazelbaker and Rush call their aesthetic "Modernism with a hand-crafted soul"—it's warm and tactile, with minimal and pure forms. "The intersection of these two typologies is where our firm resonates," Hazelbaker says. The combined sink-and-toilet object straddles the line between furniture, fixture, and architecture, as does the much of the young firm's work. Above all else, Hazelbaker and Rush are builders and makers, filling their growing body of residential and commercial projects with bespoke fittings and handcrafted details.

Hazelbaker grew up in Indiana, learning how to knit, sew, and quilt from her mother. Rush's family owned a Florida farmstead, where he patched fences and built barns. Hazelbaker earned her B.Arch. from the University of New Mexico, and Rush attended Auburn University, where he honed his handyman skills at one of architecture's most celebrated design/build programs, the Rural Studio. After graduating, Rush moved to New Mexico to experience living in the Southwest. He thought he might stay a year, but that was 15 years ago. "I fell in love with the landscape, and I fell in love with Darci," he says.

The couple moved to Tucson in 2005 when Rush took a job at Rick Joy Architects, where he learned to pare back ideas to their essential elements. Hazelbaker began teaching at the University of Arizona College of Architecture in 2007. Following a steady stream of side projects, the two founded their firm in 2011.

For their first ground-up construction project, the Franklin Mountain House in El Paso, Texas, Hazelbaker Rush stacked two rectangular volumes at a right angle. The lower volume is clad with granite and basalt, ubiquitous to the area and cut to no great level of precision; the upper volume, or second story, is finished in pristine white stucco. From a distance, the ground level's walls blend into the mountainside backdrop, which allows the white stucco volume to appear to levitate. "It's a complex process to arrive at a refined, simple idea," Rush says. "Mies van der Rohe said 'Less is more,' but Rick [Joy] would say 'Less is more work.'"

A balance of opposing viewpoints leads to refinement of an idea to its bare essentials. "Darci tends to be an advocate for a more conceptual, cerebral sensibility, and I'm the advocate for more pragmatic and grounded ideas," Rush says. "It's through our push-and-pull of each other that the idea starts to get worn away to just a simple, pure form."

The duo's designs of light fixtures, tables, desks, cabinets, planters, and door pulls continue their tendency to juxtapose modernist forms with traditional materials. Their rope light fixtures hang from fraying jute strands, but the fixture body is smooth steel. Door and cabinet pulls are laser-cut black steel wrapped in hand-stitched leather. Their approach recalls the Bauhaus model of education, where "total design" meant applying the modern ethos equally to buildings, silverware, and sculpture. Rush says a return to craft has architects operating more like artists—both designing and creating their works. Hazelbaker Rush have collapsed this distance such that making becomes a design tool in itself.

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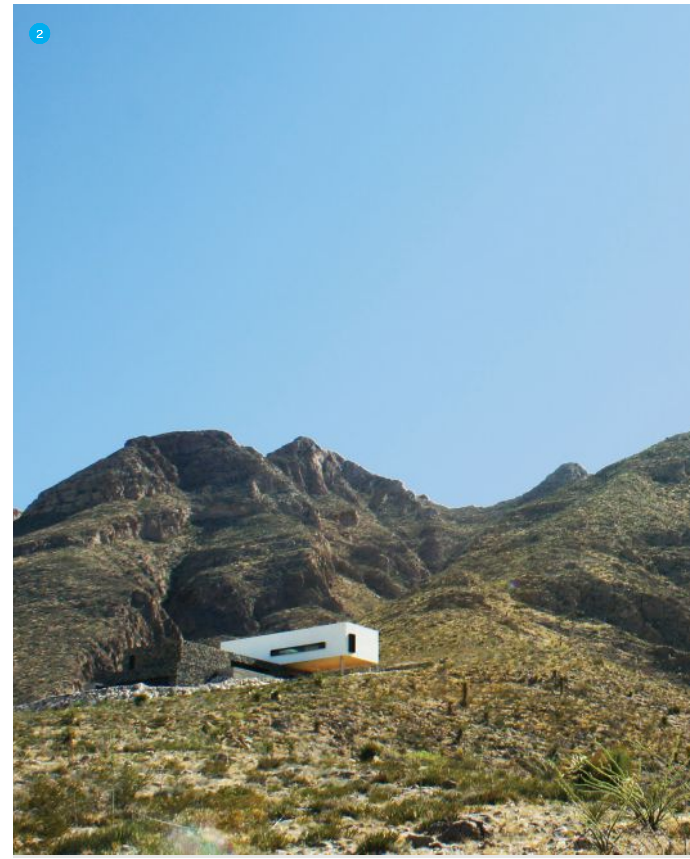
**Next Progressives:
Hazelbaker Rush**



1, 3: CASEY DUNN; 2: HAZELBAKER RUSH

1–3. With its lower volume clad in local basalt and granite, the white stucco upper volume of Franklin Mountain House seems to float beside its rocky setting overlooking the city of El Paso. **4.** Reclaimed wood laths form a stand-alone plumbing fixture in the Mabel Street Residence, Hazelbaker and Rush's renovated Tuscon, Ariz., home and studio. **5.** Custom pendant light fixtures and hand-stained wood furnishings define the interior of Atelier de LaFleur, a Tuscon wedding and event planning studio. **6.** The firm's forays into products include laser-cut door pulls: "We took the time to wrap it with leather," says Rush. "We call that the 'generous offering.' Someone took the time to offer up this moment of comfort around this hard, steel object." **7.** A purposeful void left in a concrete bench serves as a miniature planter box.

4, 6, 7: HAZELBAKER RUSH; 5: FLETCHER AND CO.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TEXT BY SELIN ASHABOGLU

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This versatile lounge-style chair can be specified completely upholstered (shown) or with a sculptural walnut backing that evokes the Eames' classic design. An ottoman is also available. *hbf.com*

Piton Adjustable Height Stool, Knoll
By British designers Edward Barber and Jay Osgerby, this 14.25"-diameter, cast-aluminum tripod stool is shaped by a base ring and threaded rod to adjust the seat height from 18" to 22". *knoll.com*

Quo 910.93, Sandler Seating
A twist at the small of this stackable chair's back adds a subtle detail while complementing its gently curved seat, which is set atop a thin sled base. *sandlerseating.com*

In, Wilkhahn
Capable of tilting up to 12 degrees forward, 26 degrees backward, and 13 degrees sideways, this ergonomic task chair, with a glass fiber–reinforced frame, promotes good posture. *wilkhahn.com*

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PHOTOGRAPHY: GREGORY COWLEY

A New Take on Old

How one architect is trying to push senior living alternatives into the mainstream.

Alexis Denton, AIA, works in SmithGroupJJR's San Francisco office and focuses on the design of senior living communities. A gerontologist and a member of AIA's Design for Aging Knowledge Community Advisory Group, she advocates for transforming the perception of "what everyone expects 'old folks housing' to look like." For Denton, changing perceptions starts with changing the way a senior living community looks. "My pipe dream is to create a place where anyone might walk by and think, 'I want to live in a place like that,'" she says.

As told to Steve Cimino

I came out of school, like any architect, wanting to do high-design–type stuff, but my first job at SmithGroupJJR was a veterans' home in Los Angeles. I started on it from the beginning and toured similar communities; they weren't places anyone would want to live in. It didn't make any sense; the caregivers were super-passionate but the environment rarely seemed to match that attitude.

A lot of people still feel uncomfortable talking or really thinking about aging. They don't want to accept that they may eventually need this sort of environment and care for themselves. The other factor weighing on public perception is the image of the old-school highly institutional nursing home. But it's been about two decades since "assisted living" offered seniors an alternative. In either case, design was an afterthought. Now there's no question that design affects behavior and how you feel every day. The goal of the AIA Design for Aging Knowledge Community is to be the go-to place for all designers to find research that centers on how the environment impacts an individual or a group's quality of life.

When it comes to aging in place and adapting homes for aging, there's the big challenge of the isolation factor. What senior living can do is to provide the social aspect, which is maybe the most important aspect of aging. While many people want to age in place, to adapt their own home for the future, that outside element will be missing. Aging in place is getting a lot of press lately, especially as demographics continue to shift here and in China, but it hasn't been fully figured out yet.

What's interesting now is providers who are combining the two approaches. In San Francisco, there's a new concept in development that includes a community center on steroids for older people who live at home. They'll provide transportation to this "mall" of services and activities so they can spend their day there and interact, and then they'll take you back home. As an architect, that's an interesting blend of aging in place and senior living. And that's why this is such a super-cool industry: There is a lot of opportunity for small changes that really matter, or even upsetting the existing model entirely. AIA

AIANow

Batteries Recharged

By Steve Cimino
Art Direction by Jelena Schulz

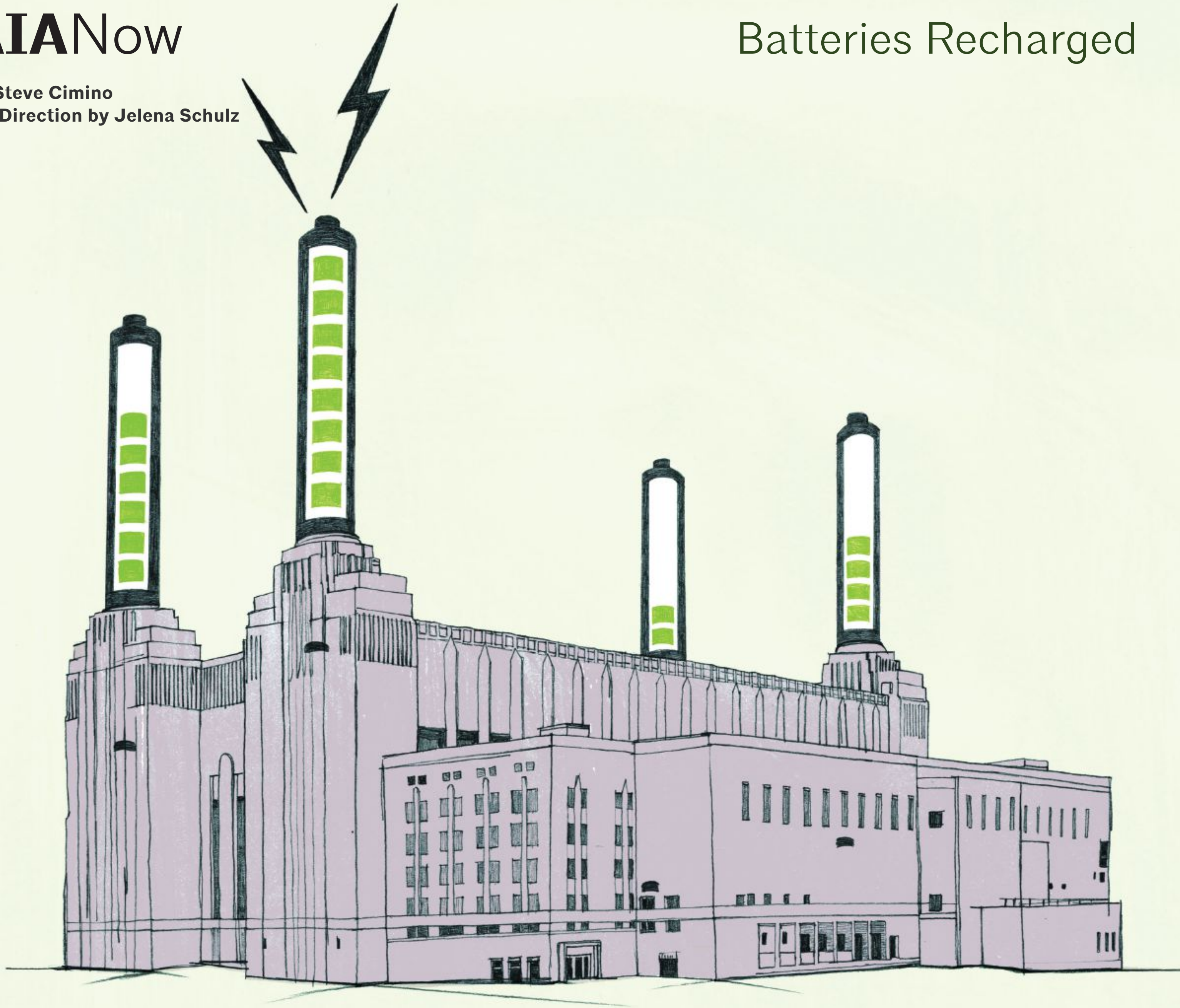

ILLUSTRATION: LAUREN NASSEF

One of the more recognizable buildings in London is the Tate Modern. Once the Bankside Power Station, it was adapted in the 1990s by international firm Herzog & de Meuron into one of the largest and most-visited modern art museums in the world. And then there's Battersea Power Station. The nearby sibling of Bankside, Battersea has undergone countless redevelopment plans since its closure in 1983. Prog rock fans will remember it from the cover of Pink Floyd's legendary 1977 album *Animals*, and the building's legacy has fueled an overwhelming sentiment to renovate it alongside Bankside for the next generation and beyond.

Benoy, an international architecture firm based in London, has been involved with the Battersea redevelopment since 2013. The firm shared its proposals with the AIA and explained how those schemes have been incorporated into the final design, along with what it was like to take part in such a large-scale adaptation:

• Benoy's designs focused on the turbine halls, two massive open spaces with walls of polished tile and loads of potential. Those are being converted into several levels of retail and residential space, in line with Benoy's initial concept, while maintaining the style and the look of their initial use.

• Jacqueline Beckingham, AIA, director at Benoy: "We saw an opportunity to create a cascade of space which extended through the power station, beginning from the main entry plaza, up through multiple levels to link cultural and leisure destinations. This also allowed for the integration of a viewing platform, which provides unobstructed views to the north and is accessible to all visitors."

• The larger benefit of the project, as a Benoy representative put it, is to use the Battersea redevelopment to "provide the city with much-needed housing and a new and vibrant place to live and work." Battersea's importance will contribute greatly to the continued regeneration of southwest London, stuck in a kind of post-industrial limbo and, until recently, "an unloved and forgotten part of the city full of warehouses and shed buildings." AIA

AIA Collaboration

PHOTOGRAPHY: CARL BOWER

Thinking About Design Thinking

How a brain scientist collaborates with NBBJ to uncover our perceptions of designed space.

In 2014, international architecture firm NBBJ announced a new fellowship program for scientific researchers in fields that impact and inform design. The inaugural fellow for this innovative program is developmental molecular biologist John Medina, author of *The New York Times* bestseller *Brain Rules* (Pear Press, 2008) and a professor at the University of Washington. Medina has spent years studying how the human brain responds to the surrounding world. Among his roles at NBBJ has been a lecture series on how the brain works, providing scientific evidence that confirms tried-and-true methods architects have relied on for years and explores new considerations for the future.

As told to Steve Cimino

To borrow a quote from [Salk Institute for Biological Studies neuroscientist] Fred Gage, "We have no clue how design affects the nervous system." We still don't know the right questions to ask. That was the first thing I wanted NBBJ to know when this opportunity arose. For 99.8 percent of our time on this planet, we have lived in settings composed of natural elements. Edward O. Wilson, the scientist behind the "biophilia" hypothesis, said that human beings are biologically predisposed to require contact with natural forms. They aren't capable of living a healthy life detached from nature. It's marinated into our evolutionary history. [NBBJ partner] Rich Dallam, FAIA, and the leadership of the firm, recognizing the need to integrate those innate desires into their process, started asking the questions that led to this fellowship.

So we don't know exactly how the brain works, but we do understand its performance envelope—the conditions under which it appears to process information optimally. The brain is designed to solve problems related to surviving in an outdoor setting, and to do so in constant motion. So if you put us in a small rectangle that's climate-controlled with the lights always on, you create processing conditions counter to that envelope. Based on that framework, I knew there were a lot of things we could try from a design perspective, some insights from brain research, as long as we're allowing for grumpiness on occasion.

For example, take open office spaces. We know that environmental noise, when it rises above 55 decibels, causes your stress levels to soar. If something like a voice breaks that barrier, you stop concentrating. Then there's something called a "halfalogue"—or half a conversation—which is the single most distracting element in all our audio space. Even if you're focused elsewhere, if you hear only half of a conversation you start filling in what the other side might be saying. Compare that idea with the work of Jay Appleton, a spatial scientist who came up with the "prospect-refuge theory." He took a hint from our evolution on the Serengeti and said that people prefer environments where they can easily survey their surroundings and then hide, or retreat to safety. If all you have in a design is the open office—a prospect—that's only half the equation. You also need a cave—a retreat space—where you can return to the privacy of your own thoughts.

Humans process information in 100-millisecond increments. So if you're walking down a hallway, there's a bit of a delay in how you're walking and where you're walking. So how do you navigate? Your brain is constantly remembering the other hallways you've walked, and it makes predictions about where your next foot is going to land based on prior experiences. And you can fool your brain. Frank Lloyd Wright did this constantly—you take a 90-degree turn into what you think is a hallway, but you're suddenly in a massive ballroom. There's no reason why it should be a shock, but it is because you were unconsciously expecting something else. It's sort of like a well-done horror movie; maybe you're not scared, but there's that same registered sense of surprise.

People are ridiculously sensitive to their environments, even to the words you're using. John Bargh, a researcher at Yale University, was interested in the idea of spatial suggestion. He took a bunch of healthy young undergrads and told them they were taking part in a language proficiency test; but what he really was after was seeing how long it took them to walk down a hallway as they left the building post-test. In the lab, he showed the students a bunch of words associated with aging, such as "old," and asked them to make sentences from the words.

To the subjects, this was basic memory and utilization. Not to John. After a period of time, he let them go but measured how long it took them to walk from the lab to the elevator and videotaped what they looked like. It took the test subjects much longer to go that short distance than controls who were primed with neutral non-aging-related words. They acted old. The environmental cues were mapped onto their behavior in the same way our physical environment influences our internal psychological—and even physiological—state.

I've been stunned throughout my collaboration with NBBJ. It's their sense of curiosity, their sense of adventure, that I relate to. What I work with is so much larger than what I am, and that sense of wonder is something they all seem to share. NBBJ has convinced me that the brain sciences might also have a chair at the architectural table. I am grateful to have been invited to take a seat. AIA

AIAPractice

ILLUSTRATION: MICHAEL KIRKHAM

Balancing Act

How firms are adapting to the modern employee.

"I wanted to have more control over decisions and how I wanted to plan my day." —Jason Winters, AIA

When Zach Wideman, AIA, architect and senior medical planner at Perkins+Will, checked his work email one day, what he found was an announcement about a new parental leave policy offered to employees. "I literally had to read the PDF twice because I wasn't expecting this," Wideman says, whose wife was pregnant with their third child at the time. "My first reaction was, 'Really? Okay, this is great.'"

Last summer Perkins+Will implemented a new paid parental leave policy that includes four weeks of paid leave for new mothers, new fathers, and domestic partners in their U.S. offices. The policy also applies to employees who choose to adopt a child or provide foster care. "I wasn't surprised that Perkins+Will offered this," Wideman says. "We've always been at the forefront of innovation through the AEC community. I found it really exciting."

In the first six months of Perkins+Will rolling out the new policy, 44 employees took advantage of the benefit. Within this group, new moms represented 54.5 percent and new dads 45.5 percent.

The policy also allows employees more flexibility in how they use that time. In Wideman's case, he chose to take two weeks off immediately following the birth of his son, and then stretched the remaining two weeks' time over the course of 12 weeks. This allowed him to leave work early to pick up his other two children from school and spend the afternoons with his family.

Meg Brown, chief talent officer at Perkins+Will, says that their approach in implementing the benefit was rooted in providing work-life flexibility. From the firm's standpoint, it makes sense to offer a benefit wherein an employee can enjoy paid time off to care and bond with a new child.

"When firms have to do anything involving a benefit that's going to have a cost associated with it, they have to look at what the hard dollar cost is, but also the return on investment," Brown says. "If it's part of your talent brand, and your recruitment and retention proposition, that value is going to outweigh what the cost is by far."

An Issue Across All Professions

In February, *The New York Times Magazine* published a series of articles on work-life balance policies nationwide. The articles addressed issues large and small, like the dangers of always eating lunch at one's desk or the challenges of single parents with full-time workloads raising children. One key argument rings throughout: It takes more than a single policy to change the status quo; the whole office and work culture must change.

Although companies across many industries have experimented with creating a results-oriented office culture, implementing flexible work policies, and offering generous or unlimited time off, struggles with work-life balance still exist. For instance, in a nationwide survey referenced by that same *New York Times Magazine* issue, 96 percent of employees said they have some flexibility in their work schedule, but only 56 percent felt they were supported in that option. And in a survey conducted by the Families and Work Institute, 40 percent of respondents felt that, in their current work environment, people who asked for time off or flexible schedules were less likely to be promoted or considered for career advancement.

And architecture is no exception. In February, the AIA released the survey findings of an executive summary titled "Diversity in the Profession of Architecture." The top three reasons listed as factors for an underrepresentation of women in the profession were a general concern about work-life balance, the long work hours that make it difficult to start a family, and the lack of flexibility to work remotely, job share, or work flexible hours.

Every benefit or policy implemented with the intention of supporting employees' personal lives comes with a counterargument for why those benefits or policies will fail. And those failures are often rooted in preconceived notions about productivity and, ultimately, success.

The Small-Firm Philosophy on Balance

Jason Winters, AIA, principal and founder of Kezlo Group, a small firm in Pennsylvania, admits that a major reason for starting his own practice was to create a flexible work environment for himself and others. "I wanted to have more control over decisions and how I wanted to plan my day," Winters says. Shortly after the birth of his son, he realized that his work environment at a large firm would not allow him to play the kind of role that he wanted in his son's life.

Kezlo, which now has six full-time employees, has adopted a remote work environment, but the staff meets regularly for lunch and often rents startup flex space, as needed. "The initial impetus for not having an office was more financial than anything else," Winters says. "There was not a need and we could not really afford it."

After the firm established itself and hired more employees, Winters noticed that not having an office became beneficial for the clients, the business, and employees. "It's worked twofold," Winters explains. "Not having an office forces us to always be physically there, on [the client's] turf, and going to them provides a better service and level of engagement. But it also has become an advantage, allowing better work-life balance and flexibility in employees' weekly work schedule."

Kezlo employees also do not have titles on their business cards. "I don't want to pin someone into any particular designation," Winters explains. "I'd rather they be a designer, and let that role evolve based on where their interests are and how they can contribute."

Tom Chung, principal of Leers Weinzapfel Associates Architects, a 30-person firm located in Boston and the 2007 recipient of the AIA Architecture Firm Award, explained that his office culture is highly collaborative, as reflected in its physical space. "We have no [individual] offices," Chung says. "It's one large open area. All 30 employees are in one big space, and the desk for our founding principal is the same [as] for our interns."

What Chung and Winters are describing is a trend gaining traction quickly across many professions. Open office environments, the abandonment of titles, and other initiatives often reflect a new philosophy about the relationship between employers and employees, an understanding that performance and productivity at work is closely tied to happiness and satisfaction in one's personal life. For perhaps the first time in history, employers are beginning to see their employees as humans who may dedicate most of their time each week to work, but shouldn't be *all* about work.

More Than Children and Marital Status

Work-life balance extends beyond flexible work hours and parental leave policies. Innovative health and well-being initiatives also contribute to the growing workplace trend. Supporting employees' health through medical coverage plans is hardly a new concept, but what about offering yoga classes in the middle of a workday? Or hosting regular discussions on diet and exercise? Or compensating employees for a full night's rest or to participate in community service? All are the latest indications that companies are gaining greater awareness of the workforce's newest demographic: Millennials.

Alongside flexible work options and leave policies, the interesting notion behind employers supporting employees' mental well-being, retirement, or health goals is that, in return, employers expect and receive optimum performance from employees.

Recognizing the diverse lifestyles of its employees, HGA Architects and Engineers in Washington, D.C., launched the Whole Wellness Program. Focusing on a different topic each month, employees are encouraged to participate in discussions, volunteer activities, and attend educational presentations on physical, mental, and even financial well-being.

Kailey Lietzke, a Millennial and entry-level engineer at HGA, admits that programs like Whole Wellness are one of the top three qualities that she looks for when selecting a firm. "Are they volunteer-oriented? Do they allow me to spend my time in a manner that I think is important? And does the company put its resources into that?" Lietzke says.

Whatever the benefit or policy, a tension exists between what we do for a living and the living we all must do to be better people and workers. The key for employers and employees is to openly acknowledge that tension, with the mutual understanding that all things can be—and should be—a win-win for both parties. AIA

Caitlin Reagan

AIA Feature

Theories of Evolution

Even as finding new uses for old buildings has become commonplace, the results can be surprisingly clever.

By Ben Ikenson

PHOTOGRAPHY: MIKE SCHWARTZ

PHOTOGRAPHY: MICHAEL BAXTER

TOP, LEFT: Everman Lofts is the product of a transformation from the Chicago Missionary Society Church into 11 rental units. TOP, RIGHT: The 43,000-square-foot napkin factory is now the site of 21 residences in the Hubbard Street Lofts. ABOVE: Albuquerque's first high school sat vacant for 25 years before it was converted into 249 condominiums, now known as the Lofts at Albuquerque High.

From motels and churches to bowling alleys and factories, buildings of all types eventually reach the end of their "natural" functioning lives. Whether to fill an otherwise overlooked market niche, provide affordable housing where it's most needed, or accommodate a group of talented Millennials with big visions but meager means, adaptive reuse projects are meaningful investments with promising returns. They represent both important opportunities for the design community—and an ever-important role in cities that need to adapt to the future.

Everman Lofts

A project in Chicago recently saw the transformation of the Chicago Missionary Society Church, located in the heart of Wicker Park, a neighborhood originally settled by steelworkers in the late 1800s. Today, the building is home to 11 market-rate rental units known as Everman Lofts.

"Many churches are landmarks, protected from demolition, but no plan was ever considered as to what to do with them when their use expires," explains Jean Dufresne, AIA, a principal with Space Architects + Planners. "They're old and in disrepair, and congregations are long gone or are so small that they can't maintain the buildings. On a grander scale, the Catholic Church is planning on closing hundreds of buildings due to rising costs and lack of attendance."

James D. Jann, the developer who converted the Chicago Missionary Society Church into dwelling units, says that "during the process of restoring the 135-year-old stained glass windows, I was approached by a neighbor who said he'd lived across the street for 10 years and just wanted to say 'thank you' for making the view out his front window such a pleasure."

But, the view from inside may be better, according to one resident: "My husband and I wanted a unique place to live and found an amazing space in this beautifully rehabbed church, with soaring ceilings and beautiful stained glass windows to frame our view."

Hubbard Street Lofts

In general, Chicago has been experiencing a major re-urbanization during the last 20 years, according to Ramiel Kenoun, AIA, another principal with Space Architects + Planners. "When I was growing up, Chicago, specifically downtown and its immediate surrounding areas, was a place you went to work every day, not to live in," he says. "Now young professionals are opting to stay within city limits."

Kenoun recently served as project architect on the conversion of a 43,000-square-foot napkin factory at the Fulton Market District, once primarily occupied by the meatpacking industry. The Italianate façade combines some of the quirkier details of century-old revival stylings with some unconventional fenestration. Costing around $3 million and taking about two years, Hubbard Street Lofts now features 21 condos. "Being a resident of the area for over 12 years and seeing a big shift in what was primarily a manufacturing district to a residential neighborhood has been an extremely positive experience," Kenoun says. "The mixture of new and old structures, along with the unique infrastructure, such as elevated walkways, railways, viaducts, and other architecturally interesting elements, has made it into a residential community like no other."

The Lofts at Albuquerque High

Albuquerque, N.M.'s first high school was a commanding 1914 Collegiate Gothic–style building that closed in 1974 and stood vacant for the next 25 years at a major intersection near downtown. In 1999, the city awarded a development contract to Albuquerque's Paradigm & Company.

"The biggest construction challenges were … building new space inside of the old volumes of the auditorium and the gymnasium," says Rob Dickson, project developer for the Lofts at Albuquerque High. "In the case of the former, we built 15 lofts and were allowed to connect the new structure to the old. With the latter, we constructed 20 lofts into the former gym, but seismic code interpretation required them to be an independent structure."

Built in eight separate phases, from 2001 to 2009, the project created 249 residential condominiums and a parking structure. The historic building looks exactly the same from outside.

"Immediately upon construction, the entire perception of this neighborhood improved," Dickson says. "This is why there have been hundreds of millions of dollars invested into renovating existing homes and former commercial buildings throughout the neighborhood."

AIA Feature

CONTINUED

PHOTOGRAPHY: MICHAEL BAXTER

Meow Wolf

Santa Fe is a renowned arts hub, but rarely do visitors see the industrial area where Silva Lanes, a 1970s-era bowling alley, had been shuttered for seven years. Today the building's simple white façade belies the activities there of a group of young entrepreneurial artists who realized their collective vision, thanks to writer George R.R. Martin, author of the *Game of Thrones* series. After hearing the group's plan, Martin purchased the building, financed renovations, and leased it for 10 years to the Meow Wolf Art Space, which opened in 2015 and hosted 25,000 visitors in the first two weeks.

"The 33,000-square-foot community arts space includes galleries and workshops, member-supported maker spaces," says Alexander Dzurec, AIA, the founder and managing principal of Autotroph Design, who worked with a core creative team from Meow Wolf on the renovation. "[The space] employs over 200 artists, fabricators, and tech experts to create an out-of-this-world experience for both young and old, connoisseur and layperson alike."

"We're building upon solid roots," says Sean Di Ianni, Meow Wolf's chief operating officer. "We're expanding Santa Fe's identity as a place to see art and culture."

The Sundowner

The Sundowner Motel in Albuquerque, built in 1960 and shuttered in 2009, was a two-story midcentury modern affair with a pool, casino, and dance floor. Vintage postcards depict what could pass for a swanky backdrop to a *Mad Men* episode.

In 2013, a $9 million renovation project retained much of the building's early mod aesthetics and created 71 residential units, the majority reserved for individuals making less than half of the local median income.

"As with many urban areas in decline, nonprofit partnerships bring the first new development in years," says Garrett Smith, AIA. "[They] provide new housing for local residents—Boomers and Millennials, and those in most need—who support walking-distance businesses and public transportation, which begins the process of neighborhood revitalization."

The project achieved LEED-Platinum certification with several conservation features, including permeable parking areas that direct water for landscaping and water-harvesting cisterns for a community garden.

PHOTOGRAPHY: COURTESY NEWLIFE HOMES

TOP: Once a 1970s-era bowling alley, Meow Wolf is now a 33,000-square-foot community arts space in Santa Fe. ABOVE: A $9 million renovation converted the Sundowner, a 1960s motel, into 71 residential units for both low-income and market-rate tenants.


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MID-RISE WOOD CONSTRUCTION

A COST-EFFECTIVE AND SUSTAINABLE CHOICE FOR ACHIEVING HIGH-PERFORMANCE GOALS

Presented by:
reTHINK WOOD®

Crescent TerminusAtlanta, Georgia. Architect: Lord Aeck Sargent

LEARNING OBJECTIVES

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

1. Identify the sustainability and economic benefits of using wood construction for mid-rise buildings.
2. Summarize building code requirements and provisions for mid-rise multi-family wood-frame structures.
3. Discuss wood framing solutions that address issues such as shrinkage, fire protection, and seismic requirements while minimizing carbon footprint.
4. Explore innovations in wood framing design techniques and wood product technologies that enhance energy efficiency.

CONTINUING EDUCATION

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

AIA COURSE NUMBER: ARJUNE2016.1
GBCI COURSE NUMBER: 920008625

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Cost-effective, code-compliant and sustainable, mid-rise wood construction is gaining the attention of developers and design professionals, who see it as a way to achieve higher density housing at lower cost—while reducing the carbon footprint of their projects. Yet, many familiar with wood construction for two- to four-story residential structures are not aware that the International Building Code (IBC) allows five stories of wood-frame construction in building occupancies that include multi-family, military, senior, student and affordable housing—and six stories for business.

"Once designers know that wood offers all the required safety and structural performance capabilities and meets code requirements for mid-rise, the most appealing feature of wood tends to be its price," says Michelle Kam-Biron, P.E., S.E., director of education for the American Wood Council. "Multi-family housing was one of the first market segments to rebound from the recession—because it's more affordable than single-family housing while offering advantages such as less upkeep and, in most cases, closer proximity to amenities. Wood construction is attractive for multi-family projects because it offers a high percentage of rentable square footage at a relatively low cost, but its benefits are equally applicable to other occupancy types."

Among their benefits, wood buildings typically offer faster construction and reduced installation costs. For example, after completing the first phase of a developer-funded five-story student housing project using steel construction, OKW Architects in Chicago switched to wood. "The 12-gauge steel panels were expensive, very heavy and difficult to install; and welding and screwing the shear

LUXURY AND PERFORMANCE

Photo: Richard Lubrant

Project: Crescent Terminus

Location: Atlanta, Georgia

Architect: Lord Aeck Sargent

Engineer: SCA Consulting Engineers

Owner: An affiliate of Boston-based Berkshire Group

Developer: Crescent Communities

Size: 275,000 square feet, 355 units

Type of construction: IIIA wood-frame construction over Type IA concrete podium

Year of completion: 2014

Surrounded by high-rises, Crescent Terminus consists of three luxury apartment buildings, each with three levels of parking topped with five stories of wood-frame construction.

"This land was at a cost basis that is among the highest in our portfolio," says Jared Ford, senior vice president for Crescent Communities. "It's prime real estate, but that's where the market is. We're either building or hunting in 13 of the top 20 metropolitan markets, and we're almost entirely focused on wood-frame multi-family apartments."

As with any complex project, there were a number of design challenges. For example, to maintain the integrity of the fire rating of the exterior bearing walls, the team used top-chord bearing trusses for the floor framing. To minimize shrinkage, techniques included using engineered wood for the plates and blocking in the first two floors, and larger sealant joints around windows and doors to allow movement. The team also designed stairs with double stud walls to provide a 2-hour fire separation, specified concrete block construction at the elevator shaft and used a wood-frame wall to separate the elevator shaft from the rest of the construction.

strap bracing was very time consuming," says project architect Eileen Schoeb. "Using wood was far more economical for the second phase."

For the three-building, five-story Crescent Terminus development in Atlanta's upscale Buckhead district, wood framing helped to achieve overall budget goals. "From a design standpoint, we were able to use wood to introduce a fresh, contemporary aesthetic to a mid-rise multi-level development," says architect Erik Brock of Lord Aeck Sargent. "By saving on the framing and speed of construction, Crescent Communities was able to deliver a higher-quality finished product for their tenants by putting more into the amenity package as well as landscaping, finishes and character of the residential units."

Wood construction also offers advantages for project teams seeking green building certification or simply to reduce the environmental impact of their buildings. Wood grows naturally and is renewable, and life cycle assessment studies consistently show that wood offers environmental advantages in terms of embodied energy, air and water pollution, and other impact indicators.[1]

From a carbon footprint perspective, wood continues to store carbon absorbed during the tree's growing cycle, keeping it out of the atmosphere for the lifetime of the building—or longer if the wood is reclaimed at the end of the building's service life and reused or manufactured into other products. The manufacturing of wood products also results in less greenhouse gas emissions than other materials.[2] For example, according to the online Wood Carbon Calculator for Buildings,[3] the new Crescent Terminus development, which includes three buildings, each with five stories of wood-frame construction over a concrete podium, has a carbon benefit equivalent to 13,523 metric tons of CO_2. This includes 4,327 metric tons of CO_2 stored in the wood products and 9,196 metric tons of avoided CO_2 emissions. According to the U.S. Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator, this equates to emissions from 2,583 cars in a year, or from the energy to operate an average home for 1,149 years.[5]

"Wood is also versatile and adaptable," says Kam-Biron. "Modifications on the jobsite tend to be straightforward and are easily made."

When asked how building with wood fits into Crescent Communities' quality mission, Ford cites both sustainability and design flexibility. "With concrete, you can't easily design to have the building pop in and out to create the architectural reveals the way you can

PODIUMS—AN ALL-WOOD SOLUTION

Although a podium structure typically refers to wood-frame construction over concrete, a handful of designers have lowered their costs even further by designing the podium in wood.

"When determining the cost of a structure, there are a lot variables, including most notably time, materials and labor," said Karyn Beebe, P.E., of APA. "Using wood instead of concrete lowers the mass of the building, which results in more economical podium shear walls and foundations. Using the same material for the entire structure may also mean lower design costs, and the construction team experiences savings in the form of fewer trades on site, which means less mobilization time, greater efficiency because framing is repeated on all of the levels, easier field modifications, and a faster schedule."

Architect Dan Withee, AIA, LEED AP, of Withee Malcolm Architects designed an 85-unit wood podium project in San Diego. He estimated that a concrete podium can cost $15,000 per parking space compared to $9,500 for an all-wood solution.[4]

RESIDENTIAL
Permanent stay multiple-family facilities (R-2) and Transient (R-1)(i.e., apartments, convents, dormitories, fraternities and sororities for R-2; hotels and motels for R-1) NFPA 13 Sprinklers. 100% Open Perimeter

	Type IIIA	Type IIIB	Type VA	Type VB
Maximum stories	5	5	4	3
Maximum building height (ft)	85	75	70	60
Total building area (at maximum permitted stories) (ft²)	270,000	180,000	135,000	78,750
Total building area (ft²), single-story building	114,000	76,000	57,000	33,250
Total building area (ft²), two-story building	180,000	120,000	90,000	52,500

with a wood-frame building. We can do a lot more design-wise with wood that we couldn't do with other products. So both our environmental goals and our design goals provided the motivation for [Crescent Terminus] to be a wood-frame building."

A survey of 227 buildings demolished in Minneapolis/St. Paul found that buildings are often torn down within 50 years, regardless of material, because of changing needs and increasing land values as opposed to performance issues.[6] Overall, wood buildings in the study had the longest life spans, showing that wood structural systems are fully capable of meeting a building's longevity expectations. However, when you consider the embodied energy in demolished buildings and the implications of material disposal, the fact that wood is adaptable—either through renovation or deconstruction and reuse (with minimal additional processing)—is a significant advantage.

MASTERING WOOD CONSTRUCTION DESIGN

As with any type of construction, mastering the technical details of wood-frame construction is critical to creating cost-effective buildings that are safe and durable. Building codes require all building systems to perform to the same level of safety, regardless of material used, and wood-frame structures can be designed to meet or exceed standards for (among other things) fire protection, seismic performance and resistance to high winds.

The following pages will provide an overview of technical considerations related to the design, safety and structural performance of mid-rise wood buildings, as well as two trends that are expanding the opportunities for wood use in multi-story design.

Free project support related to the code-compliant design, construction and engineering of non-residential and multi-family wood buildings is also available through the Wood Products Council's WoodWorks program (woodworks.org; help@woodworks.org).

Building Code Requirements

The IBC is the predominant U.S. model building code, having been adopted by most states with or without amendments. Chapters 16, 17 and 23 cover structural wood design and construction. (Non-structural provisions such as heights and areas are covered elsewhere.) IBC Chapter 6 classifies buildings into five types of construction. Construction Types I and II are generally limited to non-combustible materials such as concrete and steel, although wood can be used in all types of construction to varying degrees. Type III allows a mix of non-combustible and combustible materials, while construction Types IV and V can have combustible building materials.

Multi-story wood construction generally falls under Types III and V. (However, Type IV multi-story construction, also known as Heavy Timber, is growing in interest.) Each building type is further subdivided into A and B, which have different fire-resistance rating

FIVE STORIES OF WOOD OVER A CONCRETE PODIUM

Photo: Lincoln Barbour

Project: University House Arena District

Location: Eugene, Oregon

Architect: Mahlum Architects

Structural engineer: Froelich Engineers

Owner: Inland American Communities

Developer: Gerding Edlen

Size: 109,600 square feet, 65 units

Type of construction: Type IIIB wood-frame construction over Type IA concrete podium

Year of completion: 2013

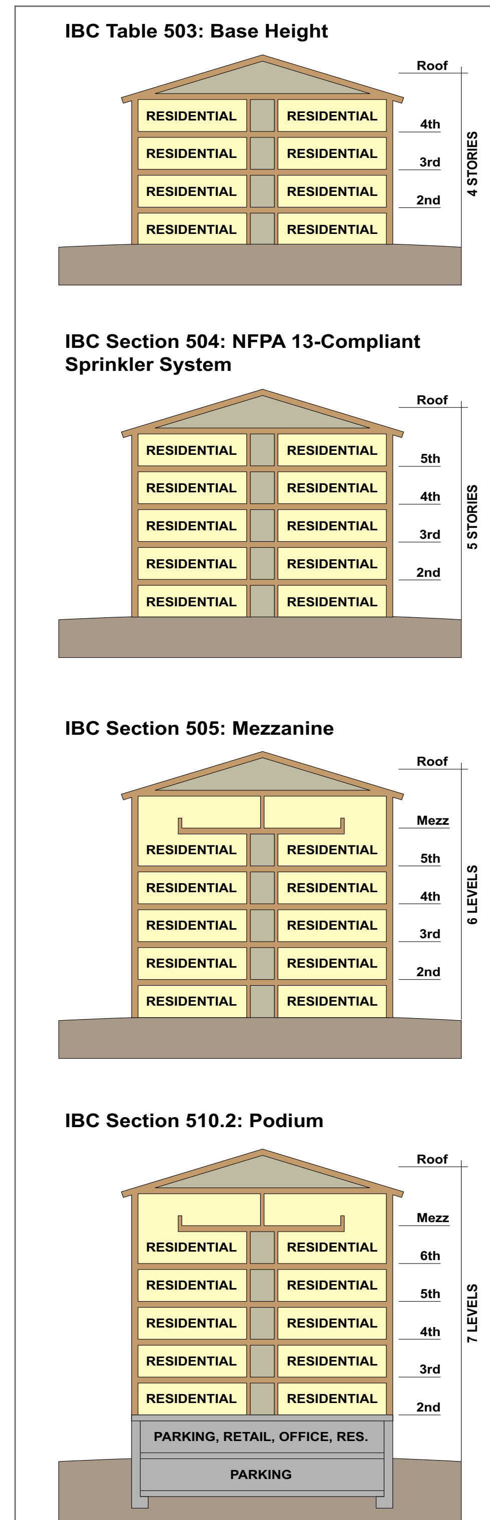
Built to accommodate recent growth at the University of Oregon, the University House Arena District student housing project includes five stories of wood-frame construction over a concrete podium. (Not shown in the photo, the podium is akin to a 'daylighted basement' at the rear of the building.)

The use of wood framing over concrete helped the design team achieve an aggressive budget of $128/square foot while ensuring a modern design aesthetic. The team also underwent an Alternate Materials and Methods Review with the City of Eugene to allow wood wrapped in fire-retardant gypsum board for exterior walls. Previously accepted as an alternate method by the City of Portland, this design approach was used instead of the fire retardant-treated wood required for exterior walls as an alternate to non-combustible construction in Type III buildings under the IBC.

"The project is a showcase of smart design that leverages tested assemblies for fire protection as well as innovative materials to express the culture of Eugene," says Kurt Haapala, principal in charge of the project at Mahlum Architects. Just a five-minute walk to the university, it contributes to the City's 'Envision Eugene' program, which encourages compact development in the city's core.

Among its sustainability features, the LEED Gold-certified project includes wood studs spaced at 24 inches on center to allow more insulation within the wall cavity, as well as a rooftop solar hot water system and energy-efficient LED lighting throughout. Based on actual utility data analyzed against the energy model, the building is operating approximately 50 percent more efficiently than originally anticipated.

PERMISSIBLE INCREASES IN HEIGHT AND AREA UNDER THE 2012 IBC



Source: Togawa Smith Martin

requirements, with A being the more rigorous. (See section: Fire Protection Requirements.) "From a cost perspective it makes no sense to use Type I for five stories," says Tim Smith, AIA, founding principal of Togawa Smith Martin, Inc., Los Angeles, and a pioneer of five-story wood framing in California. "Type I is more realistic for taller buildings. Type III for wood construction helps fill the gap between low-rise and taller buildings."

Permissible Increases in Area and Height

Table 503 of the IBC lists allowable building heights and floor areas for different construction types; however, there are provisions for increases. For Type IIIA, for instance, an allowable floor area of 24,000 square feet as stipulated in Table 503 for Group R-2 occupancies could be increased to 90,000 square feet per story. Such provisions include:

Open front areas. IBC Section 506.2 permits area increases up to 75 percent for buildings with open spaces around their perimeters such as yards, courts, parking areas and streets, which provide fire-fighting access.

Sprinkler systems. For most occupancy groups, increases to the allowable height (and number of stories) and floor area are permitted according to IBC Section 504.2 with the use of an approved automatic sprinkler system in accordance with the National Fire Protection Association (NFPA) 13 standard.

"Type IIIA construction for Residential Group R is allowed to be four stories and 65 feet high while a Type VA building is permitted to be three stories and 50 feet," explains Kevin Cheung, Ph.D., P.E., chief engineer for the Western Wood Products Association. "However, when protected by automatic sprinklers, Type IIIA and Type VA buildings are allowed to be five and four stories, respectively. Type IIIA is permitted an increase in height to 85 feet and Type VA an increase to 70 feet." (See Table of IBC Allowable Heights and Areas for Residential Construction.)

This article continues on http://go.hw.net/AR616Course1. Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. Compared to other materials, installation time for wood construction is typically:
   a. greater. b. slightly more.
   c. equal. d. less.

2. From a carbon footprint perspective, wood:
   a.stores carbon for the lifetime of the building or longer if the wood is reclaimed and reused or manufactured into other products.
   b. loses an average of 4,000 metric tons of CO_2e per five-story building.
   c. stores carbon until it is cut into lumber.
   d. loses carbon into the atmosphere once the building is enclosed.

3. Multi-story light frame wood construction generally falls under:
   a. Type I and Type III construction. b. Type IV and Type V construction.
   c. Type III and Type V construction. d. Type II and Type III construction.

4. IBC allows increases in building height and area for wood construction:
   a. only if a sprinkler system is installed.
   b.if there is a parking area but no yard in front of the building.
   c. when a mezzanine half the size of the floor below is added.
   d. if fire walls are installed.

5. The design of the joints between building envelope components, such as windows and doors, must allow for:
   a. moisture retention. b. differential shrinkage.
   c. continuous load paths. d. airflow.

6. When a multi-story wood-frame structure is built over a concrete podium, the building is treated by code as separate and distinct buildings:
   a.for purposes of height, area and continuity. of fire walls
   b.only if there are fire-resistant wall assemblies in the wood structure.
   c. if the concrete podium has two levels of parking d. beneath it.
   only if the wood structure has four stories.

7. Fire-retardant-treated (FRT) wood is an acceptable substitute for a non-combustible material for a:
   a. Type IIIA exterior two-hour rated bearing wall. b. Type VB exterior one-hour rated bearing wall.
   c. Type VA exterior one-hour rated bearing wall. d. None of the above

8.True or False: Shrinkage effects need not be considered for horizontal framing members in the wall and floor design.

9. During an earthquake wood frame structures offer a high strength-to-weight ratio, which results in:
   a. low inertia force compared with concrete or steel. b. higher inertia force compared with concrete or steel.
   c. containment of transfer loads induced by seismic activity.
   d. fewer redundant load paths.

10. Panelized systems:
   a. are manufactured on site. b. offer better quality wall construction.
   c. optimize stud design. d. b. and c.

A RAINSCREEN SOLUTION

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University of Minnesota Riverton Housing. Photo courtesy of Nichiha

LEARNING OBJECTIVES

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

1. Identify the innovative characteristics of fiber cement products used in commercial buildings.
2. Describe the cause and effect of moisture intrusion in a wall system.
3. Examine the importance of rainscreens and weather barriers in water migration.
4. Review examples of rainscreen technology and testing standards that measure their performance.

CONTINUING EDUCATION

CREDIT: 1 HSW/LU

COURSE NUMBER: ARjune2016.2

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FIBER CEMENT PRODUCTS IN COMMERCIAL BUILDINGS

Fiber cement is a composite that combines fibrous material with a Portland cement binder to produce a strong, dense product. Fiber cement was first developed in Europe in the early 1900's in response to a need to create a durable, lightweight, and affordable building product. Its first application replaced the traditional terra cotta tiles common throughout Europe with lightweight, fireproof roofing panels. In the mid-20th century fiber cement siding panels and shingles were introduced to the United States for residential buildings, but these early materials were produced with asbestos. Since the 1970's fiber cement products have been made without asbestos, and have become recognized as a safe, innovative, and even sustainable green building product.

FIBER CEMENT MANUFACTURING PROCESS

The fundamental manufacturing process of fiber cement products is generally the same, irrespective of the type, size or style of product. Wood fiber, Portland cement, silica filler and water are combined, providing flexibility, strength, weight reduction, and bonding respectively. Sometimes fly ash filler is used rather than silica because silica can pose health threats when cut, and fly ash is a recycled by-product of the coal industry.

Recycling fly ash is encouraged by many organizations with different stakeholders. The US EPA, the Natural Resources Defense Council and the U.S. Green Building Council have all agreed that recycling fly ash in building materials and products is beneficial and environmentally desirable. Fiber cement manufacturers are contributing to the growth of fly ash recycling while also finding that it improves the overall performance of their end products.

Once the ingredients are proportioned and combined, the resulting material is processed into the desired shape and length. In some cases, stamps or molds are used to create the appearance of wood grain, stone, brick, or other patterns. The final step is to apply protective coatings over the fiber cement products; these coatings are either prime coats for field finishing, or factory finish coats for a completely finished panel.

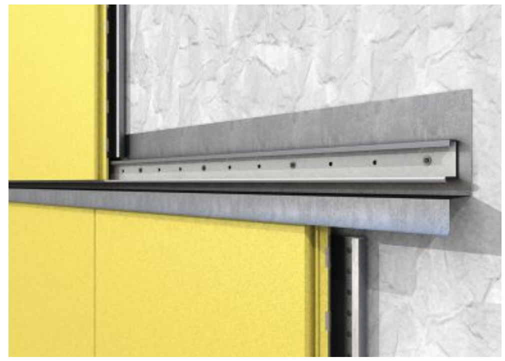
When aesthetic features are combined with a fully engineered installation system, commercial grade fiber cement architectural wall panels become an integral part of a high performance, durable, commercial exterior wall system. Photo courtesy of Nichiha

COMMERCIAL ARCHITECTURAL WALL PANELS

There are two distinct categories of fiber cement products—residential and commercial—but the two should not be confused since they are designed and produced to address fundamentally different needs, construction processes, and aesthetics. This discussion strictly pertains to commercial fiber cement products, which are best described as architectural wall panels. They are much better suited to the more demanding conditions placed on commercial buildings, particularly the forces of wind and rain on multi-story buildings. Recognizing the need for higher performance in commercial buildings, manufacturers offer not just the fiber cement panels, but also fully engineered installation systems.

The proper treatment of the exterior wall behind the fiber cement product, including appropriate moisture and air flow management, is key to the performance of commercial fiber cement products. The fully engineered installation systems are designed to work with and complement both the integrity of the substrate wall construction and the durability of the architectural wall panels.

Commercial fiber cement products are typically pre-finished in a range of standard or custom colors and textures with a corresponding warranty on the total finish. For improved appearances, some manufacturers use hidden fasteners to create the clean, uncluttered look desired in many commercial buildings. When these aesthetic features are combined with a fully engineered installation system, commercial grade fiber cement architectural wall panels become an integral part of a high performance, durable, commercial exterior wall system.



Many building materials can be used to assemble a rainscreen system, including fiber cement panels. Image courtesy of Nichiha

MOISTURE INTRUSION IN A WALL SYSTEM

Before we delve into the specifics of these various moisture management tools, let's discuss why they are necessary in the first place. There is no such thing as a water-tight structure. Because water takes the path of least resistance, it will find even the smallest opening in the building envelope, allowing moisture to enter the wall system, no matter how many layers of protection are provided.

Moisture in a wall system can originate from many sources, including elevated relative humidity (RH), precipitation and groundwater, interior sources such as broken water pipes, and even water evaporating from construction materials. This excess moisture, if not properly drained, can cause many structural issues for the building itself and health issues for occupants.

Persistent moisture can lead to rot, corrosion, expanding soil, ice dams, and other forms of deterioration. It also supports insect infestation, and if elevated moisture levels persist on or inside a wall or roof assembly, they can lead to the growth of microorganisms such as mold and bacteria. Mold produces allergens that can trigger allergic reactions or asthma attacks in those people allergic to mold spores. Most mold exposure symptoms result from inhaling or touching mold, with the most common symptoms being asthma, nasal or sinus congestion, sensitivity to light, skin irritation, shortness of breath, headache, fatigue, and burning eyes. Serious cases of mold exposure can lead to lung disease and a compromised immune system.

Therefore, it is imperative that wall assemblies are properly designed to manage moisture intrusion. In addition to keeping water out with various weather resistive barriers, systems must be put in place to allow water to exit the envelope once it inevitably does get in. Rainscreens are one such method of shedding water, while also providing a drying mechanism for the building. Many building materials can be used to assemble a rainscreen system, but we want to focus here on using fiber cement panels as rainscreens.

FUNCTIONS OF A BUILDING ENCLOSURE

The primary functions of a building enclosure are to separate the inside and outside of a building, protect the inside from external elements, and conserve energy. An enclosure's performance is determined by heat flow, air flow, and moisture flow, which are all interlinked. Moisture management is possible through the use of a combination of methods including weather resistive barriers (both air and water), vapor permeation, cavity drainage, as well as a rainscreen, which resists wetting and allows drying when moisture does permeate.

The four components of a successful building envelope design are deflection, drainage, drying and durability. Deflection limits the structure's initial exposure to rain with the use of overhangs and flashing. Drainage redirects any moisture that penetrates the wall to the exterior. Then, any moisture that penetrates the wall should be able to dry within a reasonable amount of time before causing damage to the structure. Finally, only durable, weather-tolerant materials should be used.

In conjunction with these four design considerations, a modern wall system should typically be designed with six layers. These layers are exterior cladding, stud framing, weather resistive barriers and flashings to manage water and drainage, insulation to provide energy efficiency, anchors and fasteners to hold the system together, and finally sheathing as the interior layer.

A successful wall design provides multiple pathways for drainage and doesn't allow the water to build up in the wall system. The wall should be "back ventilated," meaning air is allowed to circulate, which enables the wall to dry out as conditions moderate and change.

The four components of a successful building envelope design are deflection, drainage, drying and durability.

A successful wall design provides multiple pathways for drainage and doesn't allow the water to build up in the wall system. The wall should be "back ventilated," meaning air is allowed to circulate, which enables the wall to dry out as conditions moderate and change. Photo courtesy of Nichiha

EXTERIOR WALL ASSEMBLY ELEMENTS

First let's define the various exterior wall assembly elements, including air barriers, vapor barriers, and water resistive barriers/weather resistive barriers.

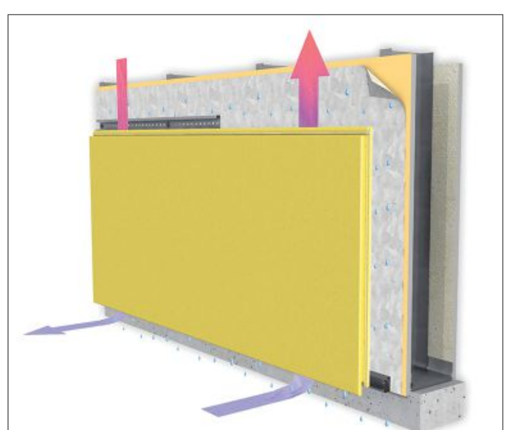
Air barriers are materials that are used anywhere in a building assembly to stop the movement of air into or out of the conditioned space. Note that water vapor can be transported by air. Any material that has an air permeability less than 0.02 L/(s·m²) at a pressure difference of 75 Pa (0.004 cfm/ft^2 at a pressure difference of 1.56 lb./ft^2) when tested in accordance with ASTM E2178 is considered an air barrier material.

Vapor barriers are materials used to slow or reduce the movement of water vapor through a material. As we said, water vapor is also transported by air leakage but this can be resolved by installing an air barrier. Vapor barrier materials are installed **on the warm side of the insulation in a building assembly.** The position of the vapor barrier in a building assembly is determined by climatic conditions. In warm climates, it is located on the exterior while in cold climates it will be on the interior.

Water/weather resistive barriers are materials on the exterior of a building intended to resist liquid (bulk) water that has leaked, penetrated, or seeped past the exterior cladding from absorbing into the exterior sheathing or concrete wall (depending on the application) and further into the wall assembly.

When designing the make-up of the wall assembly there are a number of choices to consider and specify. Traditional sheet goods or building wraps are common for both residential and commercial construction and rely on paper or fabric materials that are bonded or fused with chemicals or other compounds. In essence, they are installed to seal the entire structure and create a barrier, most commonly for air infiltration control. These sheet goods are stapled or otherwise fastened to exterior sheathing with attention needed to joints and overlapping edges to create a full and complete barrier, albeit with some compromises made at the fastener penetrations.

By contrast, self-adhering sheet goods avoid the need for fasteners. These air and water barriers use multi-laminated layers or fibrous materials bonded together to form a large roll or sheet backed with an adhesive and easy-release protective film. The sheathing needs to be clean and ready to receive these adhesive backed goods and care needs to be exercised so they are installed cleanly without unwanted bubbles or other irregularities. The most continuous and seamless form of an air and water resistant barrier is a fluid applied type that is available in spray, trowel, and roll on formulations. In this case, all areas are continuously treated, but wall joints can be given appropriate special attention to be well sealed and reinforced at panel joints and sill areas.



Closed joint systems eliminate the open joints between panels creating a smooth, continuous surface on the exterior. The panels still function as a back draining, ventilated rainscreen, but with a much smaller depth. Image courtesy of Nichiha.

INTRODUCTION TO RAINSCREENS

There has been significant confusion regarding rainscreens and for many years there was never a true standard of testing or measuring the performance of products to be used in rainscreen applications. Rainscreens can be achieved with a variety of construction materials in various applications, in residential and commercial construction. Common rainscreen claddings include: brick veneers, stud back-up, stucco, clapboard, and panelized wall systems such as metal, alpolic, and fiber cement.

According to "The Rainscreen Principle" in the National Research Council Canada's Construction Technology Update No. 9, two exterior walls are better than one at controlling water penetration into a building. There are three required components of a rainscreen wall assembly, which offer multiple moisture-shedding pathways:

- The outer leaf or barrier is a vented or porous cladding (the rainscreen) that deters surface raindrop momentum.
- An air chamber or cavity—a few inches of depth is sufficient—separates the cladding from the support wall, reducing splashing and capillary moisture transfer. Large, protected openings (i.e. vents or weep holes) positioned at the top and bottom of the wall promote convective airflow, allowing moisture to quickly drain or evaporate from the air cavity.
- The inner leaf or barrier acts as the final moisture barrier and drainage layer that further protects against any moisture that bypasses both the cladding and air cavity. This is comprised of a weather resistive (air/water/vapor) barrier, insulation, and the building structural wall.

The effectiveness of a rainscreen cannot be achieved without an airtight weather barrier and appropriately-sized air chamber/cavity. In one type of rainscreen system, water is intended to be allowed into the cavity areas between the outer wall and the substructure.

Drained/Back Ventilated (D/BV) Rainscreen prevents most of the rainwater penetration at the outermost surface of the wall, while simultaneously providing for drainage and evaporation of rainwater that does get through. Photo courtesy of Nichiha

TYPES OF RAINSCREENS

There are two types of rainscreens that will be described in detail, drained/back ventilated rainscreen (D/BV) and pressure equalized rainscreen (PER). Drained/Back Ventilated (D/BV) Rainscreen prevents most of the rainwater penetration at the outermost surface of the wall, while simultaneously providing for drainage and evaporation of rainwater that does get through.

A Pressure Equalized Rainscreen (PER) prevents all rainwater penetration, while air is deliberately forced to penetrate the wall cavity in order to equalize pressure on the exterior and interior of the outer wall. This type of rainscreen allows pressure to rapidly rise behind the panels and reach equilibrium with the pressure available in front of the panels.

The first system allows water penetration and a way to drain and evaporate it; the other prevents water by equalizing air pressure in front of and behind the cavity. Both systems have an outer layer and an inner layer.

In a PER system, static and dynamic air pressures are theoretically in equilibrium. That is, pressure measured on the exterior of the rainscreen (outside) is equal to the pressure in the air cavity between the rainscreen and the substrate. Pressure equalization is important to prevent physical forces that force water to penetrate a building structure. The key to an effective and efficient PER lies in the ability to control the airflow within and through the wall assembly.

The cavity is divided into horizontal and vertical compartments, or breaks, that act as vent holes to provide horizontal and vertical air flow into and out of the cavity. This also allows the air space to respond to wind gusts rapidly, reducing the rain-driving force. Compartments are required to be closed at all building corners to prevent excess wind forces on adjacent wall faces.

The engineer determines the number and size (effective area) of these breaks according to known, expected, and calculated pressures that are dependent on building dimensions, height, exposure category, basic wind speeds, etc. The size and locations may vary within the same structure, since air pressure induced by wind can vary over the height and width of the building.

Applying PER technology to a wall or joint demands additional care with detailing. For example, short-lived sealants and foam gaskets that disintegrate will decrease the effectiveness and may incur future maintenance costs. Mechanical seals such as metal flashing and gasketed furring strips offer a more permanent approach, but increase cost and complication.

QUIZ

1. True or False: Residential and commercial fiber cement products have the same performance properties and can be used in the same applications.

2. True or False: The four components of a successful building envelope design are deflection, drainage, drying and durability.

3. True or False: A modern wall system should typically be designed with 3 layers.

4. Which of the following is a material on the exterior of a building intended to resist liquid water that has leaked, penetrated, or seeped past the exterior cladding from absorbing into the exterior sheathing or concrete wall and further into the wall assembly?
   a. Air barrier
   b. Vapor barrier
   c. Water/weather resistive barrier

5. True or False: The most continuous and seamless form of an air and water resistant barrier is a fluid applied type that is available in spray, trowel, and roll on formulations.

6. Which type of rainscreen prevents most of the rainwater penetration at the outermost surface of the wall, while simultaneously providing for drainage and evaporation of rainwater that does get through?
   a. Pressure Equalized Rainscreen (PER)
   b. Drained/Back Ventilated (D/BV) Rainscreen

7. True or False: Commercial architectural wall panels made of fiber cement can be used as a drained/back ventilated rainscreen, as long as they are always installed over an appropriately designed exterior substrate.

8. Which type of system is inherently simpler to design and install because it does not allow bulk water to penetrate into the cavity, reducing the space between the cladding and the substrate?
   a. Open joint system
   b. Closed joint system

9. Which test method was developed for the primary purpose of quantifying the volume of rain water contacting an imperfect Air and Water Barrier (AWB) and the system's ability to allow for ventilation/drying as measured by air flow through the cladding?
   a. ASTM E283
   b. ASTM E331
   c. AAMA 509
   d. AAMA 508

10. Which AAMA test method is intended to show performance at different pressures and to simulate real world conditions of wind driven rain against a building?
    a. AAMA 509
    b. AAMA 508
    c. AAMA 501.1

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Presented by:

ELDORADO STONE
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NATURAL THIN STONE VENEER

LEARNING OBJECTIVES

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

1. Understand how natural stone is quarried and crafted into stone veneer.
2. Understand and explain the special design considerations that are needed when specifying natural stone veneer.
3. List the benefits and advantages of specifying natural stone veneer.
4. Describe how natural stone veneer correlates with green building practices.

CONTINUING EDUCATION

CREDIT: 1 LU

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By Andrew Hunt

UNDERSTANDING NATURAL STONE

Few building products can match the aesthetic appeal of raw, well-hewn stone. A garden wall, finished mantel, or custom archway made of stone conjures images of luxury and grace, while also suggesting security, heft, and durability. Stone never goes out of fashion in the building and design world, and lately seems to be requested more and more both inside, and outside the home or business.

Natural stone is an extremely durable and versatile product when creating interior and exterior stone features like accent walls, back splashes, fireplaces, and outdoor living spaces. This article will explore some of the options available for architects designing with natural stone and discuss recent innovations in the mining and sawing of the raw material. One option is natural thin stone veneer, which can be installed faster and easier than traditional full depth natural stone. In order to capitalize on this product, it is important to understand the process of mining, hewing, and selecting the right type of stone, as well as the environmental benefits of specifying natural stone.

GETTING TO KNOW STONE

The most common types of stone used in the production of natural stone thin veneer are granite, bluestone, quartzite, limestone, and sandstone. These types of stone can all be found in North America, often sourced locally. Domestic sourcing of raw materials has a two-fold benefit when compared to bringing materials in from overseas in that transportation costs are less, and locally sources materials helps reduce greenhouse gas emissions.

Most natural stone types are quarried in a similar manner, but specific practices vary from site to site. Limestone, granite and sandstone mining is a relatively straightforward endeavor. First, the material is identified and verified to be of commercial grade quality. If the site holds commercial grade material, mining can begin in earnest. To extract the stone, cracks or natural breaks in the stone are found and the material is removed from the quarry site in large blocks. If the stone is solid without any fractures, then drilling and cutting help section the material into a manageable size. The blocks are then transported to a storage facility where they will be further graded and evaluated for use.

Some of the factors that impact mining include depth of material, density, fracturing or bedding planes, and the inherent physical properties of the stone. As with other natural resources, each type of stone has strengths and weaknesses that must be carefully considered during the extraction process to ensure the maximum amount of high-quality material can be removed, processed, and enter the supply chain. The most common classes of stone that are quarried for building stone and natural stone thin veneer include:

Granite is a common rock type found around the world. It is categorized as “intrusive igneous”, and is characterized by a grainy structure that composed of 20–60% quartz, mixed with plagioclase and alkali feldspars, as well as other possible minerals. Granite is popular in the commercial market, and is available in a range of varieties and colors, such as white, grey, pink, red, brown, green, and blue.

Because of its abundance and relative ease of extraction, granite is ranked as the second largest category of dimensional stone after limestone. It is extracted from 17 U.S. states, with much of the stone coming from New England.

Once granite is ready to be processed, it is cut into slabs or veneer, finished, and shaped. If the stone is to be used for applications where it needs to look more natural, it may not be finished or shaped, and instead be sold to look as natural as possible.

Sandstone, also known as arenite, is a clastic (or “cemented”) sedimentary rock that is composed primarily of quartz sand or quartz and feldspar sand, often with other materials such as calcite, clay, iron oxide, and silica, which help bond the stone together. The stone itself is very dense and hard, and is usually tan or yellow, but if it contains iron oxide, it may have a pink or red tint.

This stone is the third most produced stone in the US, and it is quarried in 16 states across the country, but primarily in Arkansas, Arizona, Colorado, New York and Ohio.

Sandstone is typically used as a primary building material, dressing stone for flagging, over other materials, or as a facing stone. Processing can vary, but generally it involves a primary cut, which is either followed by a polished or thermal finish and a secondary shaping cut. If the material is to be used for a natural look, it may not be finished or shaped. Smaller pieces may be crushed and used in concrete or other construction purposes.

Quartzite is a medium-grained rock that contains small, sparkling crystals. It is very durable, and can have a variety of colors and textures, depending on the minerals contained within the specimen. Quartz is usually mined from deep earth, and can be acquired through reclaimed mines.

Limestone is a grainy, sedimentary rock that is composed primarily of different crystal forms of calcium carbonate. The crystals stem from the calcium-based remains of ancient marine organisms such as coral and mollusks. This high-calcium content means that most limestone is light-colored, however rock samples will vary in appearance depending on what other minerals are in the rock. Other common components are silica and clay.

Limestone is the most commonly produced stone in the US, making up almost half of all domestic production, and is quarried in nine states, including Wisconsin and Indiana, which produce over 87% of US tonnage. Builders may also know limestone as dolomite, dolomitic limestone, and oolitic limestone. Travertine, which forms in situations such a near hot springs where calcium and carbonate chemically bond, is another form of limestone.

The porous nature of limestone makes it relatively easy to cut into blocks, and to shape or engrave. Consequently, it has been used as a building material for centuries from Egypt, where it was used for the Great Pyramid, through the Middle Ages, where it was used for castles and churches, and into the 19th and 20th century, where it was used for buildings such as train stations and banks.

Bluestone is a hard, feldspathic, layered sandstone that is characteristically blue, gray and buff colors, and the best known varieties are quarried in New York and Pennsylvania. The stone is often used for outdoor designs such as patios, stairs, and walkways, as well as wallstone or ornamentation.

The stone has been quarried since the early 1830s, and was popular in the mid-1800s for projects such as railway bridges and viaducts. The stone was also traditionally used for sidewalks and curbs, as well as on civic structures such as banks and churches, as well as on the Statue of Liberty.

One of the advantages of building with stone is that the material requires very little processing

before being installed. This can make stone very attractive for architects and builders hoping to support "green" or sustainable building practices through material selection. However, it is important to understand that although stone is very environmentally friendly, there are some things to consider when specifying stone and more information on the sustainable features and benefits of stone will be discussed in depth later in this article.

INTRODUCTION TO NATURAL THIN STONE VENEER

Natural thin stone veneer is a type of stone style that is fabricated to look like full dimensional stone, but is actually a thinner “slice” that is typically less than half of full thickness and often 75% the weight of full depth stone. The thin nature of this versatile product allows architects, designers, and builders the flexibility to include stone walls in both interior and exterior elements of their projects, but without the cost and additional structural support required by thicker stone.

Natural thin stone veneer is less expensive than full bed depth building stone primarily because of its lighter weight. This lighter weight reduces shipping and transportation costs, and construction costs, and ultimately that savings is passed along through to the overall price of the project.

A common challenge with full bed depth stone is that it is typically 3–5 inches deep and can weigh approximately 40–73 lbs/sq ft. That extra weight means that the building structure needs to be designed to support it. Natural thin stone veneer, on the other hand, is generally 1 ¼" thick and weighs under 15 lbs/sq ft, depending on the type of stone. Cutting machinery can also cut a 90-degree corner that helps hide the true thickness of the stone, when used on corner applications, so designers can achieve the same desired aesthetic effect of full bed depth stone, but without the weight.

Natural thin stone veneer's light weight means that less strict requirements for a building's foundations compared to situations where heavier stone is used. In cases where natural stone thin veneer is adhered to a wall, the only constraint is that the wall must be capable of structurally maintaining a maximal horizontal deflection of L/360 and a maximum vertical deflection of L/600. If these conditions are met, code states that there is no limit to the installed height of the stone veneer.

More importantly, this stone type can be installed without footings or ledges, and it is versatile in that it can be attached to almost any rigid structure, including concrete, brick, plywood, and even metal, with proper surface preparation.

TYPICAL PROJECTS THAT USE NATURAL STONE VENEER

Natural thin stone veneer is a versatile building material that is used for both for interior and exterior applications, from fireplace to building façade, and just about everything in between.

Interior walls may be finished with natural thin stone veneer to present the appearance of a solid stone wall, or to highlight a specific part of a room, such as around a fireplace. Such walls can work in almost any room in the house, from the living room to the kitchen, or bathroom. The range of colors and textures offered by natural stone can immediately, and sometimes dramatically, change the appearance of a room when it is remodeled. Whether natural stone is included as part of a new building design plan, or used when remodeling an existing building, the unique qualities of warmth and solidity can provide designers with some creative options for the space.

Exterior applications for natural thin stone veneer range from full exterior facades to highlighting a large section of a home. Stone emphasizes focal points such as chimneys, archways, garage doors, or entryways. The outdoor living area welcomes stone on landscape walls, outdoor kitchens, outdoor fireplaces and other outdoor features.

Designers can dig into their creativity when considering how to use natural stone in a new construction, or use it to completely change the look of a remodeled space.

BENEFITS AND FEATURES OF NATURAL THIN STONE VENEER

Natural thin stone veneer has many advantages over thicker full bed depth traditional building stone, and its characteristics make it a good choice for most architectural projects that incorporate stone features. The features are beneficial both during construction and throughout the lifetime of the building.

One very important factor that building professionals need to consider at the start of any project is the cost of the thin stone veneer. The stone is priced per square foot, and the prices will vary according to many different variables, primarily shipping and material costs, but also the cost of the specific installation application. Builders should be aware that stone veneer is usually packaged in units of a specific size, and so they should price the entire project from start to finish before purchasing the stone. Most suppliers will provide a quote that includes shipping and installation, however an overage should be factored into the purchase so that designers have the option to select the product they want for the project.

CONSTRUCTION AND INSTALLATION BENEFITS

When it comes to a practical construction standpoint, natural thin stone veneer shines. The relatively lightweight material is easy to use, straightforward to install, and generally quite versatile.

Because it does not require ledge support, natural thin stone veneer can be applied directly on many different rigid surfaces, which makes it ideal for remodeling projects – both indoor and outdoor. This lack of ledge support opens up a world of opportunity for designers, whether they want to use stone as an accent along a fireplace, as a featured wall inside the house, or as a means of giving an exterior wall a new look. From an aesthetics perspective, natural thin stone veneer has the benefit of being available in many shapes, textures and colors from multiple sources.

Another construction benefit of natural stone veneer is that because it is cut wet with

NATURAL STONE VENEER AND MANUFACTURED STONE VENEER

Natural and manufactured stone veneer provides architects and designers the ability to transform any space with stone. The highlights of these product types are showcased below.

Natural stone veneer

Natural stone veneer exhibits all the beauty, depth and characteristics of millions of years in nature where no two stones are alike. Natural stone includes a wide range of materials, but the most commonly used types for building and interior design are granite, bluestone, quartzite, limestone, and sandstone. These types of stone can all be found in North America. Natural stone is typically open-pit mined (quarried), and cut into large slabs, which can then be cut into smaller sizes used for a variety of different purposes. Innovations in blades and saws have made it possible to cut the full depth stone into a thin veneer option for building designers. Natural stone veneer, is typically cut to a thickness of ¾"to 1 ¼" depth so that it is lighter and easier to install than traditional full bed building stone, which typically has a thickness of 3" to 5". Natural stone veneer does not require footing for installation, like full depth stone, and it installs as an adhered stone veneer since it falls under the 15 lbs sf weight limit.

Manufactured stone veneer

Manufactured stone veneer is man-made stone, typically from concrete, which is designed to look like natural stone in terms of both texture and colors. Depending on the quality of the manufacturers, the stone will either be formed by a preset mold, or from a mold made of natural stone so as to capture more realistic textures. Manufacturers can also apply a range of natural-looking colors to the stone, so that it captures the look and feel of real stone. Manufactured stone is usually much lighter than natural stone, resulting in a versatile building material that is relatively easy to install. Because it is manufactured, stone colors and textures can be consistently available nationwide.

Applications for manufactured stone are broad, however it should not be used in, or in constant contact with, water features such as showers, pools or fountains, since the chemicals in the water and constant moisture will cause the material to deteriorate over time.

Natural stone, however, can be used in wet environment such as waterfalls and water features, depending on stone's absorption and composition.

a diamond masonry blade, airborne dust associated with stone cutting is drastically reduced when compared to other cutting techniques for other products. This feature is beneficial during the original cutting, but is also good for jobsite situations where stone needs to be cut or trimmed before installation. The potential for reduced fine-particle dust on the jobsite benefits the builders as well as anyone in the immediate local environment.

Construction and installation challenges

Although lighter in weight and easier to install than thicker natural stone, there are some specific installation recommendations for natural stone veneer that should be addressed, particularly when it comes to securing the load of the stone, preventing the risk of moisture seepage and with installing around transition points such as windows, doors, or wall caps.

Backup walls

Regardless of the type of thin veneer used, projects will require a structural backup wall to support the loads. The materials used for this wall can vary from wood or steel framing to concrete block or concrete poured in place. The important thing is that the wall can handle the load of the stone. In cases where the stone is adhered directly to the wall, the veneer will also move with the backup wall as it responds to those loads, and to any changes in temperature. It will also shift when the soil settles to accommodate the load.

While the backup wall materials can include wood and steel, designers should note that both of these materials are relatively flexible when compared to concrete. For example, steel frames can be sensitive to temperature shifts, and wood is very sensitive to changes in moisture, which causes it to swell or shrink. With both steel and wood, the frame may move slightly, which can negatively impact the mortar. Specifically, the mortar may develop narrow cracks, which can then allow water to enter the wall. If this happens, the cracks can, and should, be repaired with new mortar.

QUIZ

1. What is the most commonly produced stone in the US?
   a. Granite — b. Quartz
   c. Limestone — d. Sandstone

2. True or False: Natural stone veneer is not manufactured stone.

3. How much less does natural stone veneer typically weigh than full thickness veneer?
   a. 10% — b. 25%
   c. 45% — d. 75%

4. How much thinner is natural stone veneer than typical full thickness veneer?
   a. More than 1/16 — b. More than 1/4
   c. More than 1/2 — d. They are the same

5. What surfaces can natural stone veneer be applied?
   a. Concrete — b. Drywall
   c. Plywood — d. All of the above

6. What type of saw blade can cut natural thin stone veneer?
   a. Wet saw with a diamond masonry blade — b. Dry saw with a tungsten blade
   c. Hand saw with a steel blade — d. Hack saw with a carbine blade

7. Why is thin stone veneer superior to concrete in freezing temperatures?
   a. It handles the freeze thaw cycle well — b. It holds ice cooling the interior of the home
   c. Its natural composition resists the adhesion of ice on the surface — d. It chemically reacts to sunlight causing UV atomization and heating the surface

8. What is a benefit of hand-hewn natural stone?
   a. Outsourced labor overseas — b. No toxic chemicals were used in production
   c. Stronger than machine-hewn stone — d. Hand finished in a 14 step coating process

9. In North America, how is stone primarily transported?
   a. Truck — b. Plane
   c. Ship — d. Helicopter

10. True or False: Natural stone requires a lot of care and maintenance.

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A COMPLETE ENVELOPE SOLUTION WITH INSULATED METAL PANELS

Presented by:

LEARNING OBJECTIVES

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

1. Identify how to control building enclosures.
2. Examine how complex energy codes are simplified when using insulated metal panel systems.
3. Describe the advantages of insulated metal panels compared to alternative building systems.
4. Examine design options for aesthetics, including standard panel options and high performance continuous insulation barrier panels.

CONTINUING EDUCATION

CREDIT: 1 LU

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PHYSICS OF BUILDING ENVELOPES—HYGROTHERMAL LOADS

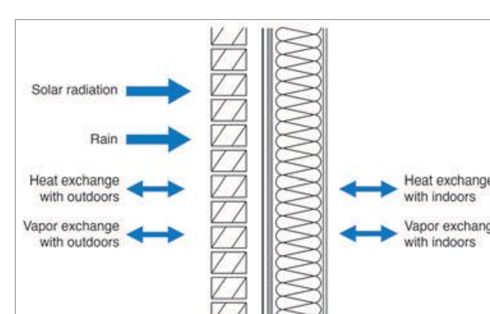
The building envelope separates the building interior from the outside environment. Environmental loads, as they were historically called, are characterized as combined heat, air, and moisture (HAM) transport that act on both the exterior and interior of a building enclosure. Today, these loads are referred to as hygrothermal loads and the process of evaluating their effect on building enclosures is called hygrothermal analysis. The key hygrothermal control requirements for building enclosures are control of heat flow, air flow, water vapor flow, rain, and ground water.

These control requirements are governed by the Laws of Thermodynamics. Of the four Laws of Thermodynamics, the 2nd law is the most misunderstood and most relevant to environmental separation. The 2nd law can be summarized as follows:

- Heat flow is from warm to cold.
- Moisture flow is from warm to cold.
- Moisture flow is from more to less.
- Airflow is from higher to lower pressure.
- Gravity acts downward.

In order to control all of the hygrothermal loads, the following building envelope components are needed, in order of importance:

- Water control layer
- Air control layer
- Vapor control layer
- Thermal control layer



Typical hygrothermal loads acting on building enclosures. The loads act on both sides of an assembly, from the exterior and the interior.

CONTROL LAYERS

All control layers are important, but not equally important in terms of envelope durability. The order of importance is drawn from historic experience and the underlying physics of each layer. For centuries, controlling water in the liquid form (rain and ground water) has been the chief goal of master builders and architects. It wasn't until the past century that a focus on controlling air arose; controlling vapor has been an even more recent development within the past couple of decades.

The water control layer controls bulk water such as rain and ground water (as opposed to water vapor or condensation), and provides the most basic protection from the elements. This task is performed by an exterior cladding element.

The air control layer controls air leakage, preventing "drafty" buildings. It provides airtightness and can include exterior cladding with sealants or films, coatings, and membranes. Air movement transports a lot more water in vapor form than vapor diffusion does.

The vapor control layer manages vapor diffusion, which is the movement of vapor even without air movement. The vapor control layer regulates the movement of vapor from one side to the other; the materials used can also be called retarders or barriers. Proper vapor control depends on the climate zone, insulation system, building use, and interior conditions.

Vapor retarders come in three classifications:

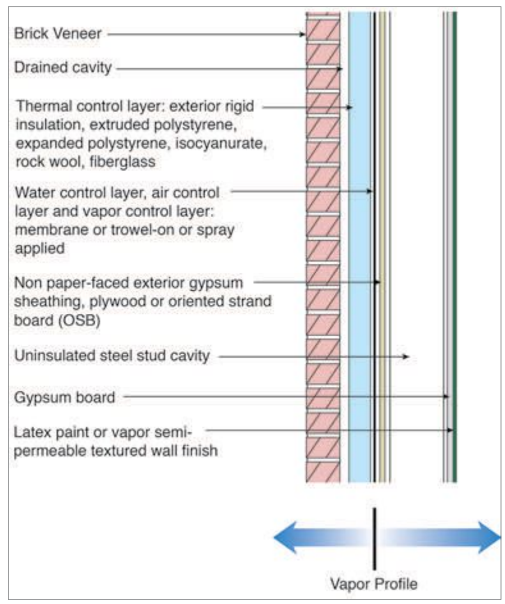
- Class I: < .1 perm (impermeable)
- Class II: > .1 perm < 1.0 perm (semi-impermeable)
- Class III: > 1 perm < 10 perm (semi-permeable)
- 10 perms = NOT a vapor retarder (considered permeable)

Vapor control layers can consist of any of the following:

- Latex paint or semi-permeable textured wall finish on interior gypsum
- Polyethylene sheathing behind interior gypsum wallboard
- Vinyl facing on batt insulation
- Interior face of insulated metal panels
- Air/water barriers

Finally, the thermal control layer controls heat loss and gain, which can have a significant impact on comfort, operating and energy costs, and sustainability. Thermal control layers consist of various forms of building insulation, including cavity systems (batt insulation), spray foam, rigid board, and insulated metal panels.

Thermal control dates back millennia, but has typically only lead to comfort or operating cost issues rather than structural failure. Hence, thermal control layers are listed last on the control layer "priority" list.



The "Perfect Wall" is the optimum configuration of the control layers for a wall assembly.

PERFECT WALLS

The "perfect wall" or "universal wall" is the optimum configuration of control layers for a wall assembly. Water, air, and vapor control layers are all located on the exterior of the structure, while thermal control is located outboard of the other control layers. The water, air, and vapor control layers are usually combined into a single layer comprised of a film, coating, membrane, or sheet good.

This perfect wall can be used in all climate zones, including cold, mixed, hot, humid, dry, or marine. The system works for all interior environments including office, residential, institutional, pools, museums, art galleries, and data processing centers. The sole exceptions are refrigerated buildings and cold storage facilities. In such assemblies the location of the thermal control layer is "flipped" so it is located on the interior of the other three control layers.

CLIMATE ZONES

The U.S. climate zones are defined by ASHRAE. In cold climates, locating the vapor control layer on the interior of the thermal control layer keeps it warm, therefore controlling condensation from occurring due to interior moisture sources.

In hot climates, locating the vapor control layer on the exterior of the structure allows condensation to drain that may occur on the exterior surface of the control layer. This condensed water is handled in the same manner as penetrating rainwater. Note the water control layer and vapor control layer are in the same location and are typically the same material.

In mixed climates, the configuration controls interior moisture loads during the heating season in the same manner a similar assembly controls interior moisture loads in cold climates. During the cooling season the configuration addresses exterior moisture loads in the same manner a similar assembly addresses exterior moisture loads in hot climates.

You can see why an assembly that locates the water, air, and vapor control layers on the exterior of the structure, with the thermal control layer outboard of the other control layers, is referred to as the "universal wall" or "perfect wall." It works in all climate zones for all interior environmental conditions with the exception noted.

HYGROTHERMAL ANALYSIS

This configuration does not require hygrothermal analysis such as Warme und Feuchte Instationar (WUFI) modeling in any climate zone. In cold climates, or in any climate zone during heating months, dew point calculations or hygrothermal modeling are not necessary regardless of the interior moisture load. This is because all of the insulation is external to the air control and vapor control layer.

In hot, humid climates or any climate where air conditioning is occurring, dew point calculations or hygrothermal modeling are again not required. Condensation can only occur, if it occurs at all, on the exterior surface of the water, air, and vapor control layer where it can drain to the exterior in the same manner that rain penetration is controlled.

CREATING A PROPER BUILDING ENVELOPE—ROOFS, SLABS, AND WALLS

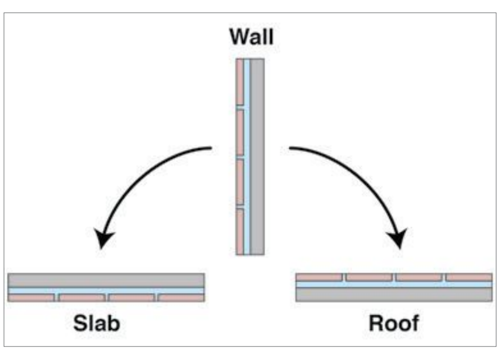
Going back to the optimum configuration of the control layers for a wall assembly, or the "perfect wall," let's discuss the functions of cladding and control layers.

The four functions of cladding are to:

- protect the control layers from exposure to ultra-violet radiation

- reduce the rain load on the control layers
- provide physical protection to the control layers
- provide aesthetics

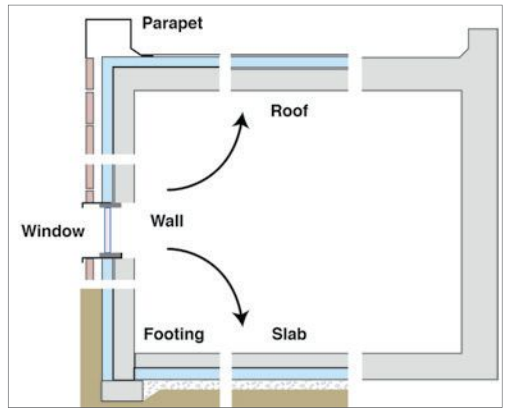
The cladding is drained and back-ventilated in such assemblies. The function of the drainage plane is to control hydrostatic pressure that may result from penetrating rainwater, while the function of the back-ventilation is to promote evaporation of moisture on the drainage plane and reduce inward vapor drive, especially when using "reservoir" claddings such as brick or masonry. Reservoir claddings store moisture during rain events, then create a large inward vapor drive when exposed to solar radiation (heat gain), causing dangerous summertime condensation within wall cavities.



Similar loads and the laws of physics apply to all elements of the building enclosure.

Because similar loads and the same laws of physics apply to roofs, slabs, and walls, the same approaches can be applied to each element of the building envelope. A typical roof membrane provides air, water and vapor control above the thermal control layer (insulation). A second membrane or layer is provided below the thermal control layer and functions as air control and vapor control. The intent is to keep the rain, air, and vapor from entering the assembly from the top (outside) and to keep the air and vapor from entering the thermal control layer from the bottom (inside). Such an assembly works in all climate zones and all interior environments, even refrigerated buildings and cold storage facilities.

The key to the performance of a slab foundation assembly is the granular or stone layer under the thermal control layer (insulation) that functions as a capillary break to control liquid water absorption in the thermal control layer. It is analogous to the "drained and back-ventilated" cladding of a wall assembly.



This is a conceptual approach to a building enclosure—an idealized enclosure with continuity of the control layers for the parapet, roof, wall, slab, and punched openings.

CONTROL LAYER CONTINUITY

Roof assemblies, wall assemblies and foundation assemblies subsequently need to be integrated to function as a building enclosure. The water control layer of the roof assembly is connected to the water control layer of the wall assembly that is then connected to the water control layer of the slab/foundation assembly. Then the air control layer of the roof assembly is connected to the air control layer of the wall assembly that is then connected to the air control layer of the slab/foundation assembly. The same conceptual approach is applied to the vapor control layer and thermal control layer.

Continuity of the control layers is key to the hygrothermal performance of building enclosures. Historically, continuity has been most significant at transitions between different building elements such as where roofs meet walls, and at penetrations such as punched openings for windows, doors, curtain wall connections, storefront connections, and service openings for mechanical, electrical, plumbing, and communication.

INTRODUCTION TO INSULATED METAL PANELS

The two most common versions of the site-built universal wall or perfect wall are masonry or concrete assemblies and steel frame assemblies. In both of these assemblies a myriad of products work successfully, including most exterior insulation and most sheet good, spray system, or trowel-applied membrane products, as long as they are installed correctly. Note the vapor profile at the bottom of the figure on the next page. Drying occurs to the interior from the bold line and to the exterior from the bold line in all climates.

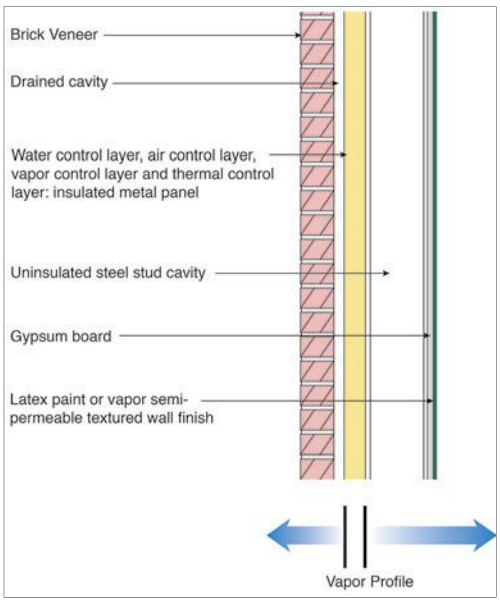
Insulated metal panel systems (IMPs) as a rainscreen barrier are a pre-manufactured version of a perfect wall. They consist of two single-skin metal facings and a foamed-in-place polyurethane core.

As discussed earlier, dew point calculations or hygrothermal modeling is not required in any climate zone when all of the insulation is located external to the air and vapor control layer, with the stipulation that no interior vapor barriers are installed on the interior of the assembly.

Insulated metal panel (IMP) systems as a rainscreen barrier are a pre-manufactured version of a perfect wall. They consist of two single-skin metal facings and a foamed-in-place polyurethane core. The metal and foam composite construction creates a rigid panel far stronger than the individual parts. This increases the span capability of the panels and reduces the need for secondary structural steel components.

IMPs are sealed to each other at the side laps and to the substructure at all perimeter boundaries, which make them the ideal choice for applications where a continuous air barrier is required. The special foam insulation of IMPs offers superior R-values that provide enhanced energy performance. Both faces have a tongue and groove joint, coupled with vapor seal mastic in the mastic grooves, which provides superior resistance to air and moisture intrusion, allowing for increased thermal performance of the building envelope.

In new and retrofit construction, insulated metal panels function as walls, ceilings, and roofing for all types of architectural, commercial, and industrial applications. They are ideally suited for low- and mid-rise offices, convention centers, performing arts centers, arenas, airport terminals, schools and universities, religious facilities, and hospitals. Commercial and industrial applications include retail buildings, hangars, government facilities, equipment maintenance buildings, manufacturing facilities, warehouses, distribution centers, self-storage complexes, utility buildings, and controlled environment buildings where temperature control and insulation values are critical.



A "pre-manufactured perfect wall" using insulated metal panel systems is configured to function as environmental separation and combines the water, air, vapor, and thermal control in one layer.

PHYSICS OF INSULATED METAL PANELS

You can see in this graphic that an insulated metal panel system combines the water, air, vapor, and thermal control in one layer. The single component simplifies design, installation, performance, and warranties. The exterior cladding sheds most of the rain, the air cavity/drainage plane allows drainage and evaporation, and the barrier wall provides backup water protection and primary air, thermal, and moisture protection. This system replaces complicated multi-component assemblies used in traditional rainscreen construction, saving time and money.

With insulated metal panel systems the vapor profile is slightly altered from a site-built universal wall. Drying to the exterior occurs from the exterior face of the insulated metal panel system in all climate zones, while drying to the interior occurs from the interior face of the insulated metal panel system in all climate zones. Because the foam of the IMP has continuous contact with steel panel facings, interstitial condensation is eliminated.

Note the exterior face of the insulated metal panel system functions as the water control layer, air control layer, and vapor control layer. In addition, the interior face of the insulated metal panel system also functions as an air control layer and vapor control layer. This dual location of both an air control layer and vapor control layer allows the assembly to function successfully for refrigerated buildings and cold storage facilities in all climates.

The exterior face of the insulated metal panel system is so robust, and the rainwater control of the panel joints is so effective, traditional cladding is omitted in most applications. The exterior metal face of the panel system becomes the cladding; it provides protection from ultra-violet radiation and physical damage and typically satisfies aesthetic requirements. That being said, there are design options we will discuss at the end that allow the use of more traditional façade materials with insulated metal panels.

QUIZ

1. Which control layer is most important in terms of building envelope durability?
   - a. Water control
   - b. Air control
   - c. Vapor control
   - d. Thermal control

2. True or False: In the "perfect wall" the water, air, and vapor control layers are all located on the exterior of the structure, while thermal control is located outboard of the other control layers.

3. Which of the following is NOT one of the four functions of cladding?
   - a. Protect the control layers from exposure to ultra-violet radiation
   - b. Prevent insect infestation
   - c. Reduce the rain load on the control layers
   - d. Provide physical protection to the control layers
   - e. Provide aesthetics

4. True or False: Continuity of the control layers is key to the hygrothermal performance of building enclosures.

5. True or False: Insulated metal panel (IMP) systems as a rainscreen barrier are a pre-manufactured version of a perfect wall.

6. Which of the following is a suitable application for IMPs?
   - a. Low- and mid-rise offices
   - b. Convention centers
   - c. Hospitals
   - d. Controlled environment buildings
   - e. All of the above

7. True or False: An insulated metal panel system separates the water, air, vapor, and thermal control layers into 4 distinct layers.

8. True or False: Insulated metal panel systems, by virtue of their joint geometry, address thermal bridging in a more robust manner than site-built assemblies.

9. In commercial wall systems a minimum continuous _____ inch gap for all cladding systems is recommended, which is based more on construction tolerances than physics.
   - a. 1/2
   - b. 1/4
   - c. 3/8

10. True or False: An HPCI barrier panel provides the benefits of insulated metal panels with more traditional facades.

This article continues on http://go.hw.net/AR616Course4. Go online to read the rest of the article and complete the corresponding quiz for credit.

HIGHER PERFORMANCE AND LOWER COSTS WITH HVLS FANS

Presented by:

ENTREMATIC

LEARNING OBJECTIVES

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

1. Identify the function and benefits of HVLS fans.
2. Examine the application of HVLS fans in specific commercial and industrial settings.
3. Understand specification and operation best practices.
4. Explain the use of performance criteria for appropriate fan selection.
5. Describe how HVLS fans help meet performance and sustainability standards for savings.

CONTINUING EDUCATION

CREDIT: 1 LU

COURSE NUMBER: ARmay2016.7

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/AR516Course7 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 Aphrodite Knoop

SECTION 1—FUNCTION AND BENEFITS

HVLS fans are engineered to provide a high level of comfort, efficiency, and productivity in large and public buildings in all seasons. This section will outline how HVLS fans work to decrease the burden on HVAC systems and reduce the costs of heating and cooling. It will also cover the concept of destratification as a means of energy efficiency.

Introduction to HVLS Fans

A high-volume low-speed (HVLS) fan, unlike its smaller residential counterpart, is a mechanical fan with a diameter greater than 5 feet that moves large volumes of air at a low rotational speed.

Walter Boyd invented the HVLS fan during the 1990s to address the needs of the dairy farming industry because when dairy cows experience heat stress, they become sluggish and their milk production goes down. HVLS technology provided an energy-efficient way to keep dairy cows comfortable. And, just like humans, farm animals that are breathing in pollutants can develop health issues. These health and productivity problems, in turn, pose a threat to a farm's bottom line. HVLS fans cool the cows and help boost their milk output while also circulating air to reduce risk of disease.

HVLS Technology

HVLS fans are designed based on the laws of physics and aerodynamics and incorporate airfoil technology to provide greater efficiency. They move air consistently and evenly, but slowly, throughout a space because a high velocity of wind indoors is both unpleasant and inefficient, even in warm or hot climates.

The large column of air produced by an HVLS fan travels farther than that of a smaller fan. When this downward column of air hits the floor, it moves horizontally in all directions, away from the column as shown in Figure 1.

Smaller high-speed fans produce a high velocity jet of air that is turbulent and quicker to dissipate. In contrast, HVLS fans are able to get a large mass of air moving and take advantage of the inertia of the air itself. We tend to think of air as being weightless. In reality, air takes up a great deal of volume in a space. Therefore, far less power is required to keep an air mass moving than to start that volume moving in the first place.

In very large, or open air spaces (such as airplane hangars or arenas) where air conditioning is impractical and cost prohibitive, HVLS fans can make a significant impact simply by keeping air moving.

In facilities where there is mechanical cooling and heating, HVLS fans work in tandem with existing HVAC systems to reduce the energy load on those systems. In cold climates, the fans can either push the hot air down or push the hot air across the ceiling and down to the ground level without creating a wind chill effect, rather than letting it sit at ceiling level. For example, large industrial buildings have the heaters placed up high. Without supporting fan action, that heat will remain at ceiling level and the space will have layers of uneven—and uncomfortable—temperatures.

In addition to enhancing HVAC and natural ventilation systems, HVLS fans improve indoor air quality and ventilation. There is always need for ventilation in enclosed spaces to remove the buildup of carbon dioxide (CO_2), smoke, and fumes. If a space has dirty air, standard exhaust fans have a hard time removing that air from the center of the room because as fresh air comes in, it stays along a room's perimeter. HVLS fans mix and move that air to prevent stagnation, eliminate condensation buildup, and maintain an even room temperature without the wind chill effect.

The need to regulate room temperature is not just about human comfort. It's also about proper circulation of fresh, dry air to preserve sensitive products including food, produce, cosmetics, pharmaceuticals, and other fragile goods.

Efficiency by Design

The profile of a blade, the spacing, and the RPM of the fan dictate how much airflow the fan can push. Originally, HVLS fans were designed with 10 blades. However, over time, blades were engineered with a larger airfoil shape, so that fewer blades were necessary for optimal performance and efficiency. As a result, HVLS fans are now down to 6-blade and 5-blade profiles, increasing airflow without increasing energy usage or causing undue stress to a building.

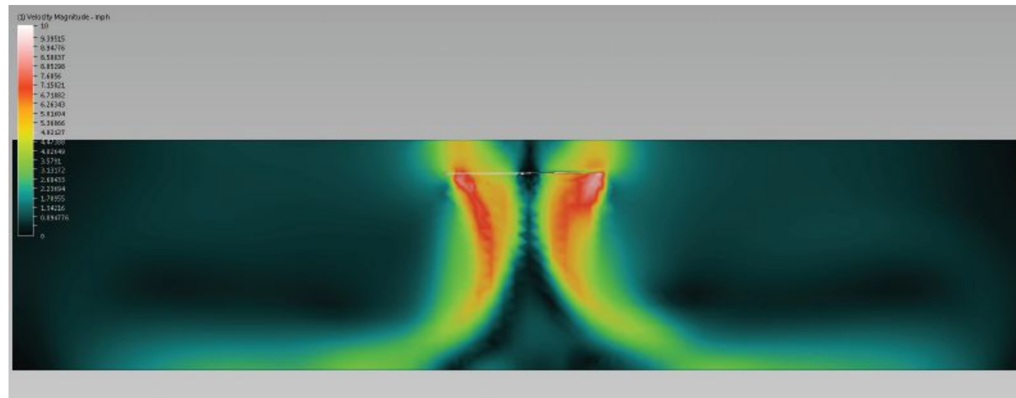


Figure 1: Horizontal Velocity Simulation. Computer simulation of air as it moves through a fan. Image shows air coming down in a vertical profile, then moving out and away from the fan, and the velocity dissipating. Airflow moving across the ground level (shown bottom of image) represents the floor jet. As the velocity dissipates, the air moves beyond until it circulates back up into the top of the ceiling (shown top of image) and is then drawn back into the fan.

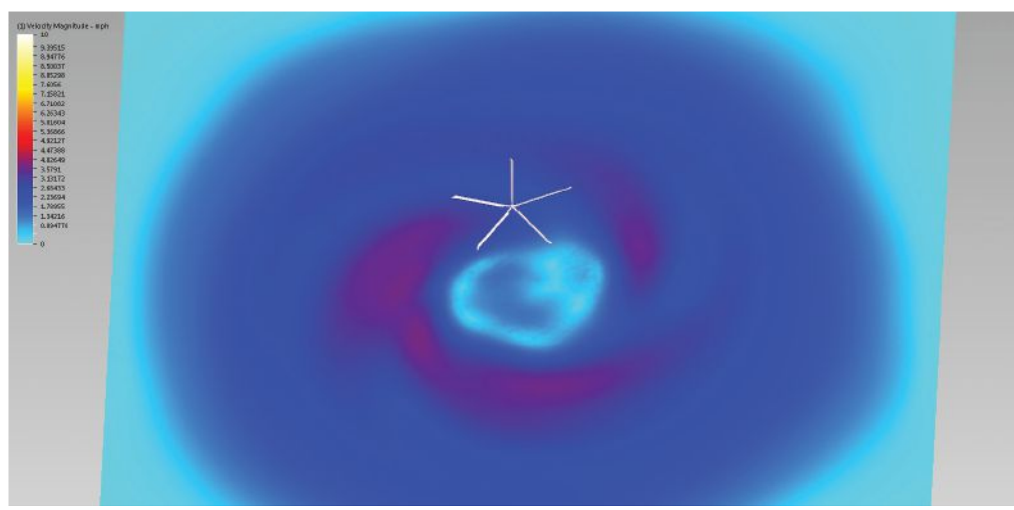


Figure 2: Floor Velocity Spill Pattern of a 5-Blade Fan. Computer simulation of air flow as generated by a 5-blade fan. Velocity magnitude is shown in mph.

The decrease in blades also reduces the manufacturing carbon footprint of a fan because the aluminum production process for the blades requires large quantities of electrical power. Therefore, the amount of electrical power used to produce a 6- or 5-blade HVLS fan is less than what is used to produce a 10-blade fan.

Anatomy of a Blade

The 5-blade design is a further improvement over the 6-blade design and is optimized for low-speed rotary airfoil applications. Airfoils represent an evolution in HVLS fan engineering.

Airfoil Blades

Airfoils are designed to produce a massive cylindrical column of air that flows down to the floor and outward in all directions. The horizontal floor jet then pushes air out a great distance away from the center of the fan. It is then pulled back vertically toward the blades.

Winglets

Winglets increase a blade's efficiency by reducing the induced drag. The downward oriented winglets generate vortices below the airfoil, thus directing turbulence away from the trailing blade.

Destratification

Cold air is denser than hot air, so it drops to the ground while hot air rises to ceiling level.

This process is called "stratification." As a result of stratification, the thermostat in a space detects the colder air and works harder to reach the desired set point. This creates system inefficiency and results in higher operating costs for a facility.

Destratification is when the layers of air are blended together to create a uniform temperature throughout a space. In a stratified space, HVLS fans mix the air and push it down to occupant level. To avoid a draft, which can decrease comfort and productivity, fan blades need to rotate slowly at the occupant level. This blending decreases heat loss through the building envelope and reduces energy consumption. The reverse function of an HVLS fan is an important component of destratification.

During warm or hot seasons, you can destratify by running an HVLS fan in forward motion, creating a downward column of air. This air movement significantly enhances human comfort.

However, wind chill in colder seasons has a negative impact on human comfort. Therefore, you can destratify by running an HVLS fan in reverse. When in reverse, the fan pushes hot air down to blend the different layers into a uniform, comfortable temperature. This reverse function eliminates wind chill and allows you to more efficiently heat a large space while reducing the cost of heating.

SECTION 2—APPLICATION IN COMMERCIAL AND INDUSTRIAL SETTINGS

The heating and cooling requirements of commercial and industrial facilities differ significantly as each environment has its own unique set of challenges. This section provides an overview of how HVLS fans are used in an array of commercial and industrial facilities to improve thermal comfort, energy efficiency, and building performance.

Commercial "C-Class" Applications

In a commercial setting, C-Class HVLS fans deliver greater airflow than residential fans. Therefore, you can increase efficiency by replacing multiple residential ceiling fans in a given space with a single commercial fan. A commercial fan produces a consistent airflow at any speed setting for more effective cooling and enhanced efficiency. In addition, commercial fans are ideal for acoustically sensitive spaces such as libraries, museums, and schools.

Commercial applications encompass the following:

Restaurants and Bars
In restaurants and bars, fans should be both functional and an enhancement of the décor. As with lighting, furniture, and materials, fans help create mood and atmosphere. C-Class fans are designed to be quiet and efficient even at low speed settings, and maintain a comfortable environment even as temperatures and crowds fluctuate. They also help control rising temperatures in outdoor patios and keep temperatures consistent in heat-sensitive areas such as tasting rooms by providing steady air movement and ventilation.

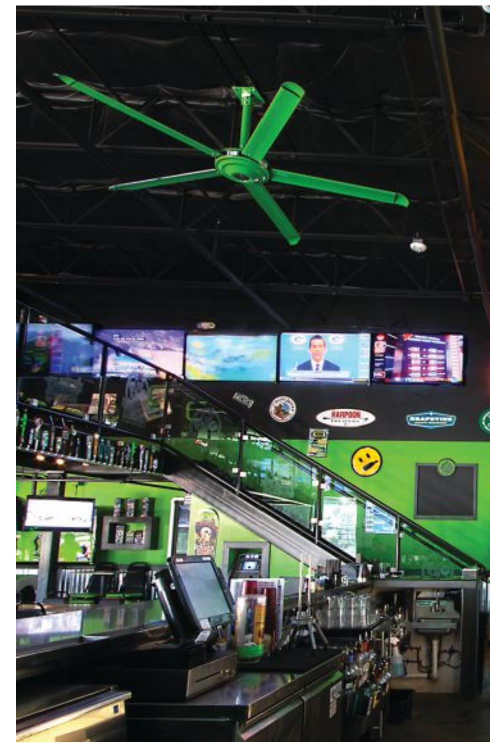
Retail and Public Spaces
In large public spaces with high ceilings, temperatures can vary widely from the ground to the upper levels. A commercial fan evens these variations so that in a theater, for example, audiences from the orchestra level to the balconies can be equally comfortable. The fans also improve efficiency in areas such as high-traffic lobbies by helping reduce the loss of conditioned air. They promote productivity in office spaces through noise reduction and comfortable temperatures and air movement.

The goal in retail and public spaces is to keep eyes focused on merchandise; at a display, on a screen, or at a stage. C-Class fans are designed to blend into most backgrounds and are available in a variety of colors and patterns to complement a space's design without being a distraction.

Sports Centers and Outdoor Spaces
Sports venues are activity hubs, with people coming and going, machines whirring, music blaring, and spectators cheering. Commercial HVLS fans work quietly in the background, providing comfort without the disturbance and commotion of standard high-speed fans.

Whether a large space is air-conditioned or not, commercial HVLS fans can increase comfort for both athletes and spectators. Hot, humid environments such as indoor pools or theme parks can be tempered by a C-Class fan's cooling breezes, while the reverse functionality can make outdoor venues and private airplane hangars more bearable in winter months.

Health and Fitness Facilities
Gyms and fitness facilities can get hot and crowded. Overheated workouts are not just miserable; they are very dangerous for some segments of the population. Therefore, it's vital



C-Class fan used in bar. Fan was specified to complement interior design and colors.

to keep these facilities cool and comfortable for all patrons. Even if a fitness center has an HVAC system, the large spaces, high ceilings, and hard-working crowds are all taxing the air conditioning systems, especially during summer. In these scenarios, a C-Class fan can be used alone or as a supplement to an HVAC system to enhance cooling and comfort. In cold seasons, the fans can destratify the air spaces for even warmth by running in reverse.

Municipal and Education Buildings
Where quiet is essential—such as in schools and libraries—a buzzing fan is a distraction. In addition, large public spaces including recreation centers, auditoriums, courts, and town halls require balanced, comfortable temperatures throughout to accommodate for the ever-shifting flow of people.

Although commercial fans are quiet even when producing enough air to blow papers off a table, they don't need to be set on high to provide both comfort and energy efficiency.

This cost-saving aspect of commercial fans is especially important for public institutions that rely on taxpayer dollars. When every dollar counts, planning commercial ceiling fans into a new building means you can install minimal HVAC, thereby reducing expensive ductwork. In

Series of I-Class fans used in dairy barn for ventilation and destratification.

the winter, simply reverse fans to circulate warm air for continued energy and cost savings.

Industrial "I-Class" Applications
Industrial spaces are huge energy consumers. I-Class HVLS fans are made to move very large volumes of air to reduce stagnation, alleviate hot and cold spots, and keep products such as food fresh and dry. Spaces will feel more comfortable, with a perceived reduction in temperature, providing substantial energy savings in the process.

Industrial environments include the following:

Farms and Ranches
In settings such as rodeos, agricultural fairs, or indoor shows involving animals, stagnant air and lack of air-conditioning or breezes make for uncomfortable conditions for humans and non-humans alike. Industrial fans are designed to provide gentle breezes and can be adjusted to accommodate for small or large crowds. The fans can also help keep down dust and reduce or eliminate stale, smelly air. In addition, the constant air circulation helps repel flies from the animals and controls moisture levels.

I-Class fans are an energy-efficient way to keep farm animals comfortably cool and productive and avoid overheating and illness. And though farm animals may be used to life outdoors, winter still takes a toll on their health and on a farm's bottom line. That's because when animals are cold, they tend to eat more, which dramatically raises the amount that farmers have to spend on feed. HVLS fans destratify barn air with reverse circulation to keep livestock more comfortable even in winter.

Aviation Facilities
Airplane hangars are large spaces with very high ceilings, and hangar doors are often wide open for hours at a time. In winter, massive amounts of cold air flows through those doors as any heated air floats over the airplanes and away from hangar workers. I-Class fans can pull that warm air down and push it out at ground level, warming workers and preventing any condensation on the floors from freezing.

QUIZ

1. For what purpose were HVLS fans originally designed?
   a. Aviation hangars — b. Ranches
   c. Dairy farms — d. Sports facilities

2. Where is destratification particularly effective?
   a. Warehouses — b. Distribution centers
   c. Airport terminals — d. All of the above

3. Which is not a LEED Certification credit category?
   a. Energy and Atmosphere — b. Innovation in Design
   c. Carbon Footprint Impact — d. Indoor Environmental Quality

4. Which is not one of the benefits of HVLS fans?
   a. Improved ventilation — b. Wind-chill cooling
   c. Energy efficiency — d. Enhanced HVAC performance

5. Which of the following can be considered a commercial building?
   a. Gallery — b. Restaurant
   c. Gymnasium — d. All of the Above

6. True or False? Destratification is ideal in all seasons.

7. True or False? Industrial and commercial HVLS fans produce the same airflow.

8. Which of the following is not a function of industrial fans?
   a. Move air down and outward — b. Dry condensation
   c. Control noise levels — d. Move air over obstructions

9. What is the maximum number of fans in a facility that can be networked with an iFAN® system?
   a. 50 — b. 2–100
   c. 5 — d. 1–30

10. What percentage of savings on a facility's energy bill can be achieved with every degree of temperature change?
   a. 4.5% — b. 5%
   c. 6% — d. 3%

This article continues on http://go.hw.net/AR516Course7. Go online to read the rest of the article and complete the corresponding quiz for credit.

SPONSOR INFORMATION

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Entrematic is a leader in engineering products that help businesses across a wide variety of industries perform more efficiently and profitably. Our HVLS fans have been beautifully designed and expertly engineered to improve energy efficiency in commercial and industrial spaces, and our sophisticated iFAN® and networking solutions provide even greater control.

“We knew that putting an iconic building into the heart of the historic landmark district could be very controversial.”

Polaris Hall at the Air Force Academy by David Hill

The Cadet Chapel at the U.S. Air Force Academy, near Colorado Springs, Colo., is a masterpiece of glass, steel, and aluminum. Designed by the late Walter Netsch of Skidmore, Owings & Merrill (SOM), the multi-denominational chapel was completed in 1963. With its stunning ribbons of stained glass and 17 identical spires that pierce the sky, the building's expressionistic design (*Time* magazine dubbed it "Air Force Gothic") stands in glorious counterpoint to Netsch's low-slung, horizontal collection of buildings elsewhere in the Cadet Area, the academy's academic and residential core.

Netsch's bold design for the academy was highly controversial when first conceived in the 1950s. Today, it's considered one of the prime examples of postwar Modernism, a kind of Rocky Mountain Brasília. And despite a few regrettable additions and alterations over the years, the Cadet Area—a National Historic Landmark District—has remained largely as Netsch envisioned it.

But there's a new kid on campus: the Center for Character & Leadership Development (CCLD), informally known as Polaris Hall. Designed by Roger Duffy, FAIA, of SOM's New York office, the $40 million, 46,500-square-foot building—funded by a combination of tax dollars and private donations—is the most significant addition to the academy in decades. The tilted tower, a short walk from the chapel, both pays homage to Netsch's rigorous Modernism and is also a radical departure from it. Duffy insists the CCLD is appropriately scaled and "respectful" of Netsch's original buildings. But there's no doubt that it steals some of the chapel's architectural thunder.

Surprisingly, there's been little controversy over the new building, which finally opened in April after numerous construction delays. (Early on, workers digging the foundation encountered a boulder the size of a semi-truck, and later it was discovered that the tower was about an inch out of alignment. Last fall, just as the building was about to finally open, a pipe in the fire sprinkler system burst, causing extensive damage—and more delays.) Although SOM's design was widely published online when ground was broken in 2012, the completed structure has received scant attention, even among architects and critics. So how did a 105-foot-tall glass-and-steel tower end up rising in the middle of a National Historic Landmark District?

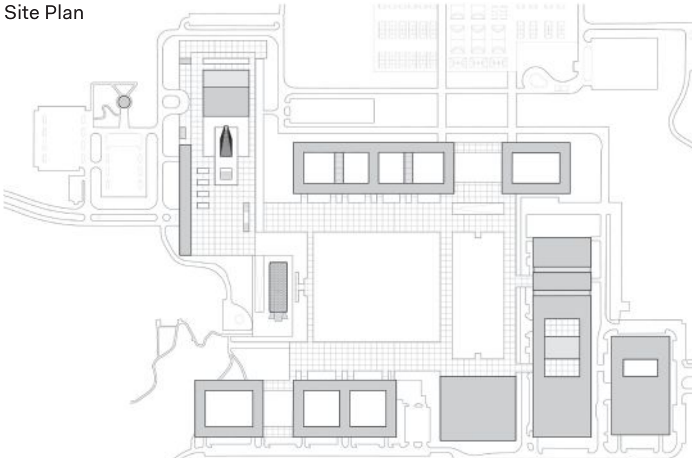
A Question of Honor

It helps to understand that one of the academy's stated goals is to train and develop "leaders of character."

The CCLD tower, canted at a 39-degree angle in order to align with the North Star

MAGDA BIERNAT

Site Plan



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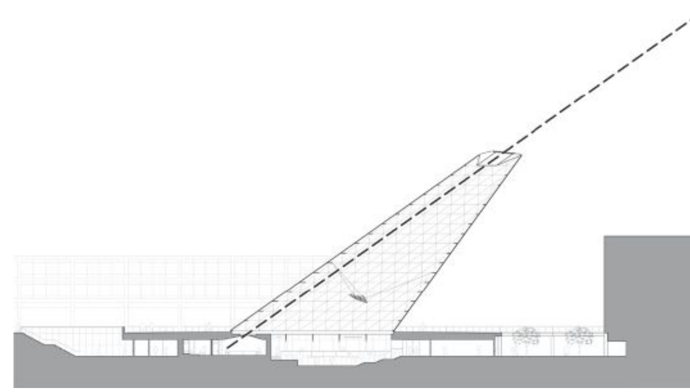
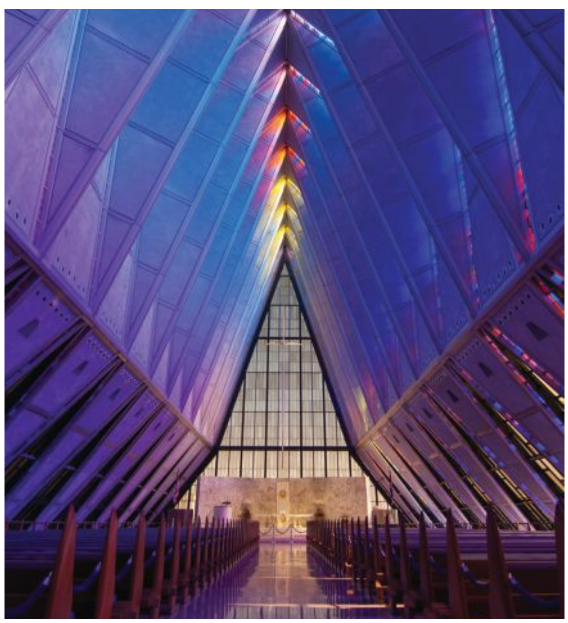
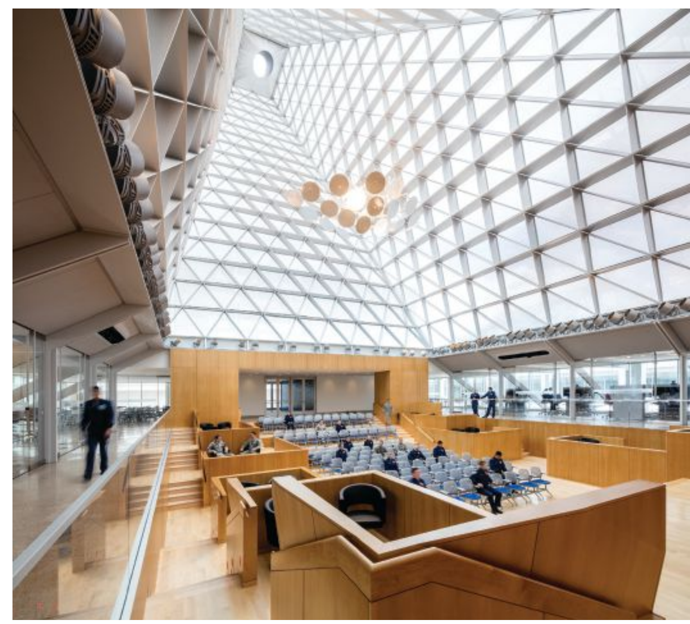




Academy chapel interior



CCLD interior

LEFT: DANIEL BOURQUE; RIGHT: MAGDA BIERNAT

Cadets pledge to adhere to an honor code: “We will not lie, steal, or cheat, nor tolerate among us anyone who does.” Those words are inscribed in large letters on the academy’s Honor Wall.

But the academy has been plagued by scandal over the years. In 2003, numerous charges of sexual assault resulted in the removal of four top officers, including the superintendent. Two years later, critics alleged that some academy staff members were pushing evangelical Christian beliefs on cadets. And most recently, in 2014, 40 freshmen were suspected of cheating on a chemistry assignment (10 of the students were found guilty).

In 2005, then-superintendent Lt. Gen. John F. Regni began exploring the idea of a dedicated building for leadership and character training. As Regni recalled in a 2012 paper, the academy’s mandatory leadership classes were “somewhat general [and] cursory,” and they were held in classrooms scattered across the campus. Honor code hearings were conducted in a windowless conference room in Fairchild Hall, the main academic building. “It became obvious the core mission of the academy was being accomplished on the cheap,” Regni wrote.

At the urging of a group of influential alumni, Regni developed a plan for a new facility that would make a powerful statement about the importance of moral and character education. “It became evident,” Regni wrote, that the building deserved to be “the next iconic structure after the chapel.”

Duane Boyle, AIA, is the academy’s resident architect.“We knew that putting an iconic building into what’s considered the heart of the historic landmark district could be very controversial,” he says. Boyle, a civilian, is not your typical government bureaucrat. He grew up in a neighborhood outside the academy’s south entrance and was inspired to become an architect

by his frequent visits to the campus. He even worked for a time at SOM. At the academy, he led the effort to get the Cadet Area listed as a landmark. At the same time, he insists, "We're not just this architectural gem that's stuck in time. We're a university campus, and you have to evolve."

Regni and Boyle both agreed that any new building should be grounded in Netsch's architectural principles for the academy, and that it had to be a complementary structure, not one that would detract from the Cadet Area's historic character. They concluded that the best firm for the job was the one that had designed the academy in the first place: SOM. Boyle contacted the firm's New York, Chicago, and San Francisco offices. "Each jumped at the opportunity," says Regni. "We decided to open a friendly competition, pitting each office against each other to independently develop their own design."

Overwhelmed at the Challenge

In New York, Roger Duffy felt the weight of the assignment immediately. "It was a very imposing challenge," he says. "We weren't exactly sure how to approach the project. It took us a while to get our heads around it. I mean, the last thing anyone wants to do is make a wrong move at a place like that."

Although Duffy, 59, had once met the famously irascible Netsch in Chicago ("He was a big man with a booming personality," Duffy recalls), he had never visited the academy. So he flew to Colorado Springs and toured the chapel, of course, with its dramatic tetrahedron-and-stained-glass interior. But he also took note of the stunning assemblage of buildings designed by Netsch using a 7-foot organizing grid, and the immense plaza known as the Terrazzo, where freshman cadets ("doolies") are required to jog to and from classes in straight lines formed by marble strips, one of many strict rules imposed on first-year students.

"I was quite overwhelmed," Duffy recalls. Visitors to the academy enter the Cadet Area at its highest point, which offers a stunning view of the entire site. "You sort of look out and down over the campus. You just in one gestalt moment 'get it.' Somehow I didn't think it would be so powerful, but it is. I love the level of rigor that Netsch and [Gordon] Bunshaft"—SOM's longtime chief of design—"imposed on everything."

Academy officials wanted the building to be in a prominent location, and they zeroed in on an area called the Honor Court, a large public plaza not far from the chapel. Duffy chose a site on the north end of the Honor Court, adjacent to Arnold Hall, a white-marble box that serves as the academy's social hall. Much of the CCLD is set below the plaza, in a little-used former courtyard space. Visitors enter the building by walking down a wide granite staircase from the plaza level. Classrooms, meeting rooms, and offices ring the remaining courtyard, allowing natural light to stream in.

Inside, Duffy adhered to Netsch's 7-foot grid, and he used materials—such as Murano glass tiles on the walls near the main entrance—that mimic those found elsewhere at the academy. (It was Bunshaft who suggested the use of red, blue, and yellow Italian mosaics at vestibules.)

The CCLD's most striking feature is the tower canted at a 39-degree angle in order to align with the North Star, symbolizing the academy's "unchanging core values," Boyle says. The tower's four sides taper to a squared-off roof containing an oculus. From inside the CCLD's Honor Board Room, a cadet accused of violating the academy's honor code can look up at night and see Polaris through the opening, an intimidating reminder, perhaps, of the value of a moral compass. The glass tower also serves as a majestic skylight for the CCLD's "forum," a large gathering space for meetings and TED Talk–style events, which is located next to the board room but doesn't share the same alignment with Polaris.

Duffy concedes the CCLD's tilted tower is a departure from the academy's strict geometric grid, with its abundance of straight lines and right angles.

The CCLD's Honor Board Room

Previously, only the expressionistic chapel stood apart from the orderly rationalism of the other architecture. While the CCLD isn't as massive as Netsch's celebrated building, it does compete with it visually.

Duffy insists the CCLD is appropriately scaled and "respectful" of the chapel and Netsch's other buildings. He intentionally placed the tower's steel trusses on the inside, with smooth glass on the outside, in order to make the building even less sculptural than it is. "If we had inverted the structure and put it on the outside,"

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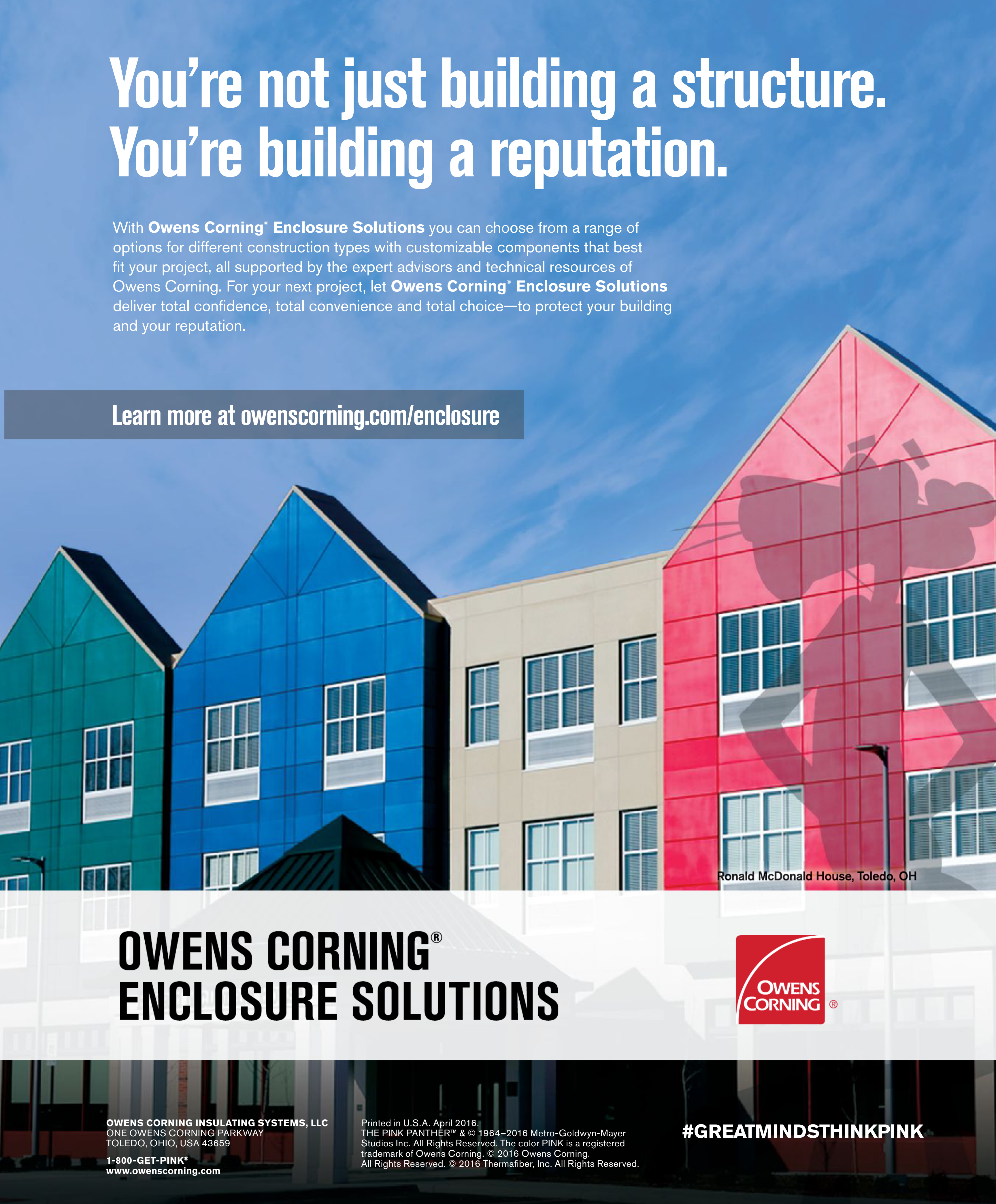
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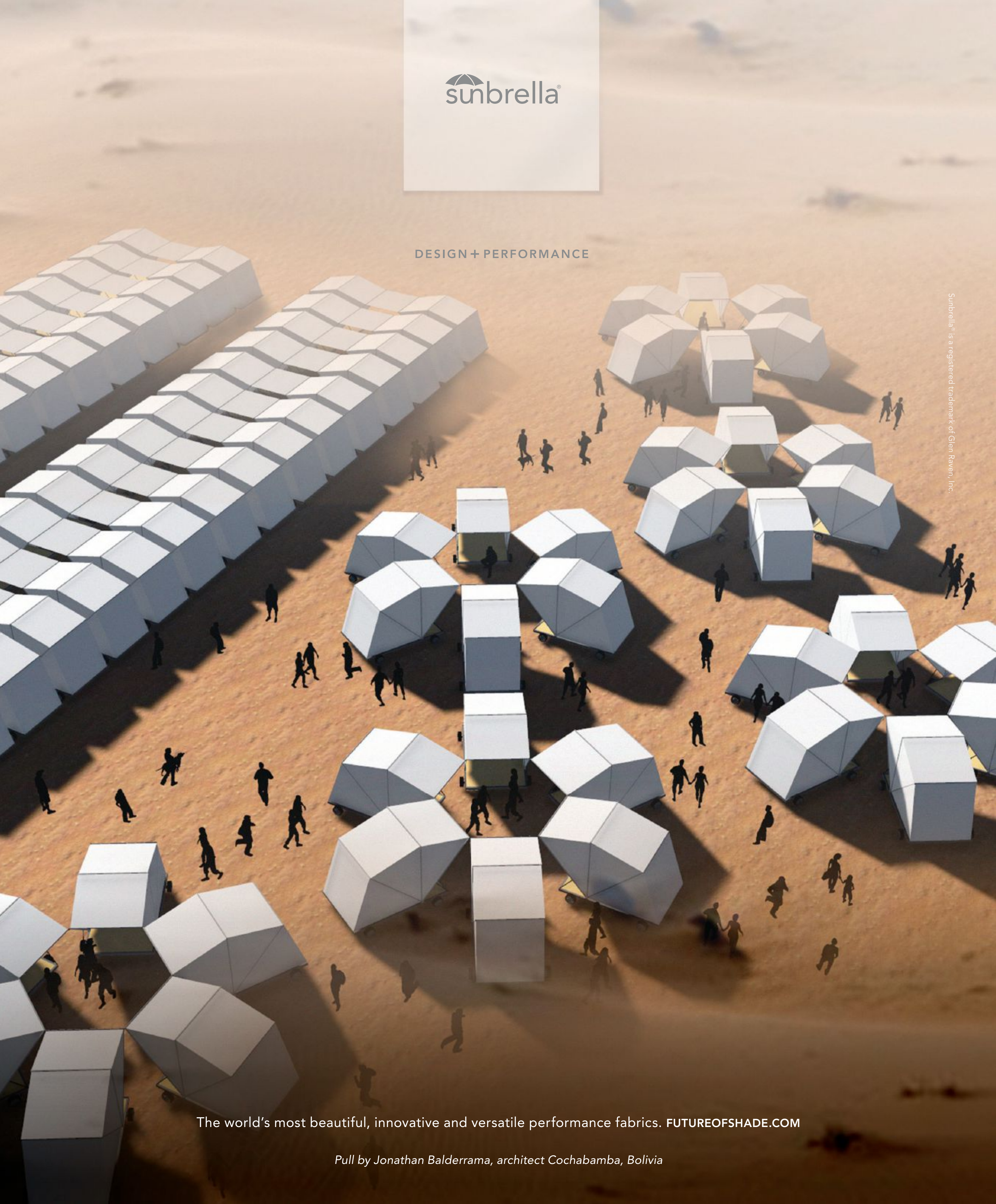
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Pull by Jonathan Balderrama, architect Cochabamba, Bolivia

he says, "I think there would have been more tension between the CCLD and the chapel."

Competing Proposals

The competition's other entries were by Brian Lee, FAIA, a design partner with SOM's Chicago office, who conceived of a cylindrical building—also next to Arnold Hall—comprising a structural steel "basket" surrounded by glass; and Craig Hartman, FAIA, a design partner based in SOM's San Francisco office, who chose a site somewhat closer to the chapel for a striking glass box supported on the inside by a series of angled steel struts.

The jury was made up of academy officials (including Regni) and two prominent architecture scholars—Joan Ockman, then-director of the Temple Hoyne Buell Center for the Study of American Architecture at Columbia University, and Kent Kleinman, AIA, dean of Cornell University's College of Architecture. They had "a good deal of debate" over the three entries, as Ockman recalls. In the end, Duffy's design prevailed, she says, because "it calls attention to itself as a leadership center" while keeping a respectful distance from the chapel. It helped that much of the building is set below the plaza level."It was a difficult task to design a building that would fit right in to that campus, rather than to site it

"I hate to say that nothing is holy in architecture, but the fact is, needs change over time, and the academy is a campus with 21st century needs. You can't just preserve it in amber."

—Robert Nauman, architectural historian, University of Colorado

off the main grid. That would have been much easier," says Ockman, now a distinguished senior fellow at the University of Pennsylvania School of Design. But Duffy, she believes, really pulled it off.

An advisory panel that included Joseph Saldibar, architectural services manager at the Colorado Historical Society; Tom Keohan, historical architect at the National Park Service; and Robert Nauman, an architectural historian at the University of Colorado, also signed off on Duffy's design. "We felt that it was the most compatible with the academy's existing architecture," Keohan says, "and had the least impact on the historical integrity of the site."

Not that they could have stopped the project. Saldibar points out that any changes to National Historic Landmarks proposed by federal agencies are subject to the Historic Preservation Act's Section 106 review process, but that the process is limited in what it can achieve. "We have the ability to make recommendations on the proposals, and under the law, the academy is required to take those recommendations into account. But they're not required to change anything. They can really choose to do pretty much anything they want in a historic landmark district: Add buildings, tear down buildings, significantly alter buildings."

Says Nauman: "I hate to say that nothing is holy in architecture, but the fact is, needs change over time, and the academy is a campus with 21st century needs. You can't just preserve it in amber."

As he sees it, the CCLD symbolically shifts attention away from a religious building—"meant to be a marker in the Cold War against godless communism"—to a secular building. "And that's more appropriate in today's world."

Netsch's Ghost

What would Walter think? "I suspect he wouldn't be particularly favorable about drawing attention away from his chapel," Nauman responds.

Boyle, however, thinks it's highly possible that Netsch would have approved of Duffy's design. In the late 1990s, he says, Netsch drew up conceptual plans for a "meditation center," a response to increasing demand for worship space from alternative religious groups at the academy. "It was a triangulated glass building with a squared-off cone," Boyle says, "a very towering structure, similar to SOM's design for the new building. But it was even taller, and would have been closer to the chapel."

It was never built, but Boyle believes it demonstrates that Netsch, who died in 2008, wasn't opposed to architectural alterations at the academy, even in the hallowed Cadet Area.

In any case, Polaris Hall seems to have been largely embraced by students, faculty, and administrators. As for the architectural community, "there's been practically zero interest," Boyle says. "It's really odd."

Still, Boyle, whose next project is a long-planned restoration of the Cadet Chapel, seems relieved to have dodged a bullet. "I did what I could to try to head off any controversy," he says. "So far, there hasn't been any, but it could still happen."


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“*Playboy* did more for modern architecture and design than any architectural journal or even the Museum of Modern Art.”

***Playboy* and the Architecture of Seduction** by Karrie Jacobs

Ant Farm's "House of the Century," as featured in a 1973 issue of *Playboy*

Read Beatriz Colomina's essay, "The Split Wall: Domestic Voyeurism," published in a collection she edited titled *Sexuality and Space* (Princeton Architectural Press, 1992), and you might get the impression that early modernist architects like Adolf Loos and Le Corbusier were playing a highly abstract game of peek-a-boo. An architectural historian, Colomina did her best to tease out traces of carnality in the peculiar ways those architects arranged their interior perspectives. Le Corbusier didn't give her a lot to work with, but Loos obliged Colomina with his famously unbuilt—and probably never actually commissioned—home for the chanteuse Josephine Baker. His design had a swimming pool at its center, with all the other rooms arranged around it, making views of the pool and its occupant, presumably Baker, "the focus of the visitors' gaze."

Given the limited rewards of basing any sexual theory on the work of those rather bloodless men, it's no surprise that Colomina, a professor of architecture at Princeton University, would be swept away by the dazzling fecundity of *Playboy* magazine's approach to modernist architecture and design. You want Sexuality and Space? Just take a look at any issue of *Playboy* from 1953, when the magazine was launched by Hugh Hefner, through the 1970s, when it hit its peak circulation of more than 7 million readers. Those years are the basis for an exhibition curated by Colomina (together with Pep Aviles, an architect and historian who's a Princeton doctoral student), "Playboy Architecture 1953–1979," on view at the Elmhurst Museum in suburban Chicago until Aug. 28.

During the postwar decades, the magazine presented an amazing cornucopia of high-quality, often radical, architecture from Frank Lloyd Wright, Buckminster Fuller, Ant Farm, Paolo Soleri, Charles Moore, and many others, plus furniture from midcentury standard-bearers such as George Nelson and Charles Eames (predictably minus Ray), and Italian designer Joe Colombo. *Playboy*'s style of presentation, naturally, differed from that of the architectural journals of the day. For starters, the magazine's photographs and illustrations were in full color. More significantly, it featured homes and apartments that were brimming with life, generally populated with naked women. As Colomina framed it in a recent Graham Foundation lecture, *Playboy* was "bringing bodies to the space."

A Tool for Seduction

The fact that *Playboy* was so crammed with architectural ideas in its early decades was once, apparently, common knowledge. In the introduction to the 1963 edition of his landmark tome, *Space Time and Architecture* (Harvard University Press), Siegfried Gideon went on a tear against "playboy-architecture," which he defined as "architecture treated as playboys treat life, jumping from one sensation to another and quickly bored with everything." The word "playboy" apparently meant to Gideon what the word "starchitect" means to us today. On the other hand, Reyner Banham applauded the magazine and its culture in a 1960 essay for *The Architect's Journal* titled, "I'd Crawl a Mile for a Playboy."

But in recent decades, *Playboy* left architecture behind, and the enthusiasm with which the magazine once covered the subject was forgotten. At least until Colomina and her students unearthed it. "I would invite surviving protagonists from that period like Chip Lord from Ant Farm to give a lecture at Princeton and he'd send a CV," Colomina told me, explaining how she'd discovered this lost piece of architectural history. "I'd look at the CV and I'd realize, 'Oh, he was published in *Playboy*.'"

She noticed that this was true of other architects. "So I realized there was a lot of architecture in *Playboy*, to make the story short. Of course, then I did a systematic study with the Media and Modernity students of Princeton in which basically I asked Princeton to buy all the *Playboys*."

Why was *Playboy* was so focused on architecture? "They really felt that this was an important tool—actually crucial—for seduction," Colomina told me. "The modern apartment is a necessity for the bachelor, who has to surround himself with all these gadgets and all this modern furniture, and eventually even the architecture, the Playboy Pad. These are the settings in which seduction happens."

I put the same question to the magazine's current editorial director, Jason Buhrmester, who's been working for *Playboy* for a mere 15 years but says he has read every back issue. His answer parallels Colomina's,

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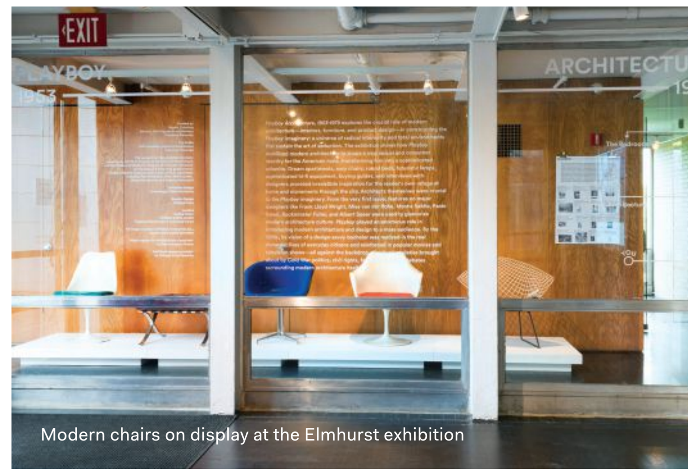
The Playboy Townhouse, as featured in a 1962 issue



Modern chairs on display at the Elmhurst exhibition

but paints a bigger picture. "*Playboy* was created in that perfect storm after World War II which Hef was a part of," Buhrmester explains. "This idea of taking all of these young men who were from small towns all over America and who were expected to marry the girl next door, and suddenly they go to war, and they come back, and they're a generation that's wildly different. So you have this kid from the middle of nowhere, and he's been to Paris, and he's been to Amsterdam, and he's been through Hawaii. ... It really is that 'You can't go home again, I've seen too much' philosophy ... which is exactly what happened to Hef. That really birthed the idea of the bachelor."

From Buhrmester's point of view, architecture was just one element in Hefner's larger project, the reinvention of American manhood: "Architecture and design were a natural part of that, because a lot of it was Hef taking on what he perceived as these rigid pillars of what masculinity meant. In the first issue, in his editor's letter, he talks about, 'This isn't *Field and Stream*. We aren't interested in hunting. We aren't interested in fishing. We would rather have a cocktail and talk about Nietzsche and listen to jazz.'"

Colomina, seduced by her discovery, contends that *Playboy* is the reason Modernism entered the American mainstream in the postwar decades. "Hefner made it mainstream," she told me. "That's the point of the exhibition, that *Playboy* did more for modern

TOP: BEATRIZ COLOMINA; BOTTOM: ELMHURST MUSEUM

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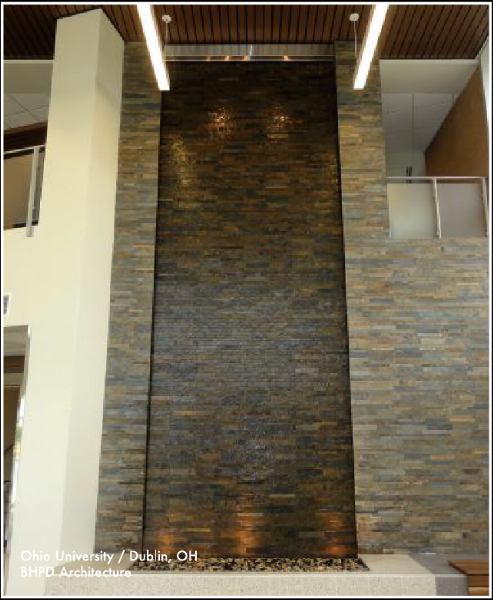

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architecture and design than any architectural journal or even the Museum of Modern Art."

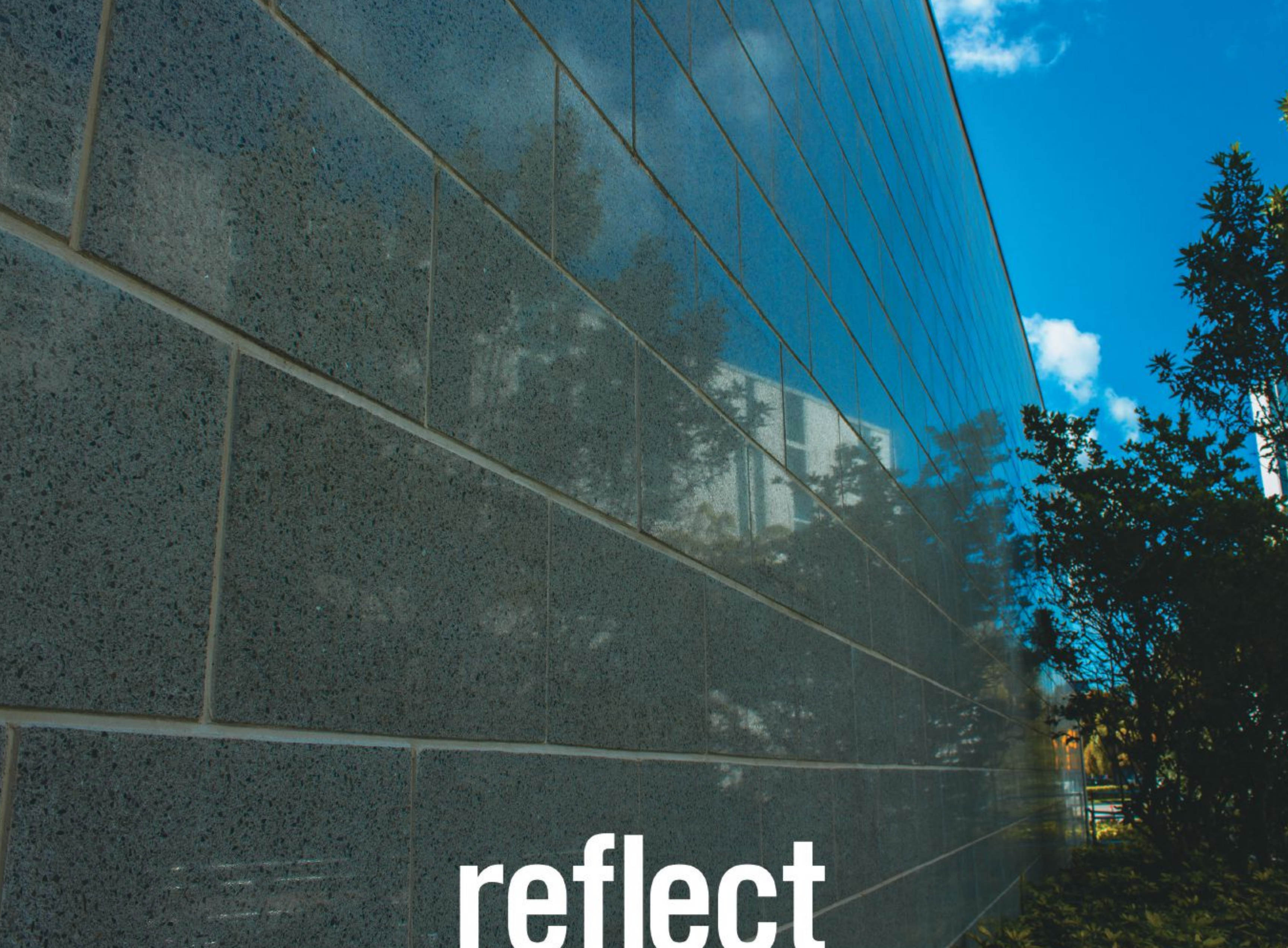
It's a difficult claim to prove. For one thing, it's a chicken and egg question. Modern design had gained widespread notoriety well before Hefner launched *Playboy*. In 1949, for instance, Richard Neutra made the cover of *Time*, and *Life* ran a feature showing how photographer Julius Shulman "glamorized" modern houses. Moreover, Modernism had already become part of everyday life, widely used in corporate and institutional settings. Eames plywood chairs, for example, were found in churches and schools more than homes. So *Playboy* was really reflecting, and amplifying, a modernist upswing that had begun before its launch.

I think it's safer to say that *Playboy* was a major player in the wholesale reinvention of American life that was happening then. Characters as disparate as Helen Gurley Brown (who turned *Cosmopolitan* magazine into a career girl bible in 1965) and Betty Friedan (whose 1963 book, *The Feminine Mystique*, is one of the pillars of American feminism) were busy reimagining what it meant to be a woman. Hefner, whose magazine represented everything the women's movement was against, was, in a way, a fellow-traveler, reimagining what it meant to be a man. Buhrmester points out that *Playboy* stood out in its early years in part because it was a men's magazine with almost no sports coverage. Of Hefner, Buhrmester says, "He's not a sports fan. He never has been." He continues, "You take sports out and you put art and design in its place and you kind of understand what Hef was trying to do."

Mies in Elmhurst

The exhibition itself, while fascinating, is not very grand; Elmhurst is a small museum. The show mainly consists of thematic clusters of *Playboy* features, reproduced and mounted on easels, accompanied by examples of midcentury furniture like Eero Saarinen's Womb Chair or Harry Bertoia's Diamond Chair. There are several dollhouse-scaled mock-ups of significant artifacts like the Big Bunny, as Hefner's private jet was called, and his famous round bed, the place where he came to spend most of his waking and sleeping hours.

What's extraordinary about the show, the thing


reflect

that justifies the 30-minute train ride from central Chicago, is the fact that it's set in a Ludwig Mies van der Rohe–designed house, one of only three private homes the architect designed in this country. The Elmhurst Mies was built in 1952 for Robert Hall McCormick Jr., the son of the developer of the architect's famous apartments at 860–880 Lakeshore Drive in Chicago. The house, with its two rectangular wings, was acquired by the museum in 1992, relocated, and eventually incorporated into a 1997 museum building. Oddly,

I wound up sitting on the gallery floor going through the magazines like a little kid who'd just happened on her dad's secret stash.

with its quiet domesticity, the house undercuts one of Colomina's central arguments. It's lovely, but it lacks that seductive *Playboy* sheen.

For me, the greatest pleasure of this exhibition wasn't the displays or even the landmark house, but the fact that many back issues of *Playboy* were sitting out in the open, available for perusing. I wound up sitting on the gallery floor going through the magazines like a little kid who'd just happened on her dad's secret stash. Putting aside the centerfolds, the bawdy cartoons, and the stupid party jokes, the editorial content was so varied and smart that it puts today's magazines to shame. You can interpret this one of two ways. Either Hefner's new urban man was so sophisticated that he actually was looking to John Lautner or Moshe Safdie, FAIA, for new ideas about how to live, or because it was really the centerfolds that sold the magazine, *Playboy*'s editors had the freedom to be as outré as they wished in other arenas.

To be sure, the exhibition is an eye opener, an unexpected perspective on the social and cultural changes we associate with the Sixties.

But the museum show is just an amuse-bouche. What's really called for is a book, a thick one, with high-quality reproductions of *Playboy*'s architecture archives and thoughtful analysis of the issues this show raises about the surprisingly intertwined revolutions, architectural and sexual.

Center for Asian Art
John and Mable Ringling Museum of Art
Sarasota, Fla.
Machado Silvetti

INTERVIEW BY NATE BERG
PHOTOS BY ANTON GRASSL/ESTO

What was your scope of work at the Ringling, and what is the site's context?
Rodolfo Machado, INTL. ASSOC. AIA: The project is on a campus that was built in the 1930s, and has been added on to at various times. Our site is at the end of one of two pink stucco wings that expand the original 1931 museum building, and on the other side of our site is a 1970s gray stucco academic building that houses offices, a library, and meeting rooms. The showcase part of our project—the jewel in the ring—is an entry pavilion to the museum's Asian art collection, and its design comes from a desire by the client to have something different, with its own identity, that is a representation of the lovely collection inside and the status of Asian art at the Ringling. And also from the desire for it to be an attractor, a piece with some sort of visual interest that people would like to go see. It houses three things: At the ground level, there is a covered loggia that is low and shaded. On the second floor, you have a new art gallery for contemporary exhibits. And on the third floor, there is a multipurpose room, which functions as an auditorium, as a dining hall, as many other things.

But our project is actually much larger than the green pavilion—the other part, which is rather traditional, is within the existing wing and is very respectful of the old museum conditions. There, we created a new red-painted entry hallway, and new galleries, laboratories, and classrooms.

In a very broad architectural sense, this complex has a lot going on. How does your addition fit into the site?
I think it brings it up to date. The campus is beautiful and the vegetation is incredible. The collection is fantastic, and so is the original building. You could call it Spanish Venetian Renaissance Revival—a typical Gilded Age folly in the park. It's quite a beautiful thing. But what affected our building the most was the desire to be different. To use a 21st-century iconography to do something that belongs in Florida, that represents the collection, that is sensual and beautiful, and that uses today's geometries.

How much did the notion of drawing people in with the pavilion affect the way that you approached the design?
It was a consideration but not an overriding one. We're not doing Disney World, we're doing architecture. So popularity has a place and is a good thing, but it's not just about attracting people. It's also about a good disciplinary kind of architecture.

What drove the design of the pavilion's tiled façade?
Materially, we chose terra-cotta because the structure is a piece in a garden, and the garden pavilion has always been a light green terra-cotta with golden edges. But the material is also in the traditional buildings on the Ringling campus, like the John and Mable Ringling House—it is on the floors and inlaid in the walls.

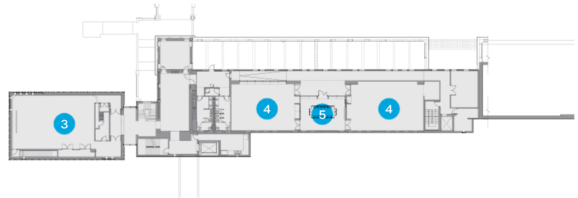
For the tiles on our pavilion, we worked with an excellent factory, Boston Valley Terra Cotta outside of Buffalo, N.Y., and the size of the tiles was determined by the fabrication process. There are three sizes, small ones, little bit larger ones, and then the corners, which are different. The tiles' geometry makes the building contemporary but also seductive and soft.

The color was chosen because of the green tile in Chinese architecture and gardens, and the green jade sculptures that are part of the collection. But it was also influenced by the vegetation—the exuberant big, thick leaves of Floridian gardens. Some may also see other things, like the leaves of an artichoke. That's fine. Actually, I love that, because when a building is rich and original, people read it differently, which is good.

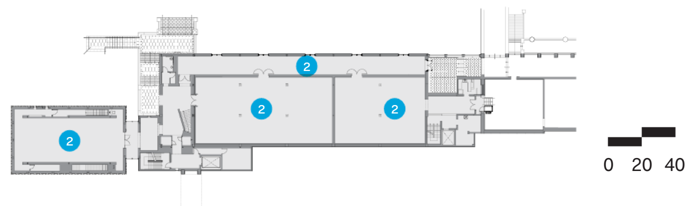
How did you determine the window arrangement?
First, I should tell you that the windows are the most expensive thing in the building. To make those perforations was very expensive, much higher than the cost of the solid pieces. Originally, we had more of them and we had to bring down the number because of a tight budget. But they are placed in such a way that when you are inside the room looking out through those frames, you will see little pieces of landscape. It's like a collection of many small paintings on the wall of the room. Sometimes it's the horizon, and sometimes only clouds or green grass. Sometimes, to see a beautiful view this way is more appealing than to see through a picture window. The eye becomes more selective when you see through small frames. They are mostly on the third floor where the lecture hall is, and are used very sporadically on the second floor so as not to impede the function of the gallery by bringing in natural light.

You note that the budget was limited. Did this change your approach to the design?
Maybe with some material choices: The floor in the entry lobby was supposed to be stone, but it became tile. But I don't like to lament those things—it is the reality for any architect anywhere. The important thing is to know how to design with the money you have, not the money you wish to have. There's a lot of pragmatism in this building. It's a rectangular box with three floors of public places, one stuck on top of each other—that's very practical thinking. But once you have that going according to budget and function, you make the most beautiful thing you can with that.

Third-Floor Plan



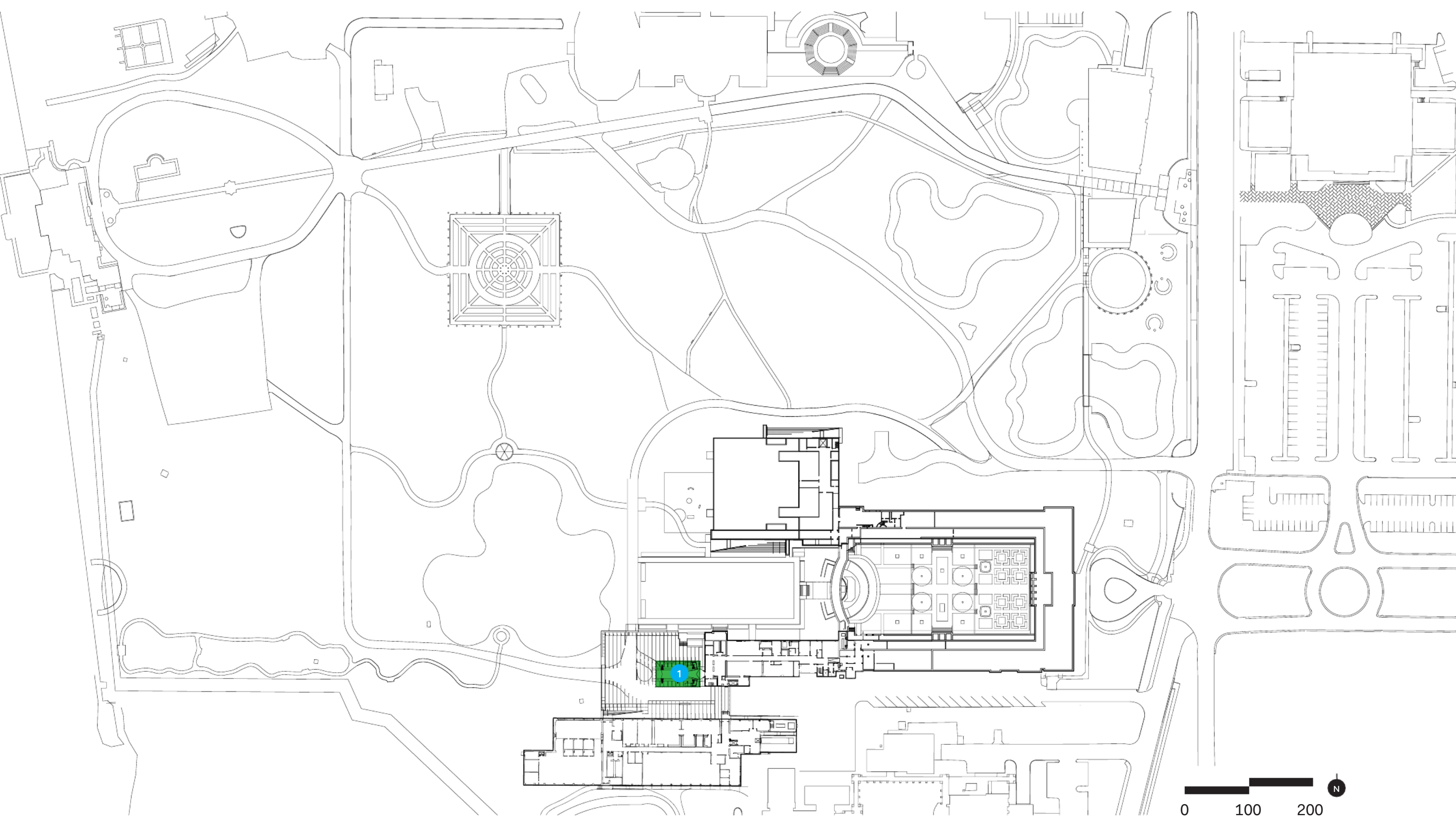
Second-Floor Plan



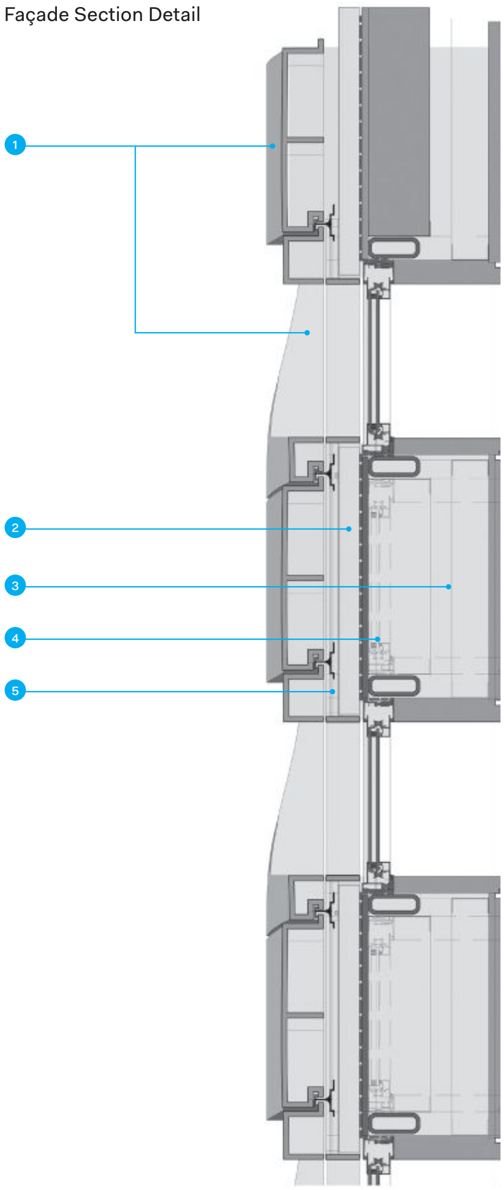
Previous Spread: View of pavilion from northwest showing ground-level loggia

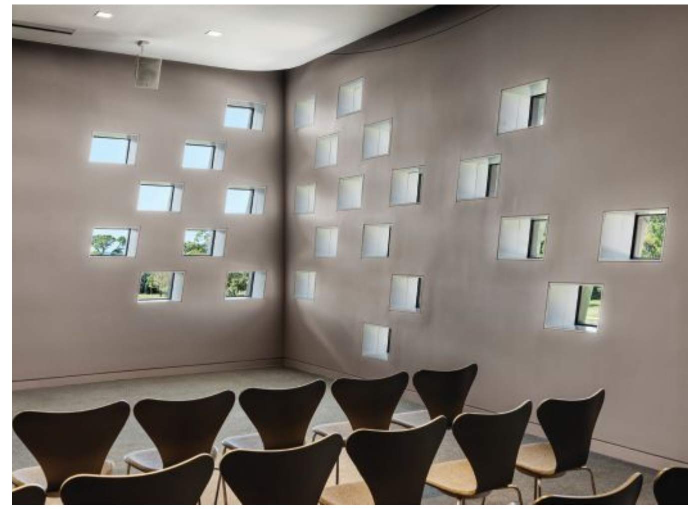
1. Pavilion
2. Gallery
3. Lecture hall
4. Storage
5. Seminar room

Site Plan



Façade Section Detail





Opposite: View of pavilion from the southeast showing glazed joint to existing building

Above: Third-floor seminar room

1. Terra-cotta façade panel
2. 2" mineral wool insulation
3. Cold-formed metal frame infill to provide continuous sheathing and support surface for standard TerraClad track
4. Line of adjacent window behind
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Second-floor gallery in new pavilion
with view to renovated galleries beyond

Project Credits

Project: The Center for Asian Art in the Dr. Helga Wall-Apelt Gallery of Asian Art at the John and Mable Ringling Museum of Art, Sarasota, Fla.
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Design Architect: Machado Silvetti, Boston · Rodolfo Machado, INTL. ASSOC. AIA (principal designer); Craig Mutter, AIA (project architect/project director); Jamie Setzler (project manager); Jeffry Burchard, AIA (senior designer); Keely McKown, Dany Gutierrez, Jayne Kang, Christian Lavista, Nicolas Viterbo (project team)
Local Consultant Architect: Sweet Sparkman Architects
Civil Engineers: AM Engineering
Geotechnical Engineers: Universal Engineering Sciences
Structural Engineers: Stirling and Wilbur Engineering Group
M/E/P/FP/AV/IT/SEC: TLC Engineering for Architecture
Landscape Architects: DWY Landscape Architects
Lighting Design: Lam Partners
Specifications: Kalin Associates
Code Consultants: Rolf Jensen and Associates
Exterior Envelope: Simpson Gumpertz & Heger
Size: 7,500 square feet (addition); 19,000 square feet (renovation)
Cost: $10 million

Stade de Soccer de Montréal
Montreal
Saucier+Perrotte Architectes/HCMA Architecture + Design

TEXT BY CAIA HAGEL
PHOTOS BY OLIVIER BLOUIN

The Stade de Soccer de Montréal is not your everyday sports facility, sited as it is along the pit-edge of a former quarry that is being turned into a 470-acre ecological park in the middle of one of the Canadian city's most ethnically diverse neighborhoods. The design, by celebrated local firm Saucier+Perrotte Architectes working with HCMA Architecture + Design, draws on natural forms and resources from the region such as spruce and zinc to articulate a seamless indoor–outdoor program and celebrate the landscape, multiculturalism, and the power of a working-class sport to bring communities together.

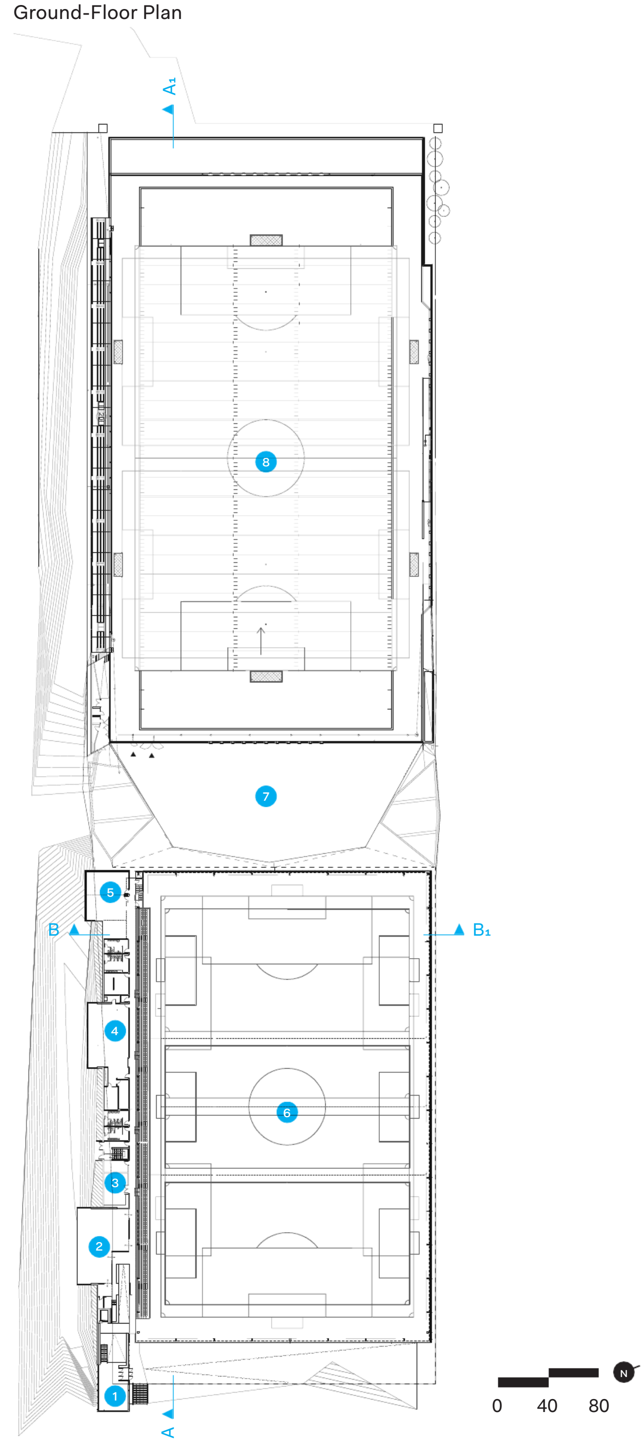
"The sports facility is emotional—it brings a diverse spectrum of people together in one environment, under one roof, united by sport," says design partner Gilles Saucier, AIA. "The Stade, we hope, is an inclusive representation of the future of international cities."

The central idea evident in the initial project sketch—a geometrically complex volume that echoes the craggy excavated face of the quarry—helped the project win a 2014 Progressive Architecture Award from ARCHITECT, and the concept has been fully realized in the built project, which opened last year: The regulation-size indoor soccer field is covered by a spectacular clear-span timber roof with an exposed, seemingly random but highly rational grid of beams on the diagonal. A slim two-story volume along one flank accommodates locker rooms, a fitness and physiotherapy room, an event space, a food court, and offices for the regional soccer association.

The exterior is clad in zinc to tie it thematically to the quarry's geological and mineral history, and a high-performance glass envelope blurs the inner and outer landscapes. Two "shoulders" of structure at the northwest edge of the indoor field extend out and fold down to form spectator seating on one side of an adjacent exterior field and a wall with team benches on the other.

To realize the complex's 44-foot-high roof, the architects brought on Québec firm Nordic Structures. Thirteen 226-foot-long glue- and cross-laminated-timber box beams, made from locally sourced wood and each weighing in at 77 metric tonnes, are combined with three 75-foot-long steel joists to form the main structure, while 3-foot-9-inch-tall lateral timber members provide secondary support at irregular but structurally purposeful angles. This disorganizing effect is exaggerated by the lighting, which includes linear fixtures mounted on the diagonal cross pieces. "If you look closely at the beams, they are not perpendicular," Saucier says. "It would have been easier to make them straight, but the angle causes the ensemble to look haphazard—just like in nature."

Ground-Floor Plan

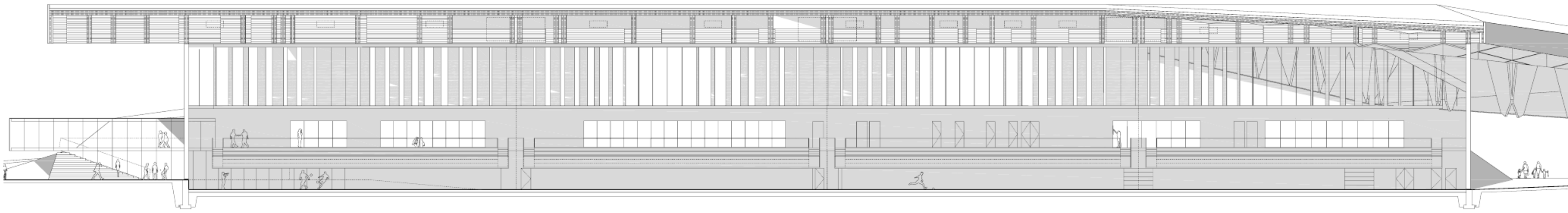


1. Lobby
2. Event space/dining area
3. Food court
4. Partner organizations
5. Multipurpose room
6. Indoor field
7. Exterior multipurpose space
8. Exterior field

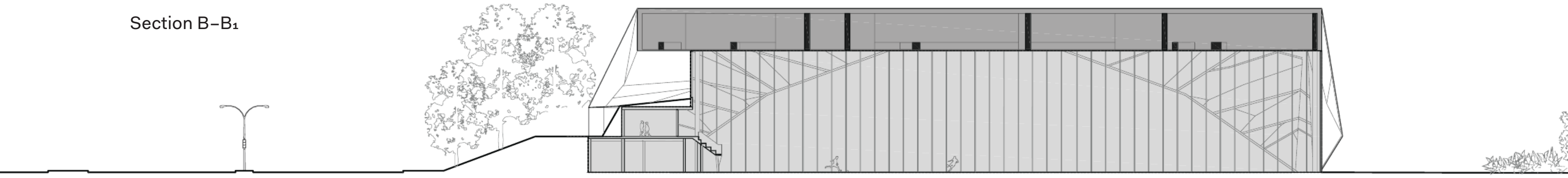
Previous Spread: View of interior field structure from the north

This Image: View of entry pavilion at the southeast corner of the structure

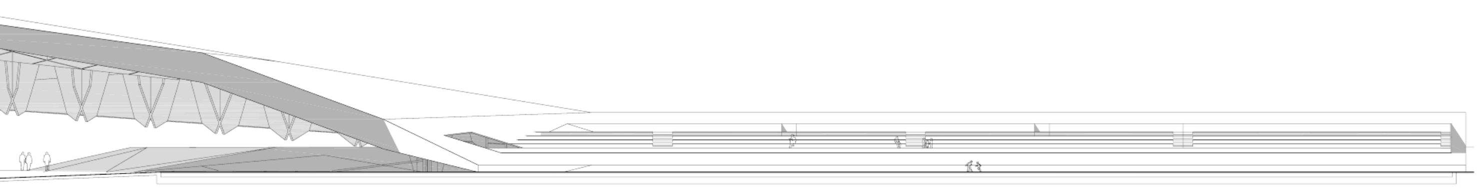
Section A–A_1



Section B–B_1



View from the northeast



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View of structure from outdoor field to the northwest

Multipurpose space at southwest corner, with a view of the roof's underside as it folds down to form seating for outdoor field

Indoor field, showing programming along southwest edge (at left)

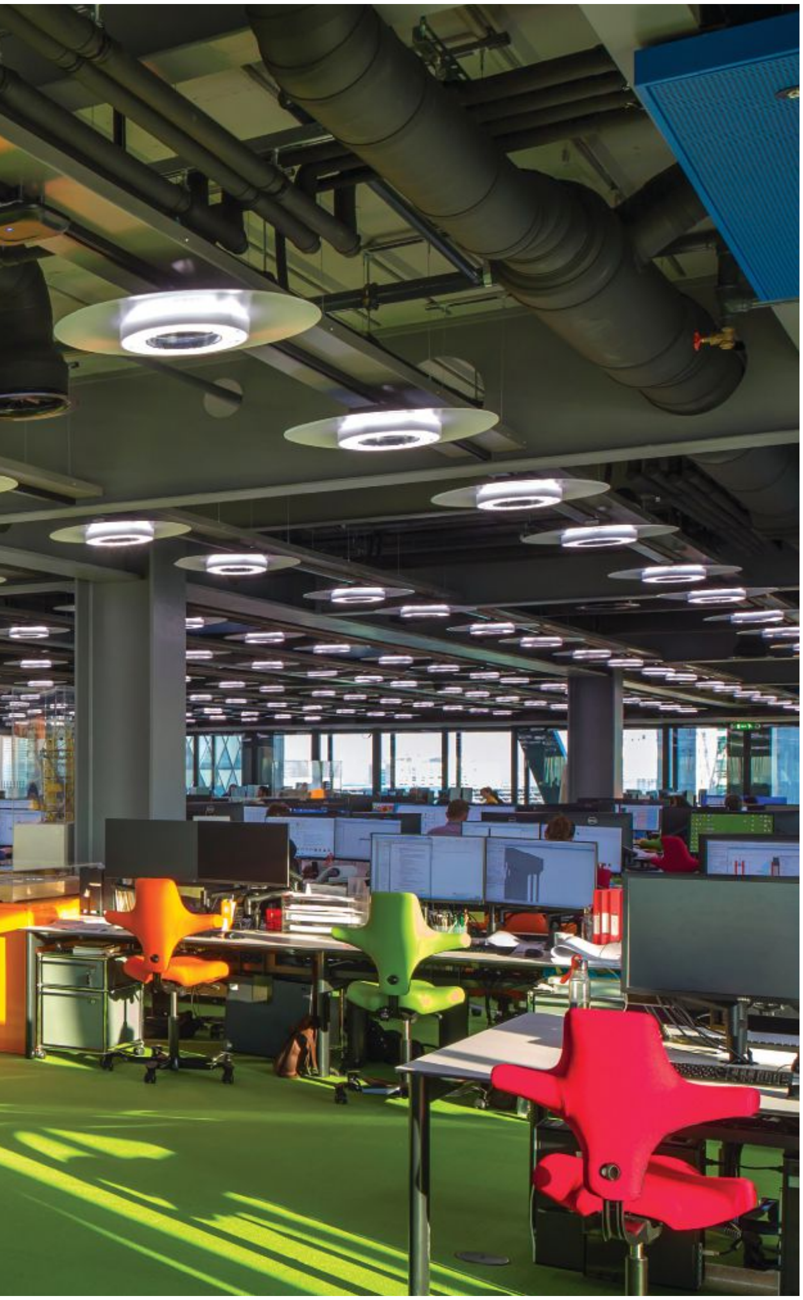
Project Credits
Project: Stade de Soccer de Montréal, Montreal
Client: City of Montreal
Design Architect: Saucier+Perrotte Architectes/HCMA Architecture + Design, Montreal/Victoria, British Columbia · Gilles Saucier, AIA (lead design architect), André Perrotte (principal-in-charge), Darryl Condon, Trevor Davies, Michael Henderson, Lia Ruccolo, Patrice Bégin, Charles-Alexandr e Dubois, Leslie Lok, David Moreaux, Yutaro Minagawa, Vedanta Balbahadur, Marc-André Tratch, Nick Worth (project team)
Structural/Civil Engineer: NCK
Mechanical/Electrical Engineer: Bouthillette Parizeau
LEED Consultant: Synairgis
Wood Structure: Nordic Structures
Landscape: WAA
Size: 402,570 square feet (site); 118,403 square feet (building footprint); 135,625 square feet (gross floor area)
Cost: Withheld

Leadenhall Building Offices
London
Rogers Stirk Harbour + Partners

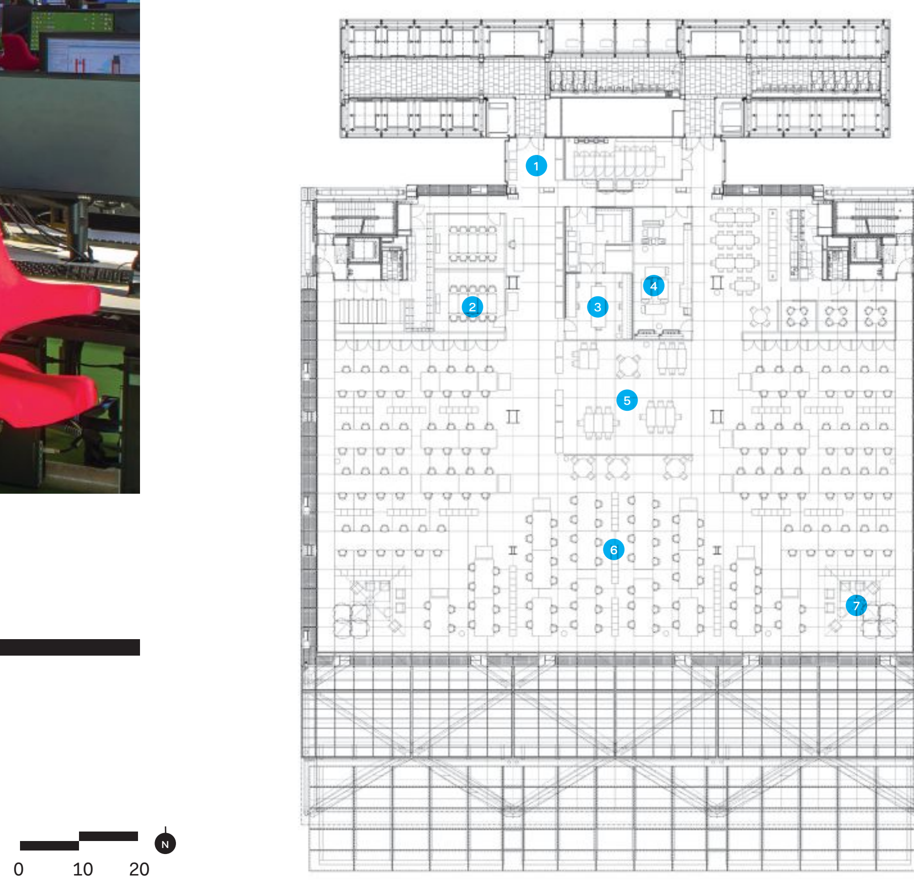
TEXT BY KATIE GERFEN
PHOTOS BY PAUL RAFTERY

With its lease expiring at the Thames Wharf complex it had called home for more than 30 years, Rogers Stirk Harbour + Partners (RSHP) set out to find a new office location for its 200-plus employees in central London. With sky-high rental rates, finding space was difficult, but when an option floor at the firm's recently completed Leadenhall Building (known as "The Cheesegrater") was offered, RSHP jumped at it. Ensconced since the beginning of the year on the tower's newly outfitted 14th floor, RSHP employees now enjoy views of Canary Wharf, St. Paul's Cathedral, and a piece of the firm's own design history: Lloyd's of London.

Back at Thames Wharf, RSHP employees were split across multiple floors in three different buildings, but now everyone shares space in a 17,438-square-foot open office. The ceiling structure was exposed to increase height and to allow visitors to "read the primary nature of the building," senior partner Graham Stirk says. A modified Ahrend benching system allows flexibility for team members to move around as new project groups form. Speirs + Major designed a lighting system with a custom version of Spectral Lighting's Iris fixture; color temperatures and light levels change during the day to reduce eye strain. Bringing everyone together in one space "felt like an intellectual shift," Stirk says. "The connectivity is fascinating."

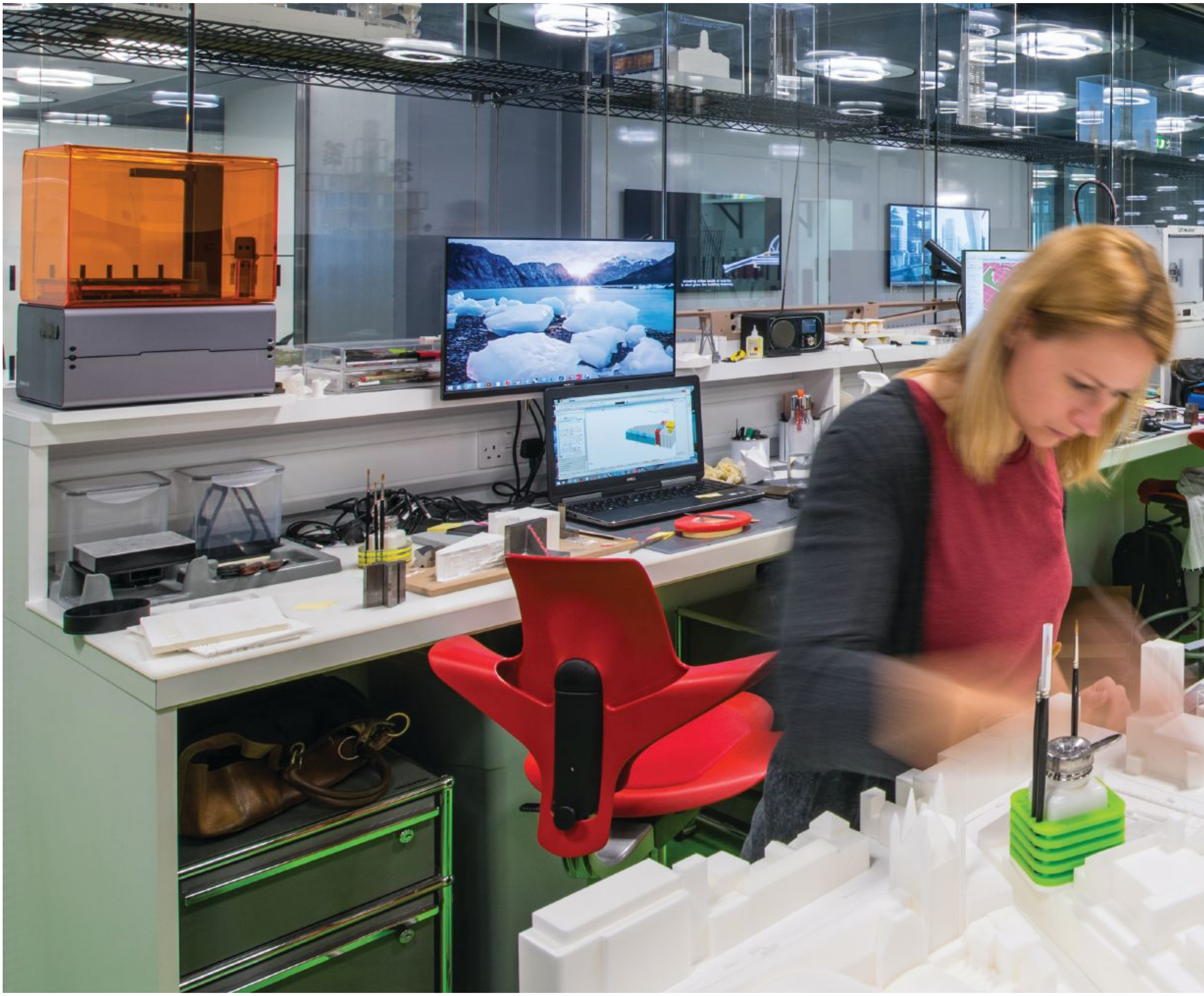


Floor Plan



1. Entrance
2. Meeting rooms
3. Model shop
4. Print shop
5. Multipurpose meeting area
6. Studio
7. Breakout space

RIGHT: BRITISH LAND/
OXFORD PROPERTIES



The enclosed spaces in the office, such as meeting rooms, print shop, and model shop (shown here), are all grouped near the building core at the north end of the floor plate to leave views from the open floor unimpeded. But these enclosed spaces are by no means hidden from view: Glass walls put the craft on display and ensure that visitors and employees alike can see every part of the design process. Even the server room is on view. What you won't find are private offices. The partners sit in the main space, and, in fact, the primary corner locations were given over to breakout areas. "It reflects a more democratic notion," Stirk says. "We exploited the corners as something that could be used by anyone."

MARK GORTON/ROGERS STIRK HARBOUR+ PARTNERS

Tk tk

The colorful interior was inspired by RSHP's overall design for the Leadenhall Building, and is a big change from the white walls at Thames Wharf. "The green carpet was a counterbalance to the neutrality of the ceiling," Stirk says. "We were working off of extreme contrast, which is what the building is about." The famed double-height model wall in the Thames Wharf studio is reimagined in the Leadenhall Building as an entrance gallery with views into the new model shop and meeting rooms. Having the life-size model of the Leadenhall Building on hand to demonstrate systems and skills to visiting clients is a boon. "You can see our enjoyment and celebration of fabric and technology," Stirk explains. The presence of the colorful studio inside a "serious office building in the City of London" also "says a great deal about our culture," Stirk says. "We're not corporate. We're designers."

Tk tk

Project Credits
Project: Rogers Stirk Harbour + Partners Office, London
Client/Design Architect: Rogers Stirk Harbour + Partners, London · Andrew Morris, Andrew Tyley, Graham Stirk, Ian Birtles, Ivan Harbour, John McElgunn, Lennart Grut, Richard Paul, Richard Rogers, HON. FAIA , Simon Smithson, Stephen Barrett, Stephen Light, Tracy Meller (partners); Maurice Brennan, Andy Young (project architects); Will Clayton, Seamus Conway, Kelly Darlington, Veronika Gilwa, Dan Hanna, Ed Hiscock, Emily Maisey, Mark Read, Annabel Rootes, Willem Kok, Andrew Yek (project team)
Structural/Service Engineer: Arup
Lighting: Speirs + Major
Contractor: Ruddy Joinery and Fit-Out Specialists
M&E Contractor: BPI
Landscape Design: Dan Pearson Studio
IT Consultants: Modern Networks/Cordless
Size: 17,438 square feet (1,620 square meters)
Contract Value: £2.3 million ($3.38 million), including £1.1 of IT

Residential: Grow Box Lexington, Mass. Merge Architects

TEXT BY EDWARD KEEGAN, AIA
PHOTOS BY JOHN HORNER

Previous Page: Exterior view from west

This Image: Double-height living area with internal courtyard (at left)

More than 12 years ago, an MIT professor bought a modest Cape Cod house on a corner lot in Lexington, Mass., and began planting an extensive garden. Not satisfied with the relationship between inside and out, he hired Boston-based Merge Architects to enlarge the structure and create a stronger connections between house and landscape. The result of the iterative design process was no simple addition focused on views, but rather a new two-story, 1,975-square-foot suburban villa whose interlocking volumes combine garden and house in one entity.

Dubbed the Grow Box by Merge principal Elizabeth Whittaker, AIA, the rectangular mass of the new house contains six recessed gardens, all but one of which are primarily experienced from the second floor. “You feel like you’re in a tree house,” Whittaker says. Only a single garden penetrates to the ground level, and the rest of the house unfolds around that 30-square-foot, glass-enclosed space, which holds a single Japanese elm emerging from a floor of moss.

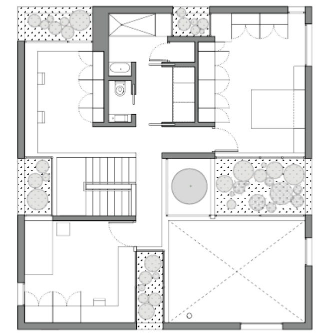
The main entry is tucked inside a blank recess facing the street and leads through a foyer into a double-height, clerestory-lit living area, a kitchen, and a dining space, all of which open onto the central glass-enclosed garden. Upstairs, the gardens divide the second floor into quadrants—occupied by the master bedroom, an office, another bedroom, and the upper portion of the living area. This configuration emphasizes the role of the garden within the house while providing sufficient distance for privacy within the relatively small footprint.

The house’s Cor-Ten steel rainscreen is punctuated by several interventions. At the first floor, shallow insets denote entries on each elevation. At the second level, the roof gardens are carved into the metal volume. Below each recessed garden, a horizontal scupper projects from the façade and drains water away from the plantings. And on each face, steel troughs convey rainwater to the ground.

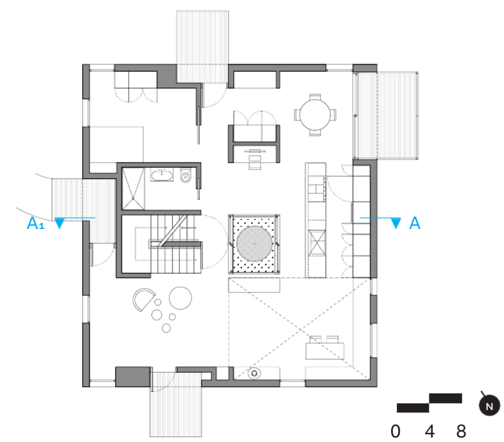
Finishes are rendered in a minimal palette, a contrast to the house’s spatial complexity. The interior is predominantly white: “It’s clean, but not too stark,” Whittaker says—noting that white oak floors and millwork add warmth. Much of the cabinetry is from IKEA, with modest customization by the architects. Outside, the Cor-Ten was left raw and mottled, giving it “a handmade quality that is unpredictable in a beautiful way,” Whittaker says.

Grow Box posits a very specific relationship with nature based on textures, colors, and rhythms found in the natural world. But unlike the previous house on site, it’s a carefully designed object that encourages the contemplation of nature and its own place within it.

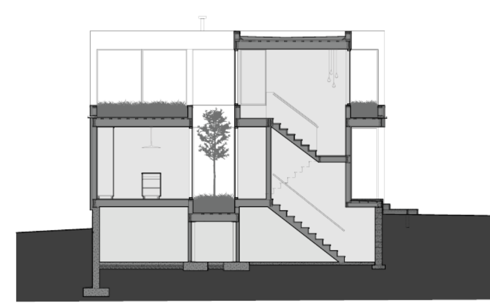
Second-Floor Plan



Ground-Floor Plan



Section A–A₁



Project Credits
Project: Grow Box, Lexington, Mass.
Client: Withheld
Design Architect: Merge Architects, Boston · Elizabeth Whittaker, AIA (principal-in-charge); Amit Oza (project manager); Allison Austin (project designer); Jamie Pelletier, Anne-Sophie Divenyi, AIA, Duncan Scovil (project team)
Structural Engineer: Evan Hankin
Steel Fabricator: Ramos Iron Work
General Contractor: Evergreen Group
Size: 1,975 square feet
Cost: $800,000

Second-floor hall, looking southeast across well of central courtyard and recessed garden

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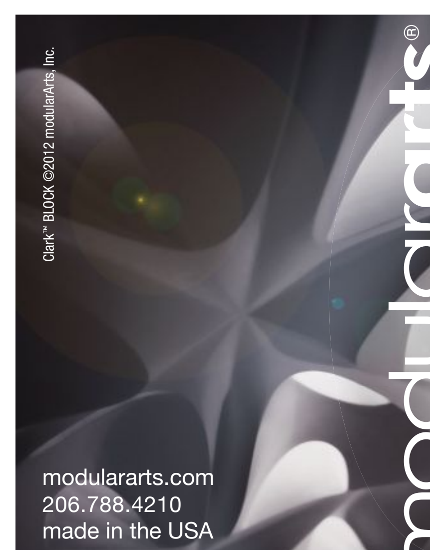

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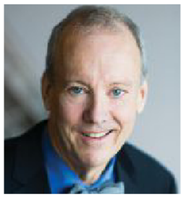

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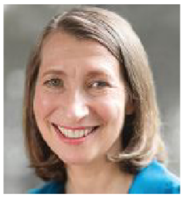

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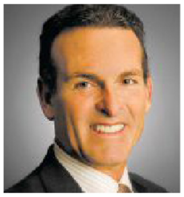

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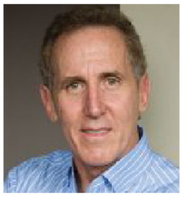

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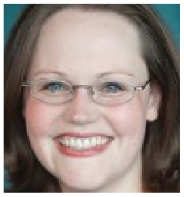

DR. SVENJA GUDELL
Chief Economist, Zillow

hanley wood
Where Data Drives Action

** issue mailed in regional editions. Publisher not liable for errors or omissions.*

Editorial: Give the Women a Raise

Architecture is anticipating a labor shortage, so firms will need to embrace socially aware policies if they want to attract and retain talent. That's what John Peterson, curator of Harvard University's Loeb Fellowship, told the audience of an ARCHITECT Live presentation at the AIA Convention in Philadelphia last month. Numerous studies support his assertion: Both Millennials and Generation Z have a deep and widespread commitment to social justice. It follows that these emerging professionals will want their employers to espouse the same values.

If you're a firm principal or partner and this all sounds daunting, don't worry: You don't need to move to Burundi and build a school (though it would be lovely if you did). Equity begins at home. A good way for firms to start embracing social justice is to simply revisit their own human resource strategies. An inclusive hiring policy is vital, obviously; it's also the law, so no points to be scored there. But at most firms, there are wrongs that need righting even among current staff—and among women staffers specifically.

At another ARCHITECT Live session, Rosa Sheng, AIA, a senior associate in Bohlin Cywinski Jackson's San Francisco office, reviewed the outcomes of a 2014 survey conducted by Equity by Design, an AIA San Francisco committee that she co-founded. (A new batch of results from the 2016 survey is due this fall.) The upshot? To paraphrase the classic Virginia Slims ads, you haven't come such a long way after all, baby.

Women in architecture are promoted less frequently than men, make less money than men, occupy fewer leadership positions than men, receive fewer awards than men, find their jobs less satisfying than men, and, not surprisingly, abandon the profession in greater numbers than men.

Despite these inequities, it's not women but men who are more likely to leave architecture due to low pay, long hours, and lack of opportunities, according to the Equity by Design survey. Women instead are more adversely affected by cultural issues: a lack of role models, unprofessional behavior, bullying.

Addressing sexism and other problems that impede women in the architectural workplace may strike some as a Pandora's box of red tape and feeling statements. Too bad. It's every manager's ethical responsibility. There are even some emotionally uninvolved, strictly procedural ways of doing so. In the audience during Sheng's presentation was a CEO who told me about a step he (yes, he) recently took to help balance the scales at his large firm: He reviewed the compensation package of every employee and gave raises to all of the women who made less than their male counterparts.

That, my friends, is a hard-boiled, quantifiable way to foster parity among women and men. Firm leaders who think they can't afford it should think again. Ever lose a commission unexpectedly and shave a point or two from expenses to make ends meet? Finding the money to rectify the gender wage gap in salaries at a firm is no different: It's all a matter of rethinking priorities. Put off buying the new 3D printer. Trim back the holiday party. Reduce executive bonuses.

Above all, take this as a given: If a firm can't afford to pay and promote women on the same scale as men, its business model simply isn't viable. That should make the decision a lot easier.

STEPHEN VOSS

> To watch videos of the two ARCHITECT Live sessions mentioned above, and many others, visit architectmagazine.com/videos.