AIA Awards Issue

ARCHITECT

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Design, Bitches
WXY

Karrie Jacobs on John Portman
Alexandra Lange on School Design
Elizabeth Donoff on Daylighting
Lee Bay on the Lynching Memorial
Beverly Willis & Emily Grandstaff-Rice on Sexual Misconduct

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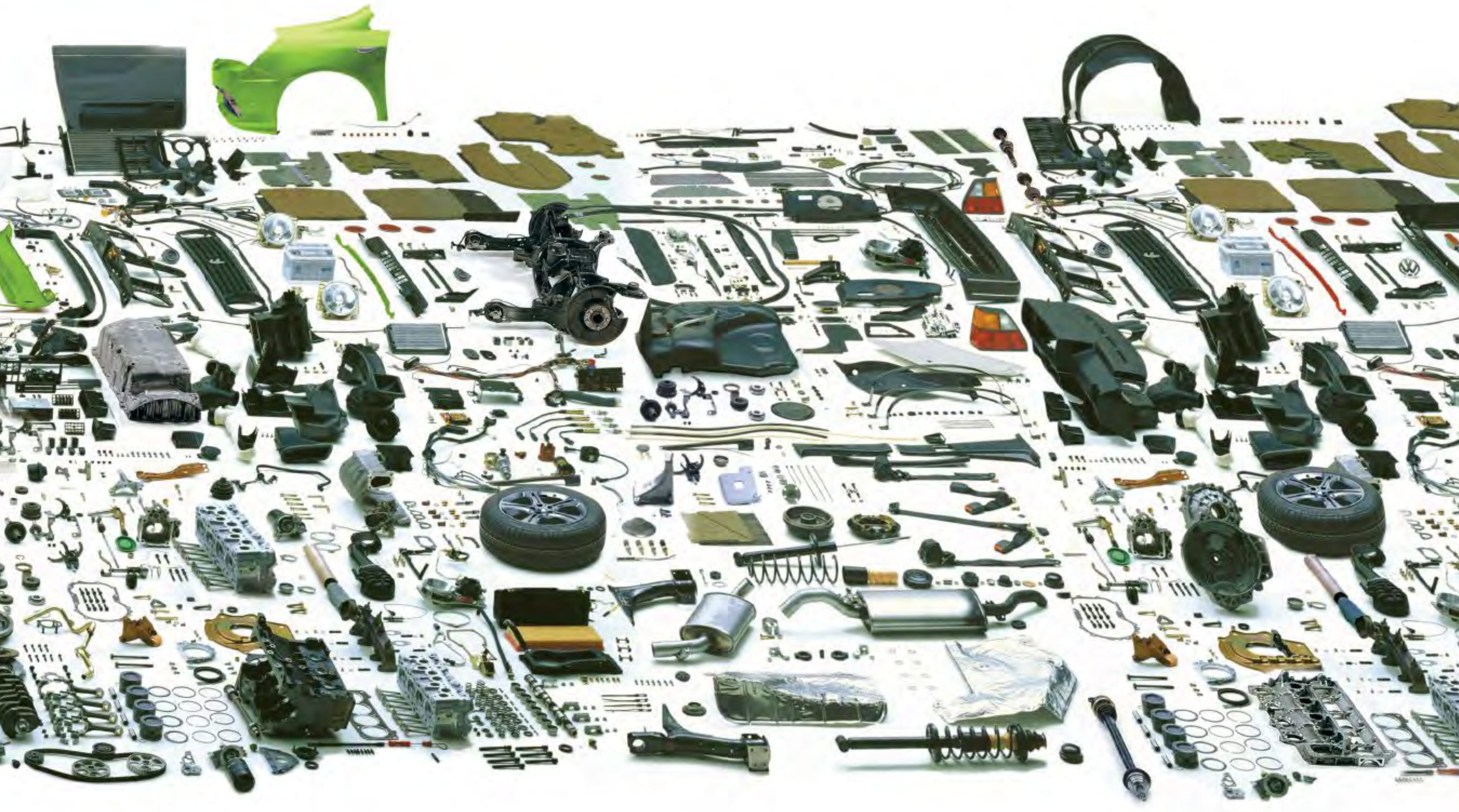


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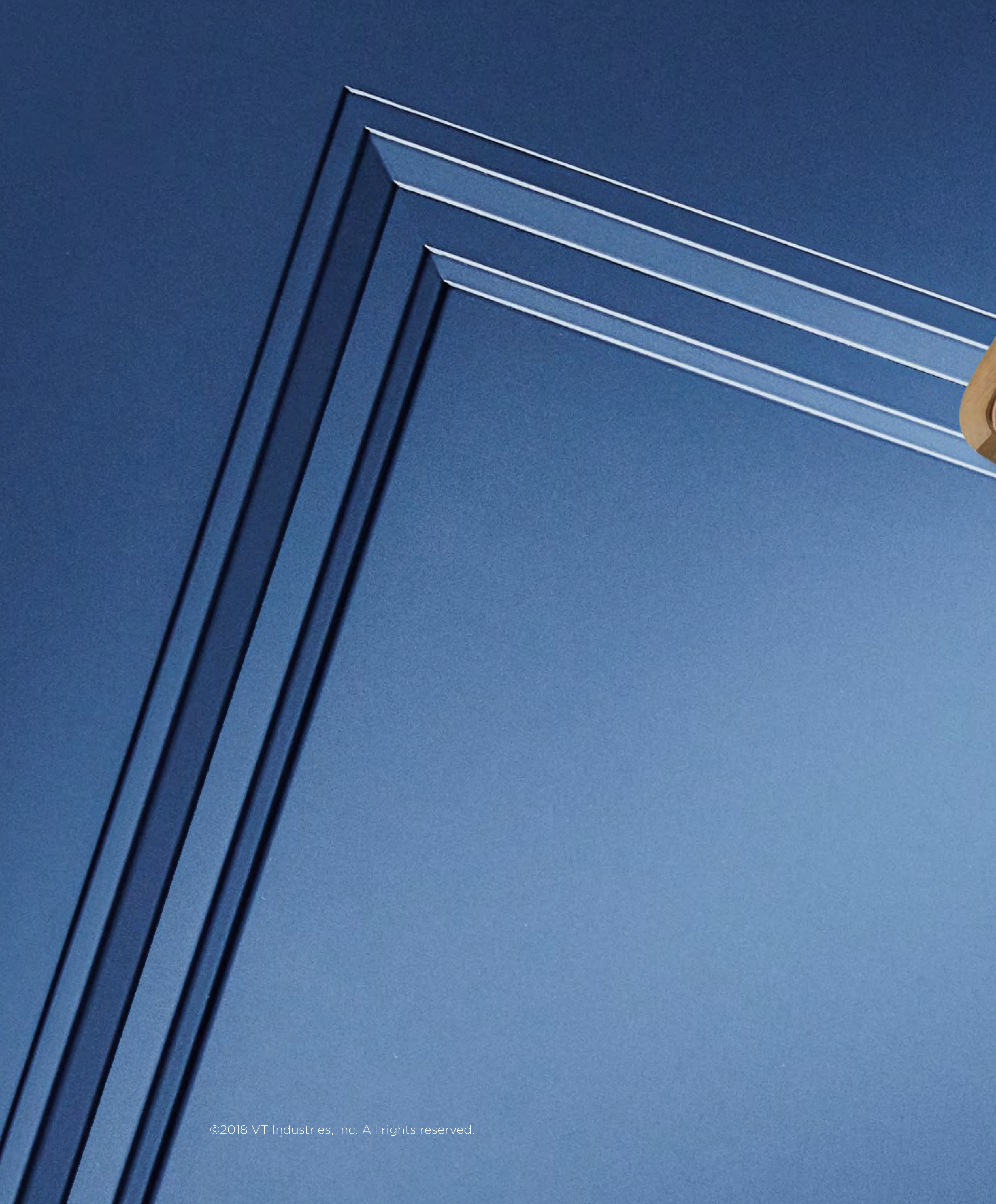

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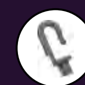
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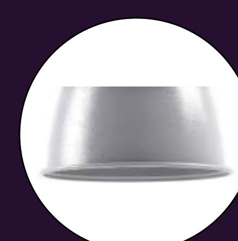
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Contents

Volume 107, number 6. June 2018.
On the cover: 2018 AIA Gold Medalist James Polshek. Photo by Lucy Hewett.

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Fire House Designed with Concrete Masonry Achieves LEED Platinum Status

The Phoenix Fire Department Station 59 was designed to provide rapid response while protecting firefighters and support staff from extreme heat, diesel fumes, biological hazards and noise. The building also had to be low-maintenance. Among the ways its designers, LEA Architects of Phoenix, AZ, accomplished all of this—and earned the City its first LEED Platinum building in the process—was through use of solar photovoltaic (PV) panels, solar hot water, concrete masonry systems, shade canopies, exhaust and ventilation systems, and a functional layout that lets the natural materials of the building help provide its own shade.

The primary mission of Phoenix Station 59 is to serve the nearby Freeport Industrial Center, which is home to a very large fuel farm. Built in 2012, the 15,000 sq. ft., four-bay fire station is located about a mile and a half away from the Center. A separate, 6,000 sq. ft. storage building on this 3.5 acre site shares the station's sustainable architectural theme and houses its own four apparatus bays, foam storage, and other specialized materials and equipment used for fighting fuel fires.

Although located in an industrial area, Station 59 is in a desert climate, with daily summer averages of 110 to 115 degrees.

"It was important to mitigate the heat on the interior of the building," says Enyart. "We chose masonry on the interior for its thermal mass properties. When the material gets cold, it tends to stay cold, reducing the strain on the air conditioning system."

The Echelon Integra® Wall System was used structurally throughout the building. Echelon's Trenwyth® Trendstone® ground face concrete masonry units (CMUs), which features a terra cotta flash, complemented the desert landscape. The Integra Wall System was chosen because it offers the benefits of a conventional masonry wall system, while at the same time providing superior thermal performance properties. For optimum thermal performance, a proprietary polyurethane, specifically blended for use in the Integra Wall System, was also used.

"By adding insulation in the walls, we earned more LEED credits, too. It's a very well-insulated building," says Enyart. He noted they also received LEED Regional Material credits because the masonry was produced only two miles away from the job site.

"We also chose the Integra wall system to contribute to the safety of the station as a non-combustible building; noise mitigation was also a value-added component of the masonry systems we selected." adds Enyart.

The combination of the non-flammable concrete and metal surfaces in Phoenix Station 59 create an environment safe from fire and biological contaminants. The low-maintenance, convenience and design aesthetic make the Firehouse 59 a more welcoming place to spend long days and nights.

Lawrence Enyart, FAIA, LEED Fellow and Principal Architect of LEA Architects
Lawrence (Larry) Enyart is founding principal and design architect at Lawrence Enyart Architects (LEA), which he owns with his son, Lance Enyart, AIA, LEED AP. Among the firm's core values is designing for sustainability with numerous LEED Certified projects in their portfolio.

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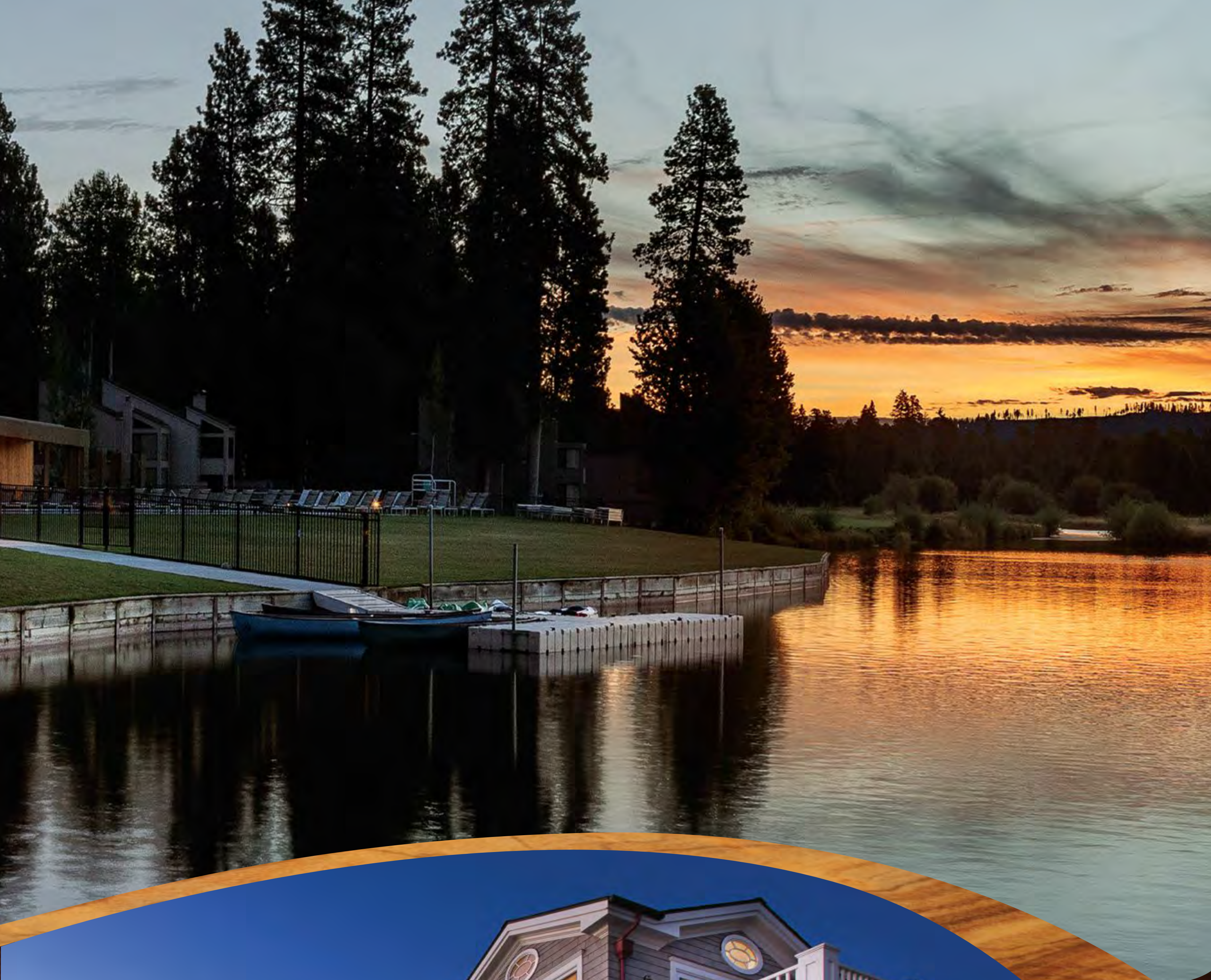

SIERRA PACIFIC
WINDOWS

SOU FUJIMOTO, NICOLAS LAISNÉ, DIMITRI ROUSSEL, AND VIRGIN LEMON

A Stacked Village for a Paris Suburb

Part of a series of design competitions for the greater Paris area, the winning proposal for Rosny-sous-Bois, France, conceives of a 164-foot-tall stacked tower designed to function as a miniature town within the Paris suburb. Designed by Tokyo's Sou Fujimoto Architects and Laisné Roussel with Atelier Georges—both based in the Paris area—Village Vertical features affordable and market-rate housing mixed with community spaces such as a daycare center, climbing walls, and a rooftop bar. The stacked form spans a pedestrian walkway at the building's center. —SARA JOHNSON

> *For more information about Village Vertical, visit ARCHITECT's Project Gallery at bit.ly/VillageVertical.*

COURTESY THE AMERICAN RESTAURANT

An American Icon

This year's recipient of the James Beard Foundation's Design Icon Award is the plainly named the American Restaurant, which opened in 1974 in Edward Larrabee Barnes' Crown Center in Kansas City, Mo. The restaurant proper was designed by architect Warren Platner, "as a huge lace valentine, with white oak columns branching into a canopy of elongated hearts," the restaurant's website explains. The Design Icon Award, part of the foundation's Outstanding Restaurant Design Awards, recognizes examples that "influenced and inspired the design of subsequent restaurants and dining spaces." —SARA JOHNSON

> *Read about the other winners in the 2018 Outstanding Restaurant Design Awards at bit.ly/2018JamesBeardDesignAwards.*

11 Ways to Design a House

Alterstudio Architecture, Bates Masi + Architects, and Lorcan O'Herlihy Architects are among the designers of the 11 winning projects in this year's AIA Housing Awards, awarded across four categories: One- and Two-Family Custom Residences, One- and Two-Family Production Homes, Multifamily Housing, and Specialized Housing. The winning projects range from 3106 St. Thomas (shown), an infill house in New Orleans' Irish Channel neighborhood by Office of Jonathan Tate, to New York's 150 Charles Street by CookFox Architects and Alan Wanzenberg Architect & Design, a conversion of a warehouse into a mixed-use complex. —SARA JOHNSON

WILL CROCKER

> See the rest of the winners of the 2018 AIA Housing Awards at bit.ly/2018AIAHousingAwards.


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COURTESY COOPER HEWITT SMITHSONIAN DESIGN MUSEUM

Honoring the Mind of a Landscape Architect

The 10 winners in this year's Cooper Hewitt Smithsonian Design Museum's National Design Awards include New York–based Weiss/Manfredi Architecture/Landscape/Urbanism (Architecture Design) and Miami-based Oppenheim Architecture + Design (Interior Design). Additionally, Anne Whiston Spirn, a Cambridge, Mass.–based landscape architect and educator, was recognized with the Design Mind award. Her portfolio of books includes the award-winning *The Granite Garden: Urban Nature And Human Design* (Basic Books, 1984, shown), which she now plans to turn into an e-book, according to her website. —AYDA AYOUBI

> *Read about the rest of the winners of the National Design Awards at bit.ly/2018CooperHewittAwards.*


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BRUCE DAMONTE

Buildings from the Golden Gate

This year, out of more than 200 submissions, AIA San Francisco recognized 19 projects in the chapter's annual Design Awards, including 13 projects in the architecture category and four projects in the interior architecture category. Local firms Aidlin Darling Design and David Baker Architects each received two project awards this year. Additionally, two other projects received special commendation, including the Washington Square Convenience Station (shown), a restroom and maintenance facility in San Francisco's North Beach designed by local firm Paulett Taggart Architects. —AYDA AYOUBI

> *See the rest of the winners of AIA San Francisco's Design Awards at bit.ly/2018AIASFDesignAwards.*

Marveolusly Modern

Since 2014, Docomomo US has recognized projects in its annual Modernism in America Awards that highlight the diversity of modern buildings and sites and demonstrate excellent preservation and documentation practices. The U.S. chapter of Docomomo International picked 13 projects for the 2018 awards—seven design awards of excellence, five citations of merit, and one special award of restoration excellence. This year's winners, including Lenox Health Greenwich Village (shown) designed by architect Albert Ledner and restored by a team headed by Perkins Eastman, will be honored on June 20 at Design Within Reach in New York. —AYDA AYOUBI

CHRIS COOPER

> *Check out the other 12 winners in the Modernism in America Awards at bit.ly/DocomomoUSawards.*

Towns for the Nuclear Family

Although Oak Ridge, Tenn., Hanford/Richland, Wash., and Los Alamos, N.M., housed more than 125,000 people in total at the end of World War II, these communities only became known after the U.S. bombed Japan. “Secret Cities,” on view through March 3, 2019, at the National Building Museum, examines these atomic towns, built by the U.S. government to house workers on the Manhattan Project. While model communities in some ways, they embodied the era’s injustices: White workers in Oak Ridge lived in prefabricated “Flat Top” houses or trailers, while African-American workers lived in plywood “hutments” (shown). —SARA JOHNSON

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> *Read more about “Secret Cities” at the National Building Museum at bit.ly/SecretCitiesNBM.*


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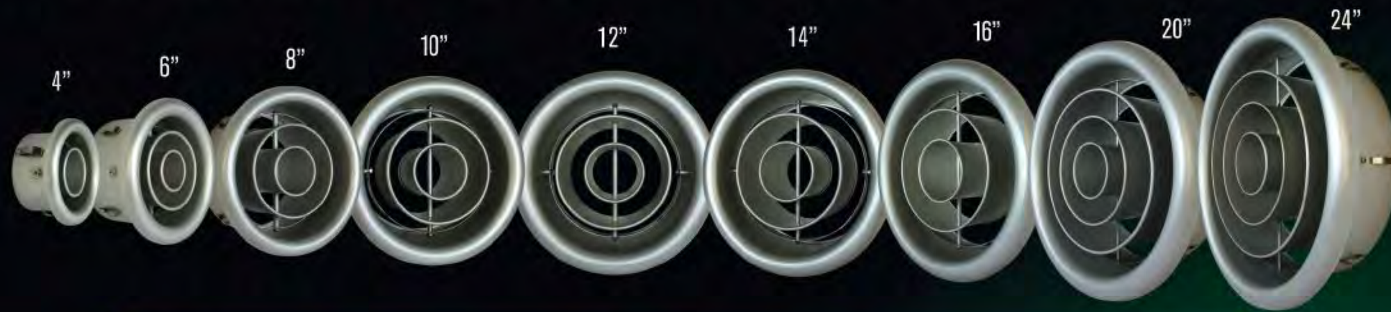

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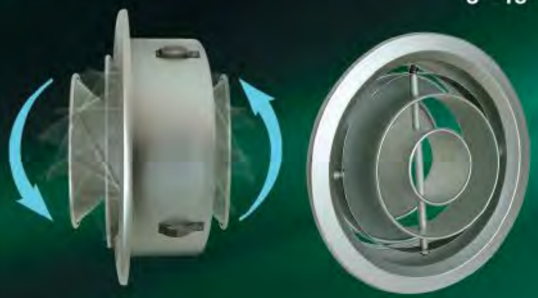

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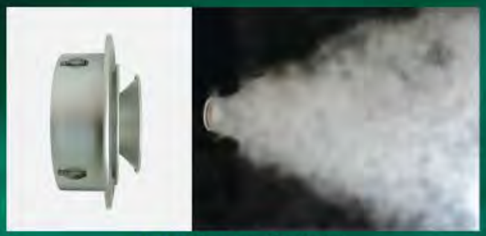

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Next Progressives: Design, Bitches

EDITED BY KATHARINE KEANE

Location:
Los Angeles

Year founded:
2010

Firm leadership:
Catherine Johnson, AIA;
Rebecca Rudolph, AIA

Education:
Johnson: B. Interior Architecture, University of Oregon; M.Arch., Southern California Institute of Architecture (SCI-Arc); *Rudolph:* M.Philosophy, Université Paris 8; M.Arch., SCI-Arc

How founders met:
Working together at another small firm in Los Angeles.

Firm size:
Six

Rebecca Rudolph and Catherine Johnson

Mission:
We founded Design, Bitches with a bold and irreverent vision to make architecture significant in daily life. By experimenting with materials and graphics, we provide durable contemporary designs that wink at history.

Origin of firm name:
The name is the response to the question: "Architecture is [fill in the blank]?" It was posed by the AIA Los Angeles Chapter as part of the first competition we entered as collaborators. Our answer? "It's design, bitches!"

Favorite project:
Our favorite project is always changing and tends to be the one most recently opened—we believe that architecture isn't complete until it's full of life.

Second favorite project:
The next one on deck—we love a challenge and the process of strong collaboration between clients, engineers, artists, and builders.

Best advice you have ever gotten:
Be honest about who you are and what you're interested in and you'll find like-minded collaborators.

Architecture heroes:
Rudolph: Kazuyo Sejima and Ryue Nishizawa of SANAA. Their work is poetic and straightforward at the same time. *Johnson:* French designer and architect Charlotte Perriand. Her work was always compelling, thoughtful, and innovative.

Design hero:
Patricia Urquiola. She draws on a huge variety of inspirations as well as material research and technical innovations—and the work is constantly evolving.

Memorable learning experience:
Meeting the other finalists for the Moira Gemmill Prize for Emerging Architecture, for which we were shortlisted in 2016. An incredible group of women from all over the world with unique practices and approaches.

Special item in your studio space:
A palm-size polished chunk of malachite.

Design tool of choice:
Rudolph: Pens and trace. *Johnson:* 3D model—digital or physical—and a fat Sharpie pen.

Biggest challenge in running a successful practice:
Management and leadership.

Design aggravation:
Rudolph: Stucco box frame detailing on façades. *Johnson:* Anything resembling a human organ.

Superstitions:
Rudolph: When you spill salt you have to throw a bit over your left shoulder. *Johnson:* Never make a toast with water.

LAURE JOLIET

> *To learn more about Design, Bitches, visit bit.ly/ARDesignBitches.*

Next Progressives:
Design, Bitches

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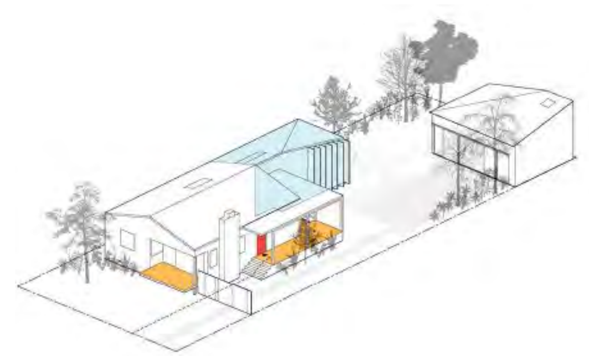

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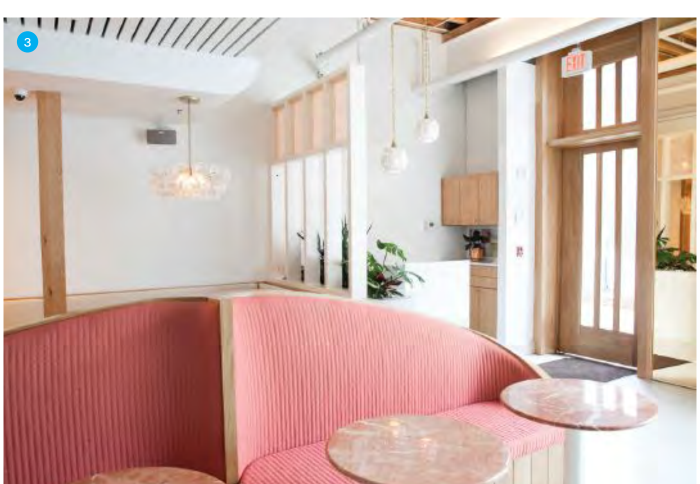

3

2

1, 2, 4, 6: LAURE JOLIET; 3, 5: COURTESY DESIGN, BITCHES

1. For the Lodge Room performance space and Checker Hall restaurant—both part of a revitalized 1923 Masonic Lodge—Johnson and Rudolph retained the building's old-world charm by salvaging original wallpaper and elaborate wood trim. **2.** The duo remodeled a bungalow in the Atwater Village neighborhood of Los Angeles, removing its single-car garage and adding an art studio/guesthouse to the back of the lot, enabling better use of the outdoor space.
3. For tapas restaurant Little Octopus in Nashville, Design, Bitches created a retro Miami interior using florals, pinks, and clean lines. The project won the 2017 AIA Los Angeles Restaurant Design Award. **4.** Repeating archways and sun motifs create continuity between juxtaposed dark and light seating areas of a Taiwanese soul food restaurant in the Mar Vista neighborhood of Los Angeles. **5.** The site for B+B House hosts a bungalow-style residence and guesthouse/studio with rectangular volumes slid into the upper floors for expanded living space. An outdoor area connects the two structures. **6.** Daylight moves freely through the indoor–outdoor space of the Counter Culture Coffee store, in Los Angeles, thanks to a skylight and translucent green, corrugated fiberglass panels set into a seating area of solid oak and knotty cedar plank. The volume also features an expansive deck and drought-tolerant garden.

THE HOUSE THAT CAMERON BUILT

Design And Technology Come Together With Captivating Result In Venice, Calif.

Folks living along Tivoli Avenue near downtown Venice, Calif. have discovered a quick way to lift their spirits.

They walk by the house Cameron McNall built.

"I can't go outside the house without people coming up to me. They tell me the house makes them smile and that's really cool," says McNall, award-winning architect-artist-sculptor-fabricator-builder and principal of Los Angeles-based Electroland. In a city renowned for creative hyphenates, Cameron McNall stands out.

For proof, just walk by 4016 Tivoli.

Flower Power

The 2,700 square foot, four-bedroom home is built to L.A.'s strict green building standards and probably scores an 11 on a 10-point neighborhood walkability index. The "smile part" is the 3,000 square foot floral-shaped façade that adorns the structure's public-facing sides. This paean to flower power is a structural wonder that showcases McNall's love of architecture, art, and design.

The façade is composed of aluminum composite material (ACM), a remarkably stiff, light, and long-lasting composite metal panel that is offset 9 inches from the home's stuccoed and glazed inner wall. The gap permits a lighting system to backlight the floral lattice after dark. The floral screen was "… a real interesting design challenge because the flowers have to touch in a way that maintains structural integrity," according to McNall. The ACM panels, manufactured by Virginia-based ALPOLIC®, were milled by computer numerical control.

ACM Enablement

McNall purchased the property 14 years ago, waiting for a day when his vision could be efficiently translated into reality. "I had this idea of this rather abstract façade that would be perforated in some way. I came up with a drawing of scattered flowers that I stared at for 10 years. About four years ago I was working on a project that introduced me to ACM. ACM can be easily milled, a big advantage over laser-cutting," explains McNall.

Unexpected Bonus

What McNall didn't expect was the aesthetic bonus ACM delivered: a spectacular finish. "I didn't want something glossy or matte," McNall says. "The finish sheen is a pleasant surprise. It's a beautiful sheen that is very environmental, reflecting its surrounding as sunlight changes. It's a real pleasure to see."

The coating is charcoal black—"a softened black"—selected to heighten evening backlighting. "The coating is a factory finish, so I know it's the very best finish possible," McNall says. The Sherwin-Williams® Valflon® FEVE architectural metal coating provides premium color consistency, adhesion, flexibility, and formability.

Business-Builder

The marriage of the Sherwin-Williams® Valflon® coil coating and ALPOLIC's ACM panels has benefited McNall beyond 4016 Tivoli. He recently proposed it for a public art project across the street from the $1 billion Lucas Museum of Narrative Art, now under construction.

As for "Tivoli House," it's interesting to note the region's graffiti writers have kindly spared the home's artful exterior. McNall has a special theory why. "They respect it."

The captivating façade lifts their spirits, too.

Owner Cameron McNall
Architect Cameron McNall
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ACM Fabricator Electroland
Photographer Cameron McNall

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Opinion: Sexual Misconduct in Architecture

BY BEVERLY WILLIS, FAIA, WITH JULIA DONOHO, AIA

One rotten apple can spoil the whole barrel, and when it comes to sexual misconduct, the design profession appears to have several rotten apples. As we are beginning to see, a single practitioner of rotten activities can ruin the name and even legacy of an entire firm.

I became interested in the topic of sexual misconduct when I was trying to understand why many women were dropping out of the design field within their first 10 years of practice. These were young and talented women who had excelled in architecture school. They were also vulnerable. Recent headlines have made it clear how prevalent sexual misconduct can be when powerful men hold the keys to a person's career and advancement. There have been too few consequences and too much looking away.

Sexual misconduct encompasses a wide array of activities. Some are criminal behaviors, while others do not rise to the level of criminality, but are still legally actionable. Some behaviors are not actionable in and of themselves, but can contribute to a hostile work environment. However, none of these activities should be confused with issues relating to equity or discrimination.

The AIA Code of Ethics and Professional Conduct has a prohibition on discrimination, Rule 1.401: "Members shall not discriminate in their professional activities on the basis of race, religion, gender, national origin, age, disability, or sexual orientation." In addition, the AIA has published a stream of statements referencing its Code of Ethics,

BY EMILY GRANDSTAFF-RICE, FAIA

We honor Beverly Willis for her tireless advocacy for women in our profession. Justifiably, she holds strong views on the long-overdue conversation about sexual misconduct underway in our country and culture today.

So does the AIA.

Long before I entered architecture school more than 20 years ago, there was a growing advocacy for gender equity in our profession, starting in the 1970s. This included AIA Women in Architecture committees formed to develop policies and programs designed to address equity and diversity issues in architecture. A decade ago, the Institute hosted the first Women's Leadership Summit, and the AIA adopted a sexual harassment policy for all AIA leadership and others in authority in 2014. More recently, the AIA formed the Equity in Architecture Commission to further the strong momentum we've established as a response to a member resolution.

Today, the AIA requires all components to comply with AIA National's harassment policy and to adopt its equity, diversity, and inclusion statements by early 2019. Further, in light of recent events, the National Ethics Council is examining whether sexual harassment needs to be more explicitly addressed within the Code of Ethics.

We are determined to drive progress and stimulate change via education, the exchange of best practices, and leading by example. Accordingly, we're putting as much emphasis on creating


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denouncing sexual misconduct in the workplace, announcing the development of a guide for equitable practices, and outlining future actions to eliminate sexual misconduct in the profession.

Sexual misconduct is a men's problem, and only the men can resolve it, because the men have the power—for now.

I write about sexual misconduct as it is defined legally. It includes sexual assault and battery, which is against the law. It is a crime. You can go to jail. Sexual harassment is the basis of a lawsuit. Retaliation is against the law. If a firm retaliates against an individual, then the firm itself can be in trouble with the law.

I describe below how I would like the men of the AIA to respond.

First, the AIA should insert into its Code of Ethics a prohibition explicitly against specifically defined sexual misconducts—the term for the whole category of sexual misconducts—and add the specific legal definitions (see "Definitions of Sexual Misconducts," at right) as some actions are crimes that could result in jail time or lead to lengthy litigation. It should be noted that each state has different regulations in their penal and labor codes, and federal Equal Employment Opportunity (EEO) regulations add another layer of protection from harassment, discrimination, and retaliation.

Second, the AIA should explicitly outline the punishment for those found guilty of sexual misconduct. For example, it can require training, publicly censure architects, and strip them of all Institute honors and awards. If a crime is found to have been committed, the AIA should revoke membership and the use of AIA after one's name.

Third, the AIA should define a process to adjudicate claims.

Fourth, the AIA should take the lead in urging the National Council of Architectural Registration Boards (NCARB) and all 54 state- and territorial-licensing boards to act on sexual misconduct. The AIA cannot revoke the license of an architect, but it has the ear of the organizations that can. NCARB and the licensing boards can also adopt statements prohibiting sexual misconduct, require training as part of maintaining licensure, institute a fine structure based on the severity or number of violations, or, in case of a crime, revoke the person's license to practice architecture.

Finally, the AIA should encourage firms to find ways to not only stop sexual misconduct, but also to support and retain architects who have been affected by any form of sexual misconduct, including that by clients or contractors.

As news accounts have confirmed, many who have been the victim of sexual misconduct in the workplace do not want to draw attention to the situation, file complaints, hire attorneys, make formal charges, or risk retaliation. So they opt to leave their firms and, in some cases, the profession, thus contributing to architecture's pipeline problem.

Indeed, one rotten apple can create a toxic workplace culture of harassment and an atmosphere of discomfort and instability, increase employee attrition, and cause a firm reputational and financial harm. Sexual misconduct also hurts the public image of our entire profession.

Let's get rid of the rotten apples.

Definitions of Sexual Misconducts

Sexual assault and battery encompasses willful and malicious acts made with the intent to cause fear, intimidation, or abuse. Actions may include rape, attempted rape, sexual comments, sexual banter, sexual exposures, sexual advances, stalking, requests for sexual favors, sexual touching. All are a crime and a basis for civil liability suit or prison time.

Sexual harassment occurs when the perpetrator uses power and position to coerce sexual favors in academic or workplace settings. In addition to incurring the potential for the criminal and civil claims above, federal and state EEO laws apply. Laws provide redress against both managers and employers for allowing these activities to occur and or continue. Additionally, claims under employment law may apply.

Retaliation occurs when a perpetrator uses power and position to negatively impact an individual's working conditions because of a complaint of assault or harassment. Both federal and state EEO laws forbid retaliation when it comes to any aspect of employment, including hiring, firing, pay, job assignments, promotions, transfers, other terms or conditions of employment, and reputational damage. Retaliation can include any defamation that hurts the character, reputation, or career of an employee who makes a complaint, including statements of disrespect, a dismissive attitude, and verbal and written debasing and denigrating attacks in social media or elsewhere. An employee or job applicant is protected by federal and state law from retaliation regardless of whether their underlying charges are proven true or false. —B.W. AND J.D.

Beverly Willis, FAIA, founded the Beverly Willis Architecture Foundation, in New York, in 2002 and closed her eponymous firm in 2005.

Response:
Emily Grandstaff-Rice

exemplary corporate cultures as we do on the buildings we design, providing the training and tools required to design safe, healthy, equitable work environments. We're also taking our best practices to colleagues in the engineering and construction industries.

What has changed in the last 40 years is that there are more options and communication channels through which to seek remedies than ever before. But the vulnerabilities—for both accusers and the accused—have increased as a result. Accordingly, the AIA approaches this topic methodically and deliberately. We believe such sensitivity is warranted.

Further, when the AIA issues statements, advocates for policy change, and develops tools for the profession, we must be scrupulous about ensuring that our content recommendations are informed by hard data. For example, it is intuitive to conclude that some or, indeed, many women leave the profession as result of pay inequity, bias, or harassment. The AIA tested this hypothesis in 2015, when it commissioned its comprehensive "Diversity in the Profession of Architecture" study. A key finding: The main reason women gave for leaving the architecture and design field was dissatisfaction with work–life balance and flexibility.

Grateful as I am for the past year's massive uptick in awareness about sexual harassment, I think it's important we grant ourselves permission, on occasion, to pause and recognize the progress made. Women today are hardly immune from workplace harassment, but men are on notice that the *Mad Men* behaviors Beverly and other trailblazers were forced to endure for decades won't be tolerated any longer.

Women have also made numerical gains in our profession. In 1970, 1.5 percent of the members of our profession were female; today it's 21 percent. By 2030, women's representation is expected to approach 30 percent. We see similar gains reflected in gender diversity in university enrollment: Female students at architecture schools account for 46 percent of the mix. It is not lost on me that this has occurred within my lifetime.

Has architecture reached gender equity yet? No. And we won't and shouldn't be satisfied until women are fully part of our profession. We have made progress—especially compared with many other industries. For example, a 2016 Bureau of Labor Statistics report indicates that the profession of architecture leads other STEM professions in terms of gender diversity.

We will continue to achieve progress when we recognize that everyone—regardless of gender identity—will drive change by embracing efforts to improve diversity and inclusion within our ranks, by confronting workplace harassers and abusers, by giving voice to victims, and by providing justice to those who, historically, feared retaliation.

Emily Grandstaff-Rice, FAIA, is the chair of the AIA Equity and the Future of Architecture committee. She also serves as an at-large director on the AIA Board of Directors.


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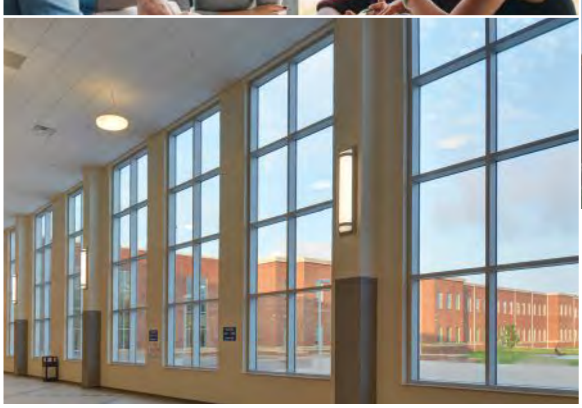

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SOUTHERN METHODIST UNIVERSITY
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Project: Anita and Truman Arnold Dining Commons
Architect: KSQ Design
EFCO Products: Series 5600 Curtain Wall, Series D518 Entrance Doors, and Series 433 Storefront

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Architect: Goodwyn Mills and Cawood
EFCO Products: 601 Windows, S403 Storefront, and D500 Entrances

TWIN RIVERS PRIMARY/INTERMEDIATE SCHOOL
McKeesport, PA
Project: New school structure
Architect: JC Pierce, LLC
EFCO Products: 5600 Curtain Wall, E-Shade™, 401/402/403 Storefront, D500 Entrance Doors, and WV410 Vents

CHARLOTTE HIGH SCHOOL
Rochester, NY
Project: High school renovation
Architect: CJS Architects
EFCO Products: 676/6750 Window, 325X XTherm® Window, and 5600 Curtain Wall

BRUNSWICK HIGH SCHOOL
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Best Practices: Establishing a Sexual Harassment Policy

TEXT BY MURRYE BERNARD, AIA

Sexual harassment has long been a problem in professional settings, and the design industry, as it has been made clear, is not immune. Below, practitioners and legal experts offer ways to implement a sexual harassment policy at firms of different sizes.

Define It

According to the U.S. Equal Employment Opportunity Commission (EEOC), the legal definition of sexual harassment describes "unwelcome sexual advances, requests for sexual favors, and other verbal or physical harassment of a sexual nature." Abusers may be supervisors, co-workers, and even clients.

However, sexual harassment is not an easy concept to define in the legal world. The law does not prohibit "simple teasing, offhand comments, or isolated incidents that are not very serious," per the EEOC, and a larger gray area exists, encompassing a range of behaviors—such as physical and emotional abuse, retaliation, and bullying—that can occur over a significant period of time and create a hostile work environment.

"Sexual harassment is about the exploitation of power in the workplace," says Robert Ottinger, a New York–based employment attorney and former prosecutor who notes that many such actions would be punishable by prison time if committed on the street.

But firms can go beyond the legal definition when creating their own policies. "It's important to have a zero-tolerance policy and do training so people understand what they should and shouldn't be doing," says Suzanne Pennasilico, the New York–based chief human resources officer at Skidmore, Owings & Merrill. "But it's even more critical to create a culture where this behavior isn't tolerated."

> "Sure, there is a legal definition, but we want to work in a place that fosters respect."
>
> —Juli Cook, ASSOC. AIA, chief operating officer, NBBJ

Codify a System

While many practices require employees to complete training related to sexual harassment—which can range from online courses to in-person seminars with discussions facilitated by human resources departments or outside consultants—only companies in the states of California and Connecticut with more than 50 employees are legally required to do so. However, no firm should wait until an incident occurs to establish a system.

"Sure, there is a legal definition, but we want to work in a place that fosters respect," says partner and chief operating officer of Seattle-based NBBJ, Juli Cook, ASSOC. AIA. "We can take actions against people if we think they are not in line with our company values."

For firms with multiple offices, consistency across locations is key. Leadership must establish a clear set of guidelines and a reporting system that engages the leadership within each office. Employers should take immediate and appropriate action in response to harassment, ranging from a warning, to discipline, and to termination.

Transparency and Consequences

Companies often keep sexual harassment cases confidential by legal means such as asking employees to sign arbitration agreements. However, Ottinger believes that keeping such information secret protects and even encourages perpetrators in the long run. "If there's a resolution of a sexual harassment allegation, it should be made public," he says. "The victim should be free to talk about it if they want to. There isn't enough of a deterrent right now. If people were worried about exposure, humiliation, or even prosecution, they might not do it."

Employees also have individual responsibilities as co-workers. "You can't be a bystander," Pennasilico says."Stand up for others who are being victimized."

But, she adds, "we're seeing the dawn of a new day. If anything, I think all of this coming out in the news has been very helpful because individuals have seen real consequences for their behavior—their legacies are taken away. And what could be worse for an architect?"

> *For more tips on creating a sexual harassment policy for your practice, visit bit.ly/ARSexualHarassment.*

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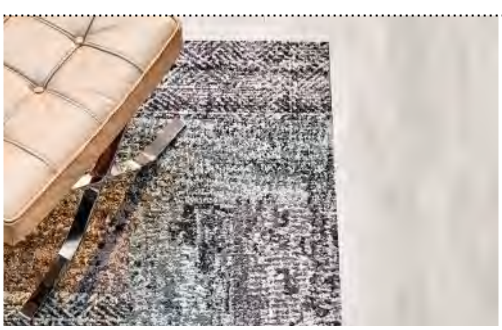
TEXT BY AYDA AYOUBI

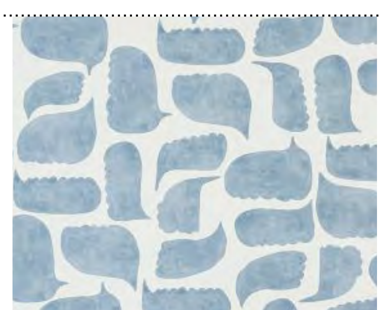
Archoterra, Archoterra
Made in part of recycled paper, Archoterra's namesake collection comprises eco-friendly surfaces that can be used as veneer, laminate, or paneling. Offered in 38 colors and 12 dimensional patterns. *archoterra.com*

Stoned, Buster + Punch
Designed by Buster + Punch co-founder Massimo Minale, the Stoned LED table lamp is fitted with a fully dimmable 2700K lamp with a CRI of 80. It measures 3.5" wide, 17.5" tall, and 6.5" deep. *busterandpunch.com*

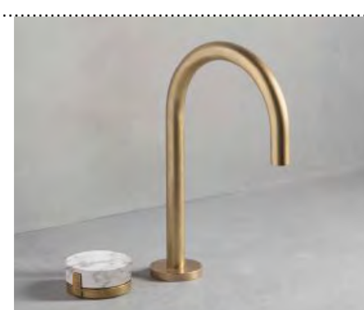
Modular Outswing, Goldbrecht
This outswing ultra-slim casement and awning window system complements the Invisible Wall System by this U.S. manufacturer of Swiss window brand Vitrocsa, increasing glazing area and views out. *goldbrecht-systems.com*



Haven, Shaw Contract
Haven carpet tiles draw inspiration from residential carpets, aiming to re-create the comfort of a home in a commercial or hospitality setting. Available in six styles and 22 patterns. *shawcontract.com*



Chatty Wallpaper, Metolius
Designed by San Francisco–based artist Laura Jo, Chatty is an eco-friendly wallpaper with hand-painted patterns printed on PVC-free paper using low-VOC ink. *metoliushome.com*



Elements 21, Watermark Designs
These fully customizable widespread faucets by Brooklyn, N.Y.–based Watermark Designs can be customized into more than 380,000 combinations. *watermark-designs.com*

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MLZ Series One-Way Ceiling Cassette, Mitsubishi Electric
Mitsubishi Electric's MLZ Series One-Way Ceiling Cassette offers adjustable airflow and is compatible with most thermostats. The compact heating and cooling unit, designed to fit between standard 16" ceiling joists, measures 44" wide by 14" long, and 7" high. With its built-in condensate lift mechanism, this ceiling cassette can be serviced directly from below. *mitsubishicomfort.com*

Ottoman Outdoor, Ligne Roset
New to Ligne Roset's outdoor collection is a three-piece waterproof version of its classic Ottoman seating collection designed by French architect Noé Duchaufour-Lawrance. Ottoman's seat is made of molded polyurethane foam while its base and sides are polyether foam. Each piece has a waterproof lining cloth and is positioned on a thermoformed ABS base. Available in single or two-tone color variations, the Ottoman Outdoor collection comes in more than 30 colors and textures. *ligne-roset.com*

FencePost, Landscape Forms
Inspired by weathered cedar fence rails, American artist Larry Kornegay created this line of concrete planters for his eponymous brand for Kalamazoo, Mich.–based Landscape Forms. Using reclaimed cedar fence rails and sandblasting, Kornegay created molds to produce the wood-grain texture. Made of high-strength concrete exceeding 6,000 psi, the planters are available in three different sizes, ranging from 24" to 42" in height. FencePost comes in bituminous sealer (recommended for interior applications) and sandblast finishes. Offered standard in natural gray concrete color; custom color mixing is available. *landscapeforms.com*

LP SmartSide Perfection Shingle, LP Building Products
Suitable for residential and some commercial applications, LP SmartSide Perfection Shingle is an engineered wood fiber lap shingle manufactured by Nashville, Tenn.–based Louisiana-Pacific (LP) Corp. Constructed with LP's proprietary SmartGuard process, the shingle is resistant to impact, freeze-thaw cycles, humidity, and fungal decay. A standard shingle measures 7.8" wide by 4' tall, and 0.37" thick. Pre-primed for durable paint adhesion, the shingles come in various styles, including classic cedar-grain texture. *lpcorp.com*


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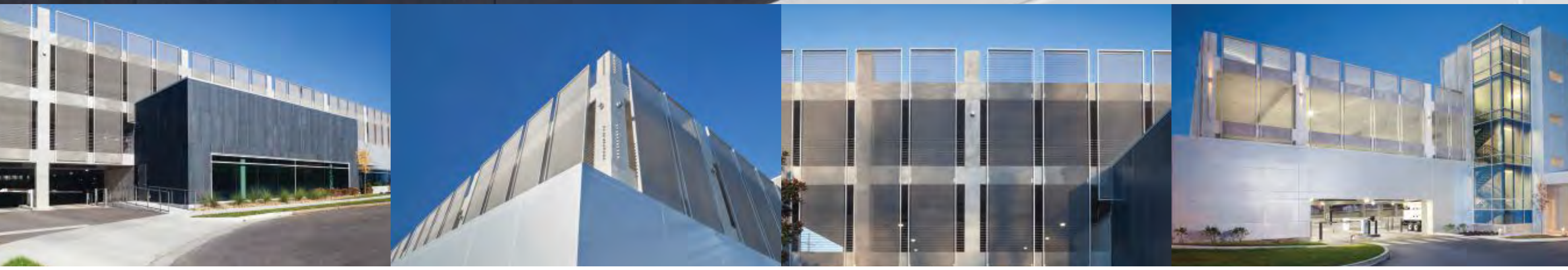

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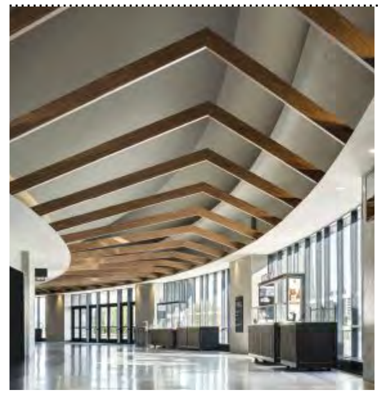
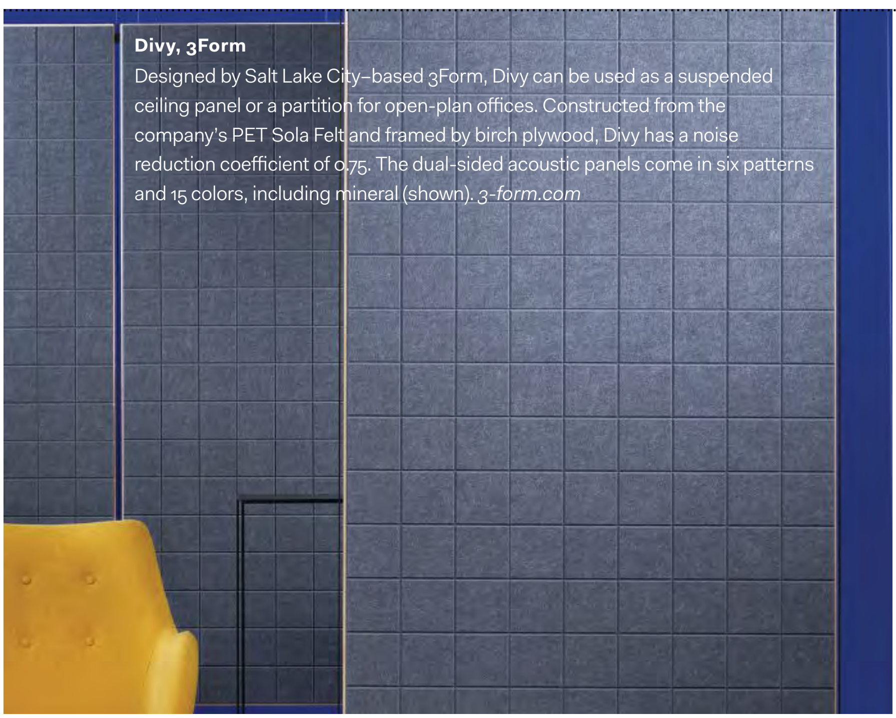


High Profile Series Frameworks, Hunter Douglas Architectural

This line of customizable, VOC-free aluminum beams comprises curved and straight members that can take on many configurations, including rafters and wall screens. The series is ASTM E84 Class A fire rated and has a flame spread rating equal to or less than 25. It is approved for use in seismic zones A through F. Available in more than 60 finishes. *hunterdouglasarchitectural.com*



Divy, 3Form

Designed by Salt Lake City–based 3Form, Divy can be used as a suspended ceiling panel or a partition for open-plan offices. Constructed from the company's PET Sola Felt and framed by birch plywood, Divy has a noise reduction coefficient of 0.75. The dual-sided acoustic panels come in six patterns and 15 colors, including mineral (shown). *3-form.com*

Enlighted 5th Generation Smart Sensor, Enlighted

The smallest and the most versatile sensor that Enlighted claims to have produced to date, this 32-bit, fully upgradable, Advanced RISC Machines processor is the first IoT-ready–compliant sensor on the market, according to the Sunnyvale, Calif.–based technology company. The new sensor comes with advanced lighting features and an astronomical clock. *enlightedinc.com*

Lock Status Sensor, Marvin Windows and Doors

The Lock Status Sensor by Marvin Windows and Doors brings smart home capabilities to its line of products. The fully integrated solution connects to any new or existing security systems through wired or wireless connections to indicate whether windows or doors are closed, open, locked, or unlocked. Doors and windows integrating this technology are ready to install and compatible with third-party home automation hubs. *marvin.com*

PowerHubb, Hubbell Control Solutions

Hubbell's PowerHubb is a Power over Ethernet lighting and control system capable of handling large enterprises. It integrates luminaires, sensors, software, and a user interface into a scalable smart-building control and management system, which can help reduce energy consumption. Available apps offer everything from basic lighting control to cloud-based analytics. *hubbell.com*

Aleta Collection, Viccarbe

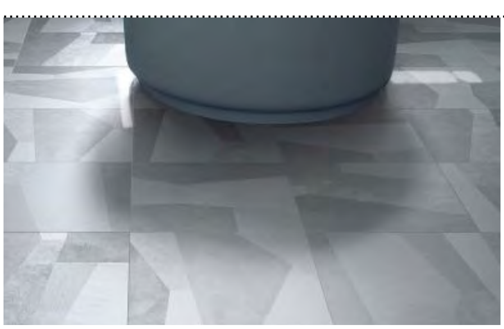
Designed by Spanish designer Jaime Hayon, the Aleta collection is suitable for residential, commercial, and hospitality applications. The chair and stool (shown) feature a foam-covered, molded plywood seat and backrest. *viccarbe.com*

Mirage Porcelain Veneers, Echelon Masonry

Designed by Italian tile manufacturer Mirage, this line of porcelain veneer finishes resists frost, corrosion, and efflorescence. With 0.125" or 0.25" thickness. *echelonmasonry.com*

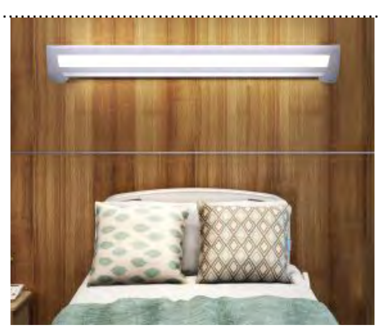
Eklipse, Griven USA

Griven USA's Eklipse is a compact LED light-shaper designed to highlight architectural elements in indoor and outdoor spaces. Fitted with four 10W LEDs in dynamic white, warm white, cool white, and RGB plus white. *griven-usa.com*



Palladiana, Hastings Tile & Bath

Designed by Hastings with Ceramica Bardelli and Studiopepe, the Palladiana collection of handmade porcelain tiles may be used on walls and floors. Offered in six designs and four colorways. *hastingstilebath.com*

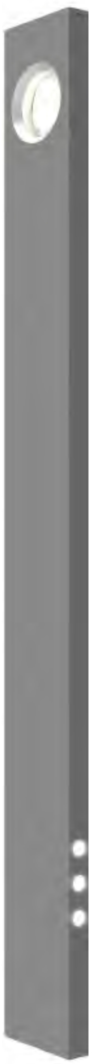


Remedi, Hubbell Healthcare Solutions

Designed for healthcare spaces, Remedi is a wall-mounted, multifunctional LED bed light with four optical compartments, each fitted with 3000K, 3500K, 4000K, or 5000K LEDs. Finished with antimicrobial paint. *hubbell.com*

QuadCore, Kingspan

Kingspan's QuadCore is a closed-cell insulated panel with a hybrid core that offers thermal performance and fire protection to building exteriors. QuadCore is certified to FM 4882 and to Greenguard Gold standards. *kingspan.com*



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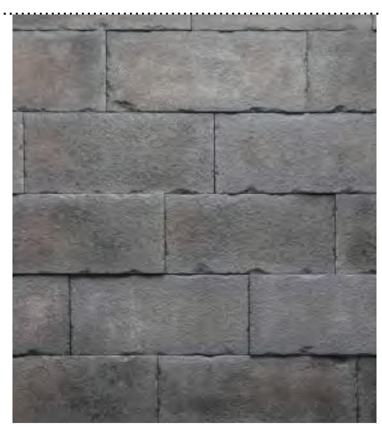
Portal, Hess America
A bidirectional luminaire suitable for public or private outdoor spaces, Hess America's Portal features an extruded aluminum body punctured with a portal outfitted with an acrylic lens that produces a halo-like illumination. Measuring 12" wide, 3" thick, and 8' or 10' tall, Portal uses a 38W, 3000K or 4000K LED with a CRI greater than 80. Three optional marker lights with diffused or controlled optics can illuminate pedestrian paths. *hessamerica.com*

Kensho, Kohler
Kensho is the newest addition to Kohler's line of Artist Edition sinks. Designed to sit on countertops, this minimalist, natural stone vessel has no overflow holes and requires wall- or surface-mounted faucets. Kensho is offered in trough (shown) or round styles, both of which are etched with patterns drawn from of a traditional Japanese Sashiko kimono that are highlighted with a metallic gold finish. Available in Italian white biancone marble or Tunisian charcoal gray foussana limestone. *us.kohler.com*



Prism, Nora Lighting
Nora Lighting's Prism is a smart LED RGBW downlight designed for installation in new construction or existing 4"-, 5"-, or 6"- diameter housings. Available in 2700K to 4000K color temperatures, with a CRI exceeding 90, Prism delivers up to 825 lumens. Using a remote control or Nora Lighting's smartphone app ControLIT, users can modify the light's color, intensity, and color temperature. *noralighting.com*

Carved Block, Boral
The latest addition to Boral's Versetta Stone product line, Carved Block mortarless stone veneer panels for residential and commercial applications range from 16" to 20" wide by 8" tall, laid out on a 36"-by-8" panel. The chiseled texture of these concrete-based panels mimic the look of split face stone. Offered in dark gray midnight (shown) and neutral sea salt. *boralamerica.com*

Mun Dark, Nordeon USA
Designed by lighting design firm Artec3 Studio, Mun Dark is a wall-mounted indirect luminaire fabricated from steel and aluminum that comes with an opal polycarbonate diffuser. Available in 5", 7", and 12" diameters—each fitted with 3000K or 4000K LEDs with a CRI exceeding 80—Mun Dark is CSAUS-certified for damp locations. Available in matte white (shown) or graphite gray. *nordeon-usa.com*

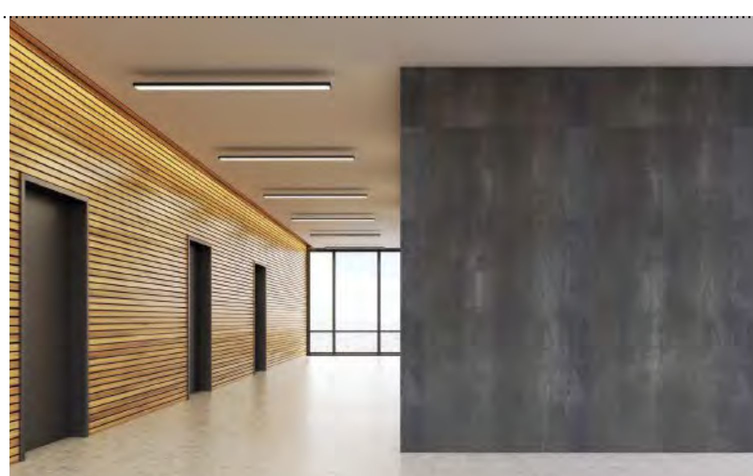
Products: AIA Show Preview and More

Interior Bronze Doors, Astec
Designed for residential and hospitality applications, Astec's new collection of customizable, architectural bronze extrusion doors was designed in collaboration with French architect Stéphane Parmentier. Astec doors are constructed from an alloy of copper and metals such as titanium. Offered in 28" to 36" widths and 83" to 91" heights, the collection offers three finishes, including burnished brass and titanium. *astec.it*

Dorrance, Newport Brass
Designed by Newport Brass, Dorrance is a widespread faucet that meets water conservation standards approved by the California Energy Commission. Made of solid brass shaped into an industrial geometric form, the faucet has a 5.5" spout reach and comes with ADA-compliant cross or lever handles. Dorrance is available in 27 finishes, including matte black (shown). *newportbrass.com*

DesignRail Aluminum Railing Kits, Feeney
Suitable for indoor and outdoor applications, this modular railing system is designed for both stair and level walkways. The system comes in a 36" height for stair railings and 36" and 42" railing heights for level railings, and can span up to 6' between posts. *feeneyinc.com*

Elements, Móz Designs
Newly available in steel, copper, bronze, and brass color offerings, these decorative wall panels are constructed from lightweight, solid-core aluminum. A standard panel measures 4' wide by 8' or 10' long, and 0.04" thick. Elements is available in 12 handcrafted or machine-made grains and four finishes, and comes in a variety of colors, including blackened steel patina (shown). *mozdesigns.com*



Detail:
Tashjian Bee Center Truss

TEXT BY TIMOTHY A. SCHULER

To educate the public about colony collapse disorder, which is threatening global bee populations, the University of Minnesota opened the 7,530-square-foot Tashjian Bee and Pollinator Discovery Center in Chaska, Minn., in 2016.

Inside the metal-roofed, timber-clad building designed by the Minneapolis office of MSR, an exhibition gallery features a series of 15 glulam trusses, which each span 30 feet and collectively run the space's 60-foot length. Their design resulted from the architects' desire to expose the building structure and to imbue a sense of delicacy.

"We opted to go with thinner members and more of them, at somewhat of a premium, because of the loveliness of that rhythm," says project manager and MSR associate Eric Amel, AIA, who credits project architect and fellow MSR associate Chris Wingate with the idea. "The frequency of those members made it sing."

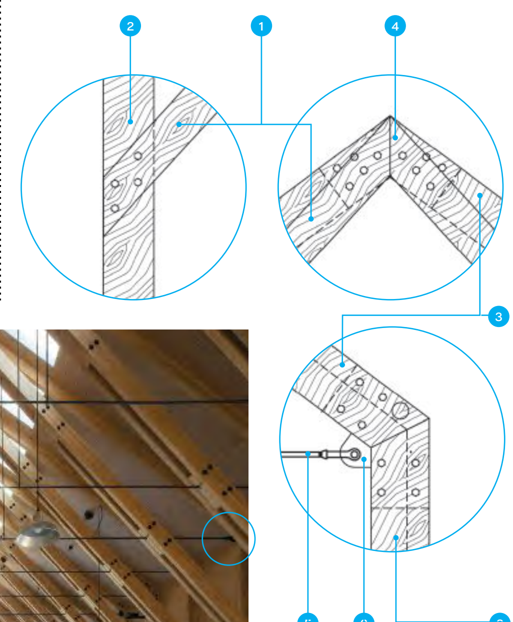
Supporting the roof decking, the simple truss's top chord—a single 3.5-inch-wide by 10.5-inch-deep member—connects to a vertical post of equal dimensions. Finalizing the triangle is the bottom chord, a pair of Douglas fir 2x8s, which attach to the posts 10 feet from the ground and angle sharply upward, meeting the top chord at the roof ridge. Wood blocking between the double chords refrains buckling, while a steel tension rod threaded through the blocking spans the width of the gallery, tying into a steel knife plate that joins the vertical truss member and top chord.

The trusses and their supporting glulam posts are spaced every 4 feet. These columns embed partially into the wall system, a Ray-Core structural insulated panel finished in the interior with plywood panels.

Erecting the building was relatively straightforward due in large part to the skill of Loeffler Construction & Consulting, in Lakeville, Minn., says MSR founding principal Thomas Meyer, FAIA, the project's partner in charge: "[T]hey saw this as a special opportunity to celebrate their craft and their skill set."

In a nod to vernacular architecture, the building's structural connections are largely exposed. "Even the tie-rods, there's a connection in the middle," Wingate says. "It's one little additional element for that thin, black, horizontal line ... but if it's done beautifully, it can add to the aesthetic of the space."

1. 2×8 Douglas fir bottom chord (typ. 2)
2. 3.5" × 10.5" glulam column
3. 3.5" × 10.5" top chord
4. Steel knife plate
5. Steel tie-rod
6. Steel knife plate and connection



RICHARD BRINE

> *To read more about the history, design, and construction of the Tashjian Bee and Pollinator Discovery Center, visit bit.ly/ARUMBee.*

Architectural Lighting: Daylighting in an LED World

TEXT BY ELIZABETH DONOFF

No building strategy intertwines the disciplines of architecture and lighting as daylighting design does. Drawing on core principles of siting, solar orientation, and environmental awareness, daylighting gives basic form to architecture through illumination. "Daylight is the primary source for architecture," says Hayden McKay, AIA, a New York–based principal at HLB Lighting Design and leader of the firm's daylighting and sustainable design studio. "It has been over time and it still remains the first thing that should be considered in creating architectural forms and fenestration orientation."

However, underlying any discussion of daylighting and architecture is the former's ability to reduce a building's energy consumption and improve its overall performance. This benefit emerged in the late 20th century, which saw the emergence of "energy-conscious architecture," a phrase that describes a generation of building projects that incorporated daylighting design as the driver for energy savings and the analytical tools used to measure their performance, says Mark DeKay, an architect and professor at the University of Tennessee, Knoxville's College of Architecture + Design, and co-author of *Sun, Wind, and Light: Architectural Design Strategies* (John Wiley & Sons, 3rd ed., 2014).

Since that time, energy efficiency and sustainable design have secured their place in the architectural lexicon with the introduction of stringent energy and building codes and marketable sustainable design metrics, such as the ratings of the U.S. Green Building Council's Leadership in Energy and Environmental Design (USGBC's LEED) system.

Critically, changes were also occurring on the lighting front. The switch to LEDs and the phaseout of incandescent sources, as mandated by the Energy Independence and Security Act of 2007, have forever changed the way in which energy performance arguments are made, particularly when specifying whole categories of light sources and associated fixtures. Simply put, lighting's analog-to-digital paradigm shift has upended the industry.

Accordingly, the case for daylighting design must transform to one that elevates its potential benefits not in energy consumption, but rather in occupant health and well-being.

Ending the Energy Argument

LED luminaires are overwhelmingly more efficient than their counterparts that utilize legacy sources such as incandescent, halogen, metal halide, or fluorescent lamps. An LED downlight today can be expected to use between 9W and 24W, while its legacy predecessor could consume between 13W and 50W—essentially double the wattage.

Multiply the savings of switching a single fixture to LED by all the luminaires on a project—and tack on the fact that designers must comply with some of the strictest building, energy, and lighting codes, such as California's Title 24—and the result is high-performance, energy-conscious lighting design. "Because LEDs are so efficient, there's very little energy to be saved with electric lighting and daylight harvesting controls," McKay explains.

Gregg Ander, FAIA, former chief architect of Southern California Edison and the author of *Daylighting Performance and Design* (John Wiley & Sons, 2nd ed., 2003), concurs: "The energy densities are much less now—below 0.5W a square foot in many cases as opposed to 3W a square foot as in previous decades." With states such as California, Massachusetts, Texas, Minnesota, and Hawaii leading the way on what he calls the "decarbonizing" of their economies, "you have this massive transformational market shift going on driven by executive orders, legislation, regulation, codes, and a whole bunch of things that's leading to a perfect storm."

In this case, the perfect storm is a good thing: increased building efficiency, advanced automation of building controls, and a demand for people who can develop these systems and associated

> *To read more about projects, products, and technologies related to daylighting design, visit archlighting.com/daylighting.*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Architectural Lighting: Daylighting in an LED World

products. But where does this leave the argument for daylighting design?

Elevating Health and Well-Being

As the impact of LEDs and daylighting on increased energy efficiency veers toward self-obsolescence, interest in the lighting mediums' roles in occupant performance is ramping up. Research correlating the presence of daylighting in work and school environments to increased occupant productivity began emerging in the 1980s and 1990s. A number of studies found that better employee performance led to fewer sick days, which then resulted in lower business operating costs. Similarly, studies such as those conducted by architect and lighting specialist Lisa Heschong and her firm, the Heschong Mahone Group (now part of the TRC Companies), found that students with greater exposure to daylight recorded better test results and fewer absences.

More recently, the argument for daylighting's ability to influence health has received a boost from advancements in technology. Designers can now adjust or tune electric light to create a specific color temperature range for a designated time of day or activity level in a manner that draws on daylight as the base layer of illumination. When the lighting of a space is calibrated to work with our biological needs and circadian cycle—which, of course, daylighting innately does—the design represents a stronger understanding of how light and architecture can coordinate and how occupants interact with their environment. This human-centric approach to lighting has emerged as the strongest case for incorporating daylighting design strategies in buildings today and in the future.

The ability to integrate color-tunable fixtures into a daylighting strategy also addresses concerns about sacrifices to the quality of light that had emerged in the wake of the incandescent phaseout, when building codes pushed lighting power densities to near zero levels, and a crop of spaces with an overall poor quality of illumination emerged. Daylighting projects today "have to make the case on lighting quality and experience," says Matt Franks, associate principal and senior lighting consultant in the New York office of Arup.

The global firm has installed a full circadian-light system in its Boston office that emulates the sun's changing hues from dawn to dusk. The electric lighting follows a color temperature curve from 3000K (warm) to 5000K (cool) and then back to 3000K over the course of the workday. The system adjusts over the year to correspond to longer daylight hours in the spring and the summer. Arup is working on similar systems in its Chicago and San Francisco locations, and exploring a system for its Seattle office, says New York–based principal Brian Stacy, who also leads the firm's lighting group in North America. "Some are full circadian systems, some are tunable systems; we're playing around with what that means because there is a distinction." Most tunable systems focus on color temperature without factoring in illuminance and glare metrics, he notes. "The key is to meet target illuminance (brightness) levels at the work surface and vertically at the eye."

And similar to how energy performance attracted more public attention with programs like the USGBC's LEED rating system, circadian lighting is getting help from the WELL Building Standard, which offers guidelines and metrics for creating healthy living and working environments. "LEED is focused on buildings," says Matthew Tanteri, associate principal and daylighting practice leader in HLB's

"LEED is focused on buildings. WELL has its focus on the body and the person: It's human-centric."

—Matthew Tanteri, associate principal and daylighting practice leader, HLB Lighting Design

Architectural Lighting: Daylighting in an LED World

office in Austin, Texas. “WELL has its focus on the body and the person: It’s human-centric.”

New—and Old—Obstacles

While daylighting might find new relevance in a light and health context rather than as a means for energy savings, its place in architectural design remains uncertain. One longstanding question is where this field sits in the realm of architecture and lighting. Practitioners remain firmly rooted in either the architecture or the lighting camp and few events, if any, work to foster interdisciplinary communication.

Also out of reach is agreement on universal performance metrics and technical vocabulary, even among daylighting practitioners themselves. In his 2008 ARCHITECTURAL LIGHTING article “Daylight Dialect,” Kevin Van Den Wymelenberg, ASSOC. AIA, director of the Institute for Health in the Built Environment at University of Oregon’s College of Design, wryly noted this lack of consensus: “Most designers working in the medium of daylight are a bit cloudy when it comes to explaining just what is meant by describing a building or a space as daylit. Or is the correct term ‘daylighted?’”

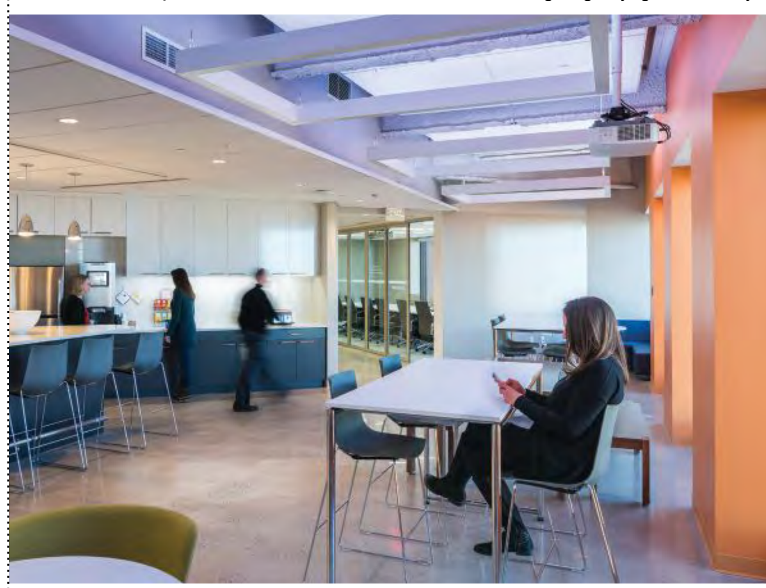
The regulation bodies are not particularly helpful. Updates to the various technical documents to reflect advancements in solid-state lighting or empirical findings between daylighting and occupant health have not occurred with great frequency. It was not until 2013 that the Illuminating Engineering Society (IES) published Lighting Measurement (LM) 83-12 “Approved Method: IES Spatial Daylight Autonomy (sDA) and Annual Sunlight Exposure (ASE),” the first IES-adopted, evidence-based annual daylighting performance metric in the lighting industry.

Then there is the ongoing issue of limited funding for lighting research. In the United States, the Department of Energy and its network of national laboratories have served as key partners for a wide variety of research and development initiatives in areas such as fenestration, glazing, and building systems. Cutbacks and reductions in funding—and even threats to do so—not only jeopardize the future of this work, but also the ability of scientists, researchers, and academics working in these areas to continue these public–private sector partnerships, which provide a direct route to the marketplace for new products and materials.

And, like many industries, daylighting is facing a generational shift in workforce. Many of the practitioners and researchers who developed the canon of studies from the 1980s through the early 2000s have recently retired or will do so in the next few years. While a new generation of lighting designers is stepping into these positions, the ranks are nevertheless smaller, and a cohort of knowledge and experience is further removed from projects of today and tomorrow.

Finally, the new technical capabilities that LEDs offer in lighting controls and the modulation of natural and electric light raise potential ethical questions. Essential to any daylighting strategy has been the connection to view. “I always believe in designing daylight first,” says Florence Lam, a London-based Arup fellow and the company’s global lighting design leader. “It is the direct process of any lighting design. Daylight should come first as the base layer to get [light] right, to get the right view and sequential experience. Then, after that, it’s about applying the electric light overlay.”

But when new control platforms, through LEDs, offer the ability to not only complement variations in daylight, but also to mimic them devoid of real-time settings, the question arises: When the simulation of daylight crosses a perceptual boundary, what in our understanding and experience of light and space are we at risk of losing?



Arup’s WELL-certified office in Boston

DARRIN HUNTER

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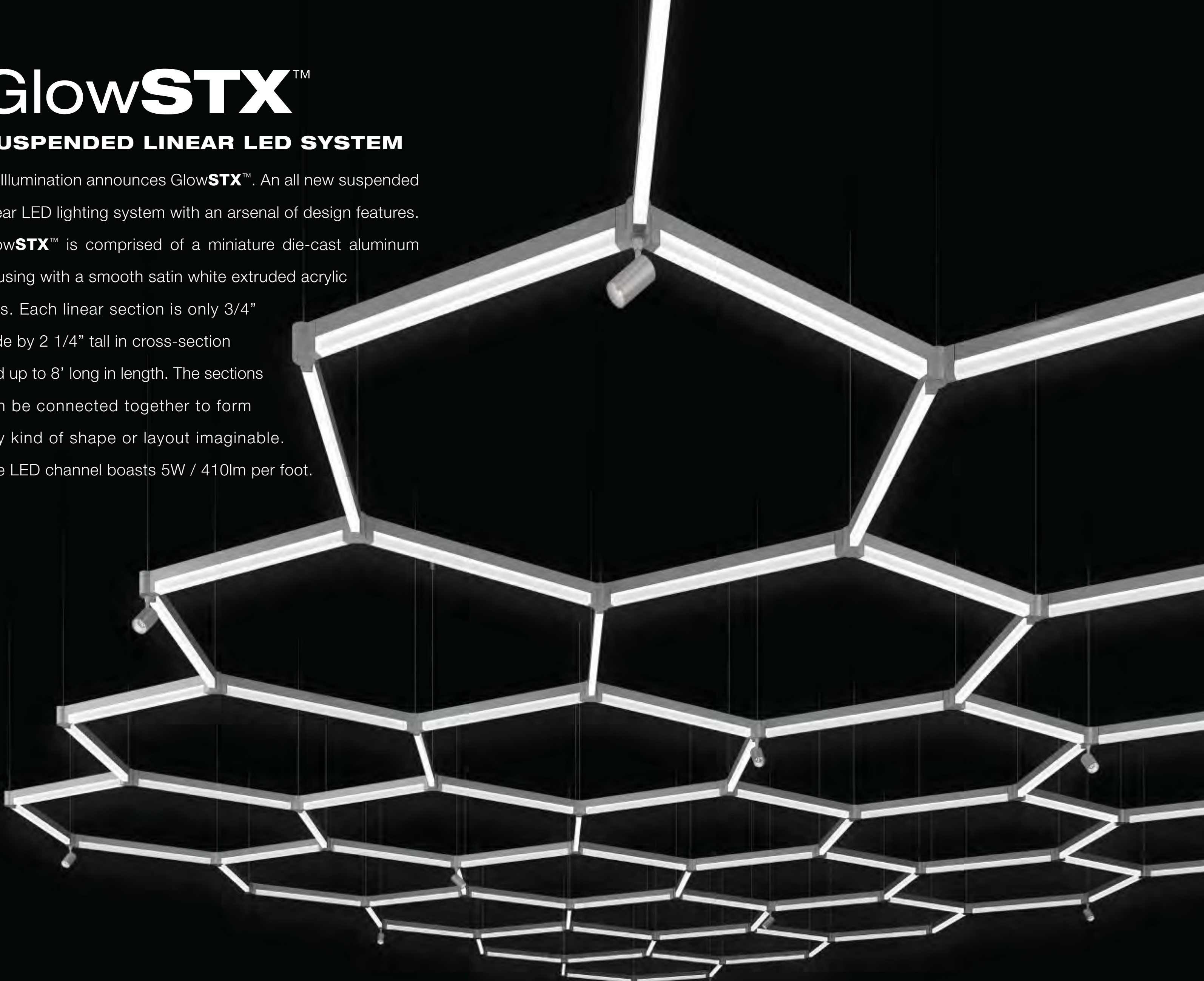

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Residential: WXY Architecture + Urban Design

TEXT BY EDWARD KEEGAN, AIA

New York state's vast park system features accommodations that are booked more than half a million nights each year. The grounds, campsites, cabins, and cottages—many of which were built under a New Deal–era Civilian Conservation Corps (CCC) program—are now undergoing a transformation as part of NY Parks 2020, a $900 million program to improve and repair deteriorating infrastructure and facilities across the system. Nearly a third of the money, which comes from a combination of public and private sources, is earmarked for improvements to recreational facilities, including campgrounds.

NY Parks 2020 funded a $9 million project to add the first cabin structures to Wildwood State Park and Heckscher State Park, both located on Long Island. For the project's first phase, New York City–based WXY Architecture + Urban Design created a set of 10 new cabins at Wildwood State Park, which began opening for rentals on Memorial Day weekend. WXY's scheme involves two cabin types—a 670-square-foot one-bedroom and a 784-square-foot two-bedroom—and grouping all 10 cabins on a site immediately north of an existing tent campground.

Design and construction were completed on a tight budget and with very particular requirements. "It's like doing tiny public buildings," says WXY principal in charge Claire Weisz, FAIA. "They need to be robust, fully accessible, and accommodate all ages." The cabin designs couldn't

Roofs are clad in galvalume from Petersen Aluminum Corp.

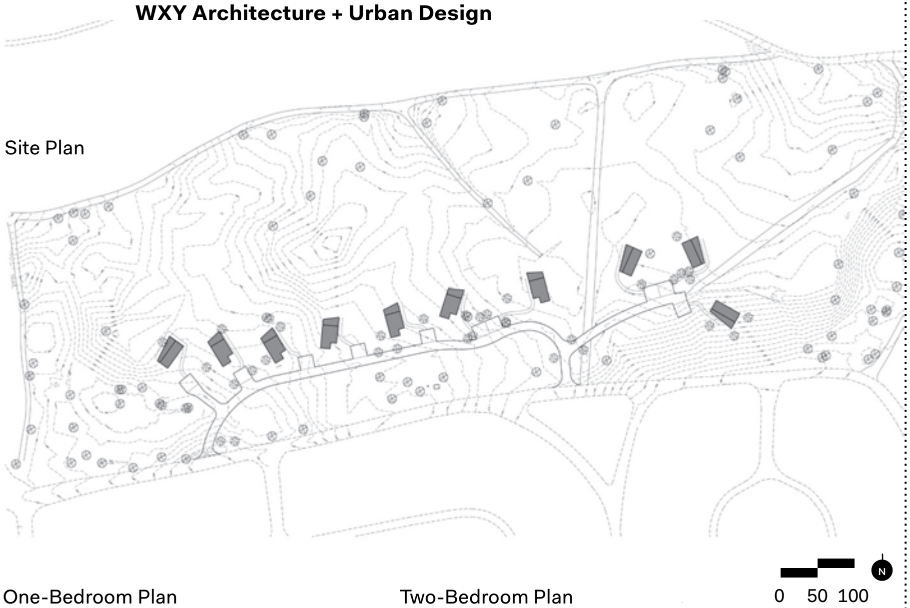
Project Credits
Project: Cabins for Wildwood State Park, Long Island, N.Y.
Client/General Contractor: New York State Office of Parks, Recreation and Historic Preservation, Long Island Region
Architect: WXY Architecture + Urban Design, New York · Claire Weisz, FAIA (principal in charge); Mark Yoes, FAIA (design principal); Layng Pew, AIA (principal); Tim Bacheller (project manager, senior architectural & urban designer); Justine Shapiro-Kline (senior planner & urban designer); Ariel Millan (architectural designer)
Mechanical/Structural/Electrical Engineer/ Landscape Architect: Stantec
Civil Engineer: Cashin Associates
Size: 670 square feet (one-bedroom cabins); 784 square feet (two-bedroom cabins)
Cost: $3 million

ALBERT VECERKA/ESTO

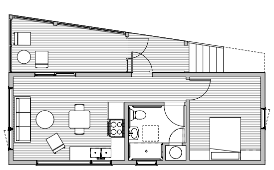
> *View more images of the Cabins for Wildwood State Park by WXY in ARCHITECT's Project Gallery: bit.ly/WildwoodParkCabins.*

Residential:
WXY Architecture + Urban Design

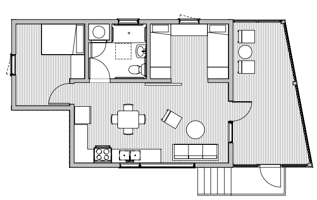
Site Plan



One-Bedroom Plan



Two-Bedroom Plan



be too complicated either because the park staff would be responsible for construction and maintenance. So the structures use conventional wood-frame construction and sit above grade on exposed concrete caissons.

The final site plan was determined in situ: WXY's designers staked the location of each cabin with flags and adjusted the composition in the rolling landscape to give the perception of diverse forms, while leaving the forest as untouched as possible.

The cabin's exteriors are simple, comprising unfinished cedar shingles, ipe decking, and galvalume roofing. "It was important that [the buildings] speak to our early group of 1930s cabins, but are built with an aesthetic that's contemporary," says Angelyn Chandler, the former deputy commissioner for capital programs of New York State Parks, Recreation and Historic Preservation (she recently joined the New York City Economic Development Corp.). The shingles match those cladding utility structures in the park and will eventually weather to camouflage with the surrounding trees, a mix of species that includes cedar.

The cabins' irregularly pitched roofs emphasize the site's terrain on the exterior and help define living spaces in the interior. On both cabin configurations, the roof ridge line matches the boundary between interior and exterior spaces. In each cabin, the low point in the roofline shelters the master bedroom, ensuring the quietest space is also the most snug and private.

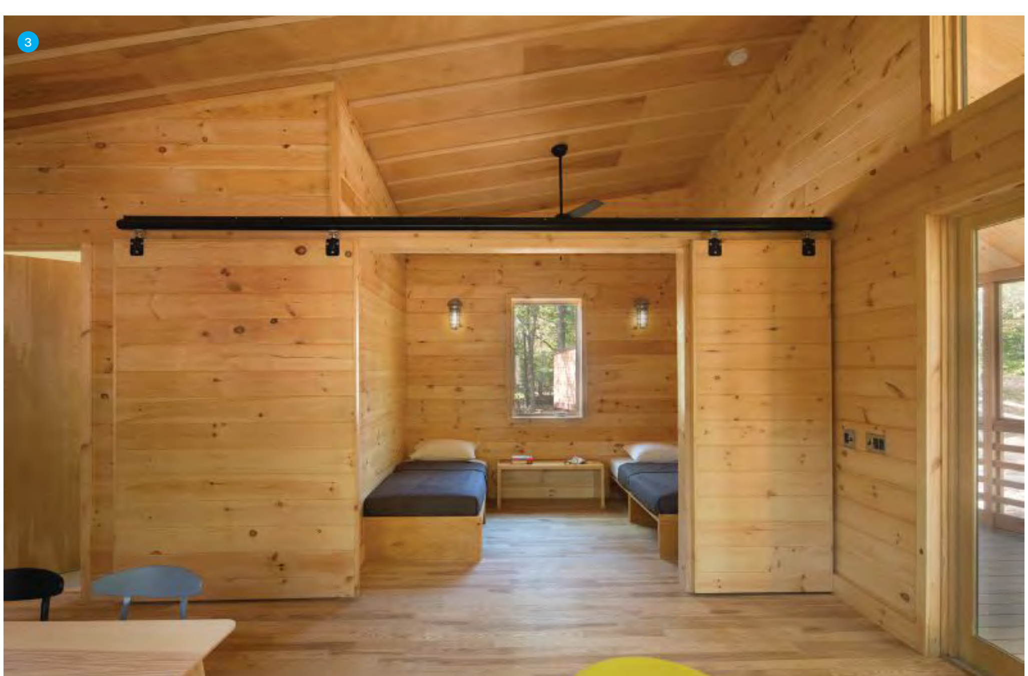
The interiors are even simpler than the envelope, and feature ash plank flooring, 8-inch-wide tongue-and-groove knotty pine wall boards nailed directly to the studs, and birch plywood board-and-batten ceilings. "We used very traditional materials on the cabin," Weisz says, "but stripped the form to its essential features."

The cabins' simple program includes a bathroom, kitchenette, and screened outdoor porch. In the two-bedroom unit, the kitchen/living area is 12 feet wide by 23 feet long; a barn door to the second bedroom can slide open to enlarge the communal space during the day. The living area of the one-bedroom variation is just 12.5 feet by 16 feet, but opens onto a screen porch for additional square footage. The kitchens are small, but each is equipped with a sink, refrigerator, microwave, and electric range cooktop with oven, as well as DuPont Corian countertops. Bathrooms are somewhat sparse, but fully accessible with zero-entry showers.

One major difference between the original CCC cabins and WXY's cabins are the latter's bigger windows, which were designed to maximize cross-ventilation and views. The cabins have no air conditioning, relying solely on breezes and well-placed windows and ceiling fans for cooling. While the cabins aren't currently available for rental during the winter, they are fully insulated and have radiant heating through copper mesh located under the floors that would allow all-season use in the future.

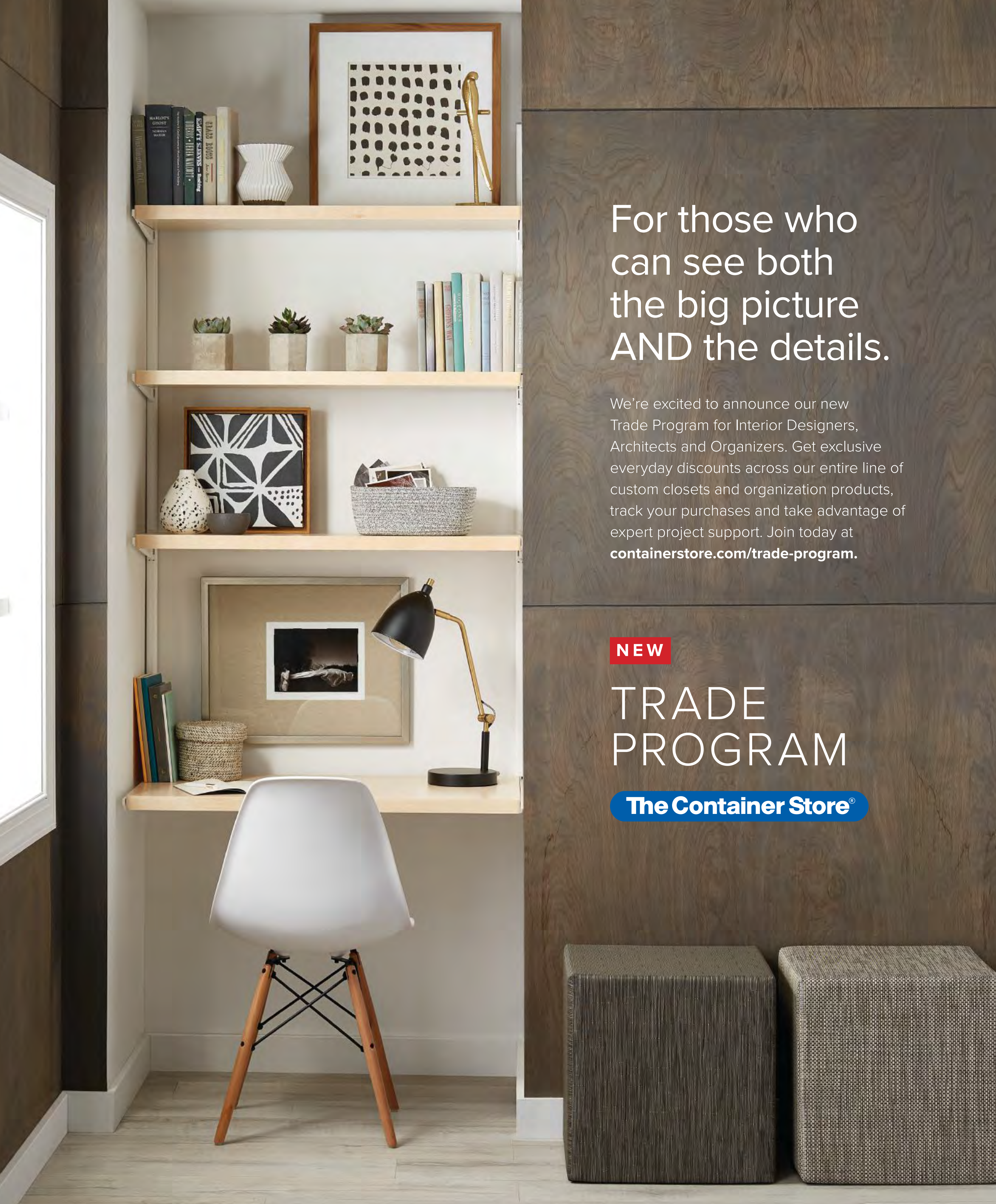
This summer will prove the cabins' place in the New York state parks' roster of accommodations. "Visitors have come to the same parks and cabins for decades," Chandler says. "Hopefully these projects will bring new people to the parks who will start their own traditions." Staff, family, and friends from WXY reserved four of the cabins for a long weekend this summer. "We're going to test it out," says Tim Bacheller, a senior architectural and urban designer at WXY. An additional 10 cabins, of the same designs, are expected to grace the Wildwood State Park landscape in the future.

Residential:
WXY Architecture + Urban Design



1. Marvin Windows and Doors bring nature and daylight into the cabin interiors, such as this living area in a two-bedroom unit. **2.** The cabins' Shakertown cedar shingle panels will weather over time to blend with the surrounding forest. **3.** A sliding door in the two-bedroom model separates a bedroom from the living area at night and opens to allow more space and daylight during the day.

ALBERT VECERKA/ESTO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THURSDAY, JUNE 21

10:30am	A+ Welcome to Day 1!
10:50am	A+ Session: The Future of Licensing Architects
11:10am	A+ Session: A Conversation with Snow Kreilich Architects
11:30am	A+ Session: A Conversation with Tamara Eagle Bull, FAIA
11:50am	A+ Session: Affordable Housing Design
12:40pm	A+ Session: Design to Achieve Zero Waste Goals
1:10pm	A+ Session: Canstruction International Awards
1:30pm	A+ Session: A Conversation with James Stewart Polshek, FAIA
2–4 pm	AIA Member Reception
3:50pm	A+ Session: Driving Growth, Innovation, & Safety Through Product Evaluation
4:10pm	A+ Session: A Conversation with Shelley Poticha
4:30pm	A+ Session: Stalled! Social Equity & Public Restrooms

FRIDAY, JUNE 22

10:30am	A+ Welcome to Day 2!
10:50am	A+ Session: Urban Cool
11:10am	A+ Session: The Future of Public Funding for Architecture & Infrastructure
11:50am	A+ Session: Mitigating Coastal Risk
12:30pm	A+ Session: The Top 10 Forecast from Kermit Baker
12:50pm	A+ Session: Architectural Activism Then & Now
1:30pm	A+ Session: Introducing the Assembly Civic Design Guidelines
1:50pm	A+ Session: A Conversation About Architectural Woodwork
2:10pm	A+ Session: A Conversation with Critic Inga Saffron
2:30pm	A+ Session: Planning for Water
2:50pm	A+ Session: Insulation Fire Performance: Innovation that delivers
3:10pm	A+ Session: Lessons Learned from Whitney Young
3:30pm	A+ Session: The New Role of Health & Wellbeing in Housing
3:50pm	A+ Session: A Conversation with Critic Justin Davidson
4:10pm	A+ Session: Biophilic Design & Why It's Time to Reconcile with Nature
4:30pm	A+ Session: Practicing Architecture at a Construction Company & Changing the Way We Specify
4:50pm	A+ Session: Global Approaches to Age-Friendly Design

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ACHIEVING DISASTER RESILIENCE WITH ICF CONSTRUCTION

Presented by:

amvic building system

This image shows the devastation from Hurricane Katrina, with sole resilient building **(ICF construction)** standing.

LEARNING OBJECTIVES

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

1. Define the term "resilience" as it pertains to construction practices and the impact of natural disasters.
2. Recognize the many obstacles that have prevented resilient construction from being the norm in the building industry.
3. Identify the advantages of ICF system over traditional construction materials in strengthening disaster resiliency and sustainability.
4. Outline best-practice construction guidelines for new ICF construction projects.
5. Recognize the short-term ROI of disaster-resilient ICF construction during the design/construction phases, as well as the long-term benefits in terms of occupant safety, sustainability, and insurance savings.

CONTINUING EDUCATION

CREDIT: 1 LU/HSW

COURSE NUMBER: AR062018-6

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/AR062018-6 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.

FROM HAZARD-PRONE TO DISASTER-READY

Imagine 3000 football fields, each filled four stories high with debris. That is the staggering amount of waste generated by three of America's major hurricanes of the past 25 years—namely, Hurricanes Andrew, Katrina and Sandy. When you pile on debris from the dozens of other severe storms that have shattered American communities since 1992's Hurricane Andrew, the extent of material loss is inconceivable. This doesn't even take into account the lives lost, bodily injuries, loss of productivity, economic instability, and emotional turmoil experienced by the victims.

In the wake of each new disaster (whether it be a hurricane, tornado, earthquake, fire or flood), there is a scurry of activity surrounding emergency response, damage assessment, and return to normalcy. Since recovery processes are invariably delayed after a catastrophic event, the lessons learned tend to concentrate on streamlining emergency capacity in order to better service disaster victims and communities. Rarely in the public discussion is the emphasis on preventative measures relative to the built environment—measures that would help reduce the pile of debris in those representative football fields.

Since the advent of LEED (Leadership in Energy and Environmental Design) in 2000, a great deal of attention has been paid to sustainable building practices in the construction industry. But somewhere along the way, "sustainable" has become synonymous with "green."

While it is essential to improve metrics on energy efficiency, renewable resources, and environmental quality for the future of our planet, those actions do little to protect a building from natural disasters.

As Aris Papadopoulas, a leader in the disaster resilience movement, explains, "A highly rated building may be 'green,' but if hazard-vulnerable, it cannot be sustainable. And when it becomes a pile of rubble, it is no longer green either."1 Put another way: What good is a green building if you have to build it twice? That's where resilience come into play.

Despite the destruction from Hurricane Harvey, the ICF building remains intact.

WHAT CONSTITUTES A DISASTER?

A **disaster** is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources.

The combination of *hazards, vulnerability and inability to reduce the potential negative consequences of risk* results in disaster.

Natural hazards are naturally occurring physical phenomena caused either by rapid or slow onset events:

- ***Geophysical*** – Earthquakes, Landslides, Tsunamis, Volcanic Activity
- ***Hydrological*** – Avalanches, Floods
- ***Climatological*** – Extreme Temperatures, Drought, Wildfires
- ***Meteorological*** – Cyclones, Storms, Wave Surges
- ***Biological*** – Disease Epidemics, Insect/Animal Plagues

Source: International Federation of Red Cross and Red Crescent Societies (http://www.ifrc. org/en/what-we-do/ disaster-management/ about-disasters/what-is-a-disaster)

In this course, we'll examine what "disaster resilience" means and how effective planning and application of progressive structural design, practices and building materials—particularly Insulated Concrete Forms (ICF)—can fulfill a two-pronged sustainability objective: reducing a building's carbon footprint while fortifying it against nature's inevitable hazards.

RESILIENCE DEFINED

Resilience is generally defined as the ability to recover from or adjust easily to misfortune or change. This interpretation can be misleading, since it implies that something bad has to happen before someone or something responds in a resilient fashion.

"Resilience" in relation to natural disasters has a much broader meaning that encompasses actions taken before a natural disaster hits, as well as effective response following such an event. The UN International Strategy for Disaster Reduction (UNISDR) defines resilience this way: "The ability of a system, community, or society exposed to hazards to resist, absorb, accommodate, and recover from the effects of a hazard in a timely and efficient manner, which includes preserving and restoring essential basic structures and functions."[2]

Based on this definition, achieving a high resilience capacity in any community requires intense coordination among a variety of key players in the public and private sectors to adopt and enforce resilient planning strategies, upgraded code language and building design criteria. Specific to the construction industry, high resilience capacity boils down to this: focusing not only on building back better, but even more importantly, building better from the start. This philosophy of up-front resilience planning for long-term sustainability is gaining momentum, thanks to the efforts of numerous private and governmental organizations.

Of major importance has been the UN International Strategy for Disaster Reduction (UNISDR), which in 2015 united several private-sector initiatives under the umbrella of the Alliance for Disaster Resilient Societies (ARISE). With this alliance driving change, progressive businesses will be able to capitalize on the emergence and growth in resilient-related products and services for the building sector.

The Insurance Institute for Business and Home Safety (IBHS) has also stepped forward to create FORTIFIED for Safer Living. This multi-hazard program specifies code-plus construction, design and landscaping standards that will increase a building's resilience during all-natural hazard risks for a geographic area. Similar to the incentive-based LEED-certification system for "green" building, FORTIFIED offers multiple designation levels based on degree of compliance with enhanced building standards. IBHS's efforts are no doubt making great strides toward counteracting the ambiguity and inconsistency of current minimum building codes.[3]
(For more information, see www.disastersafety.org/fortified.)

As momentum grows in the resilient-build movement, the pendulum will shift from a green-dominant strategy toward an integrated approach that rewards use of materials and processes that sustain the environment and the structure itself—a classic win-win for society, communities, builders and owners alike.

ROADBLOCKS TO DISASTER PREPAREDNESS

> *"While disasters are starkly visible, the process of risk creation is invisible or opaque to 99% of people."*
>
> *Dr. Richard Olsen, Director, Extreme Events Institute, Florida International University*

Disasters have been inflicting damage on humankind since the beginning of time. So why is disaster resilience a relatively new concept that just started to take hold in the 21st Century? The obstacles to a path toward resilient design and building practices—particularly in the residential sector—have been plentiful:


The starting of an ICF foundation wall. All the ICF forms and bracing are placed on the interior to allow for easy access and to expedite construction.

A VULNERABLE NATION

Some ominous facts about America's preparedness for natural disasters [5]

- The number of natural disasters has doubled over the past four decades.
- With accelerated trends in urbanization and coastalization, 45% of our residential and commercial built investments lie in 18 hurricane-prone states.
- Almost two-thirds of the country is impacted by wind vulnerability.
- 90% of one- and two-story homes are constructed of combustible softwoods.
- The U.S. is the most tornado-prone country in the world.
- The New Madris Fault has the potential for larger and more powerful earthquakes than previously thought.
- The majority of our built environment is classified as Risk Category II structures, carrying the lowest level of protection for occupied buildings.

Persistence of minimal building codes—The vested interests of various public and private entities have sabotaged government enforcement—let alone the upgrading—of minimum building codes because tighter regulations might hurt their investments or the affordability of their products. FEMA highlights the need to surpass any minimums to ensure safety: "Meeting minimum regulatory and code requirements for the siting, design, and construction of a building does not guarantee that the building will be safe from all hazard effects."[4]

Short-term affordability over long-term investment—First-cost of a build is top priority for most consumers, so the building industry designs and builds to that spec, unless a client is willing to invest in a custom build. That translates into cheaper materials and structural features that make the building more vulnerable to high winds, water damage, and seismic events. Affordability as a primary decision-making tool becomes a "pay now or pay later" proposition. Most consumers are willing to gamble tomorrow for a more cost-effective today.

Pressure to keep insurance premiums low—Insurance companies are often viewed as the villain when disaster strikes. But early in the life cycle of a building, when insurers are advising against minimal protection, their voices are not heard because higher coverage means higher premiums. It is only when coverage is assessed post-disaster that cutting corners on premiums inflicts painful consequences.

It's all about going "green"—The green movement is years ahead of resilience in capturing the public's attention. The construction industry is motivated to earn LEED certifications and incentives, but has not tuned into disaster resilience as an equal partner in building sustainability.

Competition from other crises—Terrorism, war, famine, and a slew of other immediate crises all compete for Americans' attention—and money. So investing in something that may or may not happen (i.e., disasters) tends to get pushed to the background. It only gets top billing when an actual catastrophe hits, and then the focus is on emergency response, not preventative measures.

False sense of security—Part of the willingness of a consumer or a community to gamble on disaster risk is the mindset that chances are low that it will happen to them. Besides, if a disaster does strike, the underlying assumption is that the government will have their back (because, for decades, that's been the government's response).

Although taxpayers have been largely absorbing the residual risk for victims of natural disasters, this is not a sustainable approach. Eventually, the expenditures will surpass what our government can cover via taxes or loans.

RESILIENCE: THE NEXT WAVE IN CONSTRUCTION

Careful steps taken upfront by architects, engineers, developers and builders can have a huge impact on the long-term resilience of a commercial or residential structure. But it sure sounds expensive. Surprisingly, many of the measures involve minimal costs with sizable benefits, like safeguards against hurricane winds. In cases of adjustments that do require substantial investment, like fortification against earthquakes, those gains are realized through long-term ROI.

> *Every dollar spent on pre-event mitigation related to earthquakes, wind and flooding saved about $4 in post-event damages.*[6]
>
> *Multihazard Mitigation Council*

As a "culture of resilience" catches on in the private sector, code-plus standards such as IBHS's FORTIFIED program or the U.S. Resiliency Council's report card system will become more widely recognized in the industry and government sectors. Following the path of LEED, these upgraded codes are predicted to spur incentives for owners through lower insurance premiums, tax breaks, financing options, favorable permits, and enhanced resale value.

Probably the best news is the abundance of opportunities for adopting resilient building practices in the years ahead. Currently, the U.S. owns approximately 20% of the world's building stock. Each year, it adds new stock at a rate of 1.8% per year while renovating existing stock at the same steady rate. By 2040, 75% of the U.S. building environment will be new or renovated. Great strides can be made in reducing the vulnerability of a majority of the nation's property if action is taken now.

Ultimately, the resilience movement will lead to increased market demand for better building construction—which is the best possible motivator for progressive construction professionals to get ahead of the curve.

Resilience in Action

The stark images of neighborhoods wiped out by a ruthless tornado or houses submerged in floodwaters are unmistakable. But as communities learn from previous oversights, resilience success stories abound. Here are just a few pioneers of resilient design, code enhancement and grass-roots activism who are highlighted in the groundbreaking book, *Resilience: The Ultimate Sustainability*:

Code-plus residential construction in the post-Katrina era—John Bowman is an owner of a small family contracting business specializing in building watertight concrete floors and basements. After Hurricane Katrina, John moved his business from Illinois to the Gulf Coast to lend his expertise to the construction of watertight basements and retaining walls—skills that were sorely lacking in the area. His innovations have since expanded to building entire resilient homes to code-plus standards, often with an aesthetic combination of wood, steel and concrete materials. His signature feature is the spraying of concrete on the outer walls using a gunite technique, which he hopes to extend to existing wooden structures as a cost-effective approach to improving hazard resilience.

Resourceful roof retrofitting initiative—Margot Brandenburg focused her resilience efforts on founding MyStrongHome, a non-profit/for-profit organization that retrofits existing homes in the wind-hazard prone areas of the Atlantic and Gulf Coasts. Within a few years, the company had retrofitted the roofs of 30 homes in three coastal states according to FORTIFIED code-plus standards for wind resistance. Since the upgraded roofs reduced insurance premiums, MyStrongHome was able to finance the retrofits using the insurance savings—at no additional cost to the owner. In the wake of the success of this pilot, the organization has set an aggressive goal of retrofitting 10,000 additional homes over the next five years.

This article continues on http://go.hw.net/AR062018-6.
Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. True or False: "Resilience" in relation to natural disasters has a much broader meaning that encompasses actions taken before a natural disaster hits, as well as effective response following such an event.
   a. True b. False

2. True or False: Typically after a natural disaster in the U.S., a community's primary focus is on adopting construction techniques that will serve as preventative measures in future events.
   a. True b. False

3. To be truly sustainable, a building should be built for disaster resilience as well as comply with _________ standards.
   a. LEED b. Building Code
   c. FORTIFY d. AIA

4. Which organization created the FORTIFIED…for Safer Living code-plus building standard?
   a. U.S. Green Building Council (USGBC) b. Insurance Institute for Business and Home Safety (IBHS)
   c. Federal Emergency Management Agency (FEMA) d. UN International Strategy for Disaster Reduction (UNISDR)

5. Which one of these wind hazard design guidelines is recommended for achieving elastic response of a building structure?
   a. 300-year wind speed b. 400-year wind speed
   c. 700-year wind speed d. 900-year wind speed

6. Continuous load path is not fully achieved until it terminates at:
   a. Building's foundation b. Surface where loads are applied
   c. Soils that support building

7. An ICF wall can withstand hurricane winds ranging from 200–300 mph. By comparison, what is the capacity of light-wood frame construction?
   a. 75 mph b.125 mph
   c. 175 mph d. 250 mph

8. Which one of these is not typically a cost-saving advantage of ICF construction?
   a. Light-weight construction reduces need for hazardous heavy equipment, resulting in less injury potential and lower insurance costs
   b. 9-1 construction methodology requires less trades and building wraps
   c. No additional layering required to meet wind/energy codes
   d. Up-front materials costs are 10% less than traditional light wood frame construction
   e. ICF protection of concrete from freezing extends building season and eliminates the need for additional heating and tarps

9. In which of these ways have ICF increasingly contributed to the green movement?
   a. ICF insulation is typically composed of 100% post-industrial recycled polypropylene b. Concrete aggregate is now commonly recycled onsite
   c. Virgin materials/fuels used in cement-making process are being substituted with recycled municipal, agricultural and industrial by-products d. a and c above e. b and c above f. All of the above

10. True or False. According to a 2017 Boston College study, insurance quotes for concrete builder risk policies were 22–72% HIGHER than those for wood-framed construction projects
   a. True b. False

OPTIMIZING ACOUSTIC PERFORMANCE OF WOOD BUILDINGS

Presented by:

THINK WOOD®

WREN is a wood-frame, 6-building, 7 story development in LA's South Park community and is the city's first Type III double-podium design. Architect: Togawa Smith Martin | Photo: Kevin C. Korczyk

LEARNING OBJECTIVES

1. Examine factors affecting acoustic performance and review building types where optimal acoustics are important for occupant comfort
2. Understand acoustical codes and standards and how acoustics are incorporated into green rating systems, including LEED v4 and the California Green Building Standards Code
3. Identify how wood building systems can help meet acoustic requirements for optimal indoor environmental quality
4. Review two case studies where integrating acoustic design, as well as numerous other sustainable features, was a high priority

CONTINUING EDUCATION

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

AIA COURSE NUMBER: AR062018-5
GBCI COURSE NUMBER: 0920016044

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/AR062018-5 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.

THE IMPORTANCE OF OPTIMIZING ACOUSTICS

Acoustic comfort is realized when a person's activity is not disturbed by noise and their hearing does not suffer. The opposite occurs when exposure to noise causes psychological disorder, hinders performing normal activities and reduces the ability to concentrate. According to the Centers for Disease Control, "Continual exposure to noise can cause stress, anxiety, depression, high blood pressure, heart disease and many other health problems. Hearing loss is the third most common chronic health condition in the US; almost twice as many people report hearing loss as report diabetes or cancer."

There are many sources of noise throughout a building and around a site, from the continual background noise of an HVAC system to walking and talking among building occupants. Outside noises such as emergency vehicles and traffic can also have a significant impact on acoustics, and, of course, higher density equates to more noise. Such noise can travel around and through ceiling, deck and floor joists, as well as windows and doors. Sound can also travel through fixtures and fittings, such as electrical outlets and recessed light fixtures, as well as perimeter joints and wall partitions.

Noise has a great impact on the built environment and the occupants that live and work in it. Noise control can be particularly relevant in healthcare settings where patient recovery, mental health and patient privacy are so important, especially in regards to the Health Insurance Portability and Accountability

Since we relax and sleep at home, it is important for sound mental health that noise is mitigated in our personal space. Residential noise issues can arise from floor/ceiling footfall, party (demising) walls, plumbing, HVAC and elevators and/or trash chutes. Orchards at Orenco | Architect: Ankrom Moisan Architects, Inc. | Photo: CBPhotography & Designs

GLOSSARY OF ACOUSTIC TERMS

Decibel (dB)
The ear is capable of hearing a very large range of sounds; in fact, the ratio of the sound pressure that causes permanent damage from short exposure to the limit that undamaged ears can hear is more than a million. Also, the human ear does not respond equally to all frequencies; we are much more sensitive to sounds in the mid-frequency range than we are to very low or high frequency sounds. To deal with such a wide range of sounds, logarithmic units are used: The log of a million is 6, so this ratio represents a difference of 120 dB. The decibel (dB) is the logarithmic unit used to measure the intensity of a sound. Each 10 dB increase is an increase of 10 times.

Impact Insulation Class (IIC)
Impact Insulation Class (IIC) is a single-number rating that describes how much noise is created by impact on a floor through a ceiling. This is a laboratory test in a controlled acoustical environment. A standardized testing device generates the impact sound by dropping five hammers, which impart a known energy into the floor/ceiling construction. In the receiving room below, the resulting sound pressure level is measured in frequency bandwidths comparable to those used in sound transmission loss measurements. Increasing IIC values correspond to improved impact noise dampening qualities (larger IIC value = better impact sound isolation).

Noise Reduction Coefficient (NRC)
Noise Reduction Coefficient (NRC) is the difference in sound pressure level between any two points along the path of sound propagation.

Outdoor-Indoor Transmission Class (OITC)
Outdoor-Indoor Transmission Class (OITC) is a standard used for indicating the rate of transmission of sound between outdoor and indoor spaces in a structure. While sound transmission class is based on a noise spectrum targeting speech sounds, OITC is based on a noise spectrum weighted more to lower frequencies down to 80 hertz (such as aircraft/rail/truck traffic).

Sound Transmission Class (STC)
Sound Transmission Class (STC) is single-number rating that describes how much sound a wall or floor/ceiling construction will block from one room to the next. STC is applied to situations where speech or office noise constitutes the main sound problem. To determine the rating, an active loudspeaker is placed on one side of the partition and sound levels are measured on both sides. The difference in levels shows how much sound can be blocked by the partition. The higher the rating, the better the sound insulation properties.

Transmission Loss (TL)
TL is a measurement, in decibels, of how much sound energy is reduced by transmission through materials.

Act (HIPAA), which provides data privacy and security provisions to safeguard medical information. Therefore, privacy is imperative in exam rooms, counsel rooms, doctor's offices and the lobby/waiting area. In schools, optimal acoustics are equally important, as the learning environment for students must be free from distractions. Productivity is essential in office environments too. In addition, since we relax and sleep at home, it is important to sound mental health that noise is mitigated in our personal space as well. Residential noise issues can arise from floor/ceiling footfall, party (demising) walls, plumbing, HVAC and elevators and/or trash chutes.

For centuries, wood has been a material of choice for architects and designers intent on delivering the highest quality acoustic performance. From a violin to a concert hall, wood plays a role in delivering memorable acoustic experiences. Wood produces sound by direct striking, and it amplifies or absorbs sound waves that originate from other bodies. For these reasons, wood is an ideal material for musical instruments and other acoustic applications, including architectural ones.

In large buildings with hundreds or even thousands of occupants, such as apartment buildings, condominiums, hotels or dormitories, every acoustic detail has a positive or negative effect on the quality of daily life. Post-occupancy evaluations of buildings have revealed that poor acoustic performance is a common problem in buildings with large areas of hard, acoustically reflective surfaces. Ironically, such surfaces are frequently found in buildings designed to be sustainable, where the use of absorbent materials is minimized due to indoor air-quality concerns.

Fortunately, wood is not as "acoustically lively" (translation: noisy) as other surfaces, so wood-frame construction is efficient in buildings where sound insulation is required. In particular, wood doesn't present the impact noise transmission issues commonly associated with other types of construction. A study by Canada's National Research Council's Institute for Research in Construction shows when it comes to acoustical performance, a properly designed and constructed wood floor/ceiling assembly performs on the same level as other construction types.

Architect Marcy Wong, whose firm Marcy Wong Donn Logan Architects frequently uses wood for its acoustic properties, articulates the connection between acoustics and sustainability in this way: "In addition to the usual sustainable advantages of wood—renewability, nontoxic, carbon storing—there is an additional aspect, that being acoustics. Sustainability is more than being responsible about the impact of a project on the earth's resources and climate, but also on the quality of environment for users."

CASE STUDY: PEOPLES HEALTH NEW ORLEANS JAZZ MARKET

Peoples Health New Orleans Jazz Market | Architect: Kronberg Wall Architects | Photo: Peter Vanderwarker

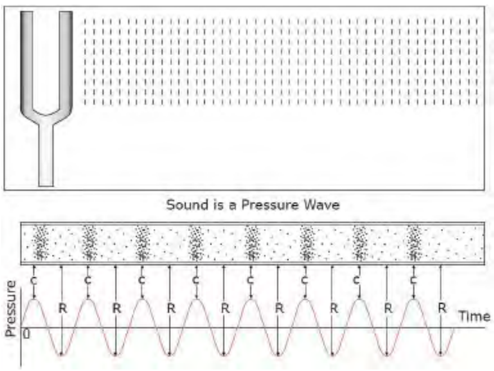
For Atlanta-based Kronberg Wall Architects, one of the greatest challenges in designing this 14,000-square-foot contemporary jazz performance space was acoustics. Located in an historic building in the birthplace of jazz—and home to the New Orleans Jazz Orchestra—the acoustics needed to add vibrancy and energy to the music being performed.

According to firm principal Eric Kronberg, part of the design brief was also that the aesthetics of the space should "feel as warm as Louis Armstrong's horn sounds."

Working with acoustics consultants Kirkegaard Associates, Kronberg Wall used wood for a majority of the reflective surfaces both to create the desired sound and warm aesthetic.

The team designed a carefully shaped pair of acoustic 'clouds' over the stage combined with curved, wood-clad cheek walls that extend out into the hall. These surfaces are designed to reflect sound back to the musicians for on-stage communication and out to the audience for a more exciting experience.

The hall includes salvaged wood planks that are oiled instead of polyurethaned to maintain a slightly porous surface. "The oil finish allowed the highest pitch sounds to be slightly absorbed by the wood," said Kronberg. "This helped to avoid excessive brightness and made the overall sound warmer." All of the wood was installed tongue and groove with hidden fasteners so it performs acoustically as a solid surface.



Simplified illustration of sound (pressure wave) propagation through air/solid structure (Kappagantu, 2010). In this figure, C signifies regions of compression and R signifies regions of rarefaction of the air molecules. Furthermore, the "0" pressure line in the graph represents the atmospheric pressure level. Source: US CLT Handbook

FACTORS AFFECTING ACOUSTICS

Environmental vs. Architectural Noise

There are two types of noise: environmental and architectural. Sources of environmental noise include automobiles, locomotives, rail cars, jet aircraft, industrial sources, telecommunications equipment, entertainment and construction vibration. The impacts of environmental noise include sleep disturbance, speech interference, occupant annoyance, reduced worker productivity and prolonged patient recovery in healthcare settings. Environmental noise can be controlled through measures such as noise barriers, sound-rated walls and sound-rated windows. Building codes dictate different land use categories that each have varying levels of acceptable exterior noise exposure, measured in decibels (the levels are Normally Acceptable, Conditionally Acceptable and Unacceptable).

Land use categories are categorized as

- Residential, Hotels and Motels
- Outdoor Sport and Recreation
- Schools, Libraries and Museums
- Auditoriums, Concert Halls and Amphitheaters
- Industrial, Manufacturing, Utilities and Agriculture

Land uses where people live and work have more stringent codes and standards for acceptable noise exposure than uses such as stadiums and manufacturing plants.

Architectural noise includes environmental noise but also mechanical/equipment noise, structural vibration and room acoustics, which can affect occupants in all building types including healthcare, schools, institutional/commercial, residential, performing arts, civic and industrial. The practice of architectural acoustics attempts to achieve good speech intelligibility, improve privacy, enhance the quality of performances in studios or venues and suppress noise to make schools, offices and residences more productive and pleasant places to work and live. This can be achieved by carefully specifying and detailing each building element and system to ensure the materials used work well together acoustically. Because of the complicated nature of this practice, architectural acoustic design is often performed by acoustic consultants in tandem with the rest of the design team.

Source of Sound	RMS Pressure (Pa)
Music club (loud)	≈10
Heavy traffic at 32.81 ft. (10 m)	≈1
Busy office	≈10^{-1}
Normal speech at 3.28 ft. (1 m)	≈10-2

Sound generated by various sources and their pressure (Pope, 2003). Source: US CLT Handbook

Airborne versus Impact Sound

Transfer of sound between adjacent spaces takes two forms. The first is the transfer of **airborne sound** such as speech or music. In airborne noise, the medium carrying the sound energy is air. The ability for a building element such as a wall or floor/ceiling to prevent the transfer of airborne sound is measured by **STC ratings**. The second form is the transfer of **impact sound** such as footfall. Impact sound is often more disruptive than airborne sound. For example, if a residential building is constructed of concrete, an eight-inch slab will effectively block the sound of voices from the suite above, but the sharp reports of someone walking in hard-soled shoes will be clearly audible. In contrast, it has been observed that very stiff wood-joisted floor/ceiling assemblies present greater low-frequency impact sound insulation. The ability of a floor/ceiling assembly to prevent the transfer of impact sound is measured by **IIC ratings**. Designers should determine the most appropriate rating to satisfy codes, regulations and owner requirements.

ACOUSTICAL CODES AND WOOD BUILDINGS

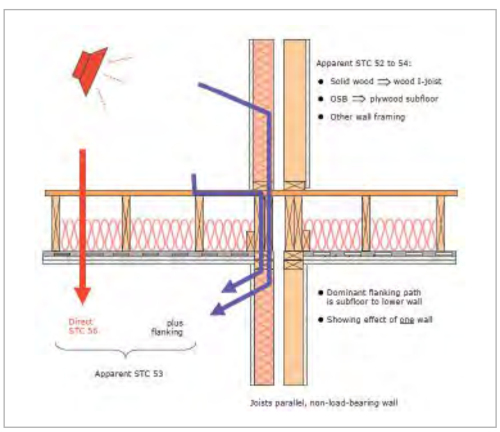
The International Building Code (IBC) provides the minimum requirements for sound insulation of demising walls and floor/ceiling assemblies between adjacent dwelling units or between dwelling units and public areas such as halls, corridors, stairs or service areas. In **residential buildings**, the IBC provides a minimum design requirement for unit-to-unit acoustical protection between floors. It requires an STC rating or IIC rating of 50, unless the "authority having jurisdiction" has its own more stringent requirement. The International Residential Code (IRC) has an appendix that provides for a minimum design separation of STC 45 for townhouses, where specifically adopted by the authority having jurisdiction. This minimum requirement is the same for entry level housing, market rate housing and luxury housing, whether it is dorms, apartments or condominiums. Beyond that, it is the responsibility of the design team to develop an acoustical design that meets owner/developer/tenant expectations for the project.

In a **mixed-use project**, consideration must be given to the acoustics between all of the adjacent spaces—not just dwelling unit to dwelling unit. Acoustical separation between residential and other occupancies can be a significant challenge, and this condition is not addressed in the IRC or IBC, though it is starting to be addressed in green building codes such as the California Green Building Standards Code (CALGreen).

For wood-frame mixed-use buildings, Section 1206 of the 2018 IBC includes the following:

> 1206.1 Scope. This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent dwelling units and sleeping units or between dwelling units and sleeping units and adjacent public areas such as halls, corridors, stairs or service areas.
>
> 1206.2 Airborne sound. Walls, partitions and floor/ceiling assemblies separating dwelling units and sleeping units from each other or from public or service areas shall have a sound transmission class of not less than 50 (45 if field tested) for airborne noise when tested in accordance with ASTM E90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. This requirement shall not apply to dwelling unit entrance doors; however, such doors shall be tight fitting to the frame and sill.

1206.3 Structure-borne sound. Floor/ceiling assemblies between dwelling units and sleeping units or between a dwelling unit or sleeping unit and a public or service area within the structure shall have an impact insulation class rating of not less than 50 (45 if field tested) when tested in accordance with ASTM E492. Alternatively, the impact insulation class of floor-ceiling assemblies shall be established by engineering analysis based on a comparison of floor-ceiling assemblies having impact insulation class ratings as determined by the test procedures in ASTM E492.



Floor surface as flanking path (IRC, 2002). The red arrow indicates the direct path and the blue arrows indicate the flanking path. Source: US CLT Handbook

ACOUSTICS AND GREEN BUILDING STANDARDS

Green-building certifications such as LEED are beginning to incorporate acoustics more prominently. LEED v4 Building Design and Construction (BD+C) and Interior Design and Construction (ID+C) both address acoustics under the Indoor Environmental Quality (EQ) Category: Acoustic Performance credit. This credit seeks to provide workspaces and classrooms that promote occupants' well-being, productivity and communications through effective acoustic design. One to two points are available under BD+C depending on whether it is applied to new construction, schools, data centers, warehouse and distribution centers, hospitality or healthcare (1–2 points). Two points are available under ID+C Commercial Interiors or ID+C Hospitality. Some of the considerations, depending on the certification a project is seeking, are HVAC noise; sound transmission; speech privacy and sound isolation; background noise; acoustical finishes and site exterior noise; reverberation time requirements; sound reinforcement and masking systems. Wood can contribute to optimal acoustic performance and can help projects earn points under the Indoor Environmental Quality category.

QUIZ

1. Which of the following is a single-number rating that describes how much noise is created by footfalls/impact on a floor through a ceiling?
   a. Impact Insulation Class (IIC)
   b. Sound Transmission Class (STC)
   c. Decibel (dB)
   d. Outdoor-Indoor Transmission Class (OITC)

2. Which type of noise includes mechanical/equipment noise, structural vibration and room acoustics?
   a. Environmental Noise
   b. Architectural Noise

3. True or False: Airborne sound is often more disruptive than impact sound.

4. In residential buildings, the IBC requires an STC rating or IIC rating of _____ for unit-to-unit acoustical protection between floors, unless the "authority having jurisdiction" has its own more stringent requirement.
   a. 25
   b. 48
   c. 50
   d. 63

5. In what LEED v4 category can projects earn Acoustic Performance credits?
   a. Materials and Resources
   b. Energy and Atmosphere
   c. Sustainable Sites
   d. Indoor Environmental Quality

6. Which of the following is a fundamental building technique for sound isolation?
   a. Mass
   b. Decoupling
   c. Air space
   d. All of the above

7. What is the best framing solution to optimize acoustics in a wood building?
   a. Double stud
   b. Staggered stud
   c. Single stud

8. True or False: In a light-frame wood building, the mass of the sheathing is just as important as the air space provided by the stud or joist cavity.

9. The most cost-effective acoustical improvement to a wood sound isolation system is:
   a. Decoupling
   b. Batt insulation in stud or joist cavity
   c. Double stud construction
   d. Increase mass

10. True or False: The strategy for controlling the transient vibration AND noise transmission of wood joisted floors is to control the proper combination of floor stiffness and mass.

This article continues on http://go.hw.net/AR062018-5. Go online to read the rest of the article and complete the corresponding quiz for credit.

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A NEW APPROACH TO ACOUSTICS USING SOUND MASKING AS A DESIGN PLATFORM

Presented by:


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LEARNING OBJECTIVES

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

1. Outline the role background sound plays in achieving effective acoustics.
2. Explain how sound masking reduces STC_c requirements.
3. Use Speech Privacy Potential (SPP) to achieve project savings.
4. Understand recent changes to ASTM standards related to sound masking.

CONTINUING EDUCATION

CREDIT: 1 LU/HSW

COURSE NUMBER: AR062018-10

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/AR062018-10 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 Niklas Moeller

With mounting recognition of the need to support focus work and promote wellness, many organizations are looking to provide building occupants with improved speech privacy, noise control and acoustic comfort.

Background sound is key to achieving these goals. Indeed, all acoustic design considers this factor; for example, when determining Sound Transmission Class (STC), Articulation Index (AI) or signal-to-noise ratio (SNR). However, building professionals often neglect to use the only accurate means of controlling the background level—a sound masking system—as a design tool. Instead, it is relegated to the last step in the design process, used to either cover up noises remaining after implementing absorption and blocking strategies or as a post-construction Band-Aid when occupants discover their speech privacy levels are not what they expected.

By turning the traditional three-tiered approach of absorb, block and cover—collectively known as the 'ABC Rule'—on its head and using sound masking as the starting point for interior planning, building professionals can set the base level of background sound throughout a facility and, hence, more accurately specify the blocking and absorptive elements used in their design, allowing it to be delivered in a more cost-effective manner—and with greater assurance of achieving the intended results.

CONSTRUCTING BARRIERS

When attempting to create speech privacy for closed offices, organizations may specify walls with high STC ratings. However, these ratings are lab-tested and frequently overstate real-world performance by five to 10 points. Site-tested Apparent STC (ASTC)—which takes into account all leakage paths, as well as the wall's performance—or Noise Isolation Class (NIC) ratings are better gauges, but unfortunately only testable after the fact.

Another common tactic is to construct full height walls that extend from the concrete floor all the way to the deck. While this approach increases isolation, it also raises costs and reduces

To preserve flexibility, walls are often built to the suspended ceiling or using demountable partitions. Walls may include substantial windows or even be built in glass from floor to ceiling. CREDIT: Benny Chan/Fotoworks

flexibility. Vigilance must still be maintained during design, construction, maintenance and renovation to ensure that penetrations in the walls' structure are controlled, because even minor ones can substantially reduce acoustic performance. This level of care can be difficult to sustain over the life of the space.

In any case, modern design and construction standards do not always allow for a high level of physical containment. To preserve flexibility, walls are often built to the suspended ceiling or using demountable partitions. Walls may include substantial windows or even be built in glass from floor to ceiling. Budget can also limit options.

These challenges raise the question as to whether there is a preferable and more reliable method of achieving speech privacy for closed rooms—an integrated approach that begins with a precisely controlled level of continuous background sound.

THE ROLE OF BACKGROUND SOUND

Many people use the words 'noise' and 'sound' interchangeably. However, not all sound is noise. Rather, one can define 'noise' as any unwanted sound. Similarly, 'silent' and 'quiet' have different meanings. A silent space is one with no sound at all, whereas a quiet one has no unwanted sound.

Understanding these seemingly subtle differences is critical to comprehending the role that sound itself plays in creating an effective acoustic environment. All too often, noise control strategies are mistakenly pursued with the intention of making a facility as silent as possible. However, the more silent one tries to make a space, the noisier it can seem to occupants. This phenomenon can be attributed to the fact that an effective acoustic environment relies in part on the provision of an appropriate level of continuous background sound.

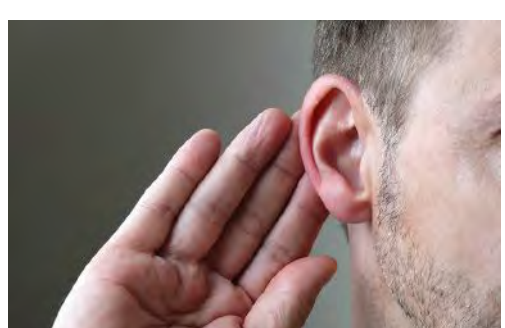
Due to improvements in construction materials, as well as quieter office and mechanical equipment, the ambient level in the majority of facilities is already too low, leaving employees working in library-like environments. The pin-drop conditions allow them to easily hear conversations occurring from a distance and even from within closed rooms. Though occupants typically describe such a workplace as 'noisy,' the root of the problem is that they are, in fact, too 'silent.' Put another way, the absence of sound makes noises easier to hear.

THE VARIABILITY OF HVAC

Both ASTM E1130, *Standard Test Method for Objective Measurement of Speech Privacy in Open Plan Spaces Using Articulation Index* and ASTM E2638, *Standard Test Method for Objective Measurement of the Speech Privacy Provided by a Closed Room* consider background sound when calculating speech privacy.

However, ASTM E2638 also reminds readers that Speech Privacy Class (SPC) is only valid at the time it is measured because the background level is presumed to be provided by heating, ventilation and air conditioning (HVAC). Even if well-designed, this equipment's output is only governed in that it is not to exceed maximums defined by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers in the *2013 ASHRAE Handbook—Fundamentals*. It cannot control the minimum background sound level.

Indeed, HVAC output often varies by 15 A-weighted decibels (dBA) or more, according to zone, time of day and season, as well the type of equipment used. Whenever and wherever the background level falls below the 30 dBA on which STC ratings—and, hence, wall choices—are based, occupants



Most people are familiar with the masking effect of background sound. Everyday examples included the drone of an airplane engine, the murmur of a crowd in a busy restaurant, the hum of highway traffic, and the rustling of leaves in the wind. CREDIT: © iStockphoto/BrianAJackson

HVAC levels vary by zone and at certain times of day or year. Furthermore, this equipment does not generate a sound spectrum designed for speech privacy. CREDIT: © iStockphoto/Alexjay can no longer rely on the partition assembly for speech privacy. Furthermore, HVAC does not generate a spectrum conducive to speech privacy. Instead, it is largely arbitrary and varies considerably from space to space, as well as over time.

Consequently, speech privacy levels fluctuate from wall assembly to wall assembly, depending on their performance in the frequencies used to calculate STC, as well as the inconsistent noise level and spectrum generated by HVAC—not to mention sound leakages through various flanking paths. If privacy is achieved, it is largely due to good luck or overbuilding. If not, a sound masking vendor is contacted. In this scenario, the technology is consigned to Band-Aid status, whereas it could have been more effectively used as the starting point for interior planning.

UNDERSTANDING SOUND MASKING

A sound masking system uses a series of electronic components and loudspeakers to distribute a sound similar to softly blowing air, causing many occupants to presume HVAC is its source. However, unlike HVAC, this sound is continuous and precisely controllable.

Though masking technology is often referred to by the term 'white noise,' modern systems do not utilize a particular color of sound. Rather, they are engineered so their output can be tuned post-installation in order to meet a spectrum or 'curve' specifically designed to balance acoustic control and comfort.

The premise behind this solution is simple: any noises and conversations that are below the controlled background sound level are covered up, while the disruptive impact of those above it is lessened due to the reduction in the degree of change between the baseline and volume peaks. Consequently, occupants perceive treated spaces as quieter.

There are many everyday examples of this effect, such as running water, rustling leaves or the murmur inside a busy restaurant. However, when introducing a sound to a workplace, it is vital to ensure that it is also as unobtrusive as possible. Because no masking system can produce the desired curve 'out of the box,' post-installation tuning of the sound is an essential part of the commissioning process within each facility.

OVERCOMING PRECONCEPTIONS

Considering that sound masking has been available since the late 1960s, one might wonder why the building community has yet to embrace it as the foundation for acoustic design. To understand this delay, one has to consider the technology's history.

Sound masking was first adopted to help with the acoustic challenges encountered in an ever-growing number of open plans. This initial application led some to conclude that masking was only intended for these types of areas.

This opinion was also reinforced by a significant technical impediment. Early sound masking systems typically used a centralized architecture, which is very limited in terms of its ability to offer local control over the masking sound. Large zones spanned numerous private offices and other closed rooms, with little opportunity to adjust the level within each space and no control over frequency. The resulting inconsistencies in masking performance led vendors and dissatisfied customers to conclude that the technology could not be applied in closed spaces.

Modern networked masking architecture addresses these historical objections by providing fine control over both level and frequency within small zones (i.e. one zone per closed office, and adjustment zones no larger than three loudspeakers, or 675 square feet [62.7 m^2], within open plan), but some still argue that closed rooms do not require sound masking because they are afforded sufficient speech privacy and noise control via physical isolation. By the same token, when a closed room fails to provide these attributes for its occupants, it is typically blamed on deficiencies in its design, construction and/or maintenance.

CRACKS IN THE ARMOR

While they might be a contributing factor, this failure cannot solely be attributed to cracks in the walls' armor because speech privacy is not determined by isolation alone. A person's ability to clearly understand a conversation is dependent on two variables: the level of the speaker's voice and the background sound level in the listener's location. The relationship between the two is called the signal-to-noise ratio.

Traditional closed room construction attempts to provide privacy by simply reducing the signal. If a solution has not been implemented to control the minimum background sound level in adjoining areas and it is lower than the sounds passing through the wall or via various flanking paths—gaps along the window mullions, ceiling and floors, as well as through the plenum, ductwork, return air grills, and open doors—conversations and noises will still be heard and potentially intelligible.

Regardless, unless a sound masking system is implemented—as well as professionally tuned, and its performance verified post installation—the minimum background sound level is not a known quantity. HVAC and other mechanical systems are sometimes thought to provide masking, but as noted above, one cannot reasonably expect this type of equipment to deliver a consistent level over time/space or to generate a spectrum conducive to speech privacy.

A sound masking system consists of a series of electronic components and loudspeakers that distribute a sound specifically engineered to balance acoustic control with occupant comfort. CREDIT: KR Moeller Associates Ltd.

Accordingly, ASTM E1374, *Standard Guide for Open Office Acoustics and Applicable ASTM Standards* was recently revised. The discussion of HVAC noise in the newly released ASTM E1374-18, *Standard Guide for Office Acoustics and Applicable ASTM Standards* pertains only to limiting maximum noise levels rather than using this equipment for masking. Further, a sound masking system is identified as the only viable source of a continuous minimum background sound level. As the title change suggests, this standard's scope has also been broadened; it now applies to private offices and conference rooms, not only to open plan.

With the advent of computer-tuned masking systems, a minimum background sound level is now a readily deliverable component of architectural acoustic design. Using it—even to apply a level as low as the 30 dBA on which STC ratings are based—allows the expected degree of speech privacy to be more reliably achieved.

Building professionals can use this predictable background sound level as the foundation for the remainder of their acoustical plan, allowing more accurate selection of the blocking and absorptive elements—and providing a means of reducing the specifications for the room's physical shell, while still achieving the desired level of speech privacy.

CALCULATING THE BENEFITS

But is an equal or greater level of privacy achievable using this alternative?

The most objective method to resolve the speech privacy question is to quantify the effects of increased attenuation and increased sound masking on intelligibility. This exercise can be done using the ASTM standard method (ASTM E1130-16, *Standard Test Method for Objective Measurement of Speech Privacy in Open Plan Spaces Using Articulation Index*) for calculating Articulation Index (AI), which is a metric of speech intelligibility and takes both factors into account. While this ASTM standard references open plan spaces, it is generally agreed that this method can also be applied to closed spaces, with slight modification to the test equipment.

This article continues on http://go.hw.net/AR062018-10. Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. Background sound is used in the calculation of:
   a. Articulation Index
   b. Speech Privacy Potential
   c. Signal-to-noise ratio
   d. All of the above

2. HVAC equipment provides the sound level and spectrum required to reliably cover conversations and noise.
   TRUE or FALSE

3. A sound masking system is used to:
   a. Cancel noise
   b. Absorb noise when other strategies have failed
   c. Control the minimum background sound level
   d. Limit maximum noise levels

4. Calculation of Articulation Index (AI) is based on several measurements taken in the space in question, as well as:
   a. Dynamic range
   b. Standardized normal voice level
   c. Noise Reduction Coefficient
   d. Sound Transmission Class

5. Composite STC (STC_c) takes into consideration:
   a. The negative impact on acoustic performance when elements such as doors and windows are added to the partition
   b. The positive impact on acoustic performance when masking is added to the design
   c. The wall's ability to block noises below 125 Hz
   d. The total number of closed rooms within a facility

6. Speech Privacy Potential (SPP) is calculated according to the following formula:
   a. STC_c + dBA ≥ 75
   b. STC_c + dBA ≥ 65
   c. STC_c + dB ≥ 75
   d. STC_c + dBA ≤ 75

7. For every 1 dBA increase in the background sound level, it is possible to reduce STC_c by one point and achieve the equivalent level of speech privacy.
   TRUE or FALSE

8. A well-designed and professionally-tuned sound masking system is able to keep variations in overall masking level to within ___ of specification.
   a. ±2 dBA
   b. ±3 dBA
   c. ±2 dB
   d. ±0.5 dBA

9. ASTM E1573-18, *The Measurement and Reporting of Masking Sound Levels Using A-Weighted and One-Third-Octave-Band-Sound Pressure Levels* can be used by acousticians tasked with verifying the performance of an installed and calibrated sound masking system against a specification outlining target levels and tolerances.
   TRUE or FALSE

10. A sound masking system's level can be adjusted post-installation in order to:
    a. Compensate for deficiencies in partition assemblies
    b. Accommodate videoconferencing requirements
    c. Improve sleeping conditions
    d. All of the above

SPONSOR INFORMATION

Industry leader KR Moeller Associates Ltd. has designed and manufactured sound masking systems for over 40 years, including the award-winning LogiSon Acoustic Network and newly-released MODIO Guestroom Acoustic Control. Worldwide distributors provide turnkey services and expert support. To learn more, visit www.logison.com and www.modio.audio.

DYNAMIC FAÇADES' MEASURABLE CONTRIBUTIONS TO HUMAN WELL-BEING

Presented by:

Ornamental Metal Institute of New York

The Tower at PNC Plaza in Pittsburgh, PA, designed by Gensler. Photography Credit: Connie Zhou.

LEARNING OBJECTIVES

After reading this article, you should be able to:

- Recognize aspects of façade design and construction that have proved detrimental to human health
- Identify façade features that enhance light exposure, air quality, thermal control, acoustics, natural views, and other features contributing to the quality of life and health
- Understand the relations of workplace quality-of-life variables to direct and indirect business metrics
- Demonstrate familiarity with research linking façade features to higher productivity and increased payback on green-design investment

CONTINUING EDUCATION

AIA CREDIT: 1.5 LU/HSW

AIA COURSE NUMBER: AR062018-2

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By: Bill Millard

Advanced façade designs improve light quality, airflow control, nature views, acoustics, and other variables affecting the quality of workplace life. Most firms spend more on personnel than on facilities. High-performance features still involve upfront costs, but as the relations of health, absenteeism, productivity, and the full range of returns on investment become clearer, austerity toward the "green premium" is giving way to a business case for dynamic façades

For architects who have designed commercial buildings with high-performance façade features, a presentation to an excessively cautious client is an all-too-familiar tale. Propose a porous skin that admits natural light and fresh air; point to the long-range energy savings that such sustainable features offer; cite respected authorities on biophilic design; show renderings of your new design alongside attractive northern European case studies, perhaps with bullet-point summaries of their light carbon footprints and the greener jurisdictions' farsighted building codes; mention the marketing advantages of LEED points; describe the falling costs of photovoltaics and the attainability of Net Zero energy performance—and then endure a moment of familiar heartsink as your greenest design ideas fall victim to the green-eyeshade brigade.

"Yes, it's beautiful," they'll say, "and the occupants will probably enjoy working in it, and it might even reach the payback point in ten years or so—but by then someone else will own it. The up-front premium is still too high. We don't like paying for another organization to get lower energy bills." What doesn't appear immediately profitable is value-engineered away. It doesn't always play out this way, but it still happens too often.

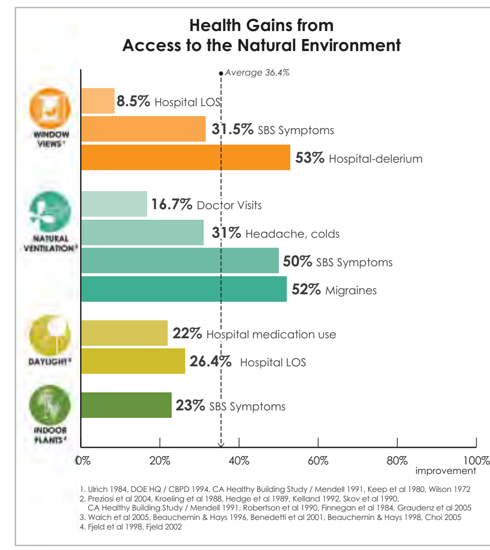
What cost-cutters in such scenarios overlook, say some specialists in building science, is the increasingly positive track record of advanced façades in promoting measurable savings in the health and well-being of occupants, apart from the energy benefits. A research base connecting high-performance façades to credible metrics of productivity, absenteeism, turnover, and other economic variables has been developing over recent years, strengthening the case for functional skins that help make a workplace more livable.

"The façade is this pressure point where so many complex issues come to the forefront," says Areta Pawlynsky, AIA, senior principal at the envelope consultants Heintges. "The first thing that design architects think about with that is the identity of the building because it's what people see.... You have to coordinate the aesthetics of that identity with performance issues, some that have been borne out by research, like light levels and thermal comfort, [and] with things that are in a different league, like building structure or the impact on the mechanical system." The challenge is to unify form and performance, she says, ensuring that "the good features… are actually fully integrated into the design, so they cannot be removed. If it's that important, it shouldn't be something that even *could* be considered for value engineering."

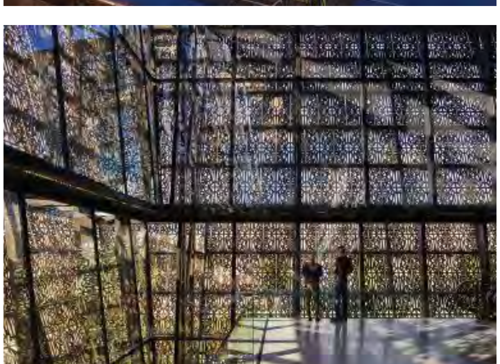
Benedict Tranel, AIA, principal at Gensler's San Francisco office, points to the underlying economics in different locales as drivers of design decisions. Progress in sustainable design, he notes, has historically correlated with high energy costs. "You can find places in the US where large corporations get negotiated rates, and they're paying five cents a kilowatt hour. And you look at a place like Germany, where they're paying ten times that amount. Then… you can make a case [that] it's an energy cost saving over the life of the project. Here it just would never pencil out in that regard, but it does pencil out in terms of employee productivity."

"Especially on projects where we're doing headquarters or a project that's built to suit for an end user," Tranel continues, "they certainly see the benefits of health and wellness and the productivity of the workforce." The more comprehensively the financial calculations account for this full range of benefits, he contends, the more readily the bean-counters can catch up with the idealists. "More and more, we're finding that the case is easy to make, that the audience is quite receptive, and that owners and developers understand the logic and the reasoning," he says. "The prevailing wisdom is becoming quite clear that the productivity benefit that you pick up on an employee-satisfaction, health-and-wellness side, less absenteeism, pays itself back. If you look at the total cost of real estate versus employees for a business, real estate is a small part of it compared to the cost of staff, and so picking up a 1% productivity gain can pay back all of the green features that you invest in. But if you try to justify it on energy cost alone, you never get there."

"A building, at the end of the day, especially a façade, really pales in comparison to the cost of the people," notes Hao Ko, AIA, design director on several high-profile Gensler buildings, including headquarters for PNC Financial Services, the computer graphics firm NVIDIA, and Mercedes-Benz. "People are starting to see the correlation between the work they do and the environment they work



NMAAHC: TRADITIONS INTERTWINED, UPDATED, AND TESTED



National Museum of African American History and Culture in Washington, DC, designed by Freelon Adjaye Bond/SmithGroup. Photography Credit: Alan Karchmer.

One new façade that has drawn vigorous public acclaim is that of the Smithsonian's National Museum of African American History and Culture (NMAAHC) in Washington, DC. Here, Heintges façade consultant Areta Pawlynsky, AIA, and colleagues helped translate the vision of David Adjaye, Philip Freelon, and the late J. Max Bond, Jr. (in a collaboration among Adjaye Associates, Perkins + Will's Freelon Group, Davis Brody Bond, and SmithGroup) into an exterior that would be both visually iconic and functional. The museum strikes a distinct profile and serves a long-overdue purpose within the artistic and monumental complex of the nation's capital. "I believe the number of people who have responded to the museum for a variety of reasons surpassed anyone's expectations," Pawlynsky comments.

The NMAAHC's tiered corona references the crowns in carved-wood columns and caryatids by Yoruban sculptor Olowe of Ise, wrapped in an ornamental bronze-coated aluminum lattice that simultaneously honors the craftsmanship of enslaved and freed African-American ironsmiths in the Deep South. The cladding panels are suspended as a scrim, adding an ethereal elegance to the building's sharp trapezoidal geometries. They come in four variants of different opacities (65%, 75%, 85%, and 90%), arranged strategically across all four elevations, with the lowest average opacity in the north elevation; the most opaque panels surround each corona opening or "lens," Pawlynsky reports, directing visitors' gaze toward nearby monuments. Balancing the daylighting requirements of a facility meant to suggest openness, exploration, and contextuality against Washington's well-known thermal challenges, her team calculated solar heat gain coefficients for the combination of screens and glazing (both vision glass and glass with 15% frit coverage), using Berkeley Lab Window 7 to simulate and compare to actual testing performed according to the National Fenestration Rating Council's NFRC 201 solar calorimetric procedures. Heintges recently verified newer modeling methods based on radiance.

"The reference there was the historical wrought-iron work of the American South," Pawlynsky says, "but while that was the original design inspiration, it was the density of it, varied across the façade, [that] impacted the solar heat gain coefficient. For us it was very interesting to see what the targets were, initially set up by the sustainability consultant for the solar heat coefficient, and to work on modeling what that would be, then actually having it tested in a laboratory in Fresno to verify what the combined solar heat gain coefficient of all parts of the façade, the multiple layers, was."

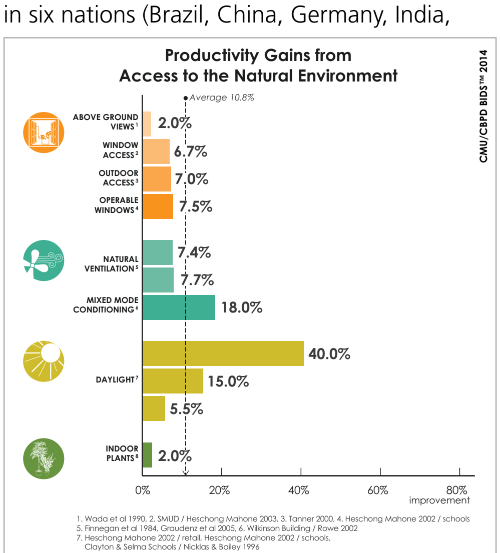
The Smithsonian Institution collects performance data on all its museums, Pawlynsky notes, a valuable resource for the architectural team both during the design process and for future post-occupancy studies. With long-anticipated LEED Gold certification officially announced on April 16, NMAAHC has been called "easily the greenest museum in Washington," with the dendritic forms of its metal latticework striking a calming biophilic note.

in—that the design of a space can also lead to increased engagement and productivity…. I think a lot of people may think 'Well, we love working at home. Or we love working outside.' Very few people think about their office work station as the most inspiring place to work." Organizations, he finds, are realizing that a homelike space with natural daylight and ventilation fosters productivity.

Vivian Loftness, FAIA, University Professor and Paul Mellon Chair in Architecture at Carnegie Mellon University, in a presentation to the Next-Generation Façade Conference at New York's *Times* Center last February, fleshed out similar arguments through an extensively detailed view of the mechanisms, scale, and implications of the façade/energy/health relationship. Her own work at Carnegie Mellon's Center for Building Performance and Diagnostics has measured and analyzed detailed data on multiple building systems, yielding actionable information on the interlocking aims of energy performance and environmental quality.[i] Drawing on case studies worldwide and research about how built environments affect the human visual, endocrine, respiratory, and musculoskeletal systems, she observes that façades allowing dynamic control of lighting, ventilation, and other features of workplace environments have cut investment payback periods dramatically, often from over a decade to just a few months, with labor-cost savings providing critical tipping points.

Expressing health effects in financial terms and on national scales, a Harvard research team recently measured the public-health benefits from LEED-certified buildings over 16 years in six nations (Brazil, China, Germany, India, Turkey, and the US, representing 82% of the global LEED commercial building footprint) at $5.8 billion ($4.4 billion of which was attributable to pollution reduction). This comes on top of $7.5 billion in energy savings; in other words, for each dollar these buildings saved on energy, they saved an additional $0.77 in prevented morbidity and mortality.[ii] Counting energy performance alone, it appears, drastically underestimates the value that sustainable design generates. Today's façades, Loftness and others argue, can be the decisive component in a well-integrated "triple bottom line" involving human, environmental, and financial capital.

Analyzing all three of those elements in dollar terms, Loftness's overview presented at the Next-Generation Façade Conference finds that installing operable windows on a typical



Courtesy of Vivian Loftness, FAIA, Carnegie Mellon University.

NVIDIA: FINE-TUNING LIGHT TO TREAT WORKERS LIKE ARTWORKS

NVIDIA headquarters in Santa Clara, CA, designed by Gensler. Photography Credit: Connie Zhou.

NVIDIA headquarters in Santa Clara, CA, designed by Gensler. Photography Credit: Jason O'Rear.

Art museums, Gensler's Hao Ko mentions, are a useful model for light management, balancing visibility with the protection of artworks. Among preliminary investigations for the NVIDIA headquarters in Santa Clara, Calif., Gensler's team visited the Los Angeles County Museum of Modern Art (LACMA), where the firm had worked with Renzo Piano on the institution's 2010 addition. Visiting LACMA with NVIDIA officials, who had exacting expectations for indirect light quality and glare control, Ko's team found that "this is exactly the quality of light that we want to bring in… light that doesn't damage the art. We hold art being so precious; we should keep that same mindset to people too."

NVIDIA's headquarters exemplifies the philosophy that a roof is what Ko calls "the fifth façade," a functional component meriting as much attention as the exterior walls and windows. Only two stories tall, the building has a total area not much smaller than PNC's (about 500,000 SF on a 250,000-SF floorplate) and a gently undulating profile created by multiple triangular roof panels (opaque and open) within a broader triangular volume. The building's atria are as large as those of medium-sized airports.

The fifth façade's pervasive triangular forms also have acoustic advantages: minimizing parallel surfaces also minimizes sonic anomalies such as standing waves. The complex roof is "doing all the acoustical work for us," Ko says, aided by perforated and insulated metal decking helping "to bounce sound in a way to take sounds away, but also get that right quality of sound. So it's not library-quiet, but it's the right kind of ambient noise." He notes that CEO Jen-Hsun (Jensen) Huang has compared the building to "a stealth bomber."

"When you have a building that low, the access that you have to daylight is incredible," Ko says. In "a large majority of that space, you really don't have to turn on electric lights in the building to work…. We tuned in the vertical façades in a very careful way to drive in daylight in a way so that you don't have to shade it a lot." Asymmetrical skylights, 313 in total, each with its solar orientation individually calibrated, admit a subtle quality of diffused, low-contrast daylight; except for a few areas where daylight is purposefully excluded, the entire space is naturally lit. The firm, Ko reports, "helped us write an actual software that could simulate the daylighting," a virtual-reality-based cluster-computing simulation that could model the character as well as the luminance of light from large numbers of sources. The glazing includes a dot-pattern film that helps soften the light; clear views of the sky, Ko says, were deemed less important.

NVIDIA's light management emphasizes translucency and reflection over transparency, avoiding hot spots and creating an atmosphere conducive to computer graphics work, where precise vision is critical. "The CEO cared so much that you could easily get the daylighting wrong, and it has the extreme opposite effect," Ko says, where "people will put up shades around their workstation. They'll put paper up. That was his biggest fear." The workers who began moving into NVIDIA's building last fall aren't hiding from light; they're enjoying working in an award-winning building (the International Interior Design Association named it one of six Interior Design Competition Winners for 2018), one that treats them like assets worth preserving.

100,000-SF building, with an initial cost of $120,000, brings a 5% return on investment (ROI) and a 19-year payback period when measured according to financial capital alone; when environmental benefits (reductions in pollutant and greenhouse-gas emissions, plus water conservation) are added to the financial benefit, the combined ROI rises to 7% and the payback point occurs in 14 years. But when the analysis accounts for cumulative financial, environmental, and human capital (using health and productivity metrics), the ROI soars to 345%, the payback period is a mere two months, with a net present value over 15 years of $805,700. Applying these analyses to an investment upgrading a whole 100,000-SF building, the figures are compelling: for $5 million in upfront costs, attaining whole-building performance goals boosted ROI from 60% (financial capital only) to 220% (financial, environmental, and human together), cut the payback period from 18 years to 10 months, and yielded a cumulative 15-year net present value of $8,404,580.

The case for overcoming a green premium is often based on the premise that human benefits are beyond financial calculation. Loftness shows that full-benefit accounting makes the case decisively using financial metrics as well.

THE THERMOS BOTTLE AND THE LIVING SKIN

Evolution in building technologies coincides with a philosophical shift. Through much of the 20th century, conceiving of the façade as a tightly guarded border between a hostile exterior and the people inside led to a certain type of structure whose downsides are now well known: profligate energy use for heating, ventilation, and air conditioning (HVAC), sick-building syndrome, and an unwelcoming internal atmosphere of eerie fluorescent light and stagnant air. When owners and architects envision a façade through a different implicit metaphor, however—not a barrier, but a dynamic filter, more like the skin of an animate being—this paradigm shift carries different implications for all these variables.

This article continues on http://go.hw.net/AR062018-2. Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. Tightly sealed commercial buildings are detrimental to:
   A. energy performance
   B. circadian light perception and hormonal response
   C. natural airflow
   D. all of the above

2. The dollar value of public health benefits from LEED-certified buildings, across a six-nation database, has recently been calculated as:
   A. approximately 5% of the value of energy savings
   B. approximately 25% of the value of energy savings
   C. approximately 77% of the value of energy savings
   D. approximately twice the value of energy savings

3. Workplaces dependent on artificial HVAC rather than natural ventilation:
   A. have higher energy costs
   B. have higher rates of illnesses, absenteeism, and turnover
   C. have lower productivity per worker
   D. all of the above

4. True or False: Current glazing technology always requires a tradeoff between visible-light transmission and heat transmission, so that protection from solar thermal gain impairs color perception and views.
   A. True
   B. False

5. Light at the blue end of the visible spectrum:
   A. is associated with serotonin production
   B. is associated with high levels of alertness and cognitive performance
   C. helps reset the human circadian clock when seen in morning hours
   D. all of the above

6. Environments that substitute natural ventilation for mechanical HVAC:
   A. vary airflow in ways most humans prefer to unvarying ventilation
   B. are associated with lower rates of respiratory illness and absenteeism
   C. are only cost-effective in regions without frost seasons or hot summers
   D. all of the above
   E. A and B but not C

7. True or False: Electrochromic glass is capable of influencing human circadian cycles.
   A. True
   B. False

8. An urban zoning standard for commercial office buildings limits internal noise (measured in A-weighted decibels) to:
   A. 10 dBA
   B. 25 dBA
   C. 50 dBA
   D. 85 dBA

9. True or False: Research and development in the automotive and aeronautical sectors has led to advances in glazing technology used in buildings.
   A. True
   B. False

10. The most substantial component of the return on investment in typical sustainable façade features is:
   A. Financial capital from energy savings
   B. Environmental benefit from energy savings
   C. Human capital from increased health and productivity
   D. Marginal increase in resale value of the property

SPONSOR INFORMATION

Ornamental Metal Institute of New York

The Ornamental Metal Institute of New York is a not-for-profit association created to advance the interests of the architectural, ornamental, and miscellaneous metal industries. The Institute sponsors programs to assist architects, engineers, developers, and construction managers in transforming their ideas into reality. For more information, visit: www.ominy.org.

Jurors Areta Pawlynsky, Heintges, Aulikki Sonntag, Drees & Sommer, Ilana Judah, FXCollaborative, Melissa Wong, Thornton Tomasetti, Tali Mejicovsky, Arup with moderator Phillip Anzalone and the winning teams.

Vivian Loftness, FAIA, University Professor and Paul Mellon Chair in Architecture, Carnegie Mellon University, presented the keynote, "Reinventing Facades for Resiliency, Health and Productivity," at the 2018 awards ceremony.

FINALISTS:

THE ART OF HEALTH AND HAPPINESS TEAM

Weston Williamson + Partners
Andrew Weston
Travis Walsh
Chloe Lockhart
Rowan Obrien
Daryl Tebug
Filipe Santos
Nayara de la Hoz
Lucy Weston

CIRCADIAN CURTAIN WALL TEAM

John Neary, *HOK Facade Architecture*
Michael Miller, *HOK*
Zhenhuan Xu, *HOK*
Blake Kurasek, *HOK*
Marie Achalabun, *HOK*
Mario Claussnitzer, *HOK Facade Engineering*
Matt Breidenthal, *HOK Structural Engineering*
Matthew Payne, *WSP Built Ecology*
Elliot Glassman, *WSP Built Ecology*

LIVING IN THE WALL TEAM

Little
Michael Coates
Eric Hawkins
Frank DeBolt
Jason Slatinsky
Garrett Herbst
Jim Thompson
Carol Rickard

PIXEL FACADE TEAM

Oliver Thomas
Keyan Rahimzadeh

Presented by:

COMPLETE WALL SYSTEMS

MAINTAINING CONTINUOUS INSULATION AND WRBS AT TRANSITIONS

LEARNING OBJECTIVES

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

1. Understand the performance of the wall components: air layer, water layer and insulation.
2. Examine the different types of details: penetrations, terminations and transitions.
3. Identify common installation and detail problems that occur on the jobsite.
4. Describe the assignment of contractor responsibility for installation sequencing of the various layers.

CONTINUING EDUCATION

AIA CREDIT: 1 LU/HSW
AIA COURSE NUMBER: AR092017-1

Use the learning objectives above to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR092017-1 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.

INTRODUCTION

For centuries, buildings were considered and designed simply as shelter to protect from the elements. Today that purpose holds, but the technology, design practices and materials that go into high-performing building enclosures have evolved to do much more to protect the building as a whole, as well as occupants. Assembly components such as continuous insulation (CI) and air/water resistive barriers (WRB)—once seen as overly conservative practices—are now required across the country.

Challenges associated with continuous insulation and water resistive barriers primarily concern maintaining continuity. Architects and building professionals can anticipate and address these challenges when they design details. This practice requires constant application of building science fundamentals and an in-depth understanding of a wall system's materials, layers and performance. The junctures, or transitions, in building detail design arguably matter most. Improper design of these transition details can lead to some of the most common, detrimental and expensive issues in wall assemblies, namely leaks and thermal bridges.

In this article, we will review building science fundamentals in terms of complete wall systems with continuous insulation and air and water barriers. We will also look at aspects that need to be considered when designing transitions and penetrations, and examine common issues that arise from errors in sequencing, material compatibility and design verification.

BUILDING SCIENCE FUNDAMENTALS

When discussing complete wall system design and detailing, it's important to review fundamental building science concepts regarding how wall assembly components function at each layer within a wall—and how they are tested for performance. These concepts aid in understanding the physical behavior of a building as a system, and how that affects key performance issues such as energy efficiency, durability, indoor air quality and occupant comfort.

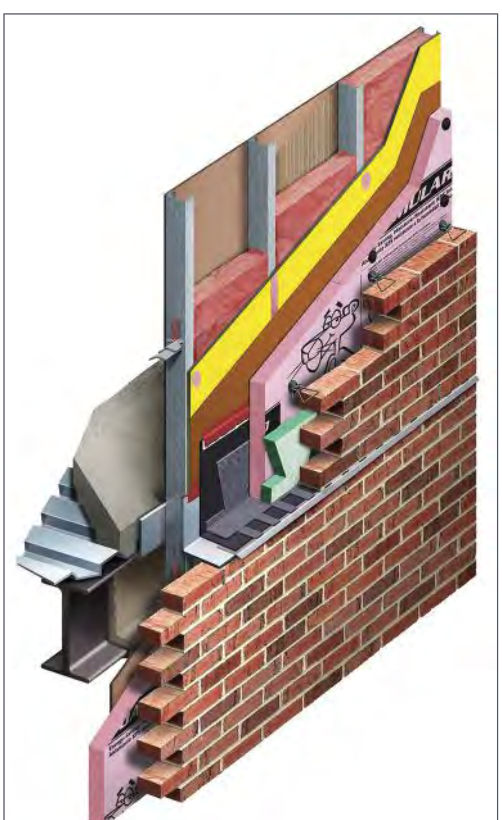
Wall System Components

A wall system contains multiple layers of components to create a cavity wall. A good way to think about a wall system is as a "ham sandwich" with the letters HAMM representing heat, air and moisture both in liquid and vapor forms (thus the double "m"). These layers are critical to wall performance, and they are bolstered with new codes and higher standards that factor in fire performance and acoustic properties.

Wall system layers include:

1. A structural system, which serves as the base of the wall. Possible construction types for the structural system may be steel stud with gypsum sheathing, wood stud with wood sheathing or concrete masonry unit (CMU);
2. A cavity, which contains multiple products; and
3. Cladding, which can be brick, CMU, stone, metal, aluminum composite or any number of new sustainable materials.

The wall cavity is critical, because it is where the most important aspects of building science and performance are addressed. Everything occurs in this space including air and water management, thermal comfort, vapor control, fire resistance, acoustic isolation and structural considerations such as how insulation and cladding are attached to the wall.

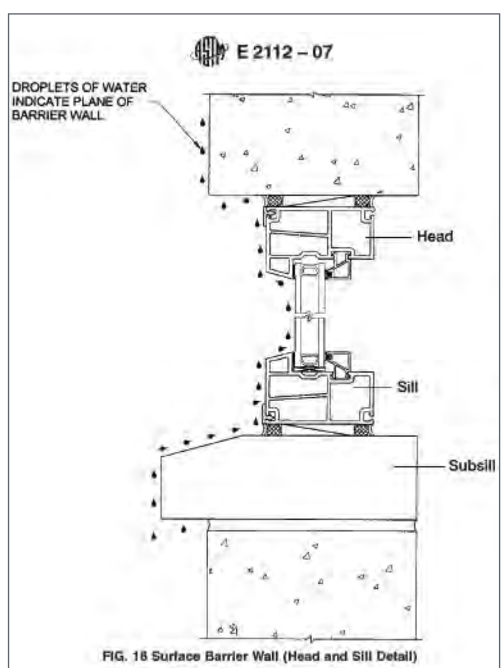


Typical wall system layers for steel stud/gypsum sheathing construction with masonry cladding. Components in the air cavity layer can include barriers, flashings, sealing washers, drainage preservation, insulation, anchors and fasteners. Image courtesy of Owens Corning. The color PINK is a registered trademark of Owens Corning.

Moisture as a Liquid

Moisture can exist in three states, either solid (ice), liquid or vapor. Liquid and vapor are the most common forms that cause the most problems in wall systems. We'll discuss liquid first, because it is the most obvious and easiest to see. Precipitation such as rain hits the outside of a building and follows the path of least resistance. A good way to think about this is to consider the path of a raindrop from the time it hits the rooftop until the time it gets to the ground. If the building is constructed well, the moisture will not rest on seams or find a way into the building. If it does find its way inside, problems can be endless. The first step to controlling moisture penetration is to test the structure's performance.

ASTM International has made specification and installation to resist moisture infiltration very easy with ASTM E2112, a standard specification for installing windows in a manner that prevents liquid water from penetrating the wall; note the raindrop illustration below.



ASTM E2112. Image courtesy of ASTM.

For drawings and specifications, architects typically specify assembly testing in accordance with ASTM E331. This test is referenced in the International Code Council (ICC) AC38, also known as the *Acceptance Criteria for Water Resistive Barriers*. ASTM E331 applies a water resistive barrier to an assembly, and then a wall of water is sprayed directly at the surface for 15 minutes. A standard "pass" is accomplished by having no moisture penetration occur after 15 minutes. Most manufacturers, however, test to failure to see how much longer than 15 minutes their wall can resist water infiltration.

In short, the goal—and fundamental principle—of water management is to shed water by layering materials in such a way that water is directed down and out. Given how critical water management is, it should be no surprise that it is a top priority with building design. To reiterate: the first rule of waterproofing is to weather-lap installations so that the water has a clear pathway from the top of the building all the way to the ground, and then away from the building. Water should never have a place to stop or pool on a building, where it then might enter the structure. This is a relatively basic and somewhat obvious concept, but it is something that is often overlooked in architectural drawings or in-field repairs and should be kept in mind when analyzing the specific details of a design.

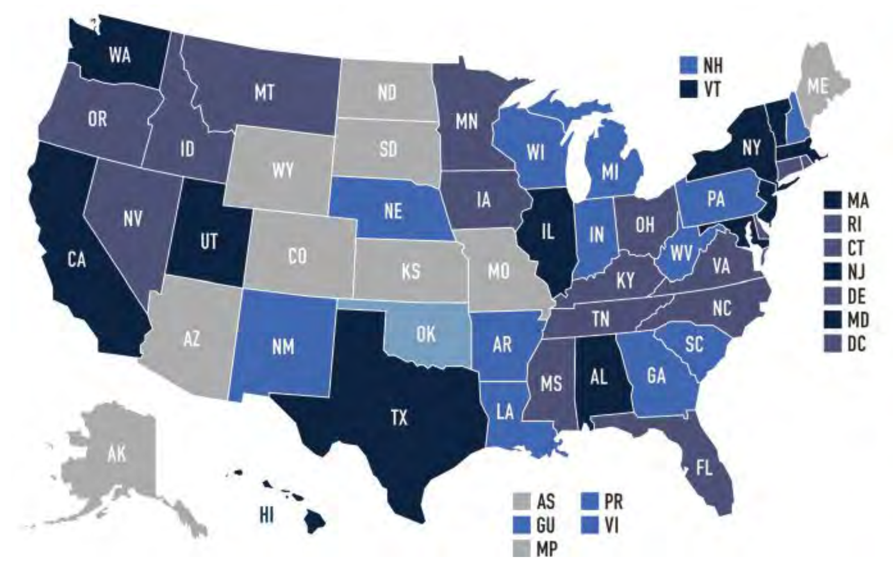
Heat

Thermal comfort—the task of keeping heat either in or out of a building—mainly deals with the transfer of heat. In the U.S., this involves what are known as U-factors, k-factors and R-values.

- "U-factor" describes the actual quantity of thermal energy conducted through an assembly. Lower U-factors represent greater resistance to heat flow, and therefore better overall insulating properties for an assembly.
- "k-factor" describes the actual quantity of thermal energy conducted through a material. Lower k-factors represent greater resistance to heat flow, and therefore better overall insulating properties for a material.
- "R-value" commonly is used to define thermal resistance for insulation either as an individual material. R for individual materials can also be totaled to determine total assembly R in the context of the building envelope, such as the walls, floors, and roofs.

U, k and R are related in that they are reciprocals of each other. "U" is the reciprocal of "total R" for an assembly. "k" is the reciprocal of "R" for an individual material. For example, a 0.25 k-factor equals an R-value of 1/0.25 = 4. A U-factor of 0.05 equals a total R-value of 20.

In some instances individual material R-values are referenced when evaluating system



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

Building Codes Assistance Project Code Status Maps, Commercial Code Status and Corresponding List of Required R-Values for Steel Framed Walls. Map courtesy of Building Codes Assistance Project.

performance against energy code requirements. R-value requirements for steel framed walls, wood framed walls and mass walls vary across the country depending on local energy codes, editions and climatic zones. Local codes are based on both the International Building Code (IBC) and International Energy Conservation Code (IECC), and may be based on an ASHRAE 90.1 standard or something mandating even higher performance such as ASHRAE 189.1, depending on the building type and location.

The map and corresponding chart above show current energy code requirements by state or territory and a list of standard R-value requirements as they have applied to the past few energy code cycles and varying climate zones. The first number listed is the R-Value prescribed for stud cavity insulation. The second number is the additional CI, or continuous insulation prescription. The energy code is rapidly causing most commercial buildings to use continuous insulation throughout the country, even in places such as the southern tip of Florida, where insulation was previously not a priority because of the temperate climate.

Continuous insulation is important because it affects thermal bridging, or areas where energy used to heat and cool is lost, and where the threat of condensation is the greatest. A building may have a high level of insulation, but it may lose energy because of too many thermal bridges by careless detailing and design. Later, we will look at specific ways to maintain continuity of insulation through the transitions and penetrations of the wall.

Air

Air leakage greatly impacts building energy efficiency and indoor air quality. Past building practices tolerated—even accepted and expected—air leakage to some extent, so that the building could "breathe." Modern practices, however, recognize that the idea of having a building "need to breathe," meaning random versus designed ventilation, is misguided, and instead encourage a sealed building envelope combined with fresh air provided through carefully controlled HVAC systems and other controlled ventilation such as operable windows. HVAC systems control the amount of air that enters and leaves the building, and conditions and filters that air based on the energy efficiency and indoor air quality needs of the building and occupants. Random air leakage is uncontrolled, unconditioned and potentially will contribute to the accumulation of condensation moisture in assemblies leading to eventual mold growth and system decay.

There are several ASTM standards that define air barriers. ASTM E283 was one of the first to demonstrate an air barrier, testing the rate of air leakage across the specimen through exterior windows, curtain walls and doors. As an early test, it was limited in that it only tested a small specimen at a limited pressure, and only looked at a single product.

The standard ASTM E2357 tests larger specimens (assemblies) at multiple pressures. This test involves an opaque wall and penetrated wall assembly, both of which are tested for air leakage, conditioned at varying pressures over different test times, and then retested for air leakage before comparing the tightness of the opaque specimen versus the penetrated specimen. For example, the conditioning starts with long, low pressures and ends with short, strong gusts, all intended to fatigue the test specimen. To simulate positive and negative pressures the pressure is applied to both sides of the specimens. After the conditioning, both walls are tested again for air leakage, and then compared. A difference of greater than 10% leakage between the solid and opaque walls is considered failing.

ASTM E2357 tests the performance of a limited system, and identifies how well materials stick together and adhere to their substrates. ASTM E2357 is becoming the predominant test to demonstrate air barrier systems on the market today.

When an air barrier is not present in a wall assembly, the HVAC system is compromised and works inefficiently to maintain thermal comfort and humidity levels within a building. Installing an air barrier as tested per ASTM E283, E2178 (both individual material tests), or most commonly as an entire assembly per ASTM E2357, helps create a wall assembly that allows the HVAC system to do its job.

Moisture as a Vapor

While exterior liquid moisture is easy to see as it runs along the outside of a building, vapor moisture is a bit trickier to identify and deal with because you can't see it and it happens within the wall itself. A good way to think about the concept of moisture as vapor is to consider how a cold glass "sweats" in a hot, humid climate, leaving a pool of water on the table. A phase change happens when the high water vapor content in the air comes into contact with the cold temperature of the glass, resulting in water vapor gas condensing into a liquid. The same thing can happen within a wall structure, especially where one surface is warm and another cool or cold.

Wall structures should be designed to prevent condensation moisture. This sounds quite obvious, but it is not always easy to achieve. Some key strategies are:

- Maintain temperatures in the assembly that prevent moisture from condensing, or,
- Prevent vapor from reaching a cold surface where it could condense, and
- Enable drying out of any areas where condensation may occur. If a wall does get wet, every attempt should be made to dry it as much as possible, and to quickly address the problem.

According to the IBC, vapor permeable materials and vapor retarders are measured and classified with ASTM E96 method A. That standard should be specified during design.

One question that must be addressed in designing to manage moisture vapor is, shall materials and assemblies be permeable or impermeable? While older buildings were inevitably permeable because of the available materials and components and air leakage, newer buildings can be designed to be either permeable or impermeable, and thus address very specific moisture concerns. For example, an art museum in Miami, a high exterior vapor pressure environment, would require a building design with highly controlled interior humidity levels, so a vapor-permeable air barrier system that would allow exterior moisture vapor to migrate inward would be counter-productive. In this case, an impermeable wall assembly, that limits inward moisture vapor migration, will allow the HVAC system to function more efficiently. The bottom line is that building designers need to consult with the HVAC designer to discuss the needs of each individual project and further analysis may be provided through consultants and manufacturer resources.

QUIZ

1. What are the 3 wall system components?
   a. Structural, Cavity, Cladding
   b. Foundation, Structural, Cladding
   c. Foundation, Framing, Roof

2. What important function occurs in the wall cavity?
   a. Air and water management
   b. Thermal comfort
   c. Vapor control
   d. Fire resistance
   e. Acoustic isolation
   f. All of the above

3. True or False: The first rule of waterproofing is to weather-lap installations so that the water has a clear pathway from the top of the building all the way to the ground, and then away from the building.

4. Which ASTM standard tests larger assemblies at multiple pressures?
   a. ASTM E283 tests which of the following?
   b. ASTM E2357
   c. ASTM E2178
   d. ASTM E96

5. True or False: Modern fire rating requirements state that both the components of an assembly and the system as a whole must be tested for compliance in order to be considered safe.

6. ___________ occur between a change in plane, or change in material, and ___________ are actual openings to the outside or inside of a wall, such as a window or door.
   a. Transitions, penetrations
   b. Penetrations, transitions

7. True or False: It is not necessary for the roof membrane to be continuous and tied in with the continuous air barrier on the wall.

8. True or False: In the floor line transition detail discussed, the insulations act as a fire barrier between floors.

9. _________ insulation, which is used in the foundation-to-wall transition example, is one of the few insulation types that is water resistant (and retains its R-value in the presence of water) and able to perform in the harsh below-grade conditions.
   a. EPS
   b. Mineral wool
   c. XPS
   d. Fiberglass batt

10. Which of the following is necessary in quality control and assurance?
   a. Sequencing
   b. Adhesion and compatibility
   c. Verification
   d. Mock-ups
   e. Testing
   f. All of the above

This article continues on http://go.hw.net/AR092017-1. Go online to read the rest of the article and complete the corresponding quiz for credit.

SPONSOR INFORMATION

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DISCOVER NEW TECHNOLOGIES AND BENEFITS OF DECORATIVE GLASS FOR INTERIOR AND EXTERIOR APPLICATIONS

Presented by:

Skyline Design

Photo: Bruce Damonte

LEARNING OBJECTIVES

At the end of this course, learners will be able to:

1. Discuss how decorative glass enhances the built environment
2. Examine the emerging technologies expanding the use of decorative glass
3. Explore how decorative glass can be used in sustainable design
4. Analyze examples of architectural work that relies on decorative glass for performance and innovation

CONTINUING EDUCATION

AIA CREDIT: 1 LU
COURSE NUMBER: AR062018-9

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/AR062018-9 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.

ENHANCING THE BUILT ENVIRONMENT WITH DECORATIVE GLASS

The decorative glass market is the high-tech industry of the glass world. As the architect Mies van der Rohe once said, "The use of glass does compel us to go new ways." Architects and designers are looking for solutions that align with their vision, offering more design flexibility. As a result, the decorative glass industry is pushing the boundaries of what's possible to create products that embrace technology and deliver on function and beauty.

Of course, window glass has been around for centuries and has played a role in creating inspired spaces from the 12th century Notre-Dame Cathedral of Paris to the more modern Notre Dame du Haut of Ronchamp by Le Corbusier. For centuries, glass for windows was limited to small panels, but the modern era has introduced technology that enables increasingly larger panels that can become the entire wall of a building, such as the new Apple Park headquarters in Palo Alto. This ambitious construction project serves as the benchmark for large glass walls and is dubbed "…one of the most environmentally sustainable projects on this scale anywhere in the world."[i]

Advances in materials and manufacturing have liberated decorative glass to transcend the ordinary, heralding a new age of inspired use of glass, light, and space. No longer the fragile material of bygone eras, glass has become a versatile medium that delivers light, provides structural strength and security, offers privacy, saves energy, reduces waste, and enables construction efficiencies. Today's decorative glass meshes beauty and function, promoting the creation of signature architecture.

Decorative glass is an expression of artistry resulting from collaboration among architects, artists, designers, and high-tech manufacturers. Increasingly inventive techniques and processes have continued to expand the potentials of glass to improve the utility and beauty of spaces for work, health, residential, learning, and recreational environments.

Modern Decorative Glass

Modern decorative glass differs from standard glazing in that it is functional art—an integral part of the architectural design. It can be printed, etched, textured, and back-painted. When used on the exterior, it can make a statement and create a dialogue with its

Harry Ransom Center by Lake Flato Architects, Photo: Hester + Hardaway

surroundings. Patterns printed directly on the exterior facing glass surface can act as a deterrent to bird collisions. In interior applications, it changes the look and feel of a space to shape daylighting, invite movement and contemplation, introduce form and color, and create a sense of place.

Sense of Place

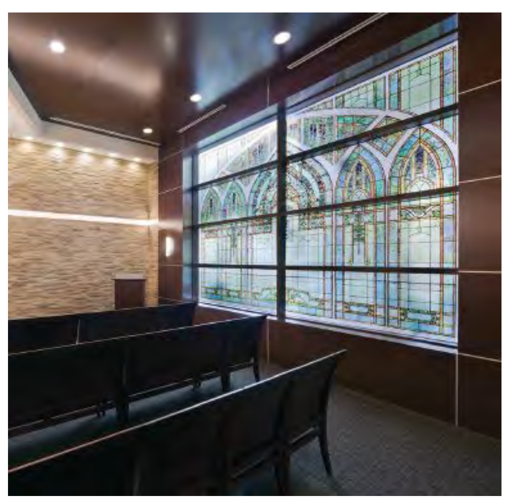
Glass is no longer just an invisible barrier; it has become a new type of plane creating semi-translucent panels that are beautiful contributors defining the character of space with an array of patterns, pigments, and translucency. Architectural glass can be used as a non-traditional partition to define and enliven spaces. For example, lobbies, reception areas, waiting rooms, transportation hubs, and shopping centers provide opportunities to create vibrant and inviting destinations and focal points.

Layered glass walls, light-diffusing panels, art installations, and windows are the architect's tools for delineating large spaces to create more intimate and memorable pockets within the larger whole. For example, at airports, decorative glass partitions are used to create indoor "markets," relaxation areas, and to delineate other destination points. In hospitals, glass can create a sense of privacy and escape in waiting areas and other public spaces.

Art as Therapy

Decorative glass has also played a successful role in healthcare and wellness environments. Patients benefit from the integration of light and art, where glass provides a form of art therapy. The benefits of natural daylighting in healthcare are amply documented. Combine those benefits with art, which engages the senses and the imagination, and you have a prescription for serenity and wellbeing.

One such example is CallisonRTKL's design for the John and Marie Chiles Chapel at Baylor Scott & White Medical Center in Texas. The design team drew inspiration from a historic Presbyterian church, famous for its stained glass. The architects took a modern approach with digitally printed glass that recreated the look of traditional stained glass, but with the benefits of a modern glass system.



Baylor Scott & White Health Medical Center Chapel by Callison RTKL, Photo: Mark Trew

Baystate Health in Massachusetts integrated decorative glass in adherence to the principles of *The Green Guide for Health Care*™. The facility incorporated eco-friendly materials and ample natural light throughout the hospital. Here, Steffian Bradley Architects partnered with designer Suzanne Tick to create artwork from images of New England landscapes. In the atrium, decorative glass presented a rhythmic, vertical, panorama—from marshes to wildflowers and upward to trees. In a public area called the "living room," a custom mural creates a shadowing effect for perspective and depth.

When light reaches the interior of the facility, the interplay with the artwork brings the natural world inside as the sun moves through each day

Baystate Health by Steffian Bradley Architects, Photo: ©Robert Benson Photography

and season. The light wells create a rhythm of nature and community from floor to floor.

This important connection to nature in healthcare is cited in the *International Journal of Environmental Research and Public Health*: "Adding elements of nature to living spaces can presumably induce positively valued changes in cognition and emotion, which again may impact on stress level, health and well-being…,"[ii] while environments divorced from nature can have a negative impact.

Productive, Comfortable Environments

In addition to enhancing healing environments, architectural glass plays a pivotal role in overall comfort and productivity in a number of ways.

Daylighting is key among these. According to the International WELL Building Institute, "Exposure to natural light can improve occupant mood, alertness and overall health."[iii] Daylighting is essential because it provides connection to place and time and is linked to the human circadian rhythm, which is important for stress control and productivity.[iv]

In addition to boosting occupant wellness, natural light can curb operating costs by reducing the need for artificial light and over-reliance on mechanical HVAC systems. Decorative glass can diminish heat and solar intensity by diffusing and filtering light. Architects have freedom to create a play of light and shadows, using the filtered light to further enhance the indoor experience.

Decorative glass also offers an array of solutions to address privacy in public and workspaces. Glass can be made translucent to allow light but obscure visual access. It can be patterned, digitally printed, textured, and back-painted so that privacy elements can also serve as points of interest.

Randall Children's Hospital at Legacy Emanuel by ZGF Architects, Photos: ©Pete Eckert

Branding and Identity

Beyond defining and enlivening spaces, glass can play a pivotal role in creating identity and telling a story through signature buildings and installations that represent a modern organization's culture and values. The array of technologies now enables the printing of images on large glass façades or a series of connected panels.

Branding and corporate identity can also be reflected on the inside through use of elements including donor walls, themed glass partitions, and elegant signage.

Randall Children's Hospital at Legacy Emanuel, Portland, Oregon, is an example of glass used to create a strong sense of place, identity, and mission.

In this case, ZGF Architects incorporated uplifting Pacific Northwest color palettes and custom artwork to create relaxing spaces for children and their families. They introduced glass made with digital glass printing and an eco-friendly etching process, applying more than 50 graphic designs to create multi-layered art. The artwork, inspired by native wildlife and Northwest geography, is functional to support wayfinding and branding. It also helps promote a soothing atmosphere of comfort and healing.

In addition to creating statement pieces, glass is also ideal for branding because of the way in which it can be etched, printed, and painted. Branded glass elements can be integrated inside and out in a variety of ways. With glass, identity can become art.

EMERGING TECHNOLOGIES EXPANDING THE USE OF DECORATIVE GLASS

Advancing technologies in glass fabrication and digital printing are revolutionizing the built environment, opening more avenues for design expression. Architects are no longer limited by the range or quality of glass design. They have greater ability to customize glass installments both inside and out.

1k Fulton by Hartshorne Plunkard Architects, Photo: Scott Shigley

Glass technology makes it possible not only to achieve larger spans of images, but also to create unique solutions for common applications and interior design. Among these design challenges are urban renovation and infill projects. These types of projects can be very costly and disruptive when using traditional building materials. However, technologies such as ceramic digital print on glass enable architects to recreate, preserve, or otherwise customize spaces by printing photographs, colors, or patterns directly on glass panels.

One such example is the award-winning Glass Farm in Schijndel, The Netherlands. The Glass Farm is an urban infill project designed to remediate devastation from World War II in a large village square. MVRDV's proposal for the site takes the form of a traditional Schijndel farm. In collaboration with artist Frank van der Salm, all the remaining traditional farms in the area were photographed to develop a collage of a "typical" farm. Using a fritted process, the resulting image was printed onto the glass envelope that forms the entire façade of the building. This process creates "…an effect similar to stained glass windows in a cathedral." Translucency varies depending on requirements for light and views.[v]

Glass Farm by MVRDV, Photos: Jeroen Musch, MVRDV, Persbureau van Eijndhoven

Modern glass technology further supports improved functionality in the areas of energy conservation, heat and shade control, glare reduction, and light diffusion to contribute to a more sustainable design. To better understand how decorative glass can deliver these benefits, it helps to understand the key technologies shaping the industry.

Fritted Glass

Fritted glass is glass that is printed with ink containing tiny particles of ground-up glass, which are the "frit." The pigmented glass enamel is "fired onto the glass at temperatures more than 1200 degrees Fahrenheit and permanently fused to the glass surface."[vi] Fritted glass is ideal for both interior and exterior applications and is available in a wide array of colors and patterns. Because of this fusion of ink and glass, ceramic frit architectural glass is more durable and weather resistant.

Frit pattern glass can be created to any desired level of transparency. The manipulation of transparency is used to create privacy, filter sunlight, and reduce glare.

In addition, fritted glass can help save energy by reducing solar heat gain. In fact, some manufacturers or glass printers can also help calculate energy efficiency ahead of construction.

Silk screening is a traditional way of applying patterns and textures to glass. It is created by applying inks through a screen printing process with either solid coverage or selectively in decorative patterns.

However, it is **ceramic digital printing** that has led to some of the biggest innovations in fritted glass. Compared to silk screening, digital printing is ideal for fritted glass because it eliminates the need to make and store screens, involves minimal machine set-up, and simplifies production, which then reduces production costs.

Digital printing is a form of art where an image is created in digital form. The digital file can be computer-generated artwork using either vector graphics software or high-resolution photographs. The image can then be printed onto glass.

Ceramic digital glass printing is more versatile than silkscreen printing and does not have the limitations of traditional screen-printing on exterior applications.

QUIZ

1. For which market sector is modern decorative glass best suited?
   a. Healthcare b. Commercial
   c. Institutional d. All of the above

2. True or False? Only opaque glass treatments can create a sense of privacy.
   a. True b. False

3. Enhanced daylighting supports which of the following?
   a. Outdoor views b. Wellness
   c. Directionality d. Sports performance

4. Which of the following applies to fritted glass?
   a. Incompatible with digital printing processes b. Accommodates only transparent applications
   c. Printed with ink containing tiny glass particles d. Fired at temperatures below 1100 degrees Fahrenheit

5. Which of the following is not true of modern architectural glass?
   a. Has very specific applications b. Is functional art
   c. Enables greater design flexibility d. Promotes organizational identity

6. Which of the following are elements of ceramic digital print?
   a. Reduced production costs b. Greater versatility than screen printing
   c. Akin to ink jet printing d. All of the above

7. Which of the following projects is an example of decorative glass achieving LEED Silver certification?
   a. Chapel at Baylor Scott & White Medical Center in Texas b. Martin Luther King Jr. Federal Building
   c. Bracco Diagnostics d. Randall Children's Hospital

8. How can decorative glass support sustainable design?
   a. By increasing use of heavy metals b. By controlling light transmission
   c. By supporting GREENGUARD IAQ standards d. By enhancing wayfinding in healthcare environments

9. True or False? All manufacturers now make decorative glass that is recyclable.
   a. True b. False

10. Which of the following would not be an example of innovations in decorative glass?
    a. Switchable glass b. Eco-friendly etching
    c. Screen printing d. Large glass facades as artwork

This article continues on http://go.hw.net/AR062018-9. Go online to read the rest of the article and complete the corresponding quiz for credit.

SPONSOR INFORMATION

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Presented by:

EXPLORING TRIM OPTIONS AND USES FOR MULTIFAMILY DESIGN THAT ENGAGE MILLENNIALS

35 Dolores, Levy Design Partners. Located in the San Francisco Mission District is a 33 condominium project on the site of a former car wash. Multiple materials including extruded aluminum trim help in creating a unique and desirable property.

LEARNING OBJECTIVES

After reading this article, you should be able to:

1. Recognize how current trends in urban/suburban multifamily apartment design are influenced by the style preferences of the millennial generation and the hospitality industry.
2. Outline the advantages of extruded aluminum trim components over traditional materials in terms of the manufacturing process, environmental impacts, safety and resiliency.
3. Identify the ways in which exterior and interior metal trim applications can provide clean, ultra-modern details that support the contemporary design of today's multi-family dwellings.
4. Understand the variety of options available for creating custom or semi-custom metal trim profiles in a cost-effective manner.

CONTINUING EDUCATION

AIA CREDIT: 1 LU
AIA COURSE NUMBER: AR062018-3

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/AR062018-3 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.

INTRODUCTION

Multifamily apartment demand continues to be on the rise in the United States. A growing desire for millennials to live close to the city, in a minimalist space, and with trendy design is influencing how and where these apartments are being built. Based on the millennial design preferences, designers and building professionals must specify products that attract this generation to the space. In this course, we will examine the impact of the millennial generation to multifamily space design and how extruded aluminum trim can provide an aesthetic design while being a smart choice economically.

MULTIFAMILY DWELLINGS—STILL VIABLE

Over the past decade, multifamily units have been on the rise, and that trend is continuing. According to the National Multifamily Housing Council (NMHC), demand for rentals has increased by nearly 1.7 million year after year.[i] According to the National Association of Home Builders: Eye on Housing, multi-family housing ended the fourth quarter of 2017 strong. The demand for multifamily units coupled with an increasing employment rate continues to strengthen the demand for this type of dwelling.

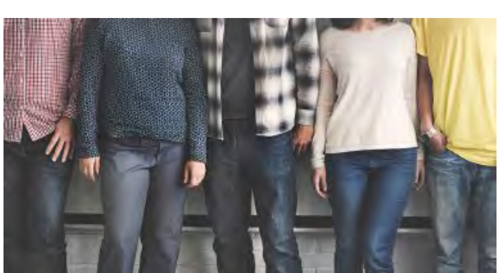
Marketplace, Studio Intrigue Architects. Located in Lansing Michigan this project strives to offer high quality amenities both shared and in each unit.

Multifamily Demographics

So, what types of consumers are purchasing multi-family apartments and where are they going? According to NHMC (2017), 37% of the United States live in renter-occupied homes with 50% of those renters being under 30 years old, also known as Millennials.[i] Considering that the millennial generation equates to around 55,518,756 people that is a HUGE number for developers to consider.[i]

Where do these renters want to live? According to NMHC (2017), New York, Los Angeles, San Francisco, Houston, Dallas, and Washington D.C. are the top cities occupied by renters.[i] New York has the highest apartment percentage of housing at 45% with 1,556,161 people occupying apartment buildings in 2017.[i]

What does this mean for building professionals? The growth and development is not going away for multi-family construction, in fact, according to NMHC, 4.6 million new apartments are needed between now and 2030 (2017).[i] But how do we meet that demand? Building professionals must understand what renters expect in multifamily dwellings while also being sensitive to the current challenges facing the building sector. According to the Barriers to Apartment Construction Index, 50 metro areas were examined, and two major barriers emerged: regulations and available land. To continue meeting the demand for multifamily dwellings, building professionals must acknowledge millennial influences while combating the construction barriers to entry.



The "Millennial Impact"

Seeing that 50% of renters are part of the millennial generation, it's important to understand the impact their preferences have on multifamily building design. The American Dream has always focused on owning a home, but for Millennials, this generation is saddled with student loans and low earning jobs. Renting is a viable option that helps them begin to save for their future home. Millennials are better informed about their choices than any other generation—they want everything to be just right, and they are willing to spend to get what they want. According to a recent study by Schlage (2016), millennial renters are willing to pay about 1/5 more to have smart home features.[ii]

In line with trendy design, this generation desires minimalistic interior design. Whereas baby boomers loved warm and rich design, millennials seek to avoid clutter. With multifamily spaces providing smaller spaces rather than a large home, designers should design the space to be functional, minimal, yet with elements of luxury.

Extruded aluminum can be used to create minimalistic reveals with drywall (left wall) or bold accents with other panels (rear wall)

Hospitality's Influence on Multifamily Design

Research shows that millennials continue to be a key demographic who want to rent near the city with the ability to be close to work and entertainment, without the hassle of maintaining a home or yard. So where do we look for inspiration? According to Britney Littleton Gilley, ASIS, IIDA, and Vice President of Design at Builders Design (2018), "Multifamily design trends continue to be influenced by the high style of boutique hotels." Trend spotting, predicting future design peaks, and trending being ahead of the trend are all ways for apartment developers to catch renter's eyes. Just as a hotel must attract and hopefully garnish repeat customers, a multifamily unit must attract and retain residents. According to Jamie Gorski, chief marketing officer at Bozzuto in Greenbelt, Maryland, apartment managers can look at the hotel industry for design, technology, and branding opportunities.

Extruded Aluminum Trim paired with multiple siding products including a commercial rainscreen fiber cement and others on a Holiday Inn and Suites.

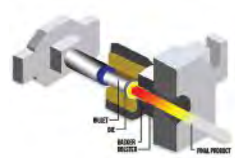
WHAT MAKES EXTRUDED ALUMINUM UNIQUE?

Because of the durability and stability of aluminum, it has become a go-to product for many types of applications both in and out of the home. Foil, zippers, smart phones and even power grids are all products of extruded aluminum. It is true that aluminum is common in our day-to-day lives, the unique aspects it possesses are what make it a perfect choice for multifamily building design.

Manufacturing Process

Crafting extruded aluminum is a highly versatile metal-forming process that has a wide array of desirable physical characteristics. Aluminum is a mineral that is found in abundance earth's crust and then mined into alumina. To make the alumina useful for building, the alumina must be smelted, mixed, and cast into billets. Created extruded aluminum is dependent upon heat, so billets are heated at 750–900 degrees Fahrenheit, and the process of extrusion begins. Extrusion is the process of taking and shaping aluminum by forcing it to flow through a shape called a die. The extruded aluminum then passes through a backer and bolster which maintains the shape while adding space. Following the extrusion process, a variety of options (e.g., anodizing and painting) are available to modify the color, texture, and brightness of the aluminum's finish.

Most extruded shapes for architectural use are fabricated from 6063, an aluminum alloy with

Step 1: Aluminum is processed into alumina. The alumina undergoes smelting and alloying producing solid billets of cast metal.	
Step 2: Billets are heated and pressed into a die which creates the shape or profile.	 
Step 3: The extruded aluminum then passes through a backer and bolster which maintains the shape while adding space.	

magnesium and silicon as the alloying elements. Known as Type 6063-T5 aluminum, commonly referred to as the architectural alloy, it has a very smooth surface and is the best alloy suited for anodizing applications. The T5 designation indicates it has been artificially aged and moderately heat-treated.

Environmentally-Friendly

Millennials are more concerned with the environment than previous generations. And because they're concerned about the long-term viability of the earth's ecosystems, they prefer to purchase products from sustainability-focused companies, even if it costs more. According to the Global Corporate Sustainability Report (2015), 73% of Millennials prefer to choose a product that comes from a sustainable brand.

Extruded aluminum trim is constructed from post-industrial and post-consumer scrap, meeting requirements for sustainability and contributing to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) certification for Recycled Content. Today's building professionals want to focus on green materials and visually appealing looks, aluminum trim products provide the best of both worlds.

Aluminum adheres to the following LEED® v4 certification criteria:

- Energy and Atmosphere Credit: Optimize Energy
- Materials and Resources Credit: Building Product Disclosure and Optimization—Environment Product Declaration (EPD)
- Indoor Environmental Quality Credit: Low-Emitting Materials

Safety

Fire or water damage in a multifamily structure is devastating to not only the tenants but also

CASE STUDY: PROMINENT HORIZONTAL REVEAL PROFILES

Located on the border of Emeryville and Oakland, this multifamily housing development on 3900 Adeline Street includes 91 residential and 10 work/live rental units.

Located on the border of Emeryville and Oakland, this multifamily housing development on 3900 Adeline Street includes 91 residential and 10 work/live rental units. The building has a partially submerged garage, and the exterior design responds to the varying scale of three different neighboring characters. The units on the first level have stoops and setbacks for the townhouse and work/live units, adding scale and interfacing with the neighborhood.

"This was a large project with 101 units, and a major challenge was modulating the scale and being able to address its varied context, from single family homes to other 4-story multifamily buildings," says Toby Levy, FAIA, President of Levy Design Partners, Inc. "The project had a tight budget, so cement siding and panels were used on the majority of the building with accents of corrugated metal panels. The intersection of these materials was critical."

With a limited palette to select materials from, the solution was to use the sheet materials of cement panels and corrugated metal cut down in size to add an intermediate scale. "We wanted to emphasize the horizontality of the façade, so we looked for more prominent horizontal reveal profiles and less noticeable vertical reveals," says Casey Feeser, AIA, architect at Levy Design Partners, Inc. A horizontal reveal board was used due to its larger size and multiple shadow lines. In addition, an H mold was used for vertical siding, and an open outside corner mold was used for outside corners. These materials were made from extruded aluminum. "The reason we specified extruded aluminum trim is because it is available in many profiles and sizes," says Feeser. "This allowed us to create patterns with affordable materials to create additional interest. The aluminum trim pieces also provided a clean transition between the materials."

Aesthetically speaking, the designers wanted a variety of reveals and shadow lines. The extruded aluminum trim system made this possible. "Another benefit of using extruded aluminum trims was that it allowed us to make clean transitions and create clean corners," says Levy. To help emphasize the form, the reveals were painted to match the wall color.

The various profiles and sizes of trim helped architects integrate the different materials into the facade. At 3900 Adeline, trim options allowed developers to cut down larger cement panels to create an intermediate scale, as well as to reorient the corrugated metal panels.

"We had a positive experience using extruded aluminum in this project," says Feeser. "The different profiles offered in the market enabled us to articulate and emphasize various design choices." Extruded aluminum trim comes in many sizes and configurations. This leads to cleaner transitions between materials of different sizes and shapes. Another benefit is that extruded aluminum trim allows for the completion of the substrate and waterproofing before installation of the final finish. According to Feeser, "Using aluminum trim creates a durable solution, which will result in a longer life cycle than wood trims and a more maintenance-free solution due to no use of caulk."

Project: 3900 Adeline Street, Emeryville, California

Architect: Levy Design Partners, Inc.

the building owner. Extruded aluminum is considered fire resistant, non-combustible, and weather-resistant. Even at high temperatures, toxic fumes are not produced by the aluminum making it a good choice for occupied buildings. Since aluminum is protected by naturally-occurring oxide film, it does not rust making it moisture resistant. Another interesting characteristic of aluminum is that as the weather becomes colder, the aluminum becomes stronger which is a good thing for exterior aluminum trim in areas where cold weather is common.

Building professionals have a responsibility to choose materials that are safe and have little to no health risks. Because the material is lighter, construction professionals are less likely to experience injuries due to lifting heavy materials. Millennials value companies that demonstrate social responsibility and ethical behavior.

Resiliency

Extruded aluminum is lightweight, durable, and resilient. This material is nearly one-third lighter than other materials on the market which equates to cheaper shipping costs. The rigid metal created through the extrusion process is strong, reliable, and doesn't swell regardless of the weather conditions.

While extruded aluminum is lightweight, the material is very durable. Compared to galvanized steel or polyvinyl chloride (PVC), extruded aluminum is stronger adding to the longevity of the material. Galvanized steel may be less expensive, but it is also less durable. In addition, when bare mill galvanized steel and aluminum flashing are used in direct contact with most claddings, there is an increased chance of a chemical reaction, causing wear and break down of both products. PVC, a commonly used plastic, is the cheapest of the three materials, but is susceptible to swelling, bucking, warping, and distortions. PVC, when exposed to direct sunlight, will experience thermal expansion and contraction distorting the material and/or paint.

Resilience is important to building professionals, designers, and most importantly, consumers. Homes that have little maintenance or repair are highly attractive to the Millennials. So choosing a product that is resilient is preferred. Also, in disaster-prone areas, especially flood-prone areas, using a trim that is moisture resistant will protect the home.

QUIZ

1. True or False. According to the National Multifamily Housing Council, the demand for rentals is decreasing.

2. According to the National Multifamily Housing Council, ____ percent of renters are under 30 years old and known as the millennials.
   a. 10 b. 20
   c. 90 d. 50

3. According to the article, to attract and retain residents in multifamily buildings, it is recommended to look at the hotel industry for:
   a. Design, technology, and branding opportunities b. Revenue calculations for future renovations
   c. Structural components to resist natural disasters d. Customer satisfaction survey results

4. __________ is the process of taking and shaping aluminum by forcing it to flow through a shaped called a die.
   a. Melting b. Extrusion
   c. Moulding d. Firing

5. True or False. An advantage of using extruded aluminum trim is that is meets the requirements for sustainability and LEED certification for Recycled Content.

6. A multifamily building designer might choose to specify extruded aluminum trim because:
   a. The sleek design is attractive to renters b. The trim is durable, leading to less maintenance
   c. The installation is easier than wood d. All of the above

7. To create a unique look with aluminum trim that varies from one piece to the next, designers should specify which type of finish?
   a. Pre-colored b. Pre-painted
   c. Anodized finishes d. Aluminum trim can't be painted

8. True or False. According to the article, extruded aluminum trim provides long-term cost savings due to the fact that it is more durable and needs less maintenance.

9. According to the article, modern design trends favor:
   a. Clean intersections b. Horizontal and vertical lines
   c. Separation of wall materials d. All of the above

10. True or False. Choosing a complex design and shape is easily achieved by using extruded aluminum trim.

This article continues on http://go.hw.net/AR062018-3. Go online to read the rest of the article and complete the corresponding quiz for credit.

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ETFE CLADDING SYSTEMS—A TECHNICAL OVERVIEW AND DESIGN GUIDE

Presented by:

vector foiltec CREATE. SUCCESS.

The single largest application of ETFE cladding technology to date is the National Aquatic Centre (The Watercube) with 1,076,391 ft² in Peking. (Image © Werner Huthmacher)

LEARNING OBJECTIVES

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

1. Explore the history and production of ETFE cladding systems
2. Examine ETFE cladding system components and how they are installed
3. Describe the material properties and attributes of using ETFE cladding systems
4. Gain insight into ETFE best practices

CONTINUING EDUCATION

AIA CREDIT: 1 LU
COURSE NUMBER: AR062018-7

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INTRODUCTION TO ETFE CLADDING SYSTEMS

An ETFE (ethylene tetrafluoroethylene) cladding system is a durable, energy efficient, and environmentally friendly cladding technology that weighs between 50 and 90 percent less than systems made from other materials with comparable light transmittance properties. ETFE is a modified co-polymer.

There are typically two to three (but can be up to five) layers of ETFE foil that form air pressure stabilized cladding panels. ETFE cushions are kept continually pressurized by a small inflation unit which maintains the pressure at approximately 4.6 psf, giving the foil structural stability by maintaining tension and providing roof insulation. ETFE can also be used in a single layer system, which is great for canopies that don't have insulation requirements. ETFE foils can be transparent, colored, or printed. The number of layers used in a panel depends on project-specific requirements for structural and thermal performance. In addition to the number of foil layers, surface coatings and treatments and embodied pigments can be utilized to fine tune U-values for any system. Therefore, different specifications can deliver a wide range and combination of visual transparency, solar control, and thermal resistance.

HISTORY OF ETFE CLADDING SYSTEMS

In 1938, Dupont first synthesized Teflon® PTFE (poly tetraflouroethylene), which has very low friction characteristics and outstanding chemical resistance. The advent of PTFE paved the way for the development of other fluoropolymer products, including ETFE. In the early 1970s, Dupont and Hoechst introduced the first commercially extruded ETFE foils under the brand names of Tefzel® and Hostaflon® respectively.

ETFE's high tensile strength, resistance to tearing, excellent light transparency, and low flammability meant that it was ideally suited for architectural applications. However, the high service temperature meant that it was difficult to process. In 1981, Dr. Stefan Lehnert invented a drop bar welding technique that was capable of welding large sheets of ETFE. Lehnert's breakthrough made the development of ETFE building cladding systems possible. The first sectors to fully recognize the potential of the technology were the leisure pool industry and zoological gardens. In the mid-eighties, the technology was increasingly accepted and used in hospitals, schools, and shopping centers across Europe. The single largest application of ETFE cladding technology to date is the National Aquatic Centre (The Watercube), one of the most important structures built for the 2008 Beijing Olympic Games.

ETFE PRODUCTION

The primary ingredient used in this cladding technology is ethylene tetrafluoroethylene (ETFE). To produce the ETFE resin, the main ingredient, fluorite—a common mineral—is used. ETFE belongs to the PTFE family which is well-known for its non-stick performance. The production method incorporates an enclosed water-based process without the use of solvents. ETFE copolymer is extruded into rolls of thin films (aka foils) typically five feet wide and between 650 feet and 1,600 feet long. The thickness of individual foil layers can vary between 80 μm to 300 μm depending on the mechanical performance required for given loading conditions.

Most layers of an ETFE cladding panel consists of smaller elements (sheets) cut from the foil rolls in a predetermined design by a computer controlled plotting machine. These elements are then welded together to form a single layer. Next, the required number of layers are sealed to one another by welding them around the perimeter to a strip of foil folded over a 'keder' rod or rope. This perimeter assembly provides the means of structural connection between the ETFE panel and the perimeter framing.

ETFE CLADDING SYSTEM COMPONENTS

A multi-layer ETFE cladding system consists of ETFE cushions or a single layer ETFE clamped into aluminum extrusions, which are then affixed to the primary structure. Further system components are an air supply unit (or units), air plenum lines, and flashings/gutters. The cushions are fitted with valves and feedback lines that, in conjunction with the air supply unit, maintain a constant low internal cushion pressure. Single air supply units can support multiple air plenum lines and therefore, provide for many cushions depending upon cushion configuration and air plenum line layout.

Air Supply Unit

The air supply units inflate the multilayer systems and are equipped with two fans: one for standard operation and one for backup. They can easily be fitted with dehumidifiers, which is recommended for high humidity environments. The air supply unit cycles to provide air for the cushions as needed. A roof is generally powered by one air supply unit, but several may be necessary if the total area of the cushions exceeds 10,000 ft^2 or if other design circumstances warrant additional units. The energy consumed by the air supply unit is minimal because it only needs to maintain pressure, not create air flow.

A typical air supply unit is 2' x 4' and weighs approximately 125 pounds. The sound level produced by a unit this size is approximately 55 dBa at a distance of five feet above ground level. Each air supply unit requires a dedicated electrical supply, clean air supply, and full clear access for maintenance. They can be located remotely, but the maximum recommended distance from the air supply unit to the building envelope shouldn't be further than 50 feet away, although with larger piping the distance can be evaluated and expanded. Air supply units can deviate greatly from the above standards, as every project is unique, so it is important to plan and coordinate the location and orientation of the units closely with the manufacturer to ensure optimal operation.

In the event of a power failure, the ETFE cladding system will maintain pressure for approximately four to eight hours due to the non-return valves. Should the power failure extend beyond this time, no harm will come to the system, but it should be closely monitored, especially if it has a very shallow slope in a roof application. In addition, high winds combined with prolonged power failure can cause slack cushions to flap, producing a loud cracking sound. A small generator can be used to power the air supply unit until grid power is restored. An entirely deflated system should always be included in a structural design worst case scenario by the specialty contractor.

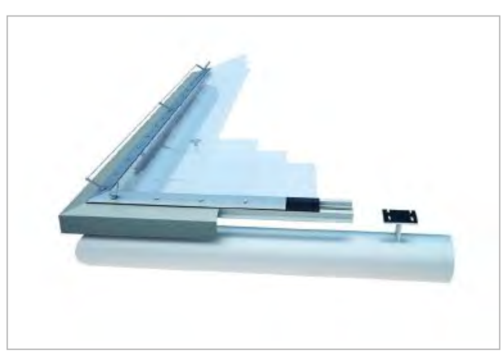
Air Plenum Supply Lines

Typically, Grey Schedule 40 PVC piping is specified for the air plenum lines in the ETFE multilayer cladding system. For a static system, the air plenum lines are 3 inch inner diameter, which can be used for ETFE systems with an overall size up to 10,000 square feet. Larger ETFE roofs, with longer runs, normally switch to spiral duct pipe. Both can be concealed or inconspicuously accommodated in the detailing of the primary or secondary structure, preferably with a consistent channel, groove, or recess. One-inch or two-inch diameter flexible ETFE supply pipes connect the air plenum lines to each layer of air in the cushion.

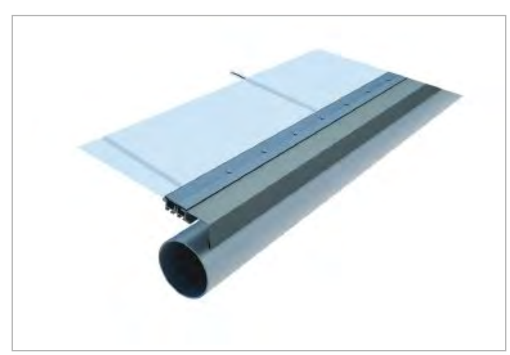
ETFE Cushions

ETFE cushions are very lightweight, weighing only 0.4–0.7 lbs/ft^2. Cushions are tailored to each project and can be a variety of sizes and shapes. Each project presents its own loading scenarios and environmental limits, such as snow and wind loads. The cushion configurations are a direct result of calculations derived from different loading scenarios. As a general design guide, linear cushions can span 10 feet, with a length of 90 feet or more. Currently the longest ETFE cushion in the US is 300 feet long. Other than calculated loads, accessibility, handling, and other factors play a role in cushion design and dimensions as well. For triangular cushions, the size of the incircle

The air supply units inflate the cushions and are equipped with two fans: one for standard operation and one for backup. They can easily be fitted with dehumidifiers, which is recommended for high humidity environments. The air supply unit cycles to provide air for the cushions as needed. (Image © Vector Foiltec)



ETFE's multi-layered construction can allow buildings to intelligently respond to the climate, changing insulation and solar transmission where required. (Image © Vector Foiltec)



ETFE single membrane systems provide un-insulated canopies and enclosures that are very light and transparent. (Image © Vector Foiltec) must be considered, as this will affect the two-way span. Larger cushion sizes can also be designed by incorporating reinforcement cables or a load sharing system.

Both air and water leaks are unlikely in ETFE cushions, unless damage occurs. In the extremely rare event a cushion becomes severely damaged, it can be readily replaced. Small repairs can be made with ETFE adhesive patches. Each cushion has a heat welded perimeter that is fitted with an aluminum channel that in turn latches the cushions with larger aluminum extrusions, attached to the building structure. The cushions are suspended through the interaction between the channels and extrusions and are ultimately secured by pressure from the cap when the aluminum framework is fully assembled.

Aluminum Framework

The aluminum framework is very lightweight, at about four to five pounds per linear foot. It can be left natural, be anodized, painted, or powder coated. Space inside the extruded framework acts as an internal gutter providing a channel to drain moisture that develops within the system, but weep holes and pipes can also be specified to direct this condensate to external gutters that integrate with the framework cap. Externally, the frame itself often acts as the path of least resistance, directing water around the cushions. Depending upon the geometry of the final shell or envelope, it is sometimes necessary to incorporate larger gutter systems to direct water flow, which is determined on a per project basis as gutters can be detailed to be hidden or expressed.

The aluminum framework is inherently flexible to allow for minor shifts and twists in plane. This attribute can be utilized by detailing the interfaces to ensure that building movement is accommodated across the entire surface of the cladding rather than at concentrated points or lines. Some gentle intentional curves are possible with in-field bending. The aluminum can also be pre-curved in one or two directions, allowing the system to express double curved surfaces with relative ease.

Installation

The ETFE cladding system is assembled on site from its constituent parts after the primary structure has been built or erected. To ensure all the pieces will fit it is preferable to design each system from accurate 3D models coordinated closely with the architect and fabricator during the design process, and then field surveys performed after the primary structure has been erected or installed. Once on site, materials are stored in a container at ground level until they are unloaded and hoisted to the installation area. After the project specific safety system is installed, if required, the steel is visually surveyed to verify that its condition and general dimensions are adequate for installation. Then a team of specialized installers mount the base framework, air supply unit, cushions, and cap framework, respectively. They can also install the flashing, gutters, and membranes required at the edges of transitions within the ETFE system.

Maintenance and Warranty

ETFE is an extruded derivative of Teflon that does not attract or retain dirt. Depending upon cushion geometry and orientation, the ETFE cladding system will often self-cleanse whenever it rains. Inside, the cushions are usually cleaned on a five to ten-year cycle, depending on the dirt and dust levels of the internal atmosphere. ETFE cladding systems should be annually inspected for maintenance purposes by the manufacturer. The maintenance inspection is comprised of a visual survey of the installation and thoroughly checking and cleaning filters, air supply units, and pressure switches as necessary. The standard warranty is two to five years, but can be extended to ten years in special cases. This should be coupled with a maintenance agreement to make certain that all components are well maintained, ensuring a long service life.

U.S. BANK STADIUM—A NEW ERA IN STADIUM CONSTRUCTION

Minneapolis, Minnesota

Stadium and arena designs have changed over the last 15 years. No matter the location around the world, designers are focusing more on the comfort and experience of stadium employees and guests. Each new stadium brings more advanced technology and more efficiencies than the last. Large stadiums are no longer reserved just for sporting events; they are multi-faceted destinations. Professional sports teams share their space for special events and musical concerts and Olympic stadia are transformed into usable spaces post-Olympic games. ETFE technology can play an integral part in the transformation of stadia, both old and new.

The early completion of the new home of the Minnesota Vikings marked a new era in stadium construction. By utilizing a transparent ETFE cladding system for 60 percent of the roof at U.S. Bank Stadium, sunlight comes in but simultaneously keeps snow, rain, cold, and heat out. The superb construction is the largest ETFE roof in North America, spanning 240,000 square feet, and the first stadium in the US to incorporate this technology. The roof is engineered to withstand harsh winter conditions while maintaining an aesthetically pleasing roof design. It was originally considered to incorporate a retractable roof, but the designers soon realized that a transparent ETFE roof would lead to huge cost savings while keeping the intended feeling of an open and airy space.

As with many projects in the United States, U.S. Bank Stadium planned for Leadership in Energy and Environmental Design (LEED) certification after its completion. In November 2017, U.S. Bank Stadium received the LEED Gold certification. The ETFE system is part of the strategy to reduce the ecological footprint of the building. The steel roof structure weighs less due to the use of ETFE and the printed foil technology reduces the need for artificial lighting while controlling solar heat gain. It is easy to see why the U.S. Bank Stadium field is so bright, with 60 percent of the roof transparent, allowing in sunlight. Some of the individual ETFE panels are over 300 feet long, resulting in a significant reduction in the weight of the supporting structure and panel frames.

The NFL fan experience and feedback has been immensely positive. On February 4, 2018, U.S. Bank Stadium was the home of Super Bowl LII. The fans loved the views to the outside while being simultaneously protected from snow, rain, and cold, and the sub-zero temperatures that Minneapolis experiences in the winter.

By utilizing a transparent ETFE cladding system for 60 percent of the roof at U.S. Bank Stadium, sunlight comes in but simultaneously keeps snow, rain, cold, and heat out. The superb construction is the largest ETFE roof in North America, spanning 240,000 square feet, and the first stadium in the US to incorporate this technology. (Image © Mark Goodman)

Each project presents its own loading scenarios and environmental limits, such as snow and wind loads. The cushion configurations are a direct result of calculations derived from different loading scenarios. As a general design guide, linear cushions can span 10 feet, with a length of 90 feet or more. (Image © Vector Foiltec)

ETFE MATERIAL PROPERTIES AND PERFORMANCE ATTRIBUTES

Durability

While building enclosures utilizing an ETFE cladding system have been in service since 1982, it is anticipated that ETFE has an extremely long 50+ year design life. ETFE foil is UV stable; the material has been extensively tested, in both the laboratory and field, exhibiting no degradation or loss of strength due to UV exposure. It is also not affected by atmospheric pollution or other forms of environmental weathering (such as sea salt) and does not become brittle, discolored, or deteriorate over time. ETFE is transparent to all wavelengths of the solar spectrum necessary for plant growth or 'photosynthetically active radiation' (PAR). Furthermore, it is more transparent than glass to shorter wavelengths (UV) which have the capability to kill fungi that may otherwise have a detrimental effect on plant growth. These properties are an important consideration in zoos and botanic gardens, for atria, courtyards, etc. where indoor plants must get enough sunlight to survive.

Long-term weathering tests in Arizona and Florida concluded that the foil did not show any signs of degradation or loss of mechanical strength. In addition, recent empirical Raman spectroscopy testing compared chemical, mechanical, and optical properties, as well as tensile strength, of archived ETFE foil samples dating back to the original 1982 production lots. The tests compared these original installation samples with new ETFE samples and concluded that the mechanical and optical properties of all foils were almost identical.

QUIZ

1. What type of ETFE application is not insulated?
   a. A series of pneumatic cushions restrained in aluminum perimeter extrusions, supported by the main building frame
   b. A single layer membrane supported by a cable net system

2. Which of the following attributes makes ETFE ideally suited for architectural applications?
   a. High tensile strength
   b. Resistance to tearing
   c. Excellent light transparency
   d. Low flammability
   e. All of the above

3. True or False: Single air supply units can support multiple air plenum lines and therefore, provide for many cushions depending upon cushion configuration and air plenum line layout.

4. As a general design guide, linear ETFE cushions can span ______feet, with a length of ______feet or more.
   a. 5, 100
   b. 10, 90
   c. 20, 50

5. True or False: ETFE is an extruded derivative of PVC that does not attract or retain dirt.

6. It is anticipated that ETFE has a _____ year design life.
   a. 10
   b. 25
   c. 50
   d. 100

7. True or False: If hot gases (over 500 °F) or flames come into contact with ETFE cladding, it will melt and shrink back from the area affected, allowing hot gases and smoke to be vented from the building.

8. A 200 μm ETFE foil is almost ______ percent more transparent than a 3,000 μm pane of float glass.
   a. 5
   b. 10
   c. 20
   d. 50

9. True or False: ETFE is an acoustically reflective material, unlike acoustically transparent materials such as glass.

10. True or False: ETFE's multi-layered construction can allow buildings to intelligently respond to the climate, changing insulation and solar transmission where required.

Fire Safety

Fire safety is one of the most critical design considerations when selecting building materials. The choice of materials must ensure an adequate level of safety and conform to all applicable fire safety standards. The principle consideration of fire safety design should be the safe exit of building occupants and the safety of firefighting teams. In the unfortunate event of a fire, it is essential to restrict the generation and spread of flames and smoke within the building and to any neighboring buildings.

This article continues on http://go.hw.net/AR062018-7. Go online to read the rest of the article and complete the corresponding quiz for credit.

THE RISE OF TEMPORARY AND POP-UP ARCHITECTURE

TEMPORARY STRUCTURES OFFER AN EXPERIMENTAL MEANS TO LOOK AT DESIGN, CONSTRUCTION TECHNOLOGY, AND USE OF MATERIALS.

Temporary or "pop-up" architecture has been used around the world for centuries to experiment with new construction technology and innovatively use materials such as the painter's buckets used here in Mexico City for the MEXTRÓPOLI festival. Photo courtesy of: Jaime Navarro

LEARNING OBJECTIVES

After reading this article, you should be able to:

1. Discover the history and motivation behind creating temporary architecture for habitable and non-habitable spaces.
2. Explore the design challenges of innovative approaches to material usage, experimentation, and progressive design solutions.
3. Recognize the positive environmental implications of temporary architecture, including dis-assembling, re-use, and recycling.
4. Identify the ways pop-up architecture concepts are being integrated into permanent and semi-permanent structures in code compliant manners.

CONTINUING EDUCATION

AIA CREDIT: 1 LU/HSW
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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/AR062018-1 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.

Architecture is most commonly thought of as something permanent, firm, long-lasting, and durable. In order to be justified in its purpose, initially and over time, traditional architecture usually needs to respond to multiple needs for the building owners, occupants, and the general public who may encounter it. Increasingly, however, for a number of projects around the world, permanence is not the goal. Instead, there is a defined need for a structure, display, enclosure, or interactive space that can be temporary, flexible, and adaptable for different people, uses, or times. This temporary architecture, sometimes referred to as "pop-up architecture," allows for great creativity and potential time and cost savings during the construction process. In this article, we will look at some of the ways pop-up architecture has been developed, used, and admired around the world.

HISTORICAL PERSPECTIVE

When we think back to the times of the Greek and Roman Empires, we picture stone and masonry buildings, some of which survive to present times. While the Empire (i.e., the government) was the primary force behind the construction of most surviving public and utilitarian buildings, the people living at the time had their own purposes for structures. In particular, they sought venues to stage local plays or celebrate religious festivals. While the Romans are known for building coliseums, circuses, and theaters, not every community had one. Further, there was government opposition to permanent amphitheaters unless built by the Romans. All of this prompted the creation of temporary wooden theaters for plays and festivals, making them a bit of a social revolution with anti-establishment ideals. This temporary architecture provided a means for people to gather for a short time with a sense of celebration and community, separate from the restrictions of the government.

A resurgence in temporary architecture occurred during the Renaissance. In one noteworthy example, King Henry II of France was often welcomed in cities and towns by civic groups who hosted festivals that included temporary architecture. A parade route for the King would be created using archways made of painted canvas, sculptures, or ornate fountains. Viewing platforms would be built, sometimes as an elaborate, adorned addition to an existing building, for notable citizens to see the procession. The temporary and celebratory nature of these structures allowed architects of the time to experiment using their most progressive ideas and designs—most of which would be considered too unconventional or extravagant for traditional architecture.

World's Fairs emerged in the 1800s as ways for cities, regions, or even entire countries to showcase their latest advances in design and technology, marking their leadership in the era of mechanization and improved living. Accordingly, the 1889 Exposition Universelle in Paris showcased France's capabilities in this emerging age. The archway designed as the entrance to this World's Fair was intended to be a temporary structure that would last only 20 years before being dismantled—the Eiffel Tower. While we see it today as one of the most iconic structures in Paris, many Parisians saw it then as an avant-garde eyesore. It likely would have been demolished as planned if radio technology had not emerged in the early 1900s. Suddenly, the capability of using this tall spire as a radio tower gave it a new purpose to continue on as a more permanent structure.

The proliferation of World's Fairs continued into the 1900s with new motivations and intentions. For example, the 1929 Barcelona International Exhibition provided an opportunity for an emerging architect named Ludwig Mies van der Rohe to create Germany's entry for a national pavilion. Now known commonly as the Barcelona Pavilion, it immediately became an emblematic work of the Modern Movement of the 20th Century. As such, it has been exhaustively studied and interpreted and has inspired several generations of architects. Built from glass, steel, and marble, the Barcelona Pavilion was intended to accommodate the official reception presided over by King Alfonso XIII of Spain along with the German authorities. After the closure of the Exhibition, the Pavilion was disassembled in 1930. Fortunately for many lovers of architecture, it was kept in storage, and six and a half decades later, a movement succeeded to have it reconstructed and re-opened on its original site.

Meanwhile, large multi-national corporations joined in to show their thought leadership and forward thinking. Many paid for subsequent World's Fair Pavilion competitions to find the best architects and designers to create sophisticated, memorable structures. Certainly some were re-purposed or re-used at the end of the Fairs, but others, such as the New York World's Fair of the 1960s, serve as public parks today. Even so, the re-use of the buildings is very limited, testifying to their true temporary nature.

Since the 1960s, countercultural design firms have experimented with mobile structures and temporary buildings using a variety of materials and methods. Many of these have been modern versions of the Roman social revolution, with temporary architecture playing a key role in rock concerts and multi-day festivals, such as "Burning Man" in the Nevada desert.

With this rich history, it is easy to understand the persistence and popularity of temporary buildings and other structures in modern times.

CURRENT IDEAS—"POP-UP ARCHITECTURE"

Today, we see many types of and uses for temporary or "pop-up" architecture. Beyond quick construction, pop-up architecture has also become known for lending itself to experimentation and artistic freedom. This applies to both the general design and the incorporation of new construction technology, including computer based design and modeling, sometimes linked directly to the fabrication and assembly of the pop-up creations. The use of technology for design and fabrication means much of the construction work can be done off site and then transported to the building site. It also applies to new ways of using transitional and non-traditional construction materials to offer progressive and avant-garde solutions expressed in unexpected ways. This has led to a description of pop-up architecture by Allison Arieff, *New York Times* opinion writer and former editor-in-chief of *Dwell*, as "a bold expression of unfettered thinking and creativity."

Such creativity can come from pop-up architecture because it isn't constrained by the demands of building owners, financial backers, or users the way traditional, permanent architecture is. Instead, it can focus on a singular purpose and concentrate its impact on the people who interact with it. In some cases, it can be the catalyst for change in a community by engaging citizens in a project that will benefit all or by demonstrating a communal concept in real-world terms. In other situations, it has enabled multi-day protests and demonstrations around the world. At the same time, temporary architecture still has ongoing value for cultural, public, and political events.

What does pop-up architecture look like? It can take on many forms, including the following singular-purpose types:

- **Art:** Large, interactive, outdoor public art installations have been set up in parks, plazas, squares, and other places that add a new dimension to a location and attract visitors.
- **Theater:** Theater set design has always been temporary in nature and can be part of a larger building or an outdoor setting.
- **Retail:** Retail installations are often temporary, such as kiosk structures in shopping malls set up for a limited time or as a supplement to a more permanent store. Similarly, temporary retail facilities are set up in open air marketplaces, farmers markets, and craft fairs.
- **Music:** Music stages and facilities for concerts, multi-day festivals, and similar events have become common in cities and even on college campuses around the world.
- **Politics:** Events such as the Presidential Inauguration in Washington, D.C. include a ceremony at the U.S. Capitol and a procession to the White House. Substantial temporary structures are built out of wood both at the Capitol Building and along

The Pop-Up-Box by Dittel Artitekten provides an expandable, interactive, and efficient retail display that can be used temporarily in a variety of retail situations. Photos courtesy of: ©DITTEL ARCHITEKTEN GMBH

Pennsylvania Avenue for the inauguration ceremony and parade viewing.

- **Gatherings:** Events can require temporary facilities and buildings on a larger scale. The previously mentioned "Burning Man" event creates a temporary city for several weeks each summer that is then dismantled to restore the land to its original condition. The international "South by Southwest" conference in Austin, Texas and the Venice Biennale combine permanent buildings with temporary installations of art, architecture, technology, and other advanced-thinking activities.
- **Disaster Relief:** Natural disasters and humanitarian situations have produced the need for temporary emergency housing, schools, churches, and other facilities to help people through difficult periods. These have been provided in numerous creative and innovative ways all around the world.

All of these temporary, "pop-up" buildings and facilities typically occur because of the rather singular and focused need to accommodate any one of the forms listed above. Other needs are certainly possible and new ones are emerging as activities and conditions change, but it is clear that there are many reasons and opportunities to create "pop-up" architecture.

INNOVATIVE DESIGN AND CONSTRUCTION PROCESSES

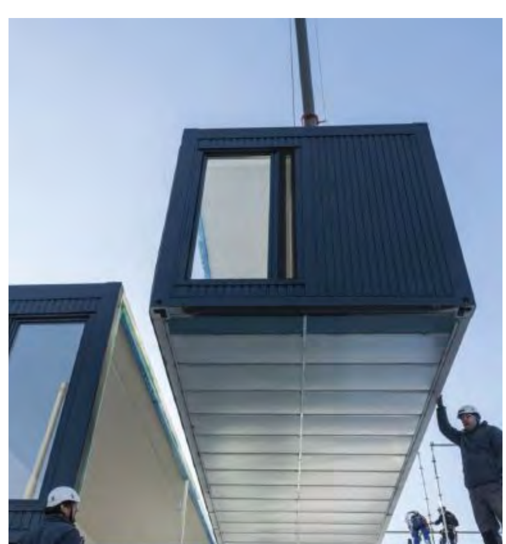
Temporary architecture receives the same level of design thinking and analysis that traditional architecture does, and in some cases maybe even more so. Because of the design freedom provided, analysis and synthesis of pure form and focused function can lead to deeper investigations and broader linkages to time, place, and technology.

This sharper focus on the cause, event, art, or demonstration of ideas can reveal the best makeup of a design team. For example, the team might be limited to a defined group of architects, or a broader, multi-disciplined team of collaborators might be assembled, including traditional design professionals along with computer specialists, information professionals, and community activists. This type of design process can be vibrant, inquisitive, and exciting—reminding many participants why they entered their professions in the first place.

When it comes to envisioning and working out the design options for temporary architecture, most practitioners already use computer aided design (CAD) and building information modeling (BIM) as their most common design tools. These are equally powerful resources for temporary and pop-up architecture. Because of the experimental but focused nature of these designs, different iterations can be quickly and easily explored in both 2D and 3D, then presented quickly and efficiently for evaluation by the rest of the group. These tools can also be used to communicate a final vision to the general public, when appropriate, and generate support and excitement for a project.

When it comes to the construction of temporary architecture, several common techniques have emerged. The first is to use traditional materials but apply them in creative ways. In this regard, materials like wood, steel, masonry, concrete, glass, and even heavy duty fabrics can be employed in ways that can surprise, inspire, or present an artistic but well-grounded installation.

The second technique is to consider some non-traditional building materials that can be incorporated to create planes, surfaces, or enclosures, particularly if there is little or no structural loading to address. That means materials like plastics, cardboard, composites, alloys, and lightweight fabrics can be quite appropriate for a pop-up installation, particularly for the creation of outdoor, non-enclosed structures. Both of these techniques rely on the traditional construction process of bringing materials and products together for fitting, shaping, and installation with a construction crew.



One technique for creating temporary pop-up architecture is to use modular components such as trailers or shipping containers. Photo courtesy of: Christoph Merian Stiftung, Basel

A third, and popular, approach is to use modular components, such as trailers or shipping containers, as the "building blocks" of the temporary construction. A series of enclosed spaces can be created by stacking the modules together—either independent from each other or linked in meaningful and organized ways.

Given all of these options, how do temporary architecture projects come together? Lots of different ways of course. It will likely depend as much on the idea or focus of the installation as on the location, use, and life expectancy of the structures. It may also depend on the experience, talent, and willingness of the design team to push the limits of their exploration and the progressiveness of their thought process. The mix of all of these variables swirling around a particular temporary architecture project can prove to be the fun of the whole process.

With all of the above in mind, we have identified four firms that have been engaged in different versions of temporary and pop-up architecture to illustrate real-world examples of how these projects are accomplished. We will next look at each of them with examples of their work.

ONE BUCKET AT A TIME PAVILION BY 5468796 ARCHITECTURE

This Winnipeg, Manitoba-based architecture practice was founded in 2007 and derives its name from its company registration number. As a young, creative, and innovative firm, 5468796 Architecture has earned a reputation for being an influential contributor to progressive design. They have also embraced the ideas of broad collaboration and pop-up architecture, not only in Canada but elsewhere in the world.

One of their celebrated pop-up projects was in Mexico City, Mexico during the four-day international architectural festival known as MEXTRÓPOLI. During this festival, Mexico City turned into a diverse stage for thinking, creating, designing, and enjoying both architecture and the city. As such, MEXTRÓPOLI is known for encouraging creative exercises and critical dialogue between the community, experts, and decision-makers. The event includes conferences, workshops, lectures, pavilions and open-air activities, all intended to showcase some of the most progressive thinking in architecture and urbanism.

The collaborative project that 5468796 Architecture produced for the 2017 MEXTRÓPOLI was designed to highlight the enjoyment of public spaces in Mexico City's unique but somewhat contentious urban environment. The architects learned that 4.5 million of Mexico City's 23 million people are also daily commuters who encounter a severe shortage of parking. The day-to-day experience of driving in Mexico City often includes complex roadway navigation, frequent traffic jams, and public protests before searching for limited parking spaces. This turns the streets into a setting for friction and anxiety for drivers. But an entrepreneurial spirit is alive there, too, in locals referred to as "viene viene" who function outside of government oversight. They are known to bribe the local police and then use common painters' buckets to claim a parking spot on the street. They will then charge hopeful drivers looking for a parking spot with an additional fee in exchange for access to their illegitimate stall. Each viene viene can control one or several city blocks with their buckets, and will threaten anyone who parks without agreeing to pay them.

Seeing the reality of this social situation as inspiration, the architects proposed a project called "One Bucket at a Time." They used the same type of plastic painters' buckets as the viene viene to create an interactive pavilion in an open space just off the street. Their design for this pop-up installation was based on using the bottoms of the tightly spaced buckets as a continuous but malleable surface. By holding and connecting the buckets together using a grid of ropes, the resulting assembly functions like a giant carpet that can be rolled, pulled together, pushed up to a point, or folded along a line to take on different forms. To ensure safety, the firm collaborated with Studio NYL Structural Engineers to work out the tensile and compressive stresses at play in the ropes and buckets. The intent was to create a structure that would encourage the public to freely explore it by sitting, running, playing, standing, lounging, and generally participating in the act of taking back control of the public realm. By using the buckets, which are viewed as a symbol of holding public space hostage, the architects highlighted this pervasive condition and inspired the people of Mexico City to metaphorically assert ownership of their public spaces.

This article continues on http://go.hw.net/AR062018-1. Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. What emerged as ways for cities, regions, or even entire countries to showcase their latest advances in design and technology, marking their leadership in the era of mechanization and improved living?
   a. Roman amphitheaters
   b. Renaissance parade structures
   c. World's Fairs in the 1800s
   d. Countercultural designs of the 20th Century

2. Which of the following is NOT a good example of pop-up architecture?
   a. Retail installations such as kiosk structures or outdoor markets
   b. Music and theatrical buildings designed for long term usage and durability
   c. International conferences such as "South by Southwest" in Austin, Texas and the Venice Biennale
   d. Temporary emergency housing, schools, churches, and other facilities due to natural disasters

3. What common design tools for temporary architecture allow different iterations to be quickly and easily explored in both 2D and 3D, then presented quickly and efficiently for evaluation by the rest of the group?
   a. Computer aided design (CAD) and building information modeling (BIM)
   b. Hand drafting
   c. Community charrettes
   d. Collaboration with non-design professionals

4. What event is a four-day international architectural festival that turns Mexico City into a diverse stage for thinking, creating, designing, and enjoying both architecture and the city?
   a. Burning Man
   b. MEXTRÓPOLI
   c. Venice Biennale
   d. South by Southwest

5. What innovative material did 5468796 Architecture and Factor Eficiencia use for their 2017 pavilion?
   a. Plastic sheets
   b. Automobiles
   c. Plastic painters' buckets
   d. Grass

6. Shigeru Ban has become well-known for creating paper-based structures, particularly emergency housing for disaster areas in places like Kobe, Japan; New Orleans, Louisiana; and Rwanda's Byumba Refugee Camp.
   a. True
   b. False

7. Dittel Architekten observes that digitization in architecture is expressed with industry-specific terms such as:
   a. BIM
   b. Augmented reality
   c. Smart architecture
   d. All of the above

8. With the help of digital tools, the architect can better control factors that influence construction time schedules and cost.
   a. True
   b. False

9. The Rakete project in Basel Switzerland is intended to do all of the following EXCEPT:
   a. Use some of the abundantly available shipping containers of this transportation hub area
   b. Create an affordable launch pad where young entrepreneurs can come together and thrive
   c. Serve as a pilot project for the creative industries of the Basel region that can be replicated at various locations in Dreispitz
   d. Be seen as a non-experimental, permanent, and fixed-in-place solution

10. In the Rakete project, prefabricated shipping container modules are stacked three high and painted on the outside to create the look of a uniform building.
    a. True
    b. False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Facing Difficult Questions

Public outreach starts with education.

Kim Yao, AIA, is a principal at Architecture Research Office (ARO) in New York, and vice president of public outreach for AIA New York (AIANY). Having taught at Barnard College for a decade, Parsons School of Design, and now Columbia University, Yao sees firsthand some of the opportunities—and challenges—for students on the path to becoming architects. "Outreach to students to help them answer difficult questions is no different than outreach to the public," she says "My firm, ARO, cares about creating collaborative environments and asking engaging questions. The design process in school is also about inquiry and allows students to explore things that don't occur to the studio critic or reviewer."

As told to William Richards

I ask my students to let their surroundings inform their work; that type of design process creates a strong framework to test ideas. Iterative aspects of design work in the classroom and studio are the same as in our office—and it's OK to not have all the answers.

One of the challenges that emerging professionals face is about their next career step. Or, to put it another way, how they can apply their critical-thinking skills to the specific tasks they'll be asked to do in a work environment. Students who go into M.Arch. programs emerge with different expectations about their careers. And not all those expectations are about being a registered architect in that singular way. The kinds of jobs in architecture range considerably—and certainly much more than when I was in school. Recent graduates need to know that a range of opportunities exists, and that has to do with transparency on my part as their instructor. Licensure is an enabling process and an accomplishment, too, and to keep that in mind helps students mark their progress toward a goal.

I am fortunate to have a practice in New York City because the people who live here instinctively know that the built environment can affect us positively. In terms of public outreach, AIANY thinks about it all the time—and there's more to do. One way is to improve communication between schools and firms, between firms and communities, and between architects back to students. The public—writ large—is interested in architecture on some level. My colleagues at AIANY spend a lot of time thinking about its own diverse membership, and how we can extend that value of inclusion to other things, like exhibits.

We'd love to influence everyone in "the public" to see things our way, but realistically we break down that word by looking at youth groups. The most strategic discussions we have happen around education. Public officials are also vital, and we constantly try to engage dialogues with commissioners, council members, and elected leaders. They were students once, too, and to work upstream and downstream at the same time is a privilege. AIA

AIANow

At Street Level

Written by Katherine Flynn
Art Direction by Jelena Schulz

New York City was largely planned as an orderly grid. More recently, however, neighborhood design interventions have changed the way locals and tourists interact with the city on its most elementary level: the street. Read on for seven must-see examples of ground-up design innovation.

1. Storefront for Art and Architecture, SoHo
This "experimental forum and exhibition space" designed by Steven Holl, FAIA, and Vito Acconci, serves as a platform for emerging ideas at the intersection of art and architecture. Movable walls allow for the gallery to be opened to the street.

2. Governors Island
This once-abandoned 172-acre island in New York Harbor now boasts amenities (thanks to West 8) that include a public plaza, 10-acre Hammock Grove, and 5 miles of bike trails. Located just 800 yards from Lower Manhattan, and only 400 yards from Brooklyn, it's accessible by ferry and open to the public during the summer.

3. Liz Christy Community Garden, the Bowery
This community garden at the intersection of Bowery and Houston Street, started by local resident Liz Christy in 1973, was the first of its kind in New York.

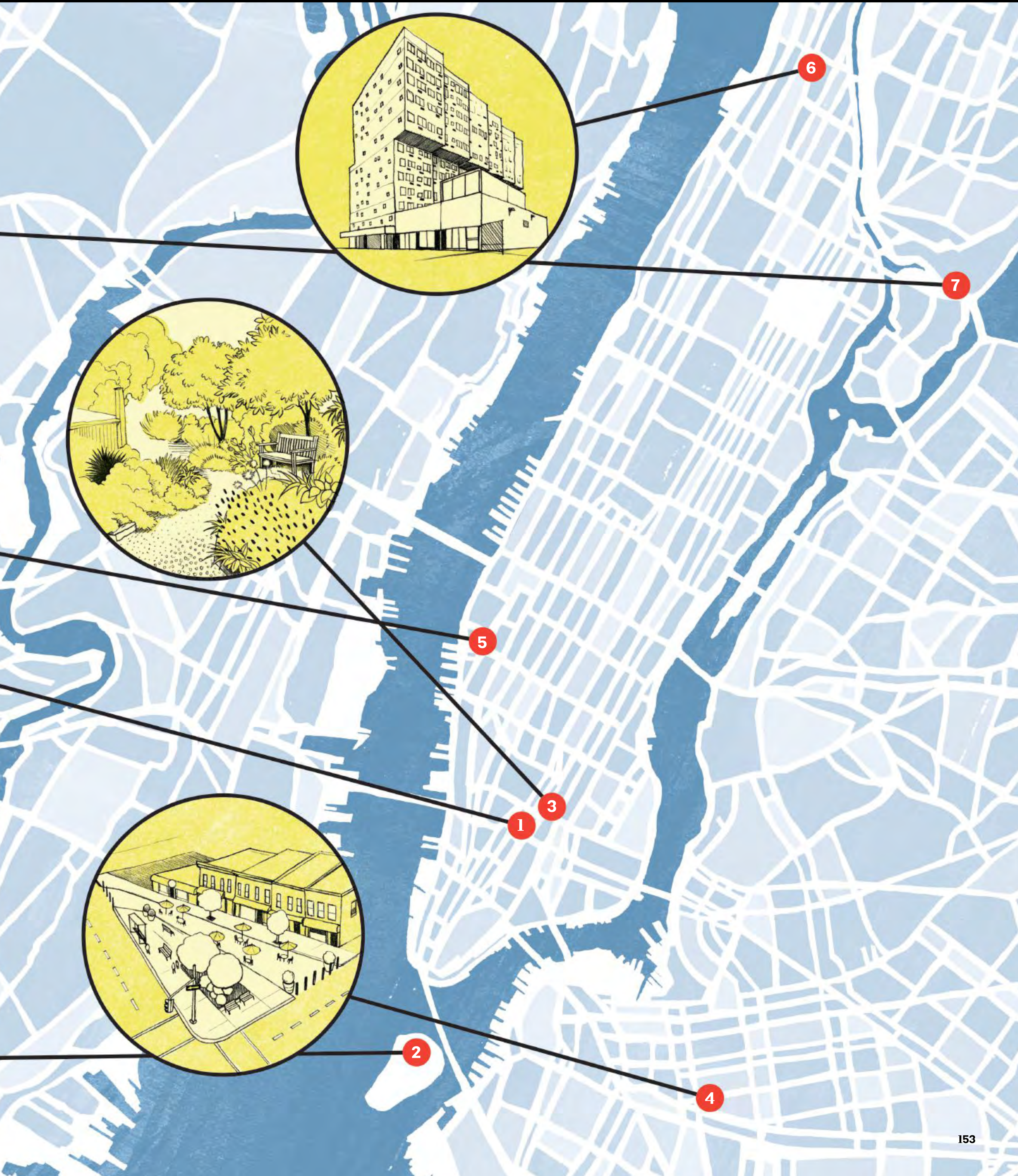
4. Putnam Triangle Plaza, Brooklyn
Located in Brooklyn's Clinton Hill neighborhood, this plaza was carved out of the existing street, and now offers seating and space for community events.

5. The High Line, Chelsea
The High Line, perhaps New York's most famous example of innovative urbanism, designed by Diller Scofidio + Renfro with Field Operations, stretches from the Hudson Yards to the northern edge of Manhattan's West Side Yards.

6. Sugar Hill Development, Harlem
Designed by David Adjaye, HON. FAIA, this towering affordable-housing complex, which opened in 2014, also features a preschool and the Sugar Hill Children's Museum of Art & Storytelling. It was a winner of an AIA New York 2016 Merit Award for Architecture.

7. Randall's Island Connector, the Bronx
This pedestrian and bike route spans the Bronx Kill strait to link the Port Morris neighborhood to the playing fields, nature areas, and bike trails on Randall's Island, a previously underutilized recreation area.

ILLUSTRATION: LAUREN NASSEF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AIAFeature

New York City, Briefly

Seven architects and designers from elsewhere explain what the Big Apple means to them.

By Steve Cimino

However proud native New Yorkers can be about their city, the immigrant's zeal for their adopted city lends the five boroughs a thrum and beat that gives them life. So what does architecture have to do with it? What buildings, spaces, or places scream "New York City" to those who now call it their home? Ask seven transplants—whether they've been residents for three years or 30—and you'll get seven answers. At least, we did.

Being a native of the Chicago area, my impression of New York architecture has always been inherently biased. Nevertheless, I have come to love the architecture of my adopted city, even if it will always occupy a secondary place in my heart. Like many transplants, it is the scale and grandeur of the buildings and spaces of New York that first captured my imagination and have continued to captivate me.

I still remember vividly the first time I went swimming in Astoria Pool after moving into an apartment nearby. I had never experienced anything like this enormous aquatic facility—the largest in the city. Set along the East River and framed by the Triborough and Hell Gate bridges, this pool seems capable of holding thousands. While the Art Deco brick, concrete, and glass-block structure has dulled with age, the architectural spectacle of swimming in this WPA pool remains as fresh as when it was finished in 1936.

The other architectural giant that continues to amaze me is St. John the Divine, the largest cathedral in the world. Perched atop the edge of the schist outcropping of Morningside Heights, the sheer size of this Gothic edifice—with its towering façade, mammoth nave, and colossal granite ambulatory columns—is astonishing. Visiting regularly now has somewhat normalized it; nevertheless, the staggering nature of this building—made all the more present by its unfinished state—continues to excite.

—Michael Waters, assistant professor, Department of Art History and Archaeology, Columbia University

I lived in New York City until I was 3. My dad was a professor at Columbia University, then he moved the family up to Vermont to become chair of the Geology Department at Dartmouth College. I've always felt a connection to the city, but I'm a country girl at heart.

While studying at the Harvard Graduate School of Design, I came to New York to visit a friend; it was a bit of an awakening. I started seeing this thriving built metropolis in a way I hadn't considered while growing up. I hadn't really thought about the different levels of design that go into making a city. One of the elements I find most compelling is how the pedestrian is king. As I travel to other cities around the country, or even around the world, I don't find the pedestrian is valued as much as they are in New York.

As a child, I was entranced by the skyline. And I still love it. But now, as a designer with a very systematic approach, I'm more fascinated by the systems that make the whole city operate. The grid, the subways, even the way that our water system brings some of the best water in the world to almost 8 million people: They never cease to amaze me.

—Susannah C. Drake, AIA,, founding principal, DLANDstudio Architecture + Landscape Architecture

I went from a town of 2,100 people in Montana to San Francisco and then to New York City, so it was a series of steps toward a very big change. When you don't live in New York, you think of it as a collection of buildings that you know from photographs or watching television. So many of those iconic views are ones you never get as a New Yorker. The vision of view you'd have as a New Yorker really doesn't end up being the case.

That said, the most profound element of being a New Yorker for me was negative space. You come to appreciate and admire the space between buildings. These tall walls—on a scale I had never really encountered before—with little gaps for air or space, or the beautiful moments between buildings, really started to define the city. To me, New York is defined by what's not there.

—John Heida, director, Visible Futures Lab at the School of Visual Arts

I arrived in New York City in October of 1998, almost 20 years ago. Having not even unpacked, I spent my first evening in the city attending the Municipal Arts Society Gala celebrating the restoration of Grand Central Terminal. While I had visited New York many times prior to moving here, my first impression of entering through this magnificent space as a new resident and recent architecture graduate is impossible to separate from my understanding of the city as a whole. Arriving through this incredible threshold, I felt immediately like an integral part of the fabric of this city.

Grand Central continues to be a pivotal part of my life here, as I now pass through it daily as part of my commute. What makes this space so incredible is that it does not act at the scale of a building but performs as a public space, a civic landscape, and a critical piece of infrastructure that connects people to people, people to place, and people to resources.

—Andrea Steele, AIA, principal, TEN Arquitectos

AIA Feature

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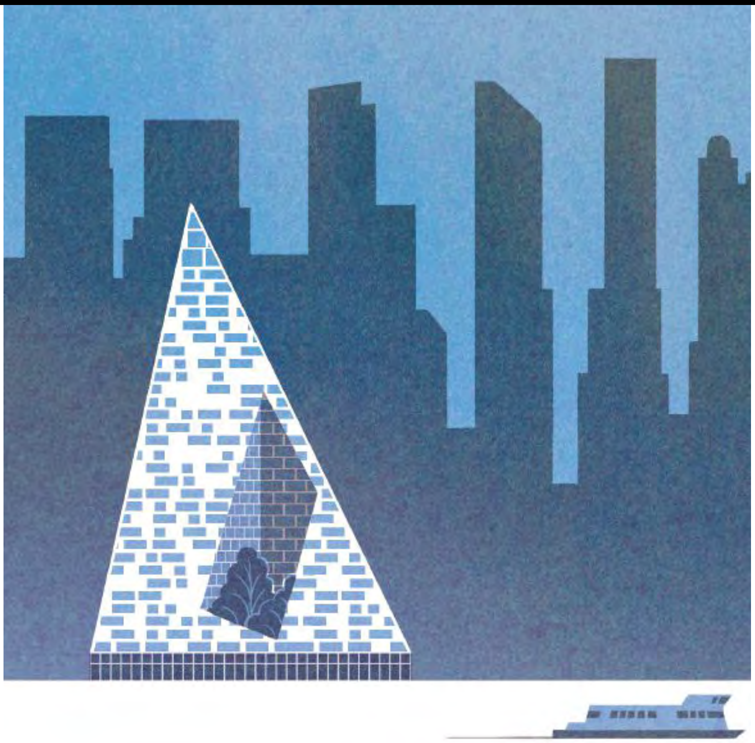
I was 6 years old when my parents and I boarded the Queen Elizabeth 2 in London, sailed across the Atlantic Ocean, and arrived at the harbor of Manhattan. The first sight I had of the United States was the Statue of Liberty. That was back in 1976; it was during the Bicentennial, and the statue had just been refurbished. It obviously made a huge impression; that's the New York City that I remember in the 1970s.

I then bounced around the United States—from Georgia to Virginia to Los Angeles to Seattle—plus 10 years in Europe. After I settled in Copenhagen and joined Bjarke Ingels Group, we received a commission to design a high-rise—what became Via 57 West—in New York. We brought a European courtyard typology and married it to an American skyscraper typology; it became known as the "courtscraper." Being able to come back and add a new typology to the Manhattan skyline has been an amazing experience, one I find extremely humbling.

I think any architect really has to believe that they can add to New York's great legacy of buildings and urbanism. You also don't necessarily have to build the biggest building; you can build something modest and scaled to the community that has a tremendous impact.

—Kai-Uwe Bergmann, partner, Bjarke Ingels Group



I am originally from Antigua; I also competed as a sprinter in the Olympics in 1988. So I've traveled a lot, but I've also lived in and around New York City for 30 years, and I can say the electricity here is unique and intoxicating. Once you're plugged in, it's very hard to leave. And if you're a young architect in the early stages of your career, there's no better place to get your name out there.

The buildings here stand out, and they're always building more. New York City changes; Times Square changed over time. Once upon a time it wasn't a good place to visit; now it's one of the city's hubs. Even Harlem, at one point, was not a very nice place. I worked on the Apollo Theater; once they started putting on Amateur Night, the whole strip of 125th Street started to change. At one point the whole city looked like it was dying; to be revived and to come alive through architecture has been amazing to witness.

—Oral Selkridge, principal Selkridge Architecture

Before New York City, most of my life happened in a town where the tallest building downtown was 18 stories high and the second tallest was four stories. Once in New York, I was first struck by the heights, the congestion, and the muted-color palette. And then by how close in proximity buildings of different heights, styles, and ages seemed to live in peace with each other.

After settling in, I visited neighborhoods so architecturally unique that it was hard to imagine that they were only separated by a block or two—like Federal Hall and the modern buildings that surrounded it. I visited all the spots I had only known through books and TV: the clubs and restaurants of Harlem, most of which no longer exist, and in the Village. I sat at the fountain between Lincoln Center's music and arts buildings; I stood at the spot where Malcolm X had once delivered fiery speeches—whose backdrop had been replaced with the Adam Clayton Powell Jr. State Office Building—and met friends after work at the greatly missed World Trade Center complex. New York's architecture was a draw for coming, and remains a prime reason for staying.

—Roberta Washington, FAIA, principal, Roberta Washington Architects

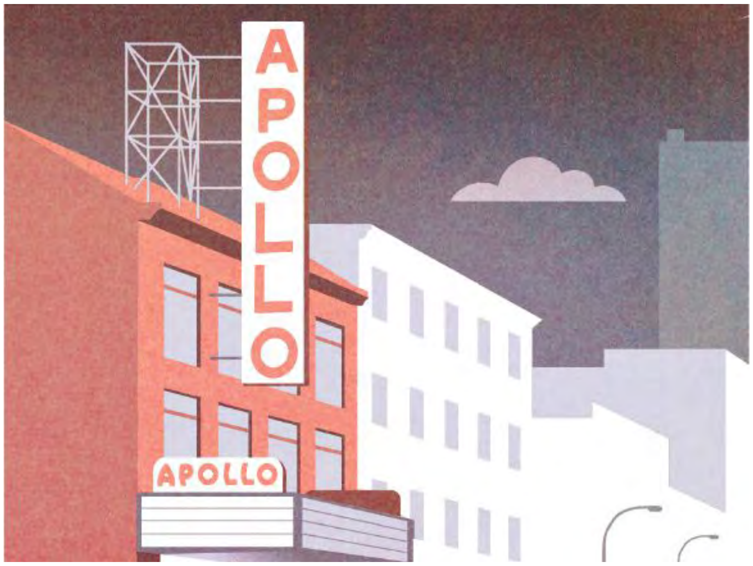
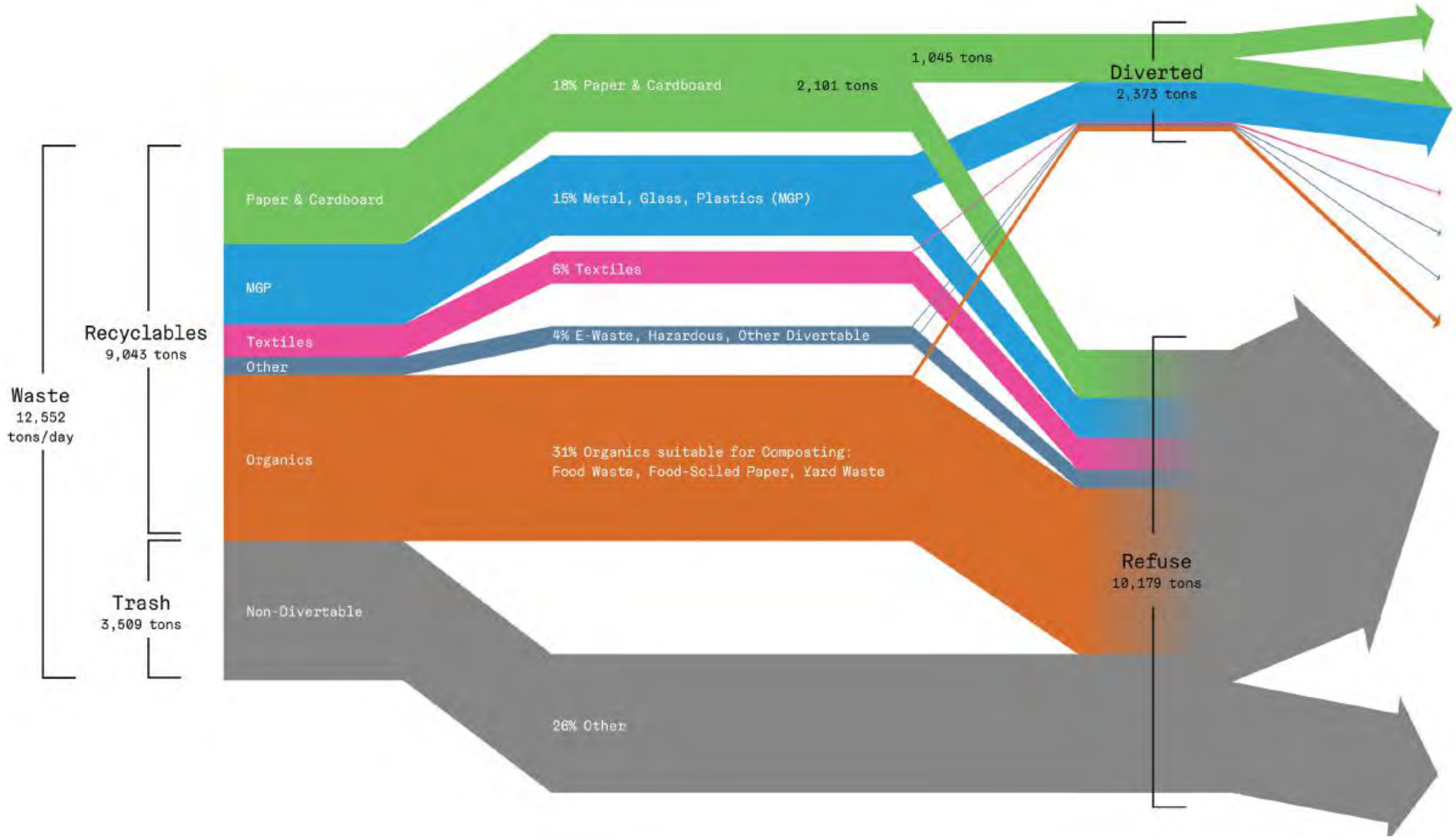


ILLUSTRATION: MICHAEL KIRKHAM

AIAFuture



New York Department of Sanitation Waste Stream: *Capture rate* is the proportion of recyclables that get diverted per waste stream. *Diversion rate* is the proportion of the total stream that is diverted from disposal. *Refuse* is defined as the waste stream that gets disposed. (i.e., sent to landfill or waste energy incinerators).

Designing a Trash-Free Future

AIA New York's Zero Waste Design Guidelines help the city devise a plan to meet ambitious sustainability goals.

Tens of thousands of tons of trash leave New York City every day—roughly the weight of 8,000 cars. Most of it travels an average of 300 miles to states such as Pennsylvania, where it is dumped into landfills and forgotten. In 2015, New York spent $316 million shipping the city's trash to its final resting places.

In a bold effort to eliminate citywide waste altogether, the city released its OneNYC plan in 2015, which takes its cue from other environmental initiatives in targeting 2030 as the year when zero waste produced by New Yorkers will end up in a landfill.

Spurred by the ambitiousness of this goal, members of AIA New York's Committee on the Environment (COTE) began asking themselves how architects and developers could best address the problem of waste generated by buildings—or, more specifically, the people in them. They released the Zero Waste Design Guidelines (zerowastedesign.org) in October 2017 as a blueprint for how buildings could better manage and divert the waste streams being created within them, and how architects and designers could think holistically going forward about waste management during the design process.

"To me, it was a blind spot that no one had really thought about, and a lot of potential to make a difference," says Clare Miflin, AIA, a member of AIANY's COTE team who spearheaded the Zero Waste Design Guidelines project. Starting in November 2016, Miflin and a team of more than 100 collaborators set out to create a resource to help designers, building operators, and planners build strategies for dramatically reducing waste and working toward the greater adoption of circular material flows. This involved more than 40 residential, commercial, and institutional buildings, following the path of waste from disposal to collection, and talking to porters and superintendents about waste collection practices. The study was supported by the Rockefeller Foundation and developed in collaboration with Kiss + Cathcart, Architects (where Miflin was working at the time); ClosedLoops, an infrastructure planning and development firm; and Foodprint Group, which helps food businesses incorporate zero waste into their operating practices.

The Zero Waste Design Guidelines will be presented publicly in the form of an exhibit at AIANY's Center for Architecture from June 14 to Sept. 1. Journalist Andrew Blum, the exhibit's curator, emphasizes the importance of bringing a larger awareness of waste management to both architects and the public.

"I feel it's really important to acknowledge how novel it is to have compactor rooms and basement hallways and stoops and garbage chutes presented as design in the Center for Architecture galleries," Blum says. "It's a space that's in every building that architects have not studied."

AIAFuture

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The exhibit will feature large gallery-sized images of infographics included in the report addressing the ways New York City currently deals with waste in different building types, as well strategies for improving practices in the future. A screen will showcase Instagram photos tagged with #pilesoftrash. The exhibit will also display a reconstruction of Etsy's office-waste management station, a pair of cardboard and plastic bailers, and a giant 3D infographic showing the potential (and benefit) of zero waste.

Although the idea of eliminating waste entirely seems like an immense and complex problem, Miflin insists that the principles are very simple. The guidelines emphasize treating waste as a resource rather than trash, which depends on the ability of city dwellers to deposit their waste into separate streams before it's collected by the New York Department of Sanitation (DSNY), which can then process them individually. New York law currently requires residents to separate all trash into three categories before leaving it on the curb for pickup: paper and cardboard; metal/glass/plastic; and non-recyclable garbage/trash. DSNY is also starting to collect additional waste types, including organic waste, textiles, and electronics waste, and promoting donation and reuse of items—all of which are necessary for getting to zero waste.

"At the simplest level, it's just thinking through each waste stream that can be diverted—where will it be collected, and how it will it be moved to the place it's collected?" Miflin says. "And what waste streams could you avoid making in the first place?" **AIA**

—Katherine Flynn

Waste Management Plan: 1. Tenant disposal and separation. 2. Movement of recyclables and waste to central storage. 3. Waste storage. 4. Collection.

AIAPerspective

1968

As thousands of AIA members gather in New York City for the 2018 AIA Conference on Architecture, our profession is compelled to recall the speech delivered 50 years ago at the AIA Convention in Portland, Ore., by Whitney M. Young Jr., one of the nation's most prominent civil rights activists. Young gave a powerful speech, chastising architects for "complete irrelevance" to the civil rights struggle. My words here do not come close to expressing the significance of the moment.

Less than three months before Young spoke before the AIA, Martin Luther King Jr. had been gunned down in Memphis. Uncontrollable anger was ignited. Neighborhoods burned to the ground in dozens of cities across the nation. The civil rights movement had lost its most trusted and beloved leader, the voice of hope, whose "dream" defined a vision for bringing races together in America.

Those emotional wounds from King's death were still very fresh when—less than three weeks before the Portland Convention—Robert F. Kennedy was shot dead while campaigning for president. His candidacy symbolized hope for ending the Vietnam War and piecing back together the shattered civil rights movement.

That was the context of Young's speech to the American Institute of Architects.

There are powerful personal connections for me in this history. In the spring of 1968, I was completing my freshman year of architecture school at the Pratt Institute in Brooklyn. But to explain the experience of the 1968 Convention, I need to back up four and a half years.

In November 1963, I was still getting accustomed to high school. I will never forget that Friday afternoon when, over the intercom, the principal announced, in a cracking voice, that President John F. Kennedy had been murdered. I was too young to have any real perspective on Kennedy's skill as a political leader, but to me he personified the promise of a brighter tomorrow. He dared our generation to aspire to greatness, to shoot for the moon.

Over the intervening years, my personal awakening to the complexities of life paralleled the nation's. Promises of the Great Society were raised in a flurry of legislation while America's cities continued to crumble. The Greatest Generation's expectations of just and winnable warfare grew increasingly out of touch as young—mostly black—men were sent to die without clear purpose.

So it was without the hopeful voices of Robert, Martin, and John, that Whitney Young came to the AIA in 1968 and challenged our profession to recognize that we weren't doing enough, that our commitment to correcting social ills was sorely lacking, and that our impact could not be—and should not be—measured in bricks and mortar alone.

With still-vivid memories of 1968, Young's words then ring just as true for me today. African-American participation in the profession has not measurably increased. In too many firms, women struggle for equal opportunity and pay, and against sexual harassment and assault. Millions of our children are marching in the streets, demanding protection from assault weapons that school design alone cannot provide. Our immigrant nation's desperate need to reinvest in infrastructure is sidetracked by arguments over a border wall to prevent immigration.

Does the responsibility of architects end with the lines we draw? Are we content serving our clients without also serving society more broadly? Can we sufficiently protect public health, safety, and welfare if we're focused only on adhering to building regulations?

In 2018, architecture is experiencing a relevance revolution. Field after field is recognizing the effects of the built environment on human outcomes. By shaping the built environment, architects shape lives. Our responsibility to contribute solutions to the compelling social, economic, and environmental challenges of our era aligns powerfully with the evolving understanding of our impact. Together they demand that our profession directly addresses human need and embraces its countless opportunities as social entrepreneurs.

Where will we draw the line? **AIA**

—Carl Elefante, FAIA, 2018 AIA President

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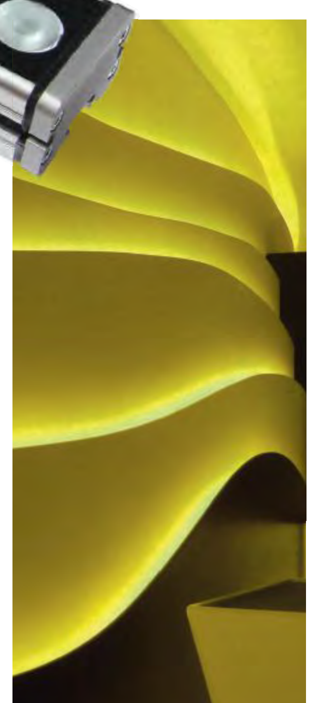

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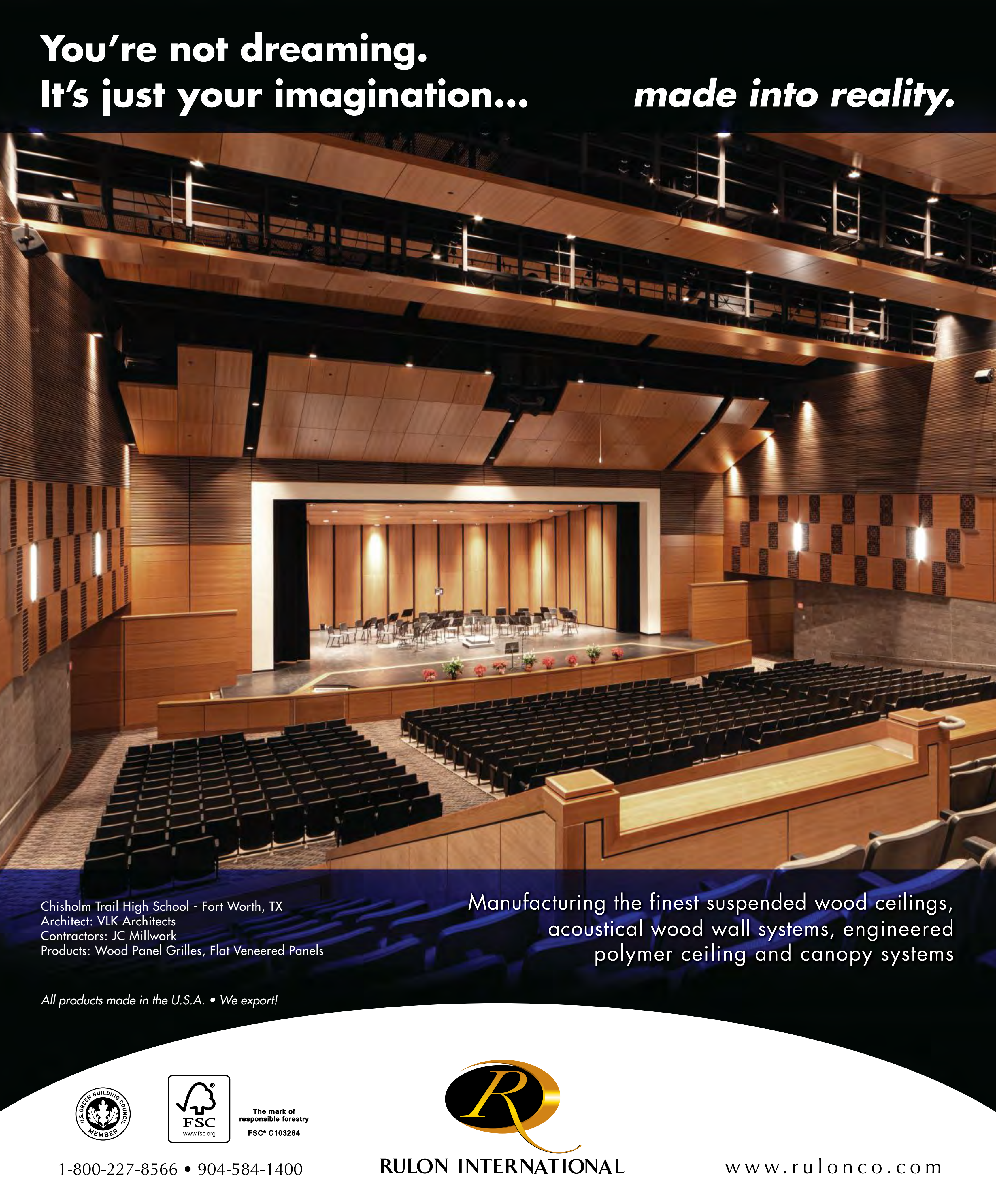
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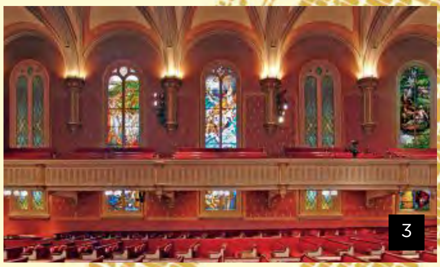
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"The lesson I draw from history is that curriculum and its container must ever be complementary. Beware those selling a fix in an app, as well as in a shiny new building."

The Future of School Design by Alexandra Lange

When Laura and Mary Ingalls went to school for the first time, in 1874 in Walnut Grove, Minn., they did so in a one-room schoolhouse. The schoolhouse, like their own newly built house, was made of machine-sawed lumber, but in Laura's later account of the experience in the book *On the Banks of Plum Creek* (Harper & Brothers, 1937), she dwells on the furniture: long benches, also made of planed boards, with attached backs. Mounted on the back of each bench is a shelf that serves as a desk for the bench behind, and so on to the back of the room. In each row, all the children are studying the same section of the primer. When they are ready to move on, they move back one bench. When I first read the *Little House* books, I regarded this description as quaint. Now I regard it as prophetic, a clear example, by virtue of its simplicity, of the way that the design of a classroom reflects and supports a particular style of teaching.

In the one-room schoolhouse, there are two pieces of design: the room and the seat. Moving forward through the history of American schools, these two elements—the container and its contents—become the object of repeated invention and modification. The classroom is molded around, and helps mold, educational reforms and new pedagogical ideas, from separating students by age, to object-based learning, to open-plan schools. The long benches of the Ingalls' schoolhouse become individual desks; desks become lightweight and movable; desks disappear in favor of seminar-style tables; and, in a recent twist, tables have become upholstered ottomans, beanbags, and booths, as suitable in a home—or the dot-com workplace—as in a school.

This latest trend in school design is all about options, furniture that gives students and teachers the ability to modify their postures as lessons allow. If the design of the one-room schoolhouse was a machine for a certain kind of one-directional education—the teacher dispensing facts without interpretation—the most progressive classrooms today reflect a very different philosophy. Project- or inquiry-based learning has become a model of 21st-century education—an approach which is less focused on learning facts and more concerned about what you do with them.

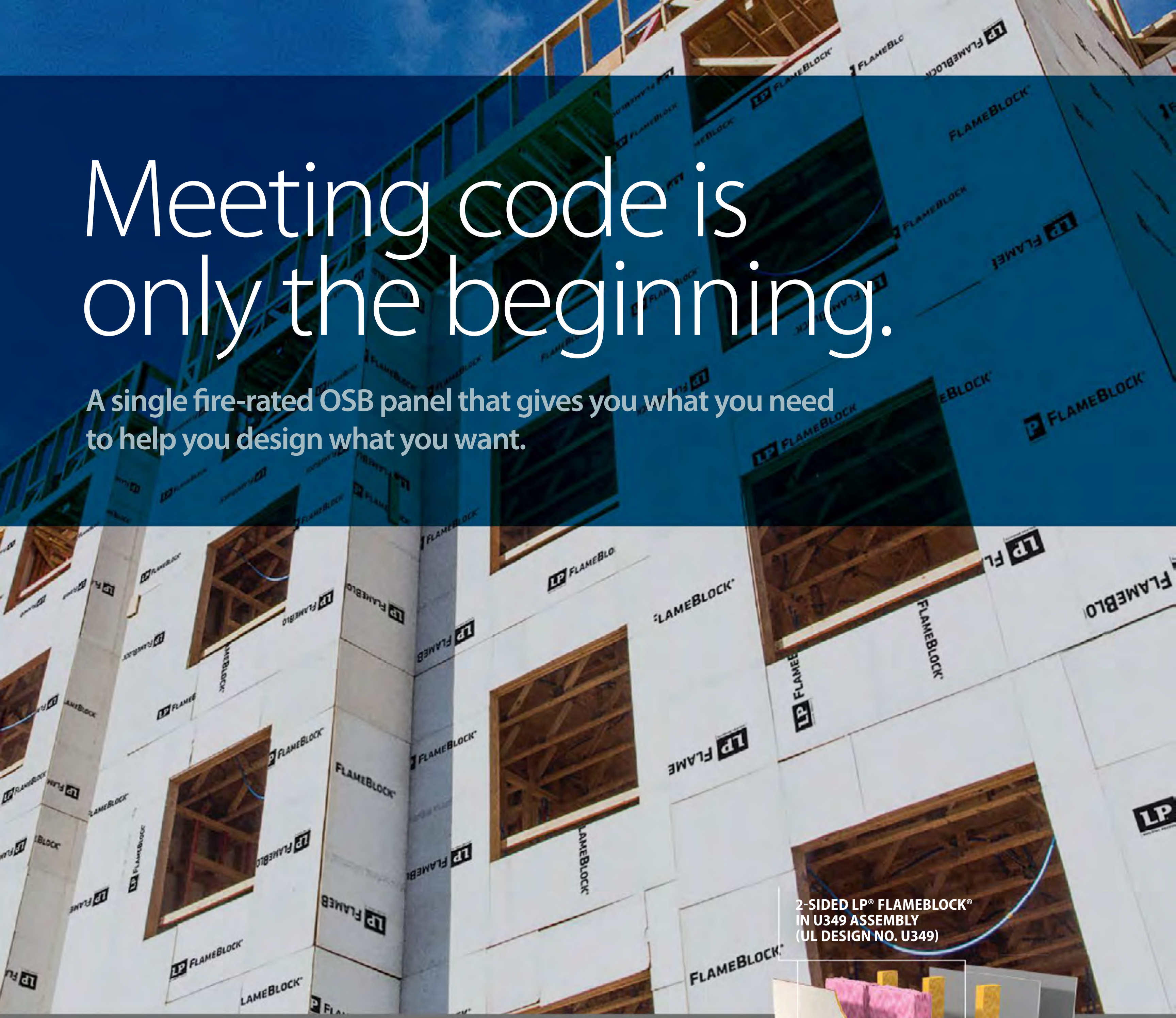
That's the theory behind the toy-like landscapes created by Rosan Bosch, a Dutch-born, Copenhagen-based designer whose practice focuses on the art, design, and architecture of learning. Bosch has completed dozens of schools, archipelagos of furniture in bright, attractive colors that work in concert with café tables, cubicles, and lab surfaces to divide high-ceilinged white rooms into zones. The aesthetic is echt-Scandinavian, not unlike many tech-company offices. As a consultant to the Ministry of Education in Argentina, the studio will pilot this scenographic approach in nine of that country's public schools this year.

Bosch is best known for the Vittra School Telefonplan, which opened in Stockholm in 2011 to a wave of publicity. "Is Sweden's Classroom-Free School the Future of Learning?" read one headline. "Sweden Debuts First Classroom-Less School," read another. As usual, this was design media hyperbole: The layout is more like a series of classrooms without walls, not unlike open-plan schools from the 1970s that used rolling bookcases and half-walls to create improvised teaching areas. Bosch's furniture pieces, while abstract in form, are intended to suggest the relationships and postures children adopt in school—or would adopt if not confined to chairs and desks—and hence provide better support, literally, for the interpersonal interactions that make up the school day.

Instead of making containers for children, Bosch creates magnets, each with an evocative name inspired by the education ideas of futurist David Thornburg. In the Telefonplan school, for example, "the show-off" is a blue, stepped mountain, a space where teachers and students can explain their work to an audience of their peers, and the whole school can gather. "The cave" has the opposite purpose: a red, carpeted nook under the mountain to get away from it all and have a private conversation or moment. Concentration niches, also coded red, provide private workspace, while a child looking for interaction might head to "the watering hole," located next to more benches for two, or to the

Vittra School Telefonplan

KIM WENDT



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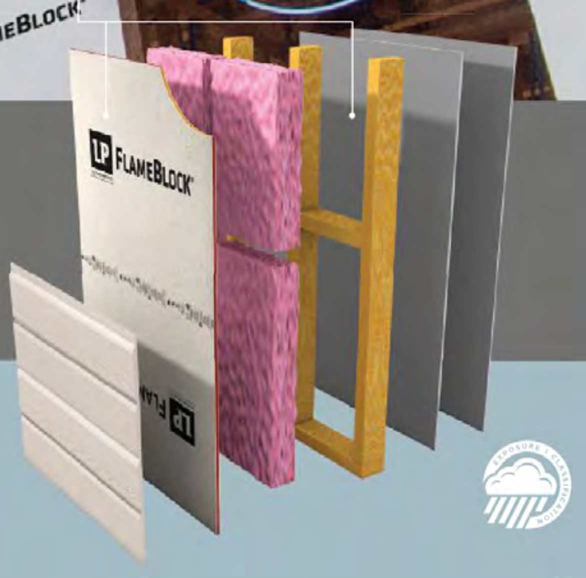

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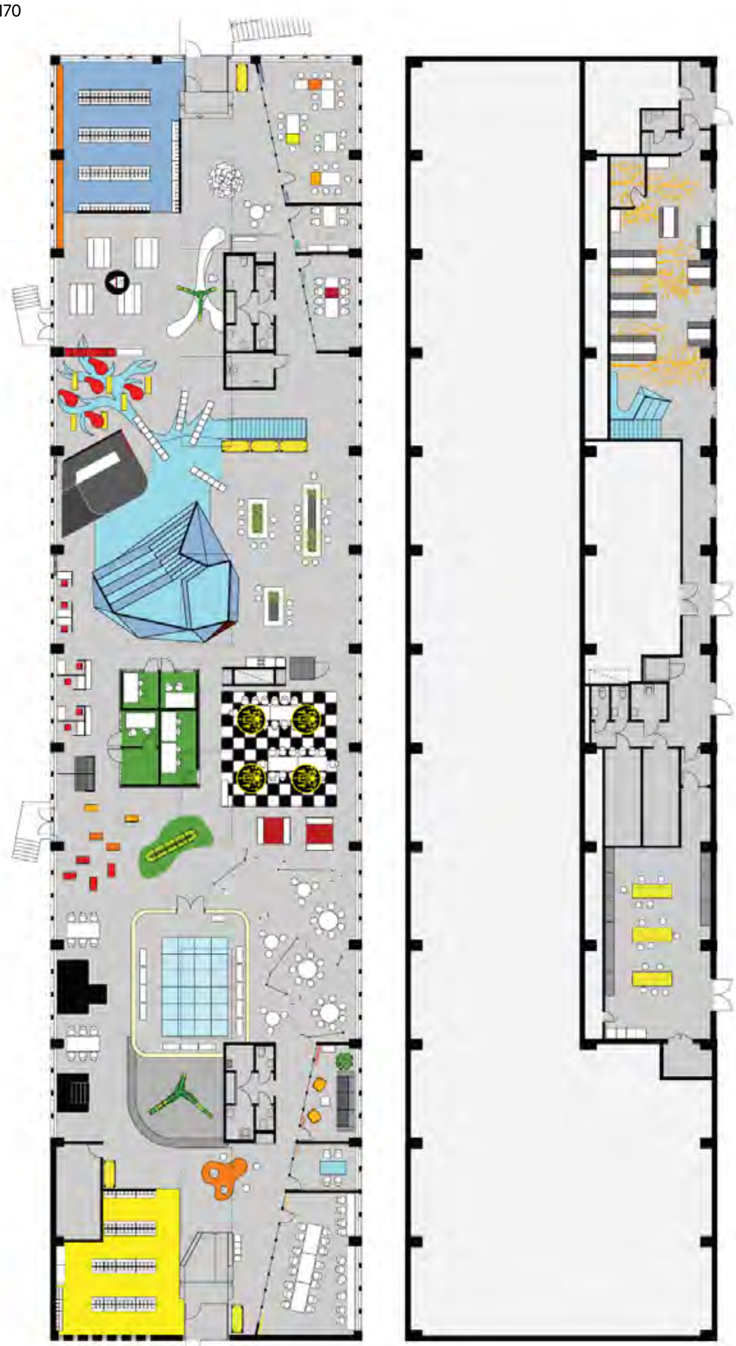

First-floor (left) and second-floor plans for the Vittra School Telefonplan

village of tables for small-group work.

The last two magnets are "the campfire" and "the laboratory." The second is self-explanatory, a zone of metal-topped tables ready for hands-on science or cooking experiments on the working set of appliances. The former represents the tightest of groups, a seminar discussion in the round. Bosch updates the Harkness Table—a mode of teaching (and a piece of furniture) created at the Phillips Exeter Academy in New Hampshire in the 1930s to foster dialogue—as an organic archipelago with three lobes and two cutouts. Kids can arrange themselves around the perimeter or draw closer around a lobe, even sit themselves within one of the cutouts, like a prairie dog, for the full frontier effect. They can move—which, if you are a fidgety child, feels like a godsend—and array themselves on the floor, on a lounge chair, or, indeed, at a desk, depending on what suits them best.

The physical autonomy relates to a degree of educational autonomy as well: Students in a class are not all learning together all the time, facing a teacher at the front of a classroom with walls—that's what time in the show-off is meant for. Instead, they are working on individual assignments, as well as longer-term projects, in various smaller groupings, at their own pace. In the U.S., students following a project-based or inquiry-based curriculum are usually posed a question as a class and given time to research answers in a variety of ways, from readings to experiments to interviews. At the end of the cycle, students present their work as a paper, a poster, a presentation, or a PowerPoint, learning from each other and collaborating along the way. But like so many previous disrupters to American education, this approach requires buy-in from teachers and parents and a radical redevelopment of space within the classroom.

Bosch began this work, like so many designer parents before her, out of frustration with her own children's early experiences at school: They went in as "wonderfully curious beings," she says. "They like to learn from everything, and then you bring them to school and you suddenly have to commit to this huge compromise, which in a way you feel is damaging your child. Worse, it's actually damaging their ability to learn and develop. That just felt so wrong." This is a refrain heard since early-20th-century education reformer John Dewey: that school is crushing children's natural desire to learn. Bosch makes the critique physical. If you put a class of kids in a room with one adult, she says, you'll revert to one-directional teaching. "Change is a little like grass which is bending. If you don't actually finish it off with a physical design, it will bend back."

A Model Campus in Chicago

Bosch is now collaborating with Studio Gang Architects on the design of the Academy for Global Citizenship (AGC), a public charter school in Chicago. It was founded in 2008 by a 26-year-old idealist named Sarah Elizabeth Ippel, who had spent three years applying, and reapplying, to the Chicago Board of Education before finally getting approval. The school

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Renderings of AGC's model campus

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currently occupies two rented buildings, separated by a busy street, in the Garfield Ridge neighborhood on Chicago's Southwest Side, a low-income and minority community. There, more than 450 kindergartners through eighth-graders learn in Spanish and English; raise chickens, grow vegetables, and eat their harvest for lunch thanks to an on-site chef working in a zero-waste organic cafeteria; practice yoga in classrooms lit by on-site solar panels; and, Ippel hopes, learn to become leaders in their community and the world.

The curriculum (the school is part of the International Baccalaureate system) emphasizes inquiry-based learning, with six-week cycles in which children (even kindergartners) investigate transdisciplinary questions, Ippel says, "about local and global food systems, or inventions and innovations over time, often using technology to research, to Skype with sister schools, to create a PowerPoint or a documentary."

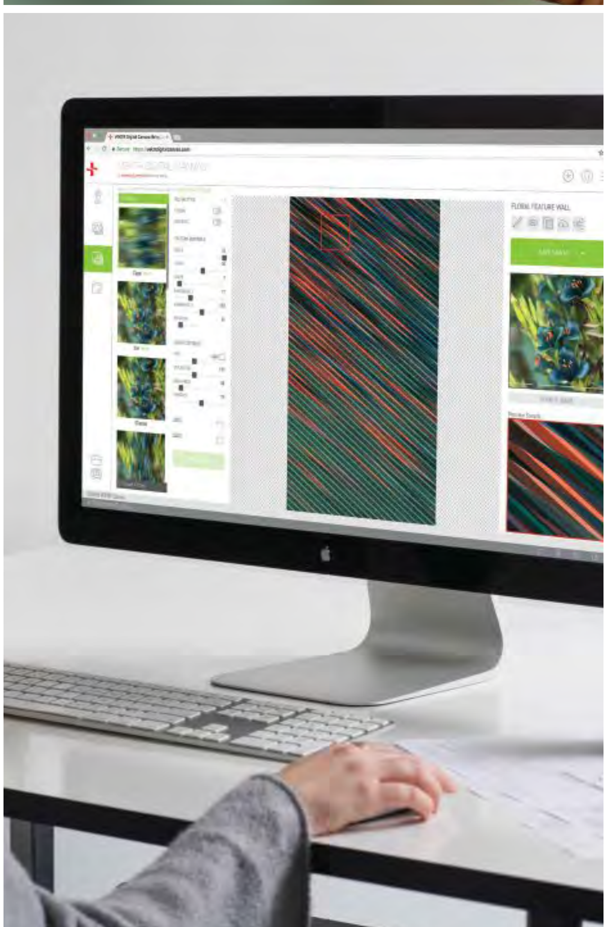
Ninety percent of the students are minorities, and Ippel has said that while she was developing the school's program, many people suggested that the student-led model could not succeed with low-income children. "It was very disheartening for all of us to see that these expectations and these beliefs were held in some people's minds, that not all children have the capacity to learn and that maybe we should focus our energy on kids who have a more promising future," she told the *Chicago Tribune* in 2013.

As the school prepared to graduate its first cohort of students in 2015, Ippel and her team began the process of creating a model campus. If they can reach their fundraising goals, a new $35 million school will be built on a former brownfield site at the corner of West 44th Street and South Laporte Avenue, next to LeClaire-Hearst Park. A 3-acre urban farm, including lightweight greenhouses, or hoop houses, designed in partnership with the nonprofit Growing Power, sits at the northern end of the site. Farm activities will be part of each day's curriculum, and the year-round harvest is expected to provide a significant amount of the produce for breakfast and lunch each day.

South of the farm, a C-shaped building, with one- and two-story sections, will embrace a central, south-facing courtyard. Each section will have a sloped roof, tilted toward the sun and covered with photovoltaic panels; the goal is for the building to become a net-positive producer of energy. On the shady sides, a clerestory window between the building's solid wall and the edge of the slanted roof will let cool northern light filter into the classrooms. Gutters running along the low points in the roof will collect stormwater, to be used for flushing toilets and irrigating the gardens. Operable windows under the eaves will allow for natural ventilation, and a greenhouse sandwiched between the classroom wings will create a sort of thermal-blanket effect in the winter, capturing sunlight, heating the air, and warming their neighbors.

"The whole thing is really all about growing a power- and food-conscious community and designing a replicable system that can be used by other schools in the future," Jeanne Gang, FAIA, told *The Architect's Newspaper* in 2016. The school has written a guidebook about the design, and the project will be constructed with accessible materials and prefabricated systems, so that, while the arrangement is unique to the location, other schools can reproduce it with changes reflecting their own program, site orientation, and climate.

Students of all ages will move from space to space as their curriculum dictates and follow what the designers call the Wonder Path, an updated version of Herman Hertzberger, HON. FAIA's village streets in his influential Delft Montessori School (1960–66). "It's a flipped relationship with circulation space," Ippel says. "Rather than breaking learning spaces up with hallways



and walls, and asking each educator to stay in one space with one group of students, teachers circulate around the shared entire learning space throughout the day depending on the activity and learning needs of our students." Paired grades will cluster in "neighborhoods," like a city in microcosm, outfitted with the same kinds of differentiated furniture as in Bosch's Vittra schools. Ippel describes the neighborhoods using natural terminology: Each one will have a forest with worktables for small groups; a farm-to-table area, where even the youngest can make a snack; a beehive with little nooks for one or two people; and a mountain with stepped seating for larger gatherings.

Changing the Classroom Design Vocabulary

The AGC plans are the most architecturally ambitious I've seen in the U.S. in the way they transform the school into a landscape of inquiry and abandon the old vocabulary (verbal and physical) of classroom, desk, and chair. But Ippel, Gang, and Bosch are far from alone in their quest to restructure public education in America. At the P.K. Yonge Developmental Research School in Gainesville, Fla., a K–12 public school run by the

> If you put a class of kids in a room with one adult, you'll revert to one-directional teaching. "Change is a little like grass which is bending," says Rosan Bosch. "If you don't actually finish it off with a physical design, it will bend back."

University of Florida that admits students from 31 cities across the state, a 2012 redesign of the elementary school by Fielding Nair International was the result of a long, collaborative process that also restructured the way teachers taught. The approximately 400 students in grades K–5 are grouped into three sections by ability and subject, not just by age, and assigned a team of seven teachers. Those groups may change during the year or change for a single topic, depending on students' needs.

Experience. Innovation.

Cincinnati Music Hall Opens with New Tune After Extensive Renovation

A Cincinnati landmark with a rich and unique history recently received a total facelift, restoring the facility to the grandeur it displayed when it opened 140 years ago.

Workers tackled a 16-month, $143-million project at Cincinnati Music Hall, which is the home of the Cincinnati Symphony Orchestra and several other cultural organizations, reduced seating capacity at Springer Auditorium from 3,417 to 2,263-2,2524, depending on the configuration. The project included updates to the roof, exterior, Edyth B. Lindner Grand Foyer, Corbett Tower, Library and Ballroom. In all, the project added 31,549 square feet in the same footprint.

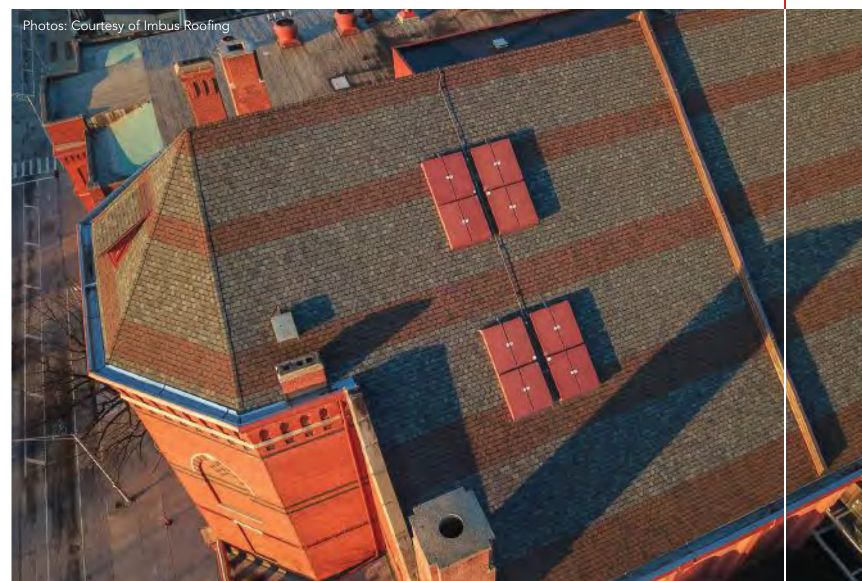
"We've been in business since 1880 and take pride in our work on many of the iconic buildings in Cincinnati," said Andrew Imbus, Project Manager at Imbus Roofing of Wilder, Kentucky. "This is a project that we are going to be proud of for a very long time."

Music Hall, which was recognized in January 1975 as a National Historic Landmark by the U.S. Department of the Interior, also serves as the home of the Cincinnati Opera, Cincinnati Pops Orchestra and May Festival Chorus.

One of the most challenging assignments in the major remodeling effort was the roof. Imbus and his team had installed the previous roof in 1988. "It was worn, but still water tight," Imbus said. "Some shingles were starting to blow off."

Imbus' first charge was to find replacement shingles that mirrored those of the past roof to preserve the historical appearance of the building. The roof also required new double leaf smoke hatches, manufactured by The BILCO Company of New Haven, Connecticut. Imbus' team installed seven DSH Automatic Smoke Vents. The vents, which measure 66 inches by 144 inches, are among the largest smoke hatches on the commercial market.

The smoke vents include a Thermolatch® II positive release mechanism that ensures reliable vent operation when a fire occurs. The vents automatically release upon the melting of a UL-listed 165F fusible link, and a curb-mounted fusible link allows the latch to be easily re-set from the roof level. The vents are fully insulated and gasketed for weather tightness.



Photos: Courtesy of Imbus Roofing

The vents are hard-wired to the fire suppression system and open electronically if the sprinkler system activates. Corken Steel, the local distributor of the smoke vents, and BILCO rep Joe DeFrain of Welling, Inc., worked with Imbus in procuring the roof hatches. The vents were installed above the main hall, Springer Auditorium, and are designed to open in an emergency to allow smoke and hot gases to escape. This allows better visibility and breathing conditions for audience members and performers to evacuate safely and aide firefighters in their containment efforts.

"This was an important project for Cincinnati," said Joe DeFrain, a BILCO representative with Welling, Inc. "It's part of a revitalization of the entire community. Everyone in Cincinnati knows the Music Hall. We're a third generation, family-owned company from Cincinnati, and we're proud to have been a part of it."

The outside of the one-story school is largely brick, with symbolic pedimented porticos supported by blue columns marking the entrance that give it a retro-village-like feeling, not unlike Harry Weese's homestyle roofs for the Lillian C. Schmitt Elementary School (1957) in Columbus, Ind. Inside, classrooms bleed into hallways, and hallways into classrooms, everything linked by internal windows and wide apertures: Teachers have set aside spaces for collaboration, and a cluster typically includes at least one classroom with a door, but the hallways are stocked with soft comma-shaped ottomans that are in a state of constant rearrangement. In fact, you can find pretty much every type of furniture you could imagine in the school's rectangular rooms: pie-shaped tables that remind me of the trapezoidal tops of my youth, two-person tables on wheels, outdoor café tables, indoor camping-style floor seats with backs, and so on. Rather than a narrow corridor with closed cell-like classrooms, the hallway seems to sprout petals of different shapes and different levels of transparency and sociability.

The architecture is less stylish, the colors more cacophonous than those in Bosch's Scandinavian examples, but the school design represents the same thinking about choices: choices made by students, not just teachers, about how their bodies need to be situated to accomplish a given task.

When Design Isn't Enough

As Bosch warned, however, the architecture is only as good as the adults' commitment to the project. Curriculum and design have to work together, or things fall apart. The Henderson-Hopkins School in East Baltimore opened to great fanfare in

Henderson-Hopkins School

ALBERT VECERKA/ESTO

2014. Envisioned as the linchpin of a redeveloped neighborhood in one of the city's most challenged communities, the school was a joint venture between Johns Hopkins University and the Baltimore City Public School System.

The design, by Rogers Partners, placed shared school and community facilities including a library, auditorium, and gym on a main urban thoroughfare, in front of classroom pavilions mixed with open courtyards. The concept has precedent: One hundred years ago, in Chicago, architect Dwight H. Perkins argued for, and designed, the same kinds of integrated amenities for adults and children, so that schools could become neighborhood centers rather than exclusive pavilions for children.

The classrooms at Henderson-Hopkins were designed for team teaching: Combined grades were assigned to a "house," with a two-story commons, an exclusive outdoor space, and what was intended to be a fluid arrangement of big classrooms, smaller seminar rooms, and shared teachers' offices. Each house was intended to hold approximately 120 students, slightly more than "Dunbar's number," the maximum number of people you can really know—100—according to the theory by anthropologist Robin Dunbar.

In March 2017, however, a *Baltimore Sun* story reported that the school was struggling after multiple changes in leadership: academic performance was well below the state average, and out-of-school suspensions had tripled. Socioeconomics undoubtedly play a major role in the school's travails: Henderson-Hopkins was intended to be a magnet school with economic and racial diversity (factors known to improve educational outcomes), serving both low-income students from the neighborhood and the children of Hopkins faculty and staff. But in response to local pressure, and the desire not to turn away students without other good options, school leaders increased class sizes. The open learning spaces were jammed, making it difficult to teach and maintain discipline. As the *Baltimore Sun* noted: "The building's open spaces, meant to spark creativity, proved more distracting than helpful for teaching."

According to the *Sun*, the school plans to divide each grade's "house" back into standard-size classrooms with permanent walls. Mariale Hardiman, vice dean of academic affairs at the Johns Hopkins School of Education and the liaison to Henderson-Hopkins, says the goal for the new renovations is to allow each class to have its own dedicated room for teacher-led instruction, with those rooms arranged around shared common spaces for additional child-led creative inquiry. She seemed perplexed by the initial design, which she regarded as too close to the open-plan schools of the '70s that were undone by bad acoustics, organizational upheaval, and a return to test-based academic standards. "Open-space schools were considered a failure back in the day," Hardiman told me. "My question for the architectural world is, 'What was the catalyst'" for making open plans again?

Rob Rogers, FAIA, is pained by this outcome, given the project's long planning process. "If you try to make stew in a skillet, it is not going to turn out so great," he says. "The school was not built for one teacher at a desk with 30 kids in the classroom."

Selling an App as a Fix

Even AltSchool, an education startup founded in 2013 by ex-Googler Max Ventilla and funded by Silicon Valley heavyweights like Mark Zuckerberg and Peter Thiel's Founders Fund, has built classrooms. Initial coverage of AltSchool focused on its "personalized learning platform," tablet-based technology that was supposed to invisibly and constantly assess student learning. Classrooms were recorded, student performance was tracked, and a teacher might take out her phone at any moment to document signs of learning, like a field scientist documenting baby animals in the wild.

But as the history of education design shows, how children sit, where they sit, and how far they can roam within their school environment are all key parts of learning. You can't play with online blocks until you've first played with real ones, and you can't learn the lessons of the digital playground without experience in a real one. AltSchool used its data—How do educators break up the day? The week? Where do students like to work? What kinds of instruction need which kinds of spaces?—and developed a physical plan.

In September 2017, AltSchool opened its first purpose-built space, a middle school located in a turn-of-the-century masonry building in Manhattan's Union Square. Enrollment for the first year was just 30 students, but the school has the capacity for 100 (Dunbar's number again). The design, by A+I (a firm best known for its open-plan offices for companies like Squarespace and Canvas) and Murphy Burnham & Buttrick Architects, the education design consultant,

AltSchool Union Square

MAGDA BIERNAT/OTTO

incorporates many familiar elements of project-based learning environments. You enter down a hallway, lined with a pinup board and bench, into a large commons, with a "mountain" of sittable steps and an open "design lab" with space for 50 students to have lunch or work on a big group project. Classrooms, visible through glass partitions, have a variety of nooks and crannies, including window seats and upholstered benches (their version of "caves"), as well as more easily recognizable tables for eight. Tiny glass rooms, like phone booths, are set up for solo work or student-teacher conferences, and another small seminar room can also be used by students from any class. Kids and adults alike have a personal cubby but no dedicated desk, and they are intended to float as instruction requires.

I was intrigued by the way the site's spatial confines pushed AltSchool to connect to the physical environment beyond its walls. For instance, the school relies on the gyms and pool at the local YMCA for recreation. Students take neighborhood walks and interview local politicians and business owners. Christopher Alexander, in *A Pattern Language* (Oxford University Press, 1977), argued for this breaking down of barriers between the school and community: "Around the age of 6 or 7, children develop a great need to learn by doing, to make their mark on a community outside the home. If the setting is right, these needs lead children directly to basic skills and habits of learning."

Here was another progressive educational model, updated for the 21st century, but ultimately that wasn't how AltSchool wanted to innovate. The Union Square middle school, as executives announced soon after its opening, will be the last it builds. "I believe effective learning can take place anywhere," says Devin Vodicka, AltSchool's chief impact officer. "Learning should transcend the classroom. Microschools are helpful in informing our strategy, but we are now focused on using the platform, which makes the best education the most accessible."

It is hard for me to believe, however, that those who seek to disrupt education won't end up rediscovering old lessons and find that classrooms aren't interchangeable. Without some control over the spaces in which their software is deployed, how will AltSchool even know that it is working? Small class sizes, creative teachers, hands-on activities—these physical manifestations of curriculum contribute to learning as surely as platforms and playlists.

Alex Ragone, head of school for AltSchool Union Square, says that the schools and districts interested in the startup's platform are probably already moving in a progressive direction and have left the rows of desks behind. Instead, Ragone sees the software as a support for teachers working in less-than-ideal circumstances, allowing them to organize and track kids so that a big class can operate more like a small one. With the intelligence gleaned from students' data—and sufficient support to learn how to use it—the question AltSchool now explores is how, and whether, software can make more good teachers. The real test will be at scale, when performance can be tracked across a wide variety of schools, public and private, large and small, rather than just boutique environments.

While AltSchool's founders seem happy to use their children as guinea pigs, will other parents see it as a choice? Would funding be better applied to creating replicable school architecture, as the team behind AGC hopes to do? The lesson I draw from history is that curriculum and its container must ever be complementary. Beware those selling a fix in an app, as well as in a shiny new building. The best students—the Laura Ingallses of the world—can learn by rote as well as by following their bliss. To teach everyone else, the physical and the intellectual must be in sync, building on the foundation of the simple needs identified for the early 20th-century classroom: light and air.

This story is adapted from The Design of Childhood: How the Material World Shapes Independent Kids, *by Alexandra Lange (Bloomsbury, June 12, 2018).*

Beyond the Glass

HOW PELLA ARCHITECTURAL SERVICES HELPED CREATE A MODERN MASTERPIECE.

River Birch House | Jose Garcia Design | Cincinnati, OH


Photographer: Ryan Kurtz Photography

Aiming to create a strikingly modern residence with narrow sightlines, expansive glass and natural materials, Jose Garcia Design turned to the Pella Architectural Support Services team. From preliminary drawings to installation advisory, Pella worked with the acclaimed firm and contractor to deliver solutions that met challenging design requirements – and created one of Cincinnati's most innovative structures.

JARON VOS
Manager, Architectural Services

AT THE DRAWING BOARD

Pella's experts started by drawing up plans for Garcia's extra-large window combinations. Using design parameters provided by structural engineers, the team developed several conventional mullion-reinforcing options that would withstand wind loads at spans greater than 14 feet.

"Conventional reinforcing options are too wide for a project like this, so the width of the mullions was very important," said Jaron Vos, manager of Architectural Services at Pella. "So we designed a one-inch custom extrusion that was deeper than the frame but could hold a narrow width."

A NEW USE FOR TRUCK BED LINER

A span this long required a unique solution. To obtain the right structural capacity, the depth of the aluminum extrusion needed to extend beyond the window frames and into the interior. This design presented the potential for condensation. And though the extrusion would be insulated by wood trim, the team wanted to be sure that condensation would not be an issue.

After utilizing thermal modeling and conductance testing, Pella's architectural engineers concluded that a coat of truck bed liner applied to the extrusion would solve the issue.

"It has durability and low thermal conductivity. Plus, it's thin enough to not interfere with the trim," Vos said. "Once the interior trim was installed, the condensation concern was alleviated."

SMART INSTALLATION PRACTICES

Because large combinations and custom extrusions were new to the installer, a field services specialist from Pella Architectural Support Services worked on-site to advise on the installation procedures.

"With specialized engineering, drafting, testing and field services, we can say 'yes' to an architect's vision, help contractors make those visions reality, and provide customers the looks and performance they want," Vos explained.

ARCHITECTURAL EXPERTISE FROM BEGINNING TO END

Design and performance analysis

Thermal analysis

Custom extrusion design

Preliminary design drawings

Custom product design

Installation shop drawings

Field services and on-site training

Photographer: Ryan Kurtz Photography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"You're going to have to navigate this difficult terrain. … You're going to have to get closer to this history than might be comfortable. And we're not going to make it shaded and padded and beautiful."

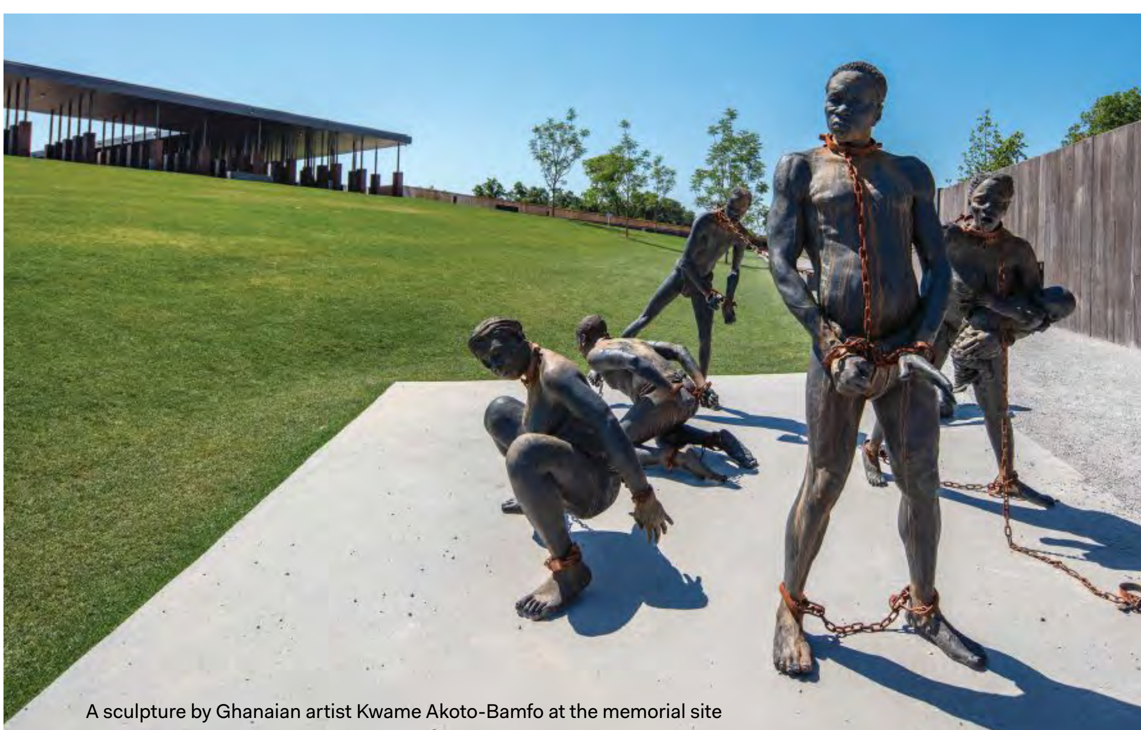
A National Memorial to Lynching text and photos by Lee Bey

On an elevated and serene 6-acre site in Montgomery, Ala., and in a former warehouse in the city's downtown, one of the most brutal stories in American history is now being told. More than 4,000 African-Americans were lynched in the U.S. between 1877 and 1950. The slaughtered included men, women, children—even whole families—that white mobs and police hanged, drowned, beat to death, or set afire with impunity and outright legal sanction. Even though the savagery often took place in public town squares, and was sometimes advertised in newspapers beforehand, the names of the victims and the circumstances of their death were largely lost to history.

But that changed in April, when the National Memorial for Peace and Justice, and its companion site, the Legacy Museum: From Enslavement to Mass Incarceration, opened in Alabama's capital city, the culmination of a six-year, $20 million effort. The open-air memorial features the names of the 4,400 people who were lynched during a reign of terror that lasted from the end of Reconstruction all the way to the dawn of the Atomic Age, when the number of lynchings trailed off. The Legacy Museum, located on a site where slaves were once caged before they were sold in what was one of the largest slave ports in antebellum America, provides a deeper, historic dive into that violent history.

Created in a collaboration between the Montgomery-based Equal Justice Initiative (EJI) and the Boston architecture firm MASS Design Group, the memorial is the more iconic and architecturally significant of the two projects. It conveys a low-key and respectful beauty as it tells a story that is as ugly as it is important. "I have no interest in punishing America for this history," says EJI founder and executive director Bryan Stevenson, a celebrated Montgomery attorney and civil rights activist whose organization provides legal assistance to the poor, condemned, and wrongly incarcerated. "I want to liberate us," he says. "I want us to get to the part where [there is] redemption and restoration and rehabilitation … but you can't get to that unless you acknowledge the past."

That such a memorial and museum could be built in Montgomery of all places is, in one sense, remarkable: More than 360 people were lynched in Alabama alone during the time period commemorated by the project. Montgomery was not just a major slave trading port, but after the Civil War it remained a bulwark against black equality and civil rights. The Alabama State Capitol dome—where Jefferson Davis was sworn in as president of the Confederacy, and where Gov. George Wallace made his infamous "segregation now, segregation tomorrow, segregation forever" speech a century later—is visible from the site.


A sculpture by Ghanaian artist Kwame Akoto-Bamfo at the memorial site

Six-foot-tall Cor-Ten steel slabs hang at the memorial site

But this is also the city of Rosa Parks and the bus boycott, a landmark event that led to the rise of the Civil Rights movement and the emergence of Martin Luther King Jr., the young pastor from Montgomery's Dexter Avenue Baptist Church. "So there is, in my view, no better place to confront this history," Stevenson told me. "If we can do something in Montgomery, Alabama, I'm persuaded we can do it anywhere in America."

A History that Continues to Burden Us

The memorial and museum are the brainchild of Stevenson, who sees the two sites as an extension of his organization's work, which includes exhaustive research and scholarship on lynching. The project is part of a recent wave of cultural sites that are attempting to re-examine and recontextualize black history, slavery, and the Jim Crow era. They include, most prominently, the Smithsonian's National Museum of African American History and Culture in Washington, D.C.; the Whitney Plantation Museum in Wallace, La.; and the International African American Museum, now under construction in Charleston, S.C. EJI's memorial in particular comes as the nation—and the South especially—struggles with the question of what to do with Confederate monuments, particularly those erected decades after the Civil War as a direct response to white fears of black advancement. What's behind this movement? "We know that we have to create cultural spaces that disrupt this narrative that we [as a country] have entertained—that we have this glorious past and things were wonderful and romantic in the mid-19th century," Stevenson told me. "We can no longer pretend that this history doesn't continue to burden us. Because it does."

At 11,000 square feet, the museum is a relatively small but effective space with exhibitions, texts, a film, and animation: Holograms portray slaves in pens awaiting sale; a Google-powered map console allows users to touch a state and see a county-by-county breakdown of the lynchings that happened there; contemporary stories recount the wrongly imprisoned. Taken together, the displays cast slavery, the lynching era, and modern-day mass incarceration of black people as part of the same racially oppressive continuum. The exhibits remind us, for instance, that the 13th Amendment to the U.S. Constitution abolished slavery and involuntary servitude—*except* as punishment for a crime. In one video exhibit, visitors can chat on a prison phone with an inmate, Robert Caston—who was locked up in the Louisiana State Penitentiary, known as Angola, until EJI's efforts freed him in 2012—and who tells us that he and other inmates were forced to pick cotton. Adding to the insult: Angola was built on the grounds of a former plantation.

The museum properly sets the stage for a visit to the National Memorial, about a 15-minute walk to the south. Inspired in both design and intent by two other international projects, the Apartheid Museum in Johannesburg and the Holocaust Memorial in Berlin,

Above: Bryan Stevenson; *Right:* The landscaped space at the center of the square that overlooks the memorial

the site revolves mainly around Memorial Square, essentially an open-air pavilion that features 816 6-foot-tall rectangular Cor-Ten steel slabs. Each slab represents a county in which a lynching took place, and each slab bears the names of those victims and the years in which they were killed.

When a visitor enters the square, the slabs are at eye level and are close enough to touch or walk between. But the wood floor slants downward as you progress through the memorial, creating a profound effect: the feeling that the slabs—suspended from the ceiling—are rising as you pass, until they are directly overhead. "The idea [is] that this history is still casting a shadow," Stevenson told me. "Still menacing. Still obstructing our ability to be liberated and free. And architecturally the most effective way to do that was to have people walk underneath the narrative and experience the shadow."

Because the Cor-Ten pieces have already started acquiring patinas that range from reddish brown to near slate—not unlike the diversity of African-American complexions—visitors can't help but think that they're walking among the symbolic figures of hanged lynching victims. It's a deeply unsettling experience—and a courageous design choice. "The goal [of those who lynched] wasn't to hide it," Stevenson says. "The goal was to actually lift it up and use it to torment and taunt and terrorize people of color. So that optic of raising—of lifting—these monuments up is really important to appreciate this history."

Stevenson told me there were initial suggestions to make the slabs lighter in color, using materials such


MEMORIAL SQUARE

as fiberglass, but "none of them were going to have the optic of those brown structures dangling." Indeed, during a 2016 TED Talk, Michael Murphy, MASS Design's co-founder and executive director, displayed a rendering of an earlier scheme in which lighter-colored materials were used for the slabs and the roof.

The emotional experience of the memorial is heightened by stories of the lynchings, which appear on a wall inside the square. Among the brief but chilling narratives: Grant Cole was lynched in Montgomery in 1925 for refusing to run an errand for a white woman. Ballie Crutchfield was lynched in Rome, Tenn., in 1901, when the mob, unable to find Ballie's brother, who was accused of stealing a white man's pocketbook containing $120, decided she would do just as well. According to the *Scranton Republican* newspaper, the mob set upon Ballie, tying her hands behind her back, shooting her in the head, and throwing her body off a bridge.

Architecture's Complicity

A journey though the memorial isn't entirely comfortable—and that's not a knock. There are few shaded areas outside Memorial Square itself, but apart from the heat, visitors can't escape the difficult history represented here: The names and the stories and the weight of it all confronts you at nearly every turn. "You're going to have to navigate this difficult terrain. ... You're going to have to get closer to this history than might be comfortable," Stevenson told me. "And we're not going to make it shaded and padded and beautiful with lots of relief. Because I don't think that's honest to this history."

Visitors aren't the only ones who will be challenged by the site. Outside the square, in Monument Park, a companion piece to the memorial will function as a kind of dynamic art installation: replicas of the 816 Cor-Ten slabs rest horizontally on the ground, instead of hanging in the air. Stevenson wants the counties represented by each monument to have a local conversation about their own lynching histories, then claim their monument and put it on display back home: "The site will become sort of a report card on which communities have owned up to their history and which ones haven't."

Other sculptures play a supporting role at the memorial. Sculptor Dana King's work depicts the three women who helped plan and carry out the Montgomery Bus Boycott. Conceptual artist Hank Willis Thomas' *Raise Up* features black men with their arms raised—a riff on the "hands up, don't shoot" mantra that has accompanied recent police shootings of unarmed African-Americans. Ghanaian artist Kwame Akoto-Bamfo's sculpture, which depicts five chained but defiant African men and women, is the most provocative of the three works. Stevenson told me that placing it at the start of the journey though the memorial is a reminder that the violent injustice against black people in this country began with slavery.

It certainly is of a piece with the city's history. Just a few blocks away, Commerce Street—an antebellum Wall Street—was designed and built to support the then-slave port. The enslaved were forced off boats on the Alabama River and marched, in chains, up the boulevard to Court Square, an open space on axis with the state capitol building, where they were sold. The captives would have passed handsome brick warehouses—some of which still exist today—where other slaves were locked up among the cotton and other commodities awaiting sale. They would have passed the banks that financed their enslavement and the hotels where their purchasers stayed. "Architecture was complicit in facilitating the slave trade," as Stevenson puts it. "It was not neutral. Creating the massive warehouses that could hold people and livestock and cotton in the same place. [Creating] the width of [Commerce] ... with sidewalks because slaveowners wanted [a place to stand along the boulevard] to evaluate the potential merchandise before the auction began. Architects were playing a role in creating an infrastructure in that."

EJI clearly does not want the architecture of the project to overshadow its larger message. It's unclear who the architect of record was for the museum, for instance. Stevenson told me that EJI shaped and coordinated the efforts of a host of artists, filmmakers, and exhibition designers to create the space, including New York City artist and writer Molly Crabapple; Local Projects, a media design firm that specializes in museums and public spaces; Stink Studios; HBO; and Human Pictures, a socially conscious documentary and film production company. The Montgomery building department lists a local firm, Hutcheson Construction, as the museum's builder but doesn't list an architect. As for MASS Design, spokespersons did not respond to repeated interview requests. In his TED Talk, Murphy says that he sent a "cold email" to EJI after reading a story about plans for the memorial, and that the firm won the job after meeting with Stevenson and his team.

And yet, if architecture was indeed complicit in facilitating the slave trade, then the memorial and museum demonstrate something else entirely, something more promising and hopeful. As Murphy told the audience during his TED Talk: "Great architecture can give us hope. Great architecture can heal."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“I came away thinking that even if I don’t entirely approve of the hothouse urbanity cultivated inside his developments, there was a genius to it that doesn’t always get the respect it deserves.”

Learning to Appreciate John Portman by Karrie Jacobs

The San Francisco Hyatt Regency

IWAN BAAN

Like many of us who obsess about American cities, I have mixed emotions about John Portman, the Atlanta-based architect and developer who died last December at the age of 93. On one hand, he made it his life's work to reinvigorate our urban centers at a time—from the late 1960s through the 1980s—when conventional wisdom had written them off. And yet his signature building type, the atrium hotel, was so antithetical to the idea of genuine urban vitality that it's hard to classify him as a savior.

In New York, we couldn't forgive him for the Marriott Marquis (1985), a fortress of a hotel deposited in the middle of Times Square. For years, it was a dead spot, a composition of blank concrete and smoky glass amid the native razzle-dazzle. Now, of course, its exterior holds a state-of-the-art eight-story-tall LED billboard, and the hotel's Broadway façade, once largely lifeless, has been rebuilt and filled with stores.

Portman was pro-city but also anti-city, or simply uninterested in the virtues of street life as espoused by Jane Jacobs. "What am I going to relate to, Howard Johnson's across the street?" That was Portman's retort when Paul Goldberger, HON. AIA, then of *The New York Times*, criticized the obdurate design of the Marriott.

Portman was an architect for an America that didn't have much use for architecture: He positioned himself as a humanist rather than a formalist. His model was not Brasília, which he'd visited and rejected, but Tivoli Gardens. He understood the value of grandeur. "Here we are, living in an age of 8-foot 6-inch ceilings and asphalt tile floors," he wrote in a 1976 book, *The Architect as Developer*, co-written with urban planner Jonathan Barnett, FAIA. "We forget that architectural space can affect us emotionally."

His work clearly had an emotional impact on me. I fell in love with one of his signature works, the San Francisco Hyatt Regency, when I was too young to know better. I was 18, on a 1976 road trip to San Francisco with a college friend, one of those unplanned adventures in which we spent nights in frightening crash pads in Berkeley and Haight-Ashbury. A ragtag group of us were hanging out at Fisherman's Wharf and somehow made our way under the Embarcadero Freeway, an oppressive elevated highway that darkened a long stretch of the downtown waterfront (until, that is, it was rendered structurally unsound by the 1989 earthquake and demolished). We rode the escalator up from the street into the lobby of the Hyatt, completed about three years earlier.

What I encountered was a marvel, a vertigo-inducing 17-story atrium, 350 feet long by 150 feet wide, with tiers of balconies angled every which way and capsule-shaped elevators zipping up and down a freestanding core. In the middle was a large aluminum sculpture surrounded by the first zero-edge fountain I'd ever seen. People were sitting on low rectangular cushions around the fountain and sipping piña coladas through extra-long straws. All I wanted at that moment was to linger in the place. Whoever these people sitting around the fountain were, I desperately aspired to be one of them.

The lobby of the San Francisco Hyatt Regency

IWAN BAAN

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I've revisited the lobby of the San Francisco Hyatt Regency a few times over the years. But I'd never stayed there—until this past April. As an homage to Portman, I booked two nights in what I still believe is his greatest creation. I found, upon inspection, that the building is even stranger than I'd believed it was when I was 18, and almost as cool. I came away thinking that even if I don't entirely approve of the hothouse urbanity cultivated inside his developments, there was a genius to it that doesn't always get the respect it deserves.

Creating a City Within a City

Portman began his professional life in the 1950s designing a string of unremarkable buildings: public schools, bus garages, YMCAs. His breakthrough was a project called the Peachtree Center, a cluster of buildings in downtown Atlanta that included a merchandise mart, parking garages, office towers, and three hotels. Notably, Portman was, with a variety of partners, the developer of all the projects, including the 1967 Hyatt Regency Atlanta—which, according to *The Architect as Developer*, "was Portman's first conspicuous success as an architect-entrepreneur."

It also marked the birth of the atrium hotel. As Portman told *Atlanta* magazine in 2014: "The foundation of the entire project was trying to understand how people experience space and how space can have an effect on people. It's like creating a symphony. You use space as the notes, and then you take people through it."

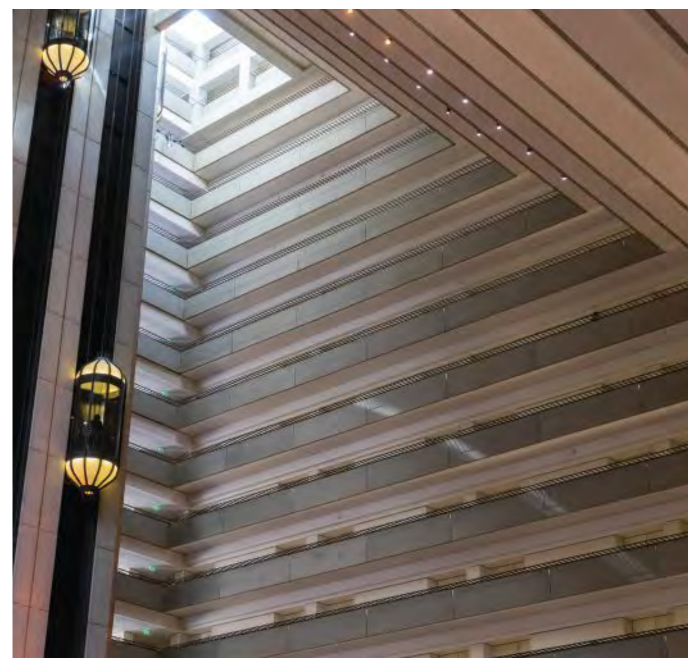
The Architect as Developer reveals that the typology has less lofty origins. The atrium hotel was an outgrowth of a project Portman had done for Atlanta's Housing Authority—the Antoine Graves Highrise (1965), low-income housing for elderly tenants: "In this building he had grouped the small apartments for the elderly, which are not unlike hotel rooms, around interior courtyards. Each apartment was reached from a balcony-corridor that looked into one of the two courts, providing a sense of community and some sheltered interior spaces that could actually be used for communal purposes."

Over the years, I've spent time in a number of Portman-designed hotels, including the Westin Bonaventure in downtown Los Angeles, a confounding and surprisingly gloomy place, and the Detroit Marriott at the Renaissance Center that, unexpectedly, I liked. The complex was originally car-centric to the point of absurdity—financed by Ford, and boasting a public esplanade dominated by an automobile showroom, it was difficult to access on foot until a 2004 renovation connected the rear of the complex to the riverfront. And yet the building was the outgrowth of Portman's belief that "cities ought to be designed in a cellular pattern whose scale is the distance that an individual

will walk before he thinks of wheels." His ideal was "a total environment in which practically all of a person's needs are met." This sounds remarkably like something an urban theorist might say today, except that Portman believed it was his calling to create the total environment himself: a city within a city.

"Everything is Around a Corner"

On the first night of my stay in the Hyatt Regency, I flew into San Francisco and took BART to the Embarcadero station just outside the hotel. In my jet-addled state, it was a little difficult to figure out



The angled balconies as seen from the lobby

IWAN BAAN

how to get inside. A blockade of hedges in planters (part of a 2016 renovation) had been set up to keep pedestrians from wandering into the porte cochère, funneling them instead onto a crosswalk leading to a central revolving door.

After getting my keycard, I ascended in the capsule elevator and realized that for the first time I was going to experience what it was like to be on one of those angled tiers, to be inside the spectacle rather than looking up at it. As it turned out, my "Bay View King" was at the far end of the building from the elevator. It was a surprisingly long walk—an entire football field—along an open corridor with a slightly dizzying view. The wallpaper in the corridor was striped beige on beige. The balcony walls were plain concrete, illuminated by lights underneath a handrail. The greenery that once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lined the edge of each tier—and that provided the color that Portman used "sparingly and always deliberately"—had been removed in 2008. My immediate surroundings were so bland that I felt as if I'd been dropped into early virtual reality, when there wasn't enough computing power to generate anything resembling verisimilitude.

My room, when I finally reached it, was around the tip of the triangle, on the side of the building that would appear to face inland. I opened the door believing I had been cheated out of my water view. I couldn't see all way into the room because of the way the layout angled, and then angled again. "Everything is around a corner," I later scribbled in my notebook. Once I was fully inside, I saw an armchair positioned next to a single large window that did indeed offer a fine view of the Bay Bridge and its pulsating light sculpture.

The journey from the lobby to my room, and from the entrance to my room to the window, gave me more insight into the eccentricities of the building than I'd ever learned by gazing upward at it. It felt like my room, and every room, had been fit into the building envelope with a shoehorn. It made me wonder if matters of conventional hotel design, like room layouts, had even occurred to Portman.

The next morning, after a run along the Embarcadero and breakfast at the Ferry Plaza Farmers Market—exactly the kind of urban experience that Portman couldn't have hoped to fabricate—I began a methodical inspection of the hotel, a study of the topology. Standing in neighboring Justin Herman Plaza, I could see that my room was the first in a series running west from the water, perfectly staggered so that the lone window in each room affords a bay view. The staggering

> While much of Portman's work in concrete falls under the heading of Brutalism, the Tulip is so sweetly off-kilter that it makes me think he's actually unclassifiable.

continues inward for about a dozen rooms. Then the façade cants slightly southward and the angle of the wall changes. It faces inland, toward the city, and the rooms appear to cascade down the side of the building in diagonal rows. It's a very Aztec pyramid. And then the façade alters direction again and the rooms all face due north, looking directly into the adjacent Embarcadero Center. Then all the angularity stops cold when it runs into an archetypal 1970s rectilinear slab of concrete that follows Drumm Street, and that forms the base of the atrium's triangle.

Some of the hotel's form is understandable, informed by a triangular lot created by the angle of Market Street; the need to boost the rooms above the level of the former freeway; the desire to maximize water views. But there's also an endearing illogic to the place. Take, for example, the interface between the hotel and the rest of the Embarcadero Center, an urban renewal project, mainly office

The Tulip (top), which connects the hotel to the other buildings in the Embarcadero Center, and curved stairs near its base (bottom)

IWAN BAAN

buildings, that was also designed by Portman. The idea, according to *The Architect as Developer*, was to make it "possible to walk from one end of the project to the other without ever going out on the street." The hotel is connected to the other buildings by a three-story-tall concrete flower, a 1981 sculpture by Portman called the Tulip. The flower's petals consist of loops of concrete, and the stem, also concrete, is surrounding by curving paths that climb from the lower level of the center to the lobby level

of the Hyatt. While much of Portman's work in concrete falls under the heading of Brutalism, the Tulip is so sweetly off-kilter that it makes me think he's actually unclassifiable.

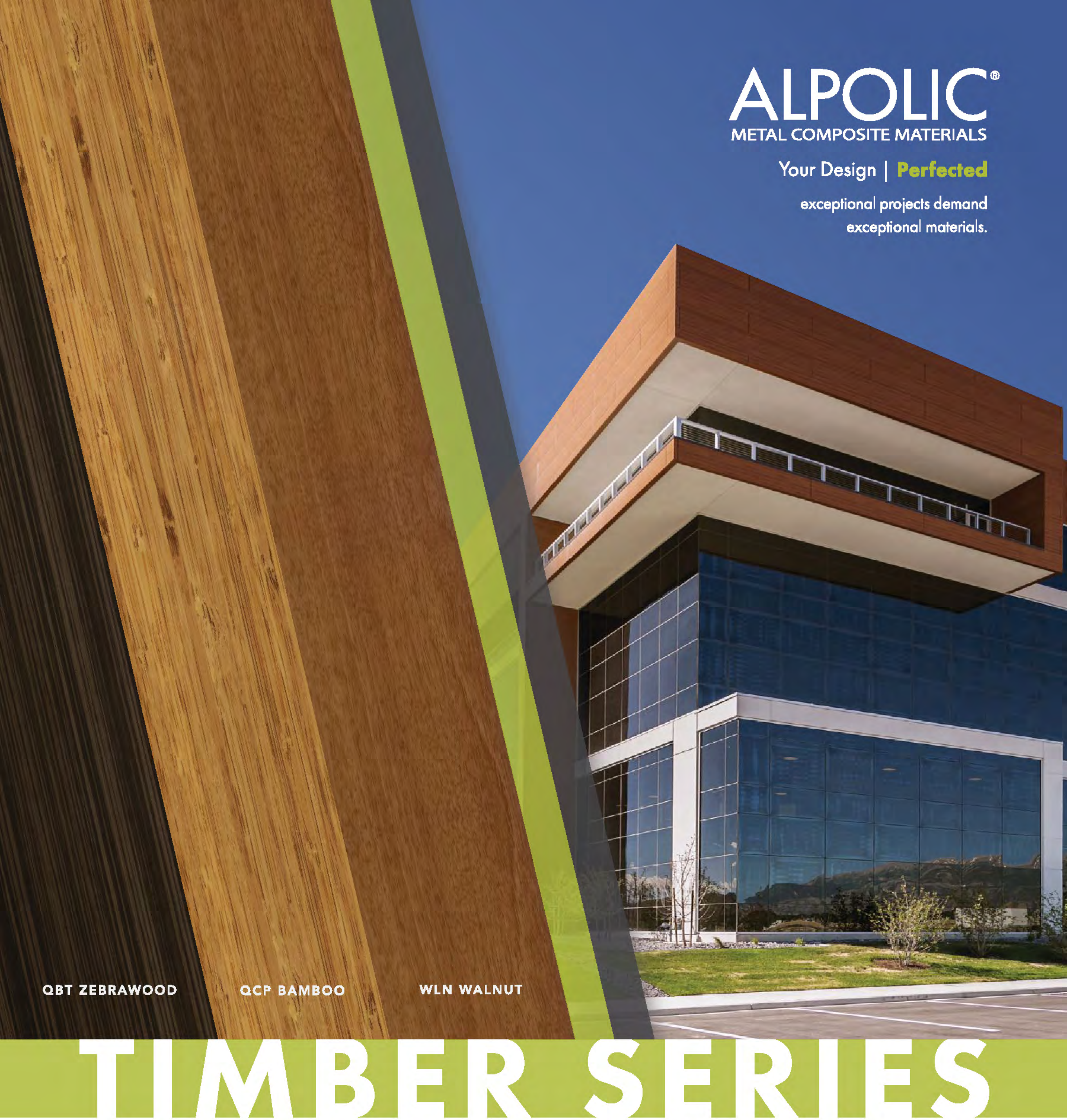
An Unfortunate Remake

I came away from my visit amazed—still—by the geometry of the atrium. But I also became better attuned to the hallmarks of the hotel's alienation from the city outside, like the way it turns its back on Market Street. By design, it's difficult to get in or out of the building on the side that offers the easiest access to the waterfront, which is now the area's most significant draw.

The other problem is the décor. I'm not convinced that anyone at Hyatt quite knows what to do with the place. Though I'm told by management that the rooms were renovated in 2014, the furniture seems awfully dated. But the bigger problem is the most recent lobby makeover, from 2016. Early photos from the 1970s show dining areas under low trellises, and long lines of modern tables and seating arrangements, in bold reds and blues, set up in the main space. (The current general manager tells me there was originally a discotheque called Happenstance.) Today the aesthetic is best classified as the all-too-familiar shabby-chic-meets-Modernism. Curvy chairs, including some that could be Saarinen's but aren't, and boxier chairs that look like knockoffs of the lobby's original furniture but without the bold colors, are joined by tchotchkes like lamps made from toy robots. Predictably, the bar is backed by an array of big screen TVs.

The Hyatt's general manager told me that the remake was "reinvigorating the interior with an industrial modern flair." And maybe it is. But it's more a reflection of current trends in hospitality design than anything particular to Portman's vision. What's missing is the boldness that made the original décor a worthy partner to the architecture ... and that off-kilter *je ne sais quoi*.

Imagine if the hotel had been designed by Breuer, Mies, or Saarinen; my guess is that not only would the décor be more respectful of the project's original intent, but that the Hyatt would be aggressively promoting the architectural pedigree of the property. I guess we should be grateful that Portman doesn't inspire that kind of reverence, but whatever you think of him (I'd characterize my stance as tortured ambivalence) he was an original, the matchless impresario of a kind of placemaking that we may yet learn to value before it's too late.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The 2018 AIA Honor Awards

Text by David Hill

Gold Medal

Because he makes architecture for people, not to satisfy his ego

James Polshek, FAIA, likes to tell the story of how he first caught the architecture bug. He was still a teenager in Akron, Ohio, when a new house went up in his parents' leafy upper-middle-class neighborhood. Designed by a Denver architect named Victor Hornbein, whose work shows the clear influence of Frank Lloyd Wright, the Usonian-style structure had a flat roof and a windowless street façade, a scandalous departure from the neighborhood's more traditional homes. "It shocked the neighbors," Polshek recalls. "But to me, it was an epiphany. It showed that architecture could act as a social critique. The house was a radical statement that the status quo was not satisfactory."

Polshek, winner of the 2018 AIA Gold Medal, credits the house—and an undergraduate course at Case Western Reserve University called "Modern Building"—with the demise of his plans to go to medical school. But not unlike the doctor he thought he would become, Polshek has always considered architecture a "healing art." "[It] aspires to restore, renew, make whole, reconcile, and harmonize," he wrote in the introduction to his 2014 book *Build, Memory* (Monacelli Press).

Not surprisingly, some of Polshek's most celebrated projects involve historic buildings—either sensitive renovations or modern additions: the Rose Center for Earth and Space, a modern orb-in-a-glass-cube addition to New York's American Museum of Natural History; a renovation and expansion of Carnegie Hall; a radical transformation of the Brooklyn Museum's grand staircase to form a new entry pavilion. "Jim was one of the first architects to show that it was possible to bring a modern aesthetic to an existing building," says David Burney, FAIA, associate professor of planning and placemaking at the Pratt Institute. "That was a real paradigm shift. [By comparison] most of the historicist approaches look pretty bad."

Indeed, in 1972, when Polshek was named dean of Columbia University's Graduate School of Architecture (a post he held for 15 years), he added the words "planning" and "preservation" to the school's title. Still, according to Paul Goldberger, HON. AIA, *Vanity Fair*'s architecture critic, "He never wanted an office that was totally dedicated to preservation projects. He's too interested in also leaving a mark as an architect of new things. But he loves old architecture, he believes in it, and he believes he has a responsibility to preserve it and make it better."

Polshek, 88, studied architecture at Yale and earned his master's degree in 1955. He briefly worked for I.M. Pei, FAIA, before setting up his own New York–based firm, James Stewart Polshek Architect, in 1963. It later became Polshek Partnership and now goes by the name Ennead Architects, with the retired Polshek serving as "design counsel."

"I think the word that best describes Polshek's work is 'balance,'" says Goldberger. "It's always balanced between all of the various things that go into a building. No one thing is allowed to push all the others off the table. There's always aesthetics, but aesthetics is never so important as to push function off the table. He's always concerned about practicality, but never so much that he will let the building lose sight of some aesthetic idea. He's concerned about a building's relationship to its surroundings, but again not so much that he will give up the other elements."

Polshek's body of work, which includes the cantilevered glass-and-steel William J. Clinton Presidential Library and Museum in Little Rock, Ark., and the Newtown Creek Wastewater Treatment Plant in Brooklyn, N.Y., certainly reflects that balance. "I've always gone out of my way to avoid stylistic games and applications of new technologies just for their own sake," Polshek says. Or, as he wrote in his 1988 monograph *Context and Responsibility* (Rizzoli): "The true importance of architecture lies in its ability to solve human problems, not stylistic ones. A building is too permanent and too influential on public life and personal comfort to be created primarily as 'public art.'"

LUCY HEWETT

Lenore M. Lucey, FAIA's career in architecture began typically enough. After graduating from the Pratt Institute in 1970 with a B.Arch. degree, she toiled for several years as a design architect for several New York firms, including for the office of Edward Durell Stone. But Lucey says she was "always a bit frustrated" as a practicing architect. "You spend so much time working on projects," she says, "and sometimes they happen, and sometimes they don't."

After spotting an opening for a project director at the American Broadcasting Company (ABC), she landed the job and spent eight years overseeing a number of construction projects for the television network, including several high-profile buildings designed by Kohn Pedersen Fox Associates. "I was very busy getting things built," says Lucey, who would go on to become a leading advocate for the profession—but not as an architect. "I was once called the poster child for alternate careers in architecture," she quips.

Lucey, named the 2018 Kemper Award winner for her contributions to the profession through her work with the AIA, was named the first female executive director of the Institute's New York Chapter in 1986. "She increased membership and helped get the chapter on a solid operational footing," says David Piscuskas, FAIA, founding principal of 1100 Architect and AIA New York's immediate past president. "But more importantly, she helped elevate an awareness of architecture and urban planning."

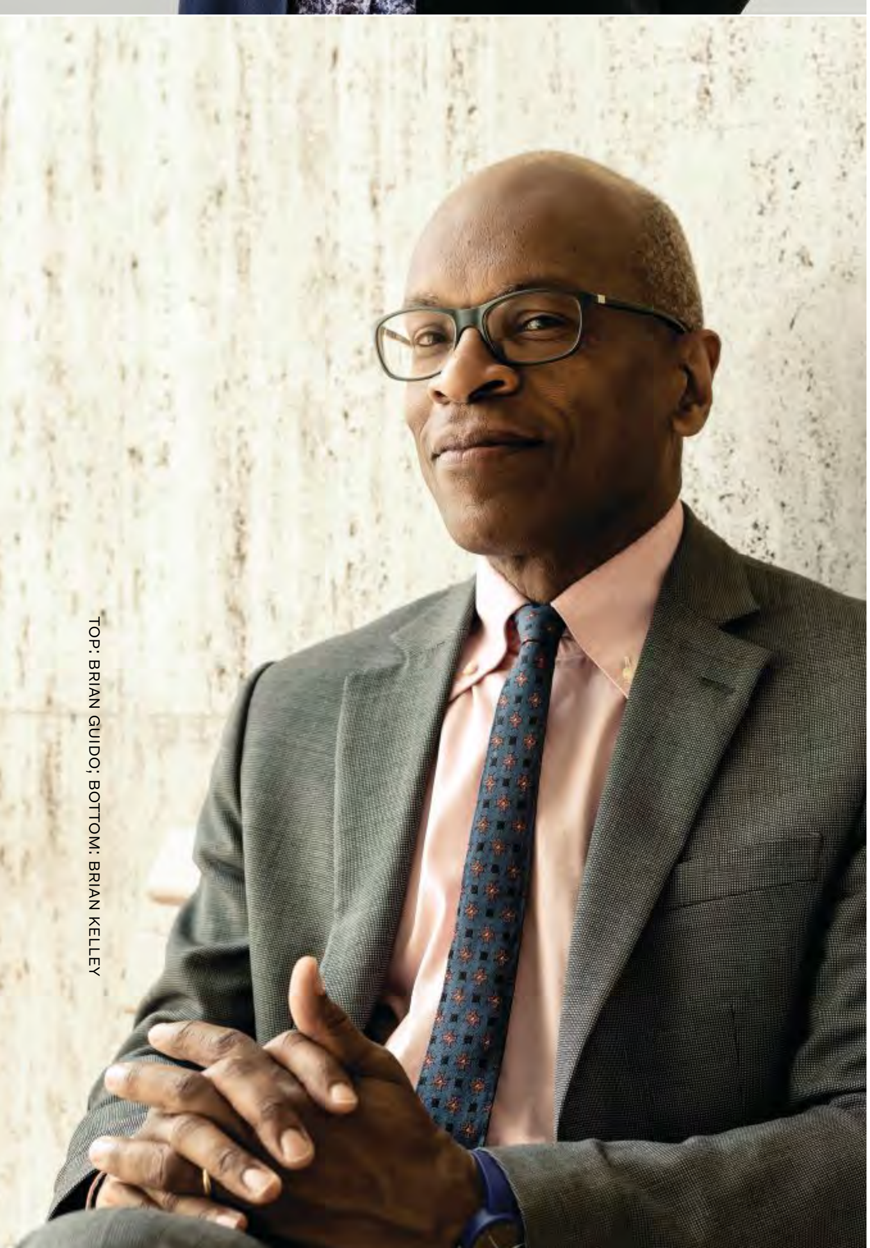
In 1997, she joined the National Council of Architectural Registration Boards as the organization's first female CEO. Fourteen years later, she left for the AIA, where she has served as chancellor of the Institute's College of Fellows Executive Committee. She led an effort to make the AIA's biennial Latrobe Prize, a $100,000 research grant, more relevant to practicing architects. No more "white papers sitting on the shelf," as she describes it.

Looking back on her career, Lucey sums it up this way: "In a certain sense, I've just been a giant cheerleader for the profession. I really do believe that everybody in the world should be using architects. We're really, really good at helping people and making things better. My whole career, I've tried to make people understand that and worked to make that happen."

Edward C. Kemper Award

Because she champions the profession

LEFT: JARED SOARES; RIGHT: TONY LUONG



TOP: BRIAN GUIDO; BOTTOM: BRIAN KELLEY

Collaborative Achievement

In 2009, Maurice Cox, now director of the City of Detroit's planning and development department, and his friend Lawrence Scarpa, FAIA, managing principal of Brooks + Scarpa, had an idea. Inspired by the Mayors' Institute on City Design, an initiative to help mayors learn more about urban planning and design, Cox and Scarpa decided to create a similar institute focused on affordable housing. The concept: connect nonprofit developers with architects, both to improve the design of projects and to influence public policy about community-based development.

Founded in 2010, the **Affordable Housing Design Leadership Institute** is one of the winners of the 2018 AIA Collaborative Achievement Award, which recognizes partnerships that have made significant contributions to the profession. The institute is directed by Katherine Swenson, vice president of national design initiatives at the Boston-based nonprofit Enterprise Community Partners.

Each year, over the course of three days, developers and city officials from around the country present real-life projects, which are then critiqued by a team of designers. "The developers learn about design, and it changes the way they think about affordable housing," Swenson says. "Developers never have a chance to do this. They're too busy building our cities and our neighborhoods. We encourage them to look beyond the number of units in a project and really think about the people they're trying to serve, and how design will help them achieve their goals."

In a survey of institute participants, 95 percent of developers say they now work more effectively with their designers, and 85 percent report that they now consider design issues earlier in the development process. "Design is becoming a NIMBY-neutralizer in communities that are skeptical of affordable housing," Scarpa says. "There's power in good design."

Collaborative Achievement

Because parks create more value than freeways

About once a month, Jim Burnett, founder and president of OJB Landscape Architecture, leads prospective clients on tours of **Klyde Warren Park**, in downtown Dallas. Burnett's firm designed the 5-acre park, which was built over the sunken eight-lane Woodall Rodgers Freeway, and which transformed a concrete eyesore into a highly popular (and highly programmed) urban oasis, reconnecting the city's Arts District and Uptown neighborhoods in the process. The project, which opened in 2012, has been so successful that civic leaders from around the country are trying to replicate some of its magic. "They say, 'We want our own version of Klyde Warren Park,'" Burnett says. "It's gotten to the point where if you're going to build a new highway through a city, you have to include a deck park."

Klyde Warren, funded through a public-private partnership and managed by the nonprofit Woodall Rodgers Park Foundation, is the other winner of the Collaborative Achievement Award this year. The park includes a children's play area, a concert pavilion, a dog park, a botanical garden, a restaurant, and a designated food-truck section. On Saturday mornings, urban dwellers flock there for yoga classes on the park's great lawn.

"No matter when you come to the park, there's something going on," says Kourtny Garrett, president and CEO of Downtown Dallas. (A downtown resident herself, Garrett likes to dine with friends on the restaurant patio while her 6-year-old twins play within eyeshot on the grass.) With more than 1 million visitors a year, she adds, the park has been a catalyst for commercial and residential development downtown.

The secret to Klyde Warren Park's success, Burnett believes, "is that it's not a one-liner. It's not just one big 'insta-moment.' It's a whole series of outdoor rooms and program ideas. It's an active park where everybody feels welcome. Everyone has a reason to go."

ALLISON V. SMITH

Thomas Jefferson Award for Public Architecture

Because history requires careful tending

GREG KAHN

Every weekday morning, **Stephen Ayers**, FAIA, commutes by car from his home in Maryland to his office in Washington, D.C. When he crests a particular hill on East Capitol Street, Ayers can spot his office off in the distance. It's not your average building but the U.S. Capitol, with its spectacular cast-iron dome. "That's when I really get energized," says Ayers, who since 2010 has served as the 11th Architect of the Capitol. Appointed by former President Barack Obama to a 10-year term, Ayers and his staff of more than 2,000 are responsible for maintenance and preservation of the Capitol, the House and Senate Office buildings, the Library of Congress, the Supreme Court, the Thurgood Marshall Federal Judiciary Building, and other historical facilities in and around the District of Columbia.

It's a job that Ayers, this year's winner of the Thomas Jefferson Award for Public Architecture, has never taken for granted. "I get to be a public servant and an architect in the greatest buildings in the world," he says. "And they pay me? Are you kidding? It's an awesome job, and it's been a dream come true."

Mary Fitch, HON. AIA, executive director of the AIA's Washington, D.C., component, praises Ayers for successfully navigating a high-profile position that ranges from the sublime to the mundane. "The job has a lot of ceremonial functions," she says, "but at the same time, the bathrooms have to work. You have to understand how the wiring works in a 100-year-old building. These buildings are icons, but they're also working buildings, with people in them every day."

Ayers oversaw completion of the Capitol Visitor Center, which was over budget and behind schedule when he was appointed chief architect. He also led the restoration of the Capitol dome, which for three years was surrounded by scaffolding so workers could repair more than 1,000 cracks in it, replace missing ornament, and repaint the entire structure. Currently, Ayers and his staff are undertaking a top-to-bottom restoration of the Cannon House Office Building, considered to be "one of the best examples of Beaux-Arts architecture in the world," Ayers says. Recently, construction workers came across a steel beam that had been signed by the entire erection crew in 1908, when the building was completed. To mimic the historic gesture, members of the current construction team etched their names into a new beam. Says Ayers: "A sense of history permeates all that we do."

Architecture Firm Award

Because they elevate the ordinary

LUCY HEWETT

A commission is a commission, but some ambitious architecture firms might be less than inclined to build a practice around "underdog building types," as Matthew Kreilich, FAIA, calls them. Yet that's exactly what Minneapolis-based **Snow Krelich Architects**, the winner of the Architecture Firm Award, has done. "We think it's very rewarding," says Kreilich, co-principal of the firm with Julie Snow, FAIA, "to elevate these pragmatic buildings to a higher level and give them the attention they deserve."

The most utilitarian structure, adds Snow, can be aspirational, even "sexy."

Take the Straight River Rest Area, located 7 miles south of Owatonna, Minn., on Interstate 35. Working with the Minnesota Department of Transportation, Snow Kreilich designed a low-slung box with dark-masonry walls and canted stainless-steel panels that direct visitors to the entrance. The project has all the usual rest stop amenities, but the architects also took advantage of the site by adding a terrace to the back of the building, which overlooks a wooded ravine. Weary travelers can now spend a few minutes communing with nature before getting back on the highway. Mimi Hoang, AIA, one of the jurors who selected the project for an AIA Minnesota Honor Award in 2017, calls it "the most exquisite rest-area building I've ever seen. The only problem is that it would be a very long time before I got back into my car."

For a new land port of entry in Warroad, Minn., at the U.S.–Canada border, Snow Kreilich embraced the area's wood-harvesting culture (Marvin windows and doors are manufactured nearby) by designing a visually striking facility clad in sustainably harvested cedar siding. "Most ports of entry are intimidating," Kreilich says. "Our hope was that the building would calm people as they enter, and that it would represent not only a gateway to our country, but a gateway to the local community."

Snow, who grew up in Michigan, founded Julie Snow Architects in 1995. When Kreilich became a partner, in 2014, the firm was rebranded as Snow Kreilich Architects. Today, about half of the firm's 30 employees are women and minorities. "Our culture is highly collaborative," Kreilich says. "Not a lot of egos, which is really unusual in a design firm."

Thomas Fisher, ASSOC. AIA, director of the Minnesota Design Center at the University of Minnesota's College of Design and an ARCHITECT contributing editor, calls Snow Kreilich's work "sensible, straightforward, and no-nonsense, yet beautiful and thought-provoking."

"The firm," he says, "is a model of how architects can work against the perception that we're these elites who only do work for rich people. In fact, we have something to contribute to the most ordinary kinds of buildings."

Because he celebrates the art of architecture

For **Jorge Silvetti**, INTL. ASSOC. AIA, teaching and practicing architecture are nearly inseparable, two sides of the same coin. "I find there's so much continuity," he says. For 43 years, the architect has taught at the Harvard Graduate School of Design while also running the Boston-based Machado and Silvetti Associates with his longtime partner, Rodolfo Machado, INTL. ASSOC. AIA. "When you're a designer," Silvetti says, "you're always trying to explain yourself and spell out the design process and how you make decisions. Teaching is almost the same thing. And the way I run my office has a lot to do with the way I teach. We work in a kind of studio environment. Everybody has an opinion that is discussed. Of course, I usually win the argument!"

Silvetti, the winner of the Topaz Medallion, the highest honor given to educators in architecture, was born in Buenos Aires in 1942 and spent his childhood immersed in music, taking piano lessons three times a week beginning at the age of 6. His teacher, he says, "was a great woman. She was a big influence on my life—like a second mother." He might well have become a professional musician if not for the fact that in Argentina at the time, "being a musician was frowned upon if you were a boy."

At 19, Silvetti switched to architecture, but his musical education clearly left its mark. Classically trained musicians are steeped in both theory and practice, just as architectural education combines a deep study of the past with the hands-on learning of the studio, which Silvetti calls "a tête-à-tête with someone who knows more than you." "In that sense," he says, "studying architecture is very similar to studying music."

At Harvard, where he served as chair of the architecture department from 1995 to 2002, and where he teaches design studios and lectures on history, theory, and criticism, Silvetti urges students to embrace "the culture and the history of our discipline" while "building for the future."

"An important part of his teaching," says former student Christian Dagg, AIA, now head of the School of Architecture, Planning and Landscape Architecture at Auburn University, "is his ability to bring in history, art, literature, and music, and to show how they might be turned into architectural ideas."

Silvetti laments how technology has pushed out other, more basic, aspects of the design curriculum. "Architecture is not technology," he insists, even while acknowledging that he's "from another era"—that is, a pre-digital one.

"I still draw," he says. "I love drawing. I think that's one of the great losses in the profession. One of these days I'm going to try to bring it back."

TONY LUONG

Topaz Medallion

Whitney M. Young Jr. Award

CALLA KESSLER

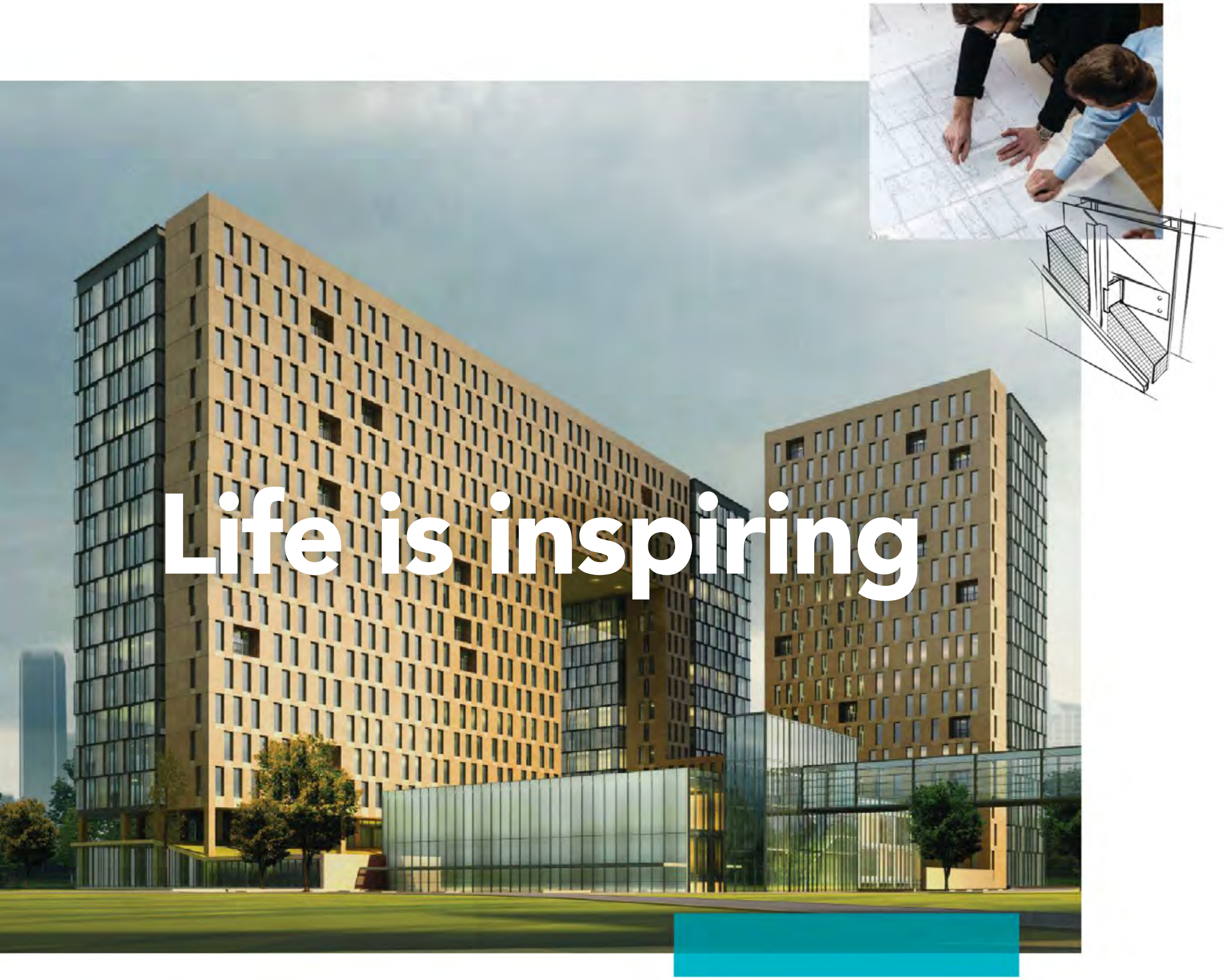
Since 2002, when **Tamara Eagle Bull**, FAIA, the first Native American woman in the United States to become a licensed architect, founded Encompass Architects in Lincoln, Neb., with her husband, Todd Hesson, AIA, the firm has carved out a niche designing schools, government offices, and detention centers for tribes in Nebraska, South Dakota, and Arizona.

Even after all these years, when Eagle Bull meets with prospective Native American clients, she's still sometimes asked, bluntly, "Are you just here to win an award?" The point, she says, is that many tribes have been burned by designers who impose their own ideas about what a building should look like, regardless of the wishes of the community. "When we begin a project," Eagle Bull says, "the first thing we say is, 'We're not going to draw anything until we understand exactly what you want. It's not my building. We're not going to design what we think you need; we're going to design what you tell us you need.'" And she tells them: "We don't go after project awards."

A member of the Oglala Lakota Nation, Eagle Bull is this year's winner of the Whitney M. Young Jr. Award, which recognizes architects who champion social responsibility. Eagle Bull grew up in Aberdeen, S.D. Her father, a teacher, had dreamed of becoming an architect but was discouraged by a non-Native school counselor. "He always regretted not becoming an architect," Eagle Bull says, "but he saw that I had a knack for design, so he encouraged me." Frequent visits to the Pine Ridge Indian Reservation, where her parents grew up, convinced her that she wanted to help improve the built environment in Native American communities, where funding is a challenge and buildings by necessity often serve multiple functions.

"Tammy is absolutely committed to tribal work," says Sam Olbekson, ASSOC. AIA, principal of Native American Design at the Cuningham Group in Minneapolis. "And she does it in a way that is very inclusive with her clients. She's very culturally oriented and a great listener. She really gets to the heart of what each community needs for a project, and she does it within the framework of Native values."

Because she's not in it to win awards


Life is inspiring

The 2018 Institute Honor Awards

Because it takes teamwork to realize award-winning design.

Architecture Jury
Lee Becker, FAIA, Hartman-Cox Architects (chair)
Anne Marie Decker, FAIA, Duvall Decker
Susan Johnson, AIA, Strata Architecture + Preservation
Anna Jones, ASSOC. AIA, MOD Design
Caitlin Kessler, ASSOC. AIA, Erstad Architects (AIAS student representative, University of Arizona)
Merilee Meacock, AIA, KSS Architects
Robert Miller, FAIA, Bohlin Cywinski Jackson
Sharon Prince, Grace Farms Foundation
Rob Rogers, FAIA, Rogers Partners Architects+Urban Designers

Interior Architecture Jury
Brian Caldwell, AIA, ThinkTank Design Group (chair)
Joshua Aidlin, AIA, Aidlin Darling Design
Kiyomi Kurooka, AIA, DWL Architects + Planners
John Paquin, AIA, Statesville
William Ruhl, AIA, Ruhl Walker Architects

Regional and Urban Design Jury
Roger Schluntz, FAIA, School of Architecture and Planning, University of New Mexico (chair)
Lisa Chronister, AIA, City of Oklahoma City Planning Department
Suzanne DiGeronimo, FAIA, DiGeronimo Architects
Timothy Griffin, FAIA, Minnesota Design Center
Gerry Tierney, AIA, Perkins+Will

Text by Ian Volner

NIC LEHOUX

Page 242, Mercer Island Fire Station 92

Architect: The Miller Hull Partnership, Seattle · Adam Loughry, AIA, Sian Roberts, FAIA, Kate Spitzer, AIA, Chuck Weldy, Scott Wolf, FAIA

Page 248, The Broad

Design Architect: Diller Scofidio + Renfro, New York · Kumar Atre, Oskar Arnorsson, Ryan Botts, John Chow, Gerardo Ciprian, Robert Condon, Zachary Cooley, AIA, Charles Curran, Elizabeth Diller, Robert Donnelly, Eliza Higgins, Christopher Hillyard, AIA, Michael Hundsnurscher, Matthew Johnson, Robert Loken, AIA, Nkiru Mokwe, William Ngo, Matthew Ostrow, Charles Renfro, AIA, Kevin Rice, AIA, Haruka Saito, Daniel Sakai, AIA, Andrea Schelly, Anne-Rachel Schiffmann, AIA, Ricardo Scofidio, AIA, Zoe Small, AIA, Quang Truong, AIA · *Executive Architect:* Gensler, San Francisco · Robyn Bisbee, AIA, Marty Borko, ASSOC. AIA, Scott Carter, AIA, Yupil Chon, Alexis Denis, Robert Garlipp, Wendi Gilbert, AIA, Nora Gordon, AIA, Lauren Gropper, Jay Hardin, Arpy Hatzikian, Steven Hergert, AIA, Patrice Hironimus, Yasushi Ishida, ASSOC. AIA, Rob Jernigan, FAIA, Greg Kromhout, AIA, Valentin Lieu, Melanie McArtor, Sebastian Mittendorfer, Ricardo Moura, Philippe Paré, AIA, David Pakshong, Jae Rodriguez, Brianna Seabron, Brenda Wentworth, AIA, Pavlina Williams, AIA, Evangelique Zhao, AIA

Page 254, Salty Urbanism: Sea Level Rise Adaptation Strategies for Urban Areas

Architect: Brooks + Scarpa with Florida Atlantic University, the University of Kansas, and the University of Southern California · Anthony Abbate, AIA, Heather Akers, Rayan Alhawiti, Norah Altwaijri, Luis Ardila, Chase Ashley, German Avila, Connor Bailey, Juanita Bernal, Danut Bidasca, Fredrick Bloetscher, Nicholas Bontrager, Angela Brooks, FAIA, Jennifer Brozozowski, Laren Buss, Camille Cieutat, Anna Collins, Pieter Conradie, Cristin Courtney, Hernan D'Angelo, Nicolas DiMatia, Milioni Doshi, Eduardo Ecenarro, Hassan El Wazzan, Christopher Emile, Christian Estrada, Austin Fox, Christie Garcia, David Gillis, Cody Gosier, Patrick Griffin, Jeffrey Huber, AIA, Hieu Huynh, Noah Illes, Fadia Jawhari, Daniel Justiniano, Carlos Justiniano, Maria Kokalias, Tyler Laforme, Laetitia Lamarre, Jake Lester, Amber Lewis, Yangxiaoxia Li, Francys Liscano, Pennie Liu, Yu Liu, Jonathan Llampay, Jen Yu (Jason) Lo, Francis Lyn, Rebeca Machado, Olga Marin, Angela Menah, Diana Mitsova, Javier Mendoza, Lisa Munoz, Haleng Mustafo, Rodrigo Navarro, Michael Olitsky, Dogus Oren, Kevin Ortega, Michael Ospina, Zachary Overschmidt, Elizabeth Parry, Connor Peede, Emily Peters, Colin Polsky, Gilberto Pujols, Kevin Purdom, Dane Quist, Quentin Rabu, Nicolas Rakowski, Spencer Reed, Emma Riordan, Jessie Robles, Maria Rodriguez, Ricardo Rodriguez, Hannah Rupprecht, Claire Ryan, John Sandell, Lawrence Scarpa, FAIA, Joseph Schaefer-Glick, Daniel Shareef, Deshay Sinclair, Mitchell Starrs, Chance Stillman, Anthony Talavera, Carlos Tejado, Hannah Underwood, Kathleen Valdez, Diego Valencia, Maria Valero, Keith Van de Riet, Kevin Van Osterom, Arty Vartanyan, Kyle Vayda, Rollson Virgile, Zhuo Wang, Katja Whyte, Fan Wu, Mengyu Wu, Nadia Zuta

Page 258, Vol Walker Hall & the Steven L. Anderson Design Center

Architect/Interior Designer of Record and Design Architect: Marlon Blackwell Architects, Fayetteville, Ark. · Marlon Blackwell, FAIA, Meryati Johari Blackwell, AIA, Jonathan Boelkins, AIA, William Burks, ASSOC. AIA, Angela Carpenter, David Jaehning, AIA, Bradford Payne, ASSOC. AIA, Michael Pope, AIA, Stephen Reyenga, ASSOC. AIA · *Associate Architect/Interior Designer:* Polk Stanley Wilcox Architects, Little Rock, Ark. · Sarah Menyhart Bennings, AIA, Craig Curzon, AIA, John Dupree, AIA, Conley Fikes, AIA, Mark Herrmann, AIA, Laura Lyon, J.B. Mullins, AIA, Kimberly Braden Prescott, Reese Rowland, AIA, Joe Stanley, AIA, Michelle Teague, AIA, Jim Thacker, Christopher Thomas, AIA, Wesley Walls, AIA

Page 266, University of Washington Station

Architect/Interior Designer: LMN Architects, Seattle · Tom Burgess, AIA, Howard Fitzpatrick, AIA, Chris Grammens, Jennifer Hing, AIA, Matthew Mamiya, Jessica Miller, AIA, Lori Naig, Jessica Nelson, John F. Nesholm, FAIA, John Park, Erik Perka, AIA, John Petterson, AIA, Dawn Polak, Mark Reddington, FAIA, Byron Rice, Tyler Schaffer, AIA, Todd Schwisow, AIA, Roger Stocker, Edward Storer, John Woloszyn, AIA, Alan Worthington

Page 272, New United States Courthouse—Los Angeles

Architect: Skidmore, Owings & Merrill, Los Angeles and San Francisco · Sally Anderson, AIA, Susan Bartley, AIA, Keith Boswell, FAIA, Frank Castillo, Kevin Conway, AIA, Sean Corriel, Paul Danna, FAIA, David Diamond, FAIA, Sally Drum, Qinghua Fan, Emily Farnham, AIA, Jordon Gearhart, Ben Grobe, AIA, Brian Hart, AIA, Craig Hartman, FAIA, Viltis Januta, AIA, Winna Japardi, Josh Kenin, Joanna Lam, Michael Mann, FAIA, Isshin Morimoto, Julia Ovsenni, AIA, Jose Palacios, AIA, Garth Ramsey, Gene Schnair, FAIA, Maria Sviridova, Marc Tanabe, Jennifer Williams, Steven Zimmerman, AIA

Page 278, Reeds Spring Middle School

Architect: Dake Wells Architecture, Springfield, Mo. · Brandon Dake, AIA, Kirk Dillon, ASSOC. AIA, Matt Thornton, AIA

Page 284, Urban Watershed Framework Plan: A Reconciliation Landscape for Conway, Ark

Architect: University of Arkansas Community Design Center, Fayetteville, Ark. · Cory Amos, AIA, Kay Curry, Jessica Hester, AIA, Mathew Hoffman, ASSOC. AIA, Jeffrey Huber, AIA, David Jimenez, Linda Komlos, Allison Lee, Chen Lu, Stephen Luoni, ASSOC. AIA, Jonathan Martinez, ASSOC. AIA, Robert Quinten McElvain, Matthew Petty, Thurmond Quinlan, AIA, Tanzil Shafique, ASSOC. AIA, Francisco Mejias Villatoro, Jay Williams, ASSOC. AIA

Page 292, Square Headquarters

Architect/Interior Designer: Bohlin Cywinski Jackson, San Francisco · Christina Cho, Helene Gregoire, Alex Gregor, Ashley Hinton, Michael Kross, Gregory Mottola, FAIA, Christopher Orsega, AIA, Nicholas Ruiz, Lena Shah, Rosa Sheng, FAIA, Shawn Wood

Page 298, Audain Art Museum

Architect: Patkau Architects, Vancouver, British Columbia · Mike Green, Marc Holland, Cam Koroluk, Dimitri Koubatis, John Patkau, AIA, Patricia Patkau, HON. FAIA, Tom Schroeder, David Shone, Luke Stern, Peter Suter, Michael Thorpe, David Zeibin

Page 306, Chicago Public Library, Chinatown Branch

Design Architect: Skidmore, Owings & Merrill, Chicago · Jason Fisher, AIA, Brian Lee, FAIA, James Mark, AIA, Dennis Milam, ASSOC. AIA, Michelle Mirrielees, Christopher Quinlan, Inho Rhee, AIA, Adam Semel, AIA, Heechan Shin, Richard Tomlinson, FAIA · *Architect of Record:* Wight & Co., Chicago · Rick Chandler, Adam Tomsha, Matt Zolecki

Page 312, Manhattan Districts 1/2/5 Garage and Spring Street Salt Shed

Architect: Dattner Architects, New York · Paul Bauer, AIA, Joon Cho, AIA, Jay Chokshi, Jillian Crandall, AIA, Michael Daniels, AIA, Richard Dattner, FAIA, Ruth Dresdner, AIA, Eric Epstein, AIA, Boris Lakhman, Daniella LaRocca, AIA, Gia Mainiero, AIA, Brian Nesin, AIA, Matthew Thomas · *Associate Architect:* WXY Architecture + Urban Design, New York · Elly Cho, Travis Eby, Iva Filipovic AIA, Karina Gilbert, Christopher Kupski, AIA, Adriel Mesznik, AIA, Layng Pew, AIA, Jowenne Poon, Maiko Shimizu, Claire Weisz, FAIA, Mark Yoes, FAIA

Page 318, Washington Fruit & Produce Co. Headquarters

Architect: Graham Baba Architects, Seattle · Brett Baba, Jenn LaFreniere, Hill Pierce

Page 324, Chicago Riverwalk

Architect: Ross Barney Architects, Chicago · Iffat Afsana, AIA, Marc Anderson, AIA, Carol Ross Barney, FAIA, Dmitry Barsky, Carl Bergamini, Chantelle Brewer, AIA, Sung-Jin Byun, AIA, Monica Chadha, AIA, Amy Chun, AIA, David Cintron, David Erven, Huili Feng, AIA, John Fried, AIA, Aaron Garbutt, Ryan Giblin, AIA, Krista Simons Gliva, AIA, Krisjan Gorospe, Jonathan Graves, Craig Hamilton, Roxanne Henry, Cayl Hollis, Tatsuya Iwata, Sung-Joon Kim, Darryl Mallett, Eric Martin, AIA, Ricardo Nabholz, Tiffany Nash, AIA, Kevin O'Connor, AIA, Kimberley Patten, AIA, David Parisi, Rajiv Pinto, Daniel Pohrte, Steven Rohr, Kim Sagami, Nicolas Sanchez, Mordecai Scheckter, AIA, Sean Schrader, ASSOC. AIA, Sallie Schwartzkopf, Michael Siciliano, Shinya Uehara, Mark Verwoerdt, Andrew Vesselinovitch, AIA, Andrew Volckens, AIA, Jonathan Wlodaver, AIA

Page 330, Photographer's Loft

Architect: Desai Chia Architecture, New York · Katherine Chia, FAIA, Arjun Desai, AIA

Page 334, Gohar Khatoon Girls' School

Architect: Robert Hull in collaboration with the University of Washington, Department of Architecture, Seattle · Bryan Brooks, Marcus Crider, Grace Crofoot, Sarah Eddy, Yasaman Esmaili, Christopher Garland, Elizabeth Golden, AIA, Robert Hull, Mariam Kamara, Michelle Kang, Kevin Lang, Carolyn Lacompte, Benjamin Maestas, Jaclyn Merlet, David Miller, FAIA, Holly Schwarz, Mazohra Thami, Andrew Thies, Mackenzie Waller, Patricia Wilhelm

> *The architects, designers, and students listed here collaborated with numerous engineers, consultants, and specialists to realize these award-winning projects. For full project credits, visit architectmagazine.com/awards/AIA-honor-awards*

Mercer Island Fire Station 92
Mercer Island, Wash.
The Miller Hull Partnership

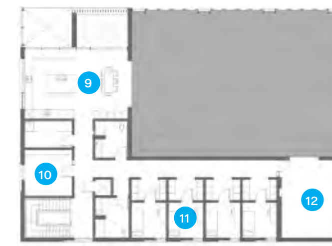
"Operations drives the design, and the execution is flawless. There is a super judicious use of materials, and a great sense of scale and public awareness."

—Jury statement

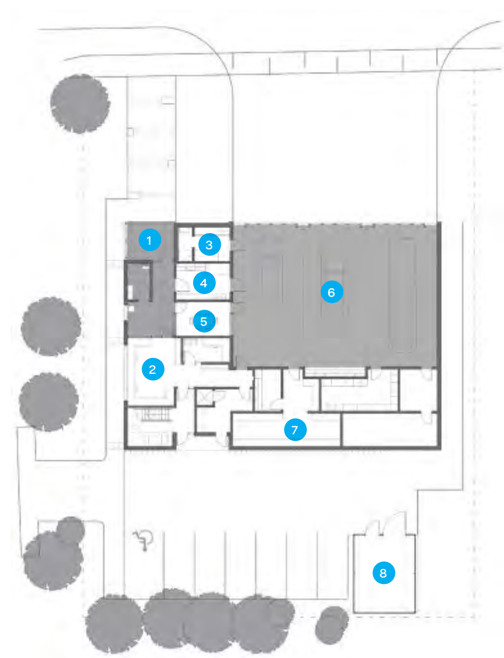
PHOTOS BY LARA SWIMMER


MERCER ISLAND FIRE STATION
8473

Second-Floor Plan



Ground-Floor Plan



The quiet suburban enclave of Mercer Island, Wash., is now home to a firehouse whose crisp modern design seems to place the community on equal footing with big, sophisticated Seattle back on the mainland. Designed by the Seattle office of the Miller Hull Partnership, the building acts as a kind of exhibition space for the technical spectacle of civic service: Through its glazed garage façade, passersby can see the firetrucks as they sit waiting, along with the various tubes and ducts used to maintain them, and the firefighters themselves as they swing into action at the sound of the emergency bell.

Roofed by a space frame, the main structure is almost entirely unencumbered by interior supports, and the primary materials palette of glass and metal lends it a refined urbanity. At the same time, the architects have added patches of wood slatting, a rustic note in keeping with the leafy park-side site and with the forested Pacific Northwest in general.

In a climate where year-round moisture and highly variable temperatures can be taxing on HVAC systems, the Miller Hull team has succeeded in fitting together the building's economical, off-the-shelf components with such precision that the firehouse achieves a level of insulation almost double the legally mandated rate. The resulting energy efficiency helps boost the building's stellar ecological bona fides; even more importantly, it backs up the image of cool, cozy hominess that the building projects, creating a comfortable environment for the firefighters who work in it.

1. Entrance
2. Reception
3. Decontamination room
4. First aid
5. Meeting room
6. Apparatus bay
7. Support space
8. Generator
9. Kitchen
10. Day room
11. Dark room
12. Gym

0 20 40

Previous Spread: Main entry on north façade

Opposite: View from southwest

Top: Apparatus bay, as seen from dining area of second-floor kitchen

Above: Kitchen and attached deck

Apparatus bay, with view to kitchen above


Nederman
E92
MERCER ISLAND
FIRE

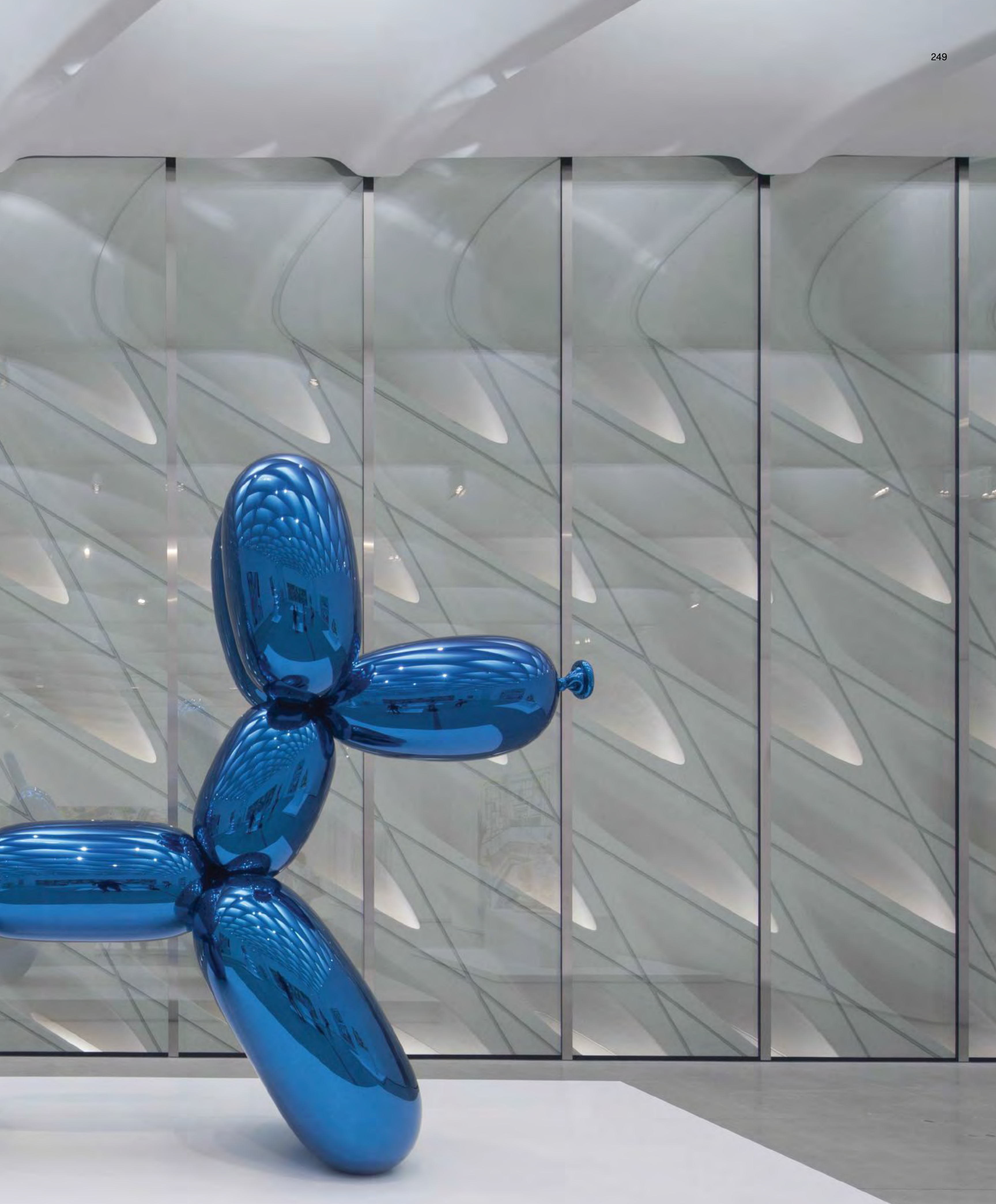
Architecture

The Broad
Los Angeles
Diller Scofidio + Renfro in collaboration with Gensler

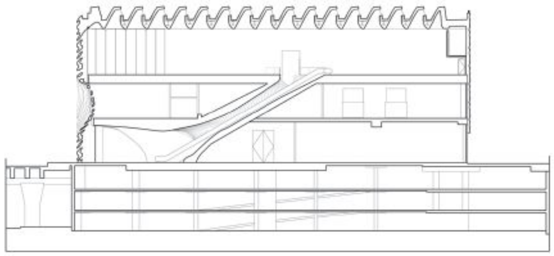
"Simultaneously sedate and spectacular, it fits the context of the visually exuberant arts buildings in this neighborhood. The types of space created are unusual but engaging and composed."

—Jury statement

PHOTOS BY RICHARD BARNES



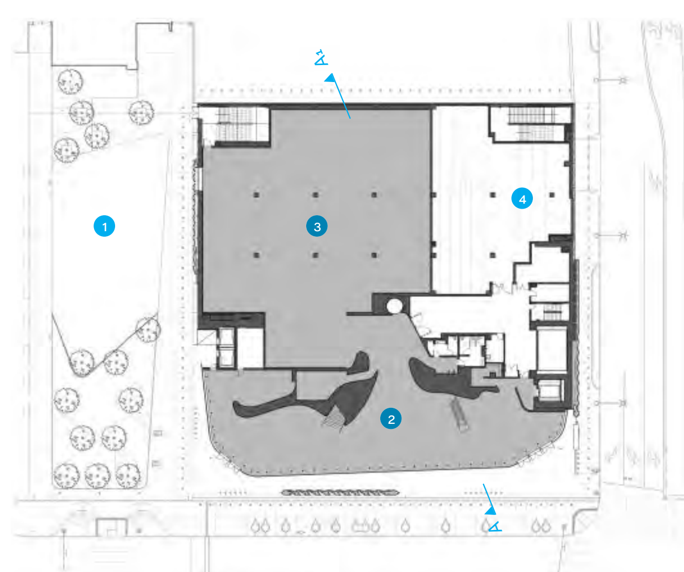
Section A–A₁



Third-Floor Plan

Second-Floor Plan

Ground-Floor Plan



Hotly anticipated by Angelenos, art-world heavies, and architecture watchers alike, Diller Scofidio + Renfro (DS+R)'s the Broad museum in Los Angeles, designed in association with Gensler, was among the most talked about new American buildings when it opened in 2015. Now, with the advantage of a little hindsight, it seems evident that the commotion was well-merited: Attracting immense crowds to its banner contemporary exhibitions, the museum is already a must-see on every L.A. tourist's itinerary and a treasured local landmark at least as recognizable as Frank Gehry, FAIA's Walt Disney Concert Hall next door. While it is in some ways a subdued riposte to the latter, the building's all-over waffle cladding, composed of a unique concrete composite, gives it a brashness all its own, and makes it a big architectural billboard for the city's newly resurgent downtown.

That sense of scale makes the building legible, as billboards in L.A. should be, from a moving car; but the building is also attuned to the visitor on foot, signaling its frontality with the great cyclopean eye on its façade, inviting visitors in with its glassed-in *rez-de-chaussée*, and then sending them up an escalator through the mysterious concrete "vault" (containing conservation and storage facilities) to the 50,000-square-foot open exhibition floor, which is suffused with light and allows for nearly infinite configurations of temporary walled-in galleries.

A design solution as beguiling and ambitious as the collection it houses, DS+R's Broad is *sui generis* and impossible to sum up except as an act of performance. It is an experimental machine for mediating between the world of the city and the world of art.

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

N

0 20 40

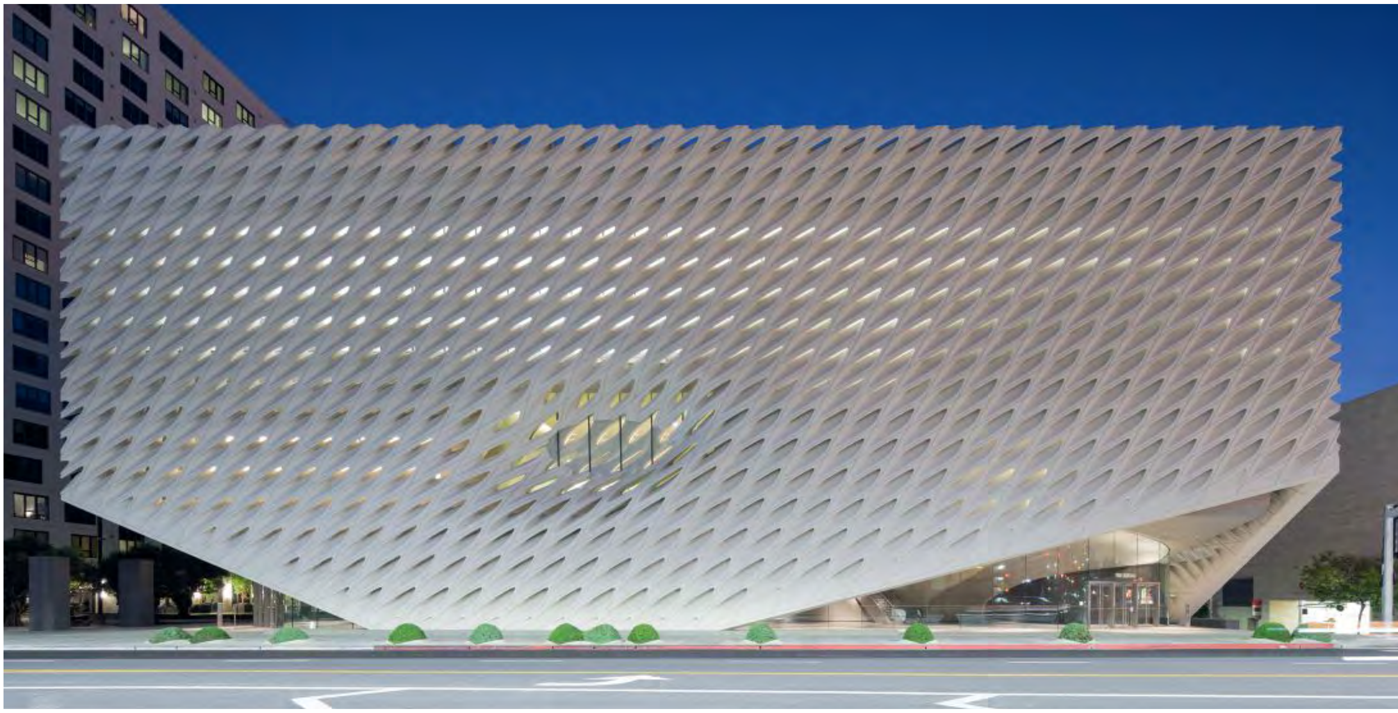
Previous Spread: Latticelike concrete cladding from inside main galleries

Above: Vertical circulation—escalator, stair, and elevator—is clustered to direct visitor experience in top-floor gallery

This Page: Staircase down from galleries with view into archival storage

Opposite, Top: Grand Avenue façade at night

Opposite, Bottom: Main lobby

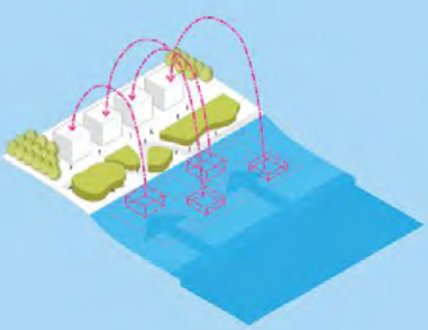


TOP: IWAN BAAN

Regional/Urban Design

Salty Urbanism: Sea Level Rise Adaptation Strategies for Urban Areas
Fort Lauderdale, Fla.
Brooks + Scarpa, Florida Atlantic University, the University of Kansas, and the University of Southern California

Adaptation Strategies for Land and Coastline Development



Strategic Retreat Neighborhood

Transverse Glades Canal Retrofit

Amphibious Neighborhoods

Ecological Retrofit Neighborhood

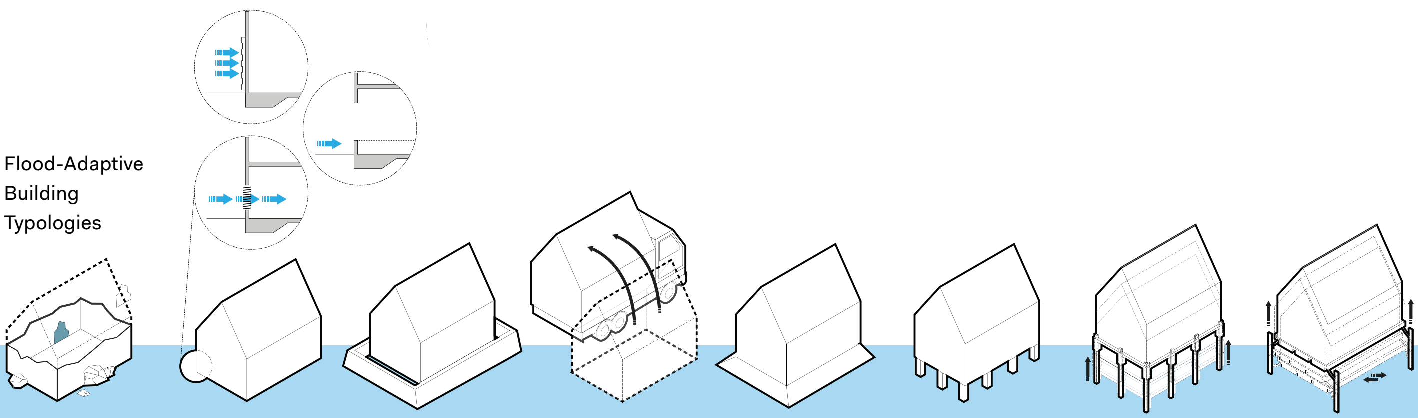
Living Shoreline District

Transit-Oriented Development Ridge

"This series of tools and frameworks gives each community myriad potential responses. The nuanced, organic approach invites each community to really own a solution."

—Jury statement

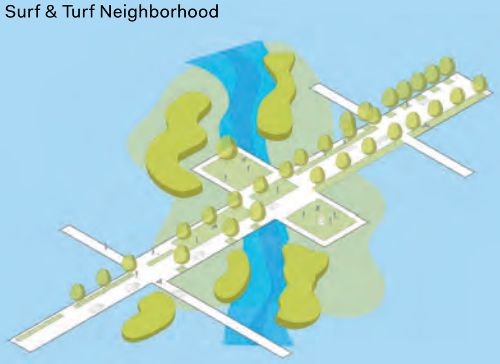
Flood-Adaptive Building Typologies



Repurpose Abandoned Structures | Dry or Wet Building Flood-Proofing | Site Flood Proofing | Retreat/ Relocation | Raised Mound Foundation | Raised Stilts Foundation | Anchored Amphibious Structure | Tethered Floating Structure

Surf & Turf Neighborhood

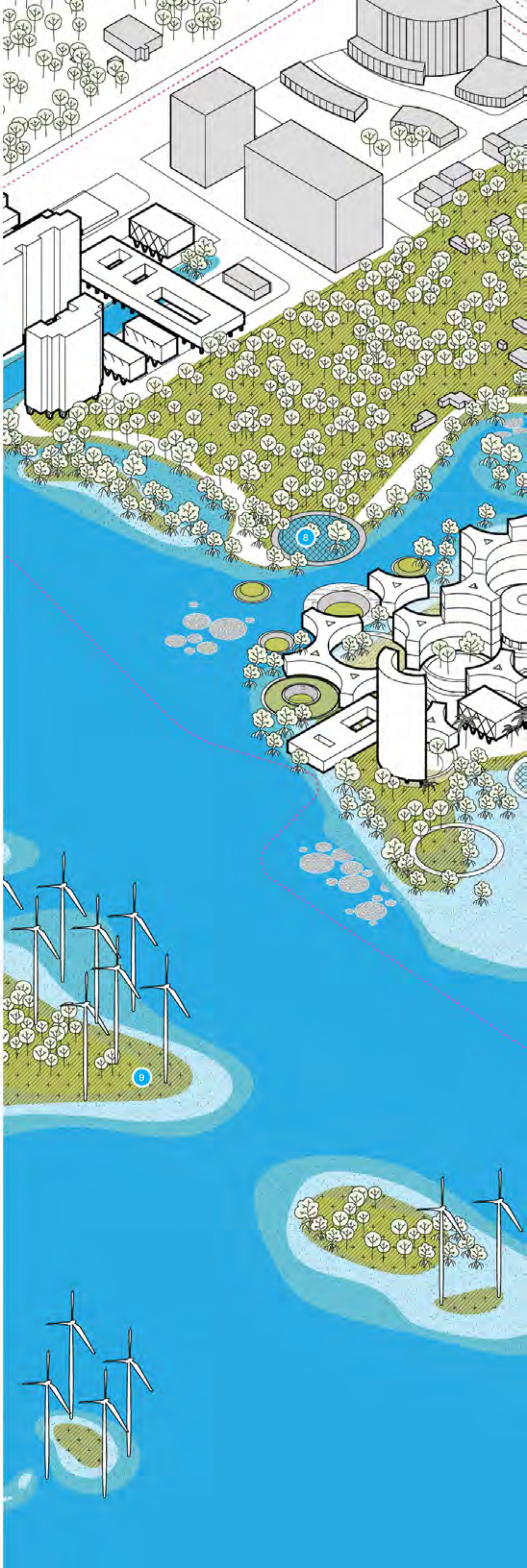
Dunescape Littoral Defense



Green Streets to Blueways

Inundation District

1. Living breakwaters/coral nursery
2. Enhanced dunes/sand engine
3. Wave streetcar/water taxi route
4. Stormwater park
5. Waterway blocks
6. Flood-adapted buildings
7. Amphibious/stilt building neighborhood
8. Floating bioremediation islands for farming and managing waste
9. Energy farms



If the phrase "Salty Urbanism" suggests something slightly off-color, that might simply be a matter of linguistic coincidence—but it's not so far off either. The proposal from Brooks + Scarpa, developed with collaborators from Florida Atlantic University, the University of Kansas, and the University of Southern California, is premised on admitting a dirty—and rather damp—truth that many in the design world would prefer to leave unsaid: Architecture by itself is not likely to halt the devastation of cities from climate change.

Instead, what Salty Urbanism suggests is an adaptive strategy that could allow coastal communities to continue to function even with water levels far above present norms. Projecting a series of "hydro-urbanisms," the designers imagine new archipelago communities, canal-like streets, and deliberately marshy waterfronts, supported by innovative new infrastructure that could allow cities to thrive even under conditions of extreme flooding, while mitigating the effects of future severe weather events.

The geographical focus of the study (appropriately, given its unique vulnerability) is the highly populated tip of the Florida peninsula; but the rigor of the team's approach—which looks back at native biodiversity and forward to entirely new architectural typologies—suggests applications on a national and even global scale, with results that might differ from place to place while still adhering to the same methodological framework. To be salty also implies a certain amount of grit, and there's certainly nothing overly aestheticized about this complex new urbanism. Yet there is also, in the team's renderings, a remarkable amount of drama, and a dazzling sense of possibility.

Land Assembly and Adjustment
Strategy to Retain Livable Conditions
After Sea Level Rise

Architecture

Vol Walker Hall & the Steven L. Anderson Design Center
University of Arkansas
Fayetteville, Ark.
Marlon Blackwell Architects

"A complementary and progressive pairing of modern and traditional forms, the design is a didactic model, establishing a tangible discourse between the past and present while providing state-of-the-art-facilities for 21st-century architectural education."

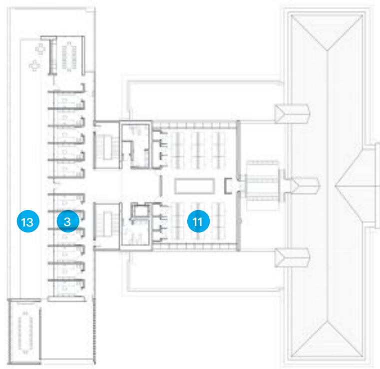
—Jury statement

PHOTOS BY TIMOTHY HURSLEY

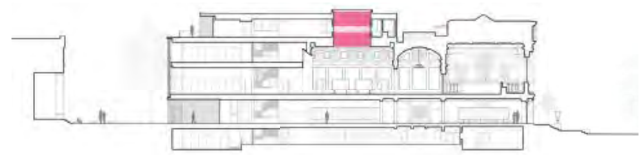
Marlon Blackwell Architects' new project for the University of Arkansas' Fay Jones School of Architecture and Design in Fayetteville, Ark., is an outstanding example of logistical and stylistic needle-threading. As so often happens on college campuses, a historic building—in this instance Vol Walker Hall, a 1935 edifice that was originally the university library—was in need of both extensive renovation and expansion, posing the perennial problem of bringing a facility up to date while still honoring its history. The maneuver performed by the Blackwell team—working with Polk Stanley Wilcox Architects—was also, in its general outline, a familiar one, but executed here with unwonted deftness: Looking to the symmetrical footprint of the Neoclassical scheme, the designers created a volume with a similar T-shaped plan and then inserted it, like a key in a lock, into the body of the older building.

Tasteful and minimal interventions into the original structure, such as the James Turrell–like skylight, bring the old library up to date and make its interiors blend seamlessly with the svelte all-modern hallways and studios of the extension (punctuated, in a few instances, by details in a stunning lipstick red). This conscientious intermingling of past and present is the more striking since, for all its subtlety, the project actually accomplishes a bold programmatic goal, uniting the full Fay Jones School's curriculum of planning, architecture, and industrial design in a single space. In that regard, the continuity forged by the seamless design seems even more apposite, helping to weave the program into a cogent whole.

Fourth-Floor Plan



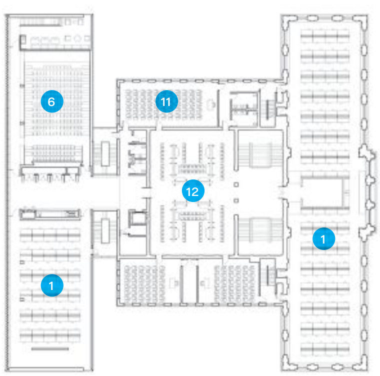
Section A–A_1



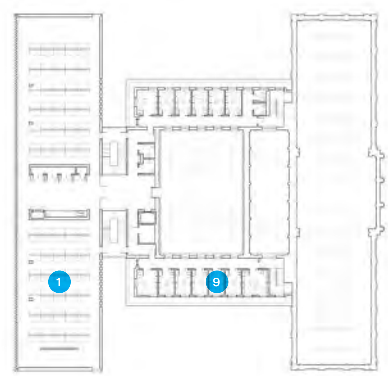
Previous Spread: South façade, with limestone rainscreen-clad addition at left

Opposite: West façade, with fixed fritted-glass fins in front of curtainwall

Second-Floor Plan

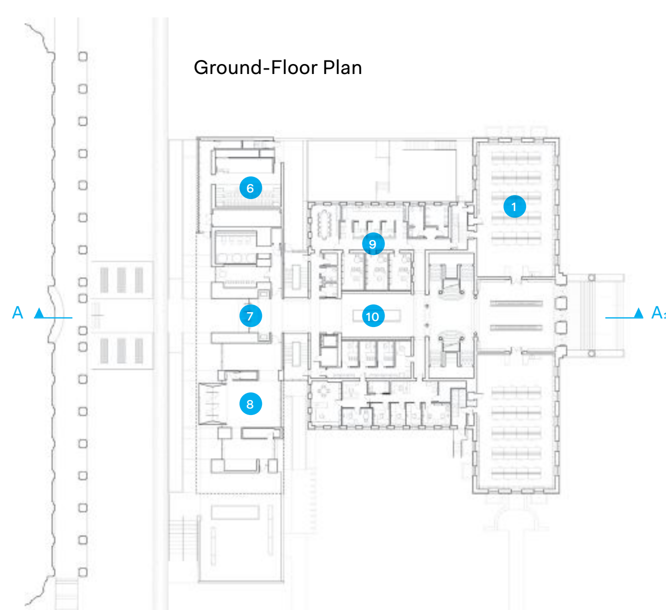


Third-Floor Plan



Lower-Level Plan

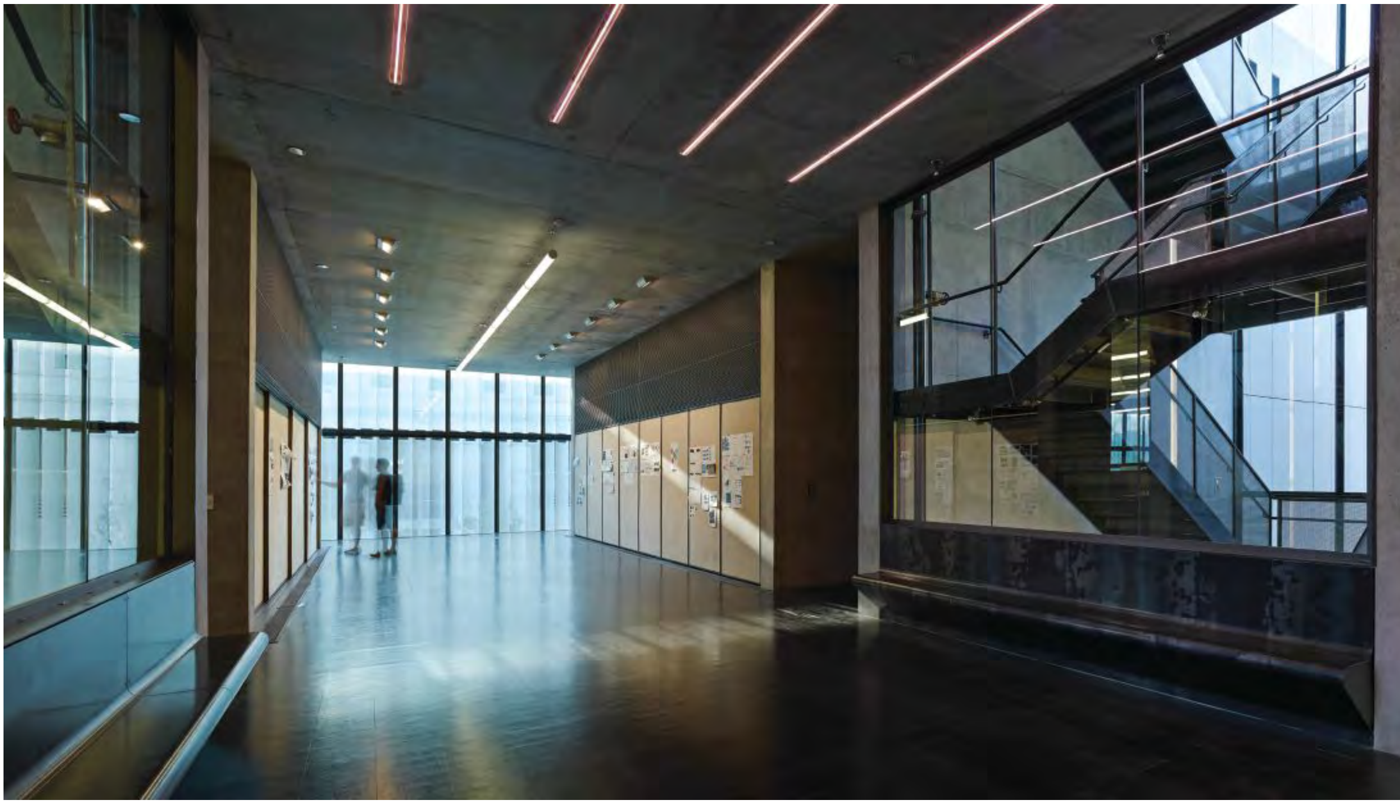
Ground-Floor Plan



1. Studio
2. Computer lab
3. Media library
4. Digital fabrication
5. Woodshop
6. Auditorium
7. Entrance
8. Gallery
9. Offices
10. Commons
11. Classroom
12. Central gallery
13. Roof deck

N

0 25 50



Hallway in addition, with pin-up space

Central gallery with red light well on second floor of old library, with addition beyond

Studio space in renovated building

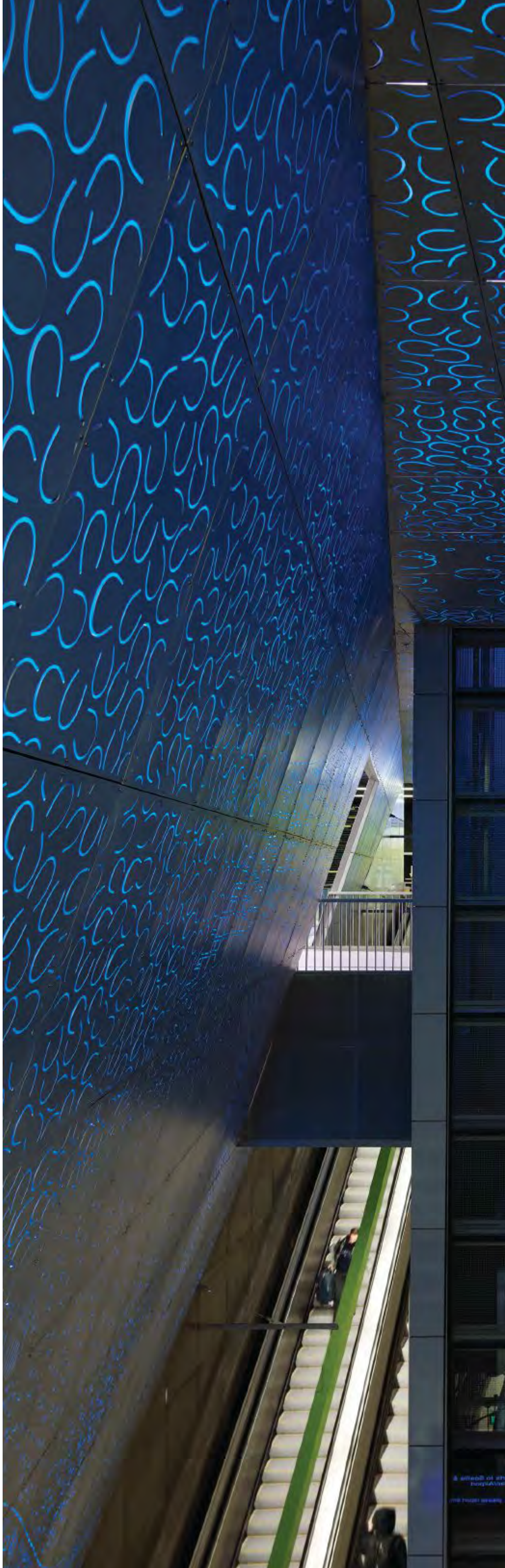
Interior Architecture

University of Washington Station
Seattle
LMN Architects

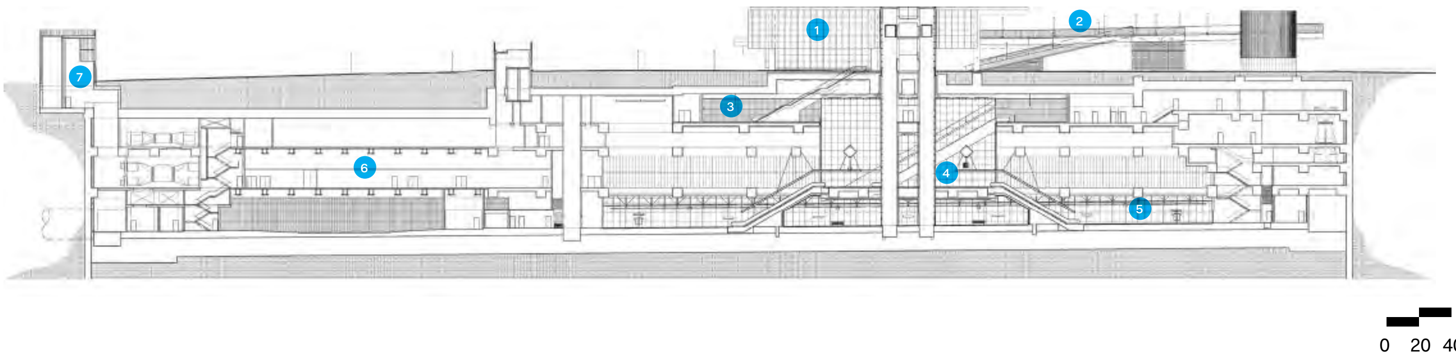
"An aesthetically inspiring jewel that doubles as fantastic public art. They have made descending deep into the earth full of light, color, and visual texture."

—Jury statement

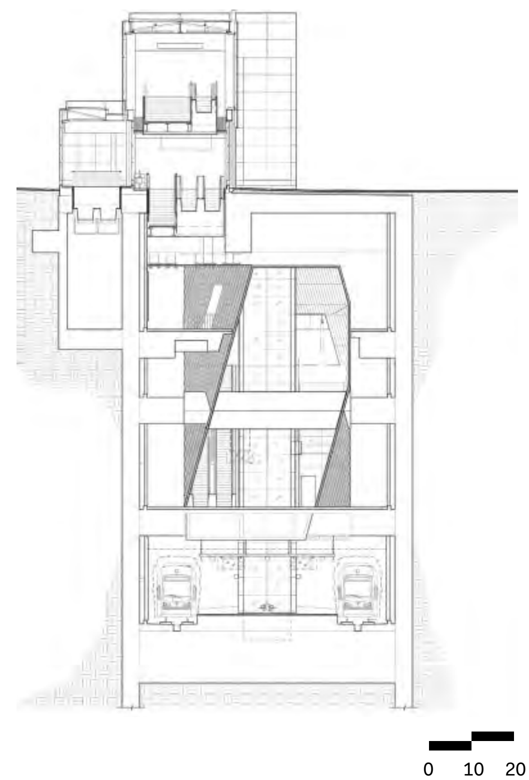
PHOTOS BY KEVIN SCOTT



Longitudinal Section



Cross Section



Rarely does a work of transit infrastructure feels like it merits the title of "interior." More often, end-users find themselves at best in a sort of claustrophobic plaza, at once unpleasantly exposed and uncomfortably hemmed-in. Eliding this double bind is the 157,856-square-foot Sound Transit University of Washington Station, designed by local firm LMN Architects to make the newest node in Seattle's transportation system more than merely a place between places, but one in its own right.

One hundred feet below ground, trains arrive in a concourse that's a crisp hardscape rendered surprisingly welcoming by colorful and delicately composed wayfinding and circulatory systems. Travelers disembark and rise via escalators and glazed-in elevators to the lower of two mezzanines, where they are greeted by walls clad in vibrant ceramic tiles, guiding them past the ticket kiosks and into the main hall, which is 50 feet high and features the facility's signature moment of visual drama: a giant installation in light and metal—the work of artist Leo Saul Berk—that traces shimmering arabesques across every surface in the vertiginous corridor.

Complemented by additional above-ground amenities that include a slender pedestrian bridge spanning the adjacent thoroughfare, as well as accommodations for bicycles and surface transit, the station is a multimodal hub with a truly public character. It preserves a sense of interiority, with users likely to linger in the cavernous subterranean gathering space and marvel at the flickering patterns on the walls, watching them change as they ride another escalator slowly upwards into the daylight of the glass-enclosed headhouse above grade.

1. Headhouse
2. Pedestrian bridge
3. Upper mezzanine
4. Lower mezzanine
5. Platform
6. Back-of-house space
7. Vent tower

Previous Spread: Escalators leading from lower mezzanine to upper mezzanine

Top: Glass-enclosed headhouse

Above: Escalator to elevated pedestrian bridge in headhouse

Above: Upper mezzanine

Opposite: Platform level


EXIT / Montlake Blvd NE
Buses & Husky Stadium
Seattle & SeaTac/Airport
Seattle & SeaTac/Airport
EXIT
SOUND TRANSIT
Link
142A
12
13

Architecture

New United States Courthouse—Los Angeles
Los Angeles
Skidmore, Owings & Merrill

"Modern elements like the glass façade create an iconic image for a 21st-century courthouse while also providing positive environmental performance."

—Jury statement

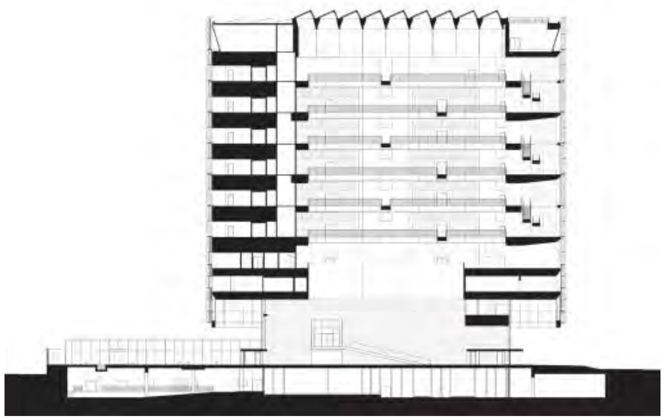
PHOTOS BY BRUCE DAMONTE

The federal government has had a long-standing policy of not designing in a single architectural style, all the better to adapt to local conditions and needs. Yet there is a certain pattern, or at least a certain presence, that seems common to many of the country's newer courthouses—a spirit exemplified by Skidmore, Owings & Merrill's design for the United States Courthouse in downtown Los Angeles.

Where an earlier age would have seen a stately colonnaded façade and an engraved entablature flanked by allegorical sculptures, the L.A. building exudes a similar sense of authority and dignity by way of altogether different formal means, deploying a spare language of rippling glass, steel, and smooth stone arranged into a cubic envelope hovering above a recessed *rez-de-chaussée*. This very modernist solution belies what is otherwise, in terms of performance, a very 21st-century building: Qualifying for LEED Platinum certification, the building boasts a rooftop solar installation that produces 507,000 kilowatt-hours every year, while the glass façade abjures the typical flat curtainwall for a pleated one that helps mitigate the intense thermal load from the harsh Southern California sun.

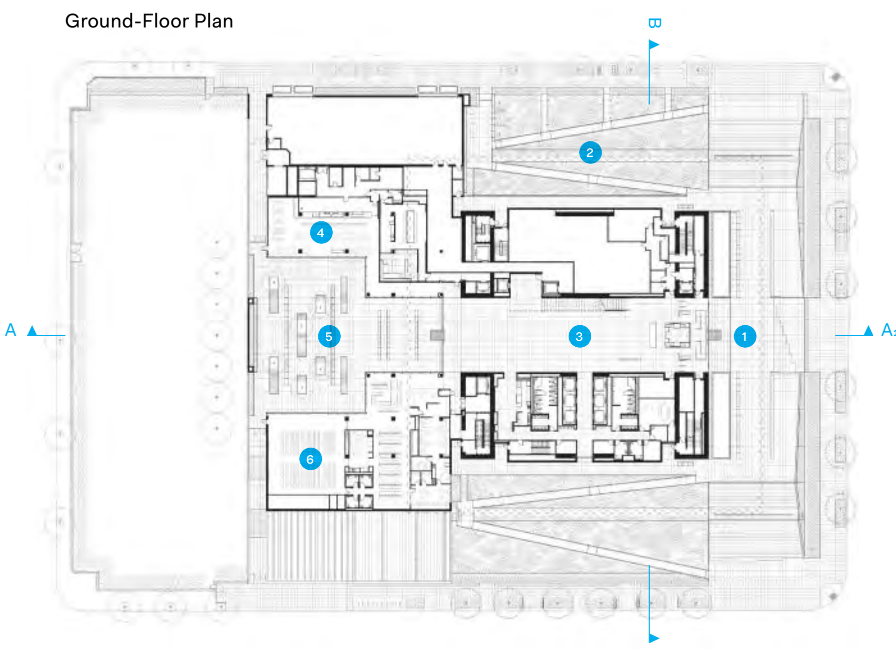
The building is also more adaptable than the typical glass box, and more sensitive to the needs of its occupants, providing views to the surrounding landscape for nearly 60 percent of office workers and offering even more sufficient natural light to render electrical lighting superfluous. Set away from the sidewalk atop a monumental plinth, the courthouse carries itself with just the right gravitas to communicate its key civic role, while still feeling open and accessible to all.

Section A–A_1

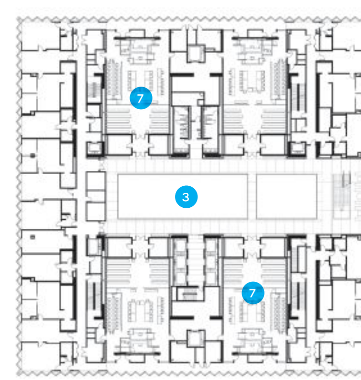


Section B–B_1

Ground-Floor Plan



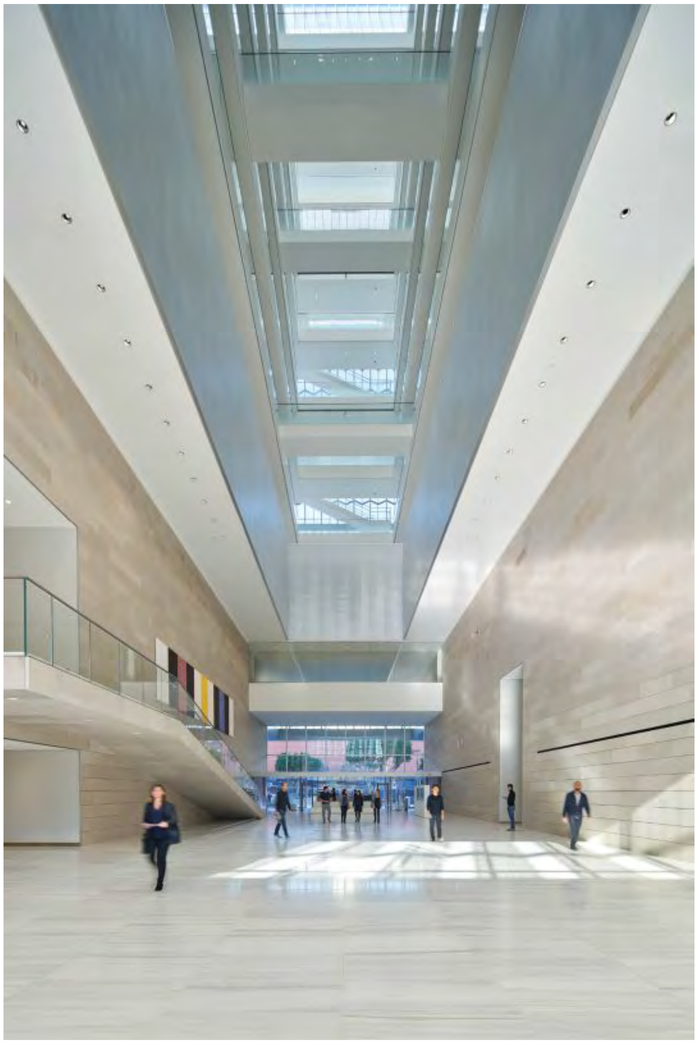
Typical-Floor Plan

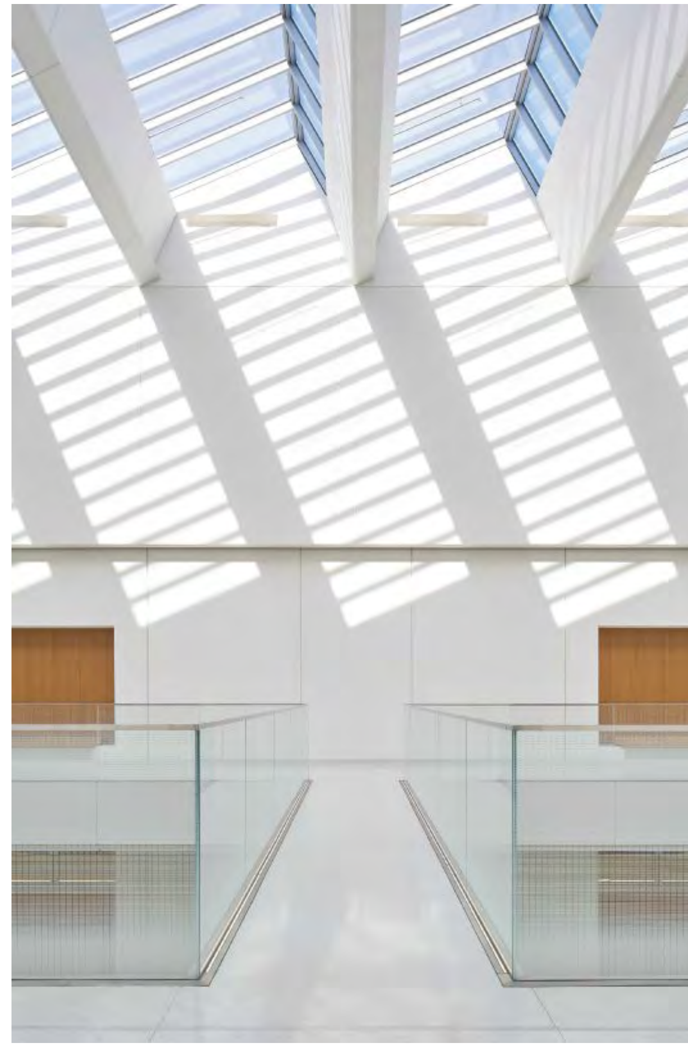


Previous Spread: Ground-floor café that extends onto terrace

Opposite: Pleated glass façade, as seen from northeast

1. Entry
2. Garden
3. Atrium
4. Café
5. Terrace
6. Jury assembly room
7. Courtroom





Left: Atrium, looking east toward main entrance

Right: Top-floor pedestrian bridge across atrium, under sawtooth skylight

Opposite: Courtroom interior

Interior Architecture

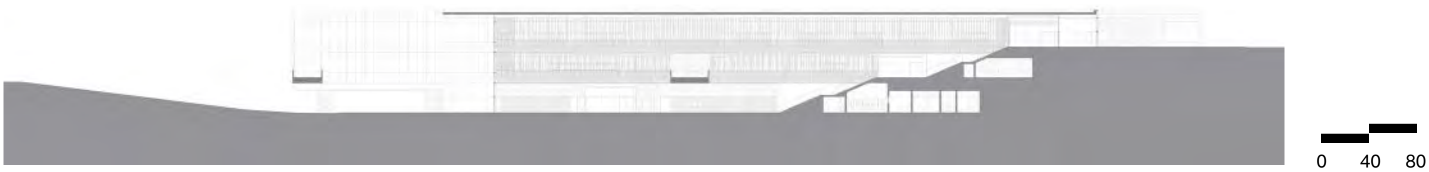
Reeds Spring Middle School
Reeds Spring, Mo.
Dake Wells Architecture

"A clear concept organized around elements found in the Ozark landscape led to beautiful execution. It's buried in a hill, yet full of daylight."

—Jury statement

PHOTOS BY GAYLE BABCOCK

Section A–A1

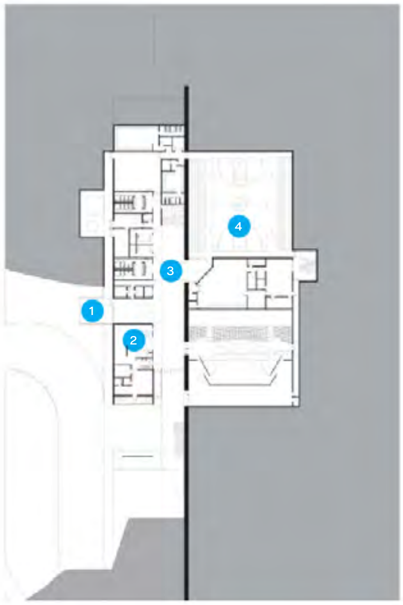


Dake Wells Architecture's design for the Reeds Spring Middle School in southern Missouri features, in a sense, an interior in an interior: While students are sheltered by the simple geometrical envelope of the building, the building itself is partially sheltered within a hillside, slotted lengthwise into one of the rolling bluffs of the western Ozarks.

Semi-buried architecture is nothing new—witness examples as diverse as the ancient cave villages of Turkey and Philip Johnson's art gallery at the Glass House complex—but in the contemporary institutional context, such structures run into persistent problems of functionality as well as atmospherics—bunkers being rather undesirable places to work and learn. For Reeds Spring, the team at Springfield, Mo.–based Dake Wells struck on an obvious but effective solution: cleaving a narrow space between the building and the verdant bank, and using the gap as a light well that runs clear through the interior—a luminous shaft ensuring that no room is left feeling like a dank basement.

Softening the environment still further is a wall that runs the length of the central skylit atrium: Composed of differing depths of buff-toned bricks, the textured surface catches the light and brightens the communal space. The wall is complemented on the opposite side of the interior hallways by a double-height wooden screen that also acts as a railing for the upper-level gallery. The light-filled concourse does double duty, as the designers have embedded seating (also in wood) into a staircase that ascends to make an active social space—a bonus amenity for students and teachers alike.

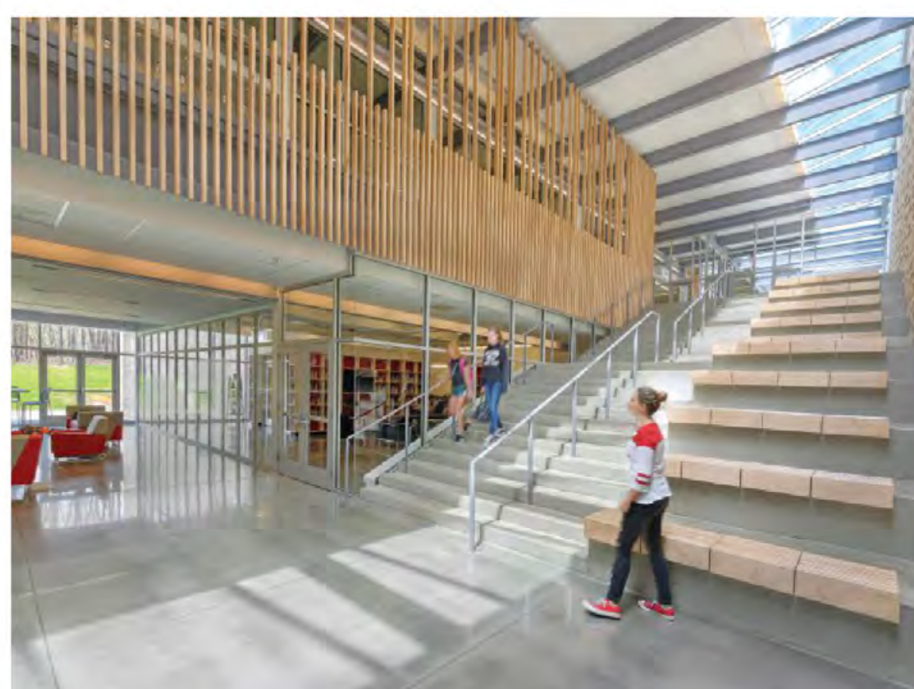
First-Floor Plan



Second-Floor Plan

Third-Floor Plan

1. Outdoor classroom
2. Kitchen
3. Atrium
4. Gym
5. Library
6. Classroom
7. Auditorium
8. Office
9. Entrance



Previous Spread: View into central atrium from exterior, looking north

Opposite: Exterior from southwest

Right: North end of atrium, on second floor, with library at rear

Above: Third-floor classroom and corridor

Opposite: View from third-floor entrance at north end of atrium

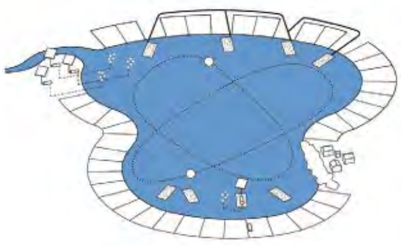
Regional/Urban Design

Urban Watershed Framework Plan: A Reconciliation Landscape for Conway, Ark.
Conway, Ark.
University of Arkansas Community Design Center

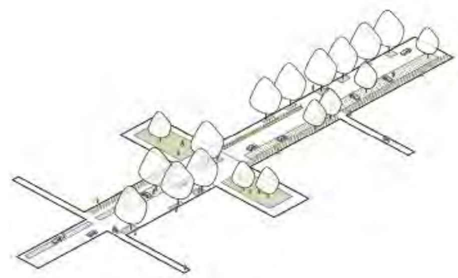
"This is a thoughtful, sophisticated, and holistic response to a recurring problem across the country."

—Jury statement

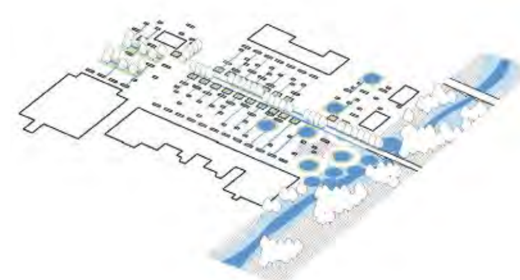
Adaptive Infrastructure Strategies



Lake Restoration to Normalize Sediment and Water Flow



Green Streets and Parks that Deliver Ecological Services



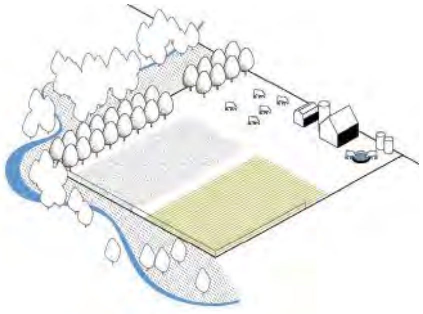
Parking Gardens that Metabolize Pollution

As millions of Americas learned during and after Hurricane Katrina, poor communities are often in positions of greater danger from water inundation and failing water infrastructure than more affluent ones. In New Orleans, as in waterfront cities nationwide, potential hazards like flooding and downstream pollution abound. But so do opportunities for greater recreational access and a healthier local ecosystem. The new "Urban Watershed Framework Plan" looks to exploit these potential upsides with a sustainable, remarkably simple scheme for the town of Conway, Ark.

Located just north of Little Rock, this so-called "City of Colleges" is home to several institutions of higher education and boasts an impressive portfolio of homegrown technology companies; with the Arkansas River to the west, and the manmade Beaverfork and Conway lakes to the south and north, the city is also effectively bound by water on three sides, and it's growing fast. To tackle these challenging conditions, the plan from the Community Design Center at the University of Arkansas' Fay Jones School of Architecture and Design envisions a diverse battery of interventions that can be slowly instituted over time, in line with local resources and economic imperatives.

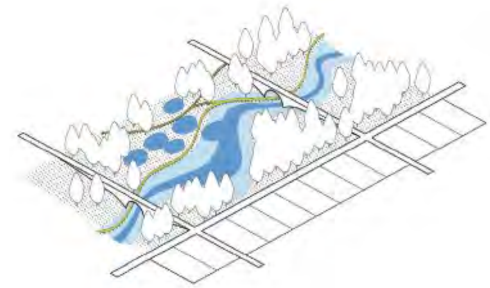
Concentrating new development in denser pockets, the scheme envisions green zones separating residential settlements from the various bodies of water, which would act as buffers against flooding. Within the zones, and at the center of the new developments themselves, Conwayans would enjoy a network of watery communal parks—fully activated public spaces replete with biking and hiking paths, rain shelters, and amenities of all kinds. These parks would both reinforce positive connections to the city's waterways, and help protect the community from damage in the ever-more-frequent storms that result from climate change.

Previous Spread: Restored wetland parks as part of a greenway system mitigate runoff year-round



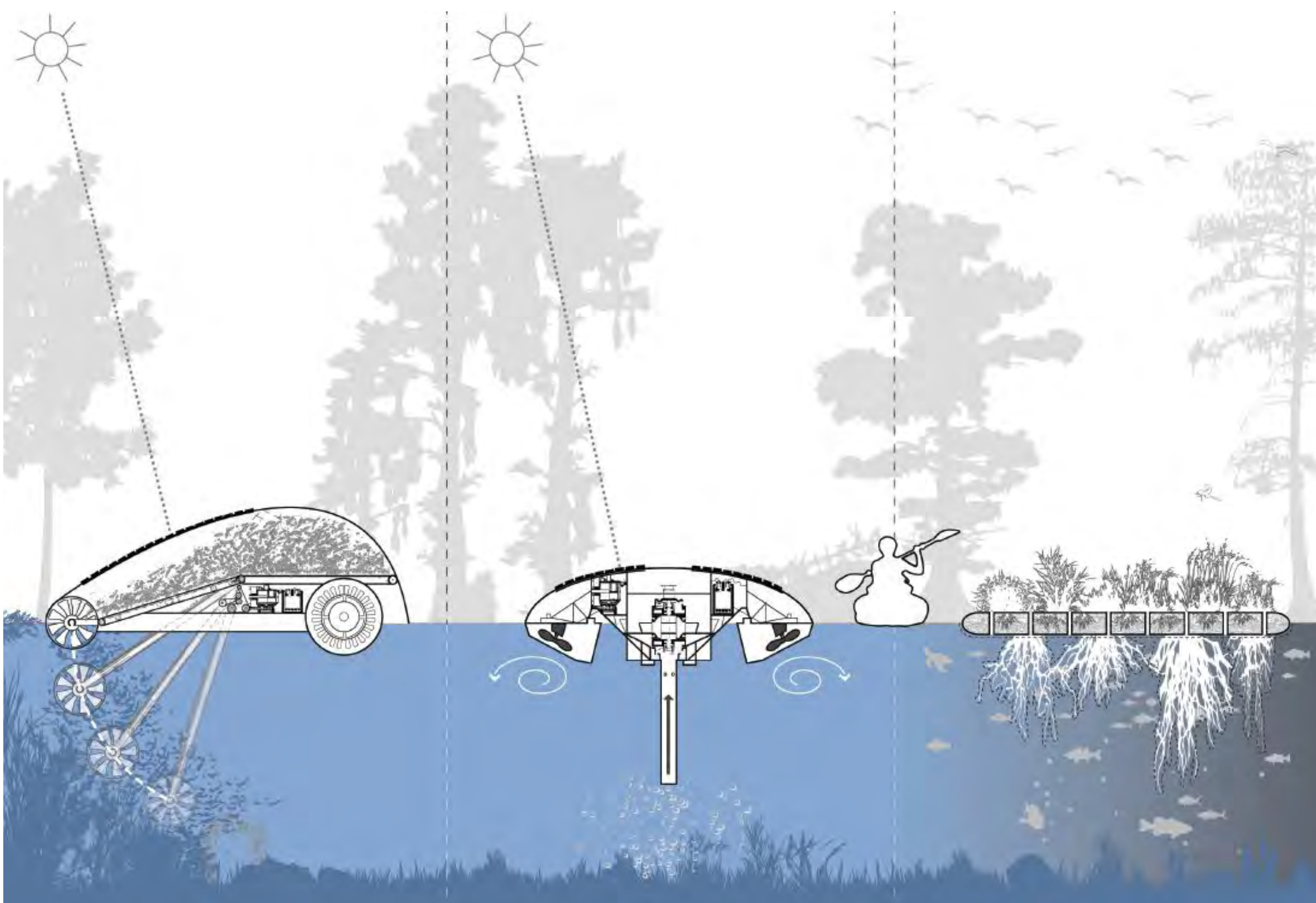
Urban Eco-Farms that Upcycle Waste Outputs

Conservation Development that Creates Vital Neighborhoods



City Greenway that Incorporates Stream and Street Networks

Proposed Tools for Lake Restoration



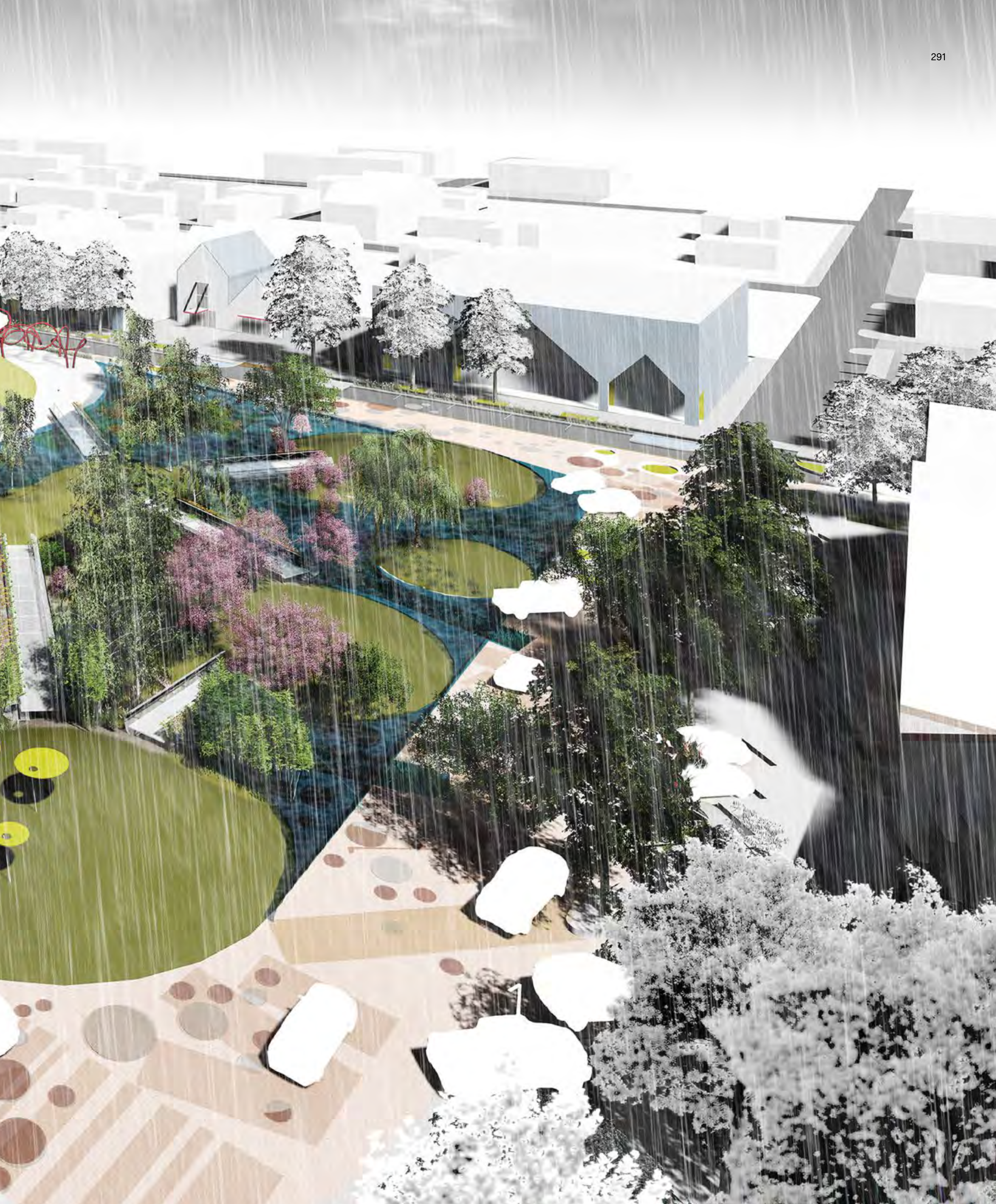
Solar Weed Havester Aquabots Maintain Vegetation Levels

Solar Aeration Aquabots Regulate Oxygen Levels

Floating Bio-Mats Function as Concentrated Wetland Habitats

A town square with wetlands and rain gardens adds to the city's greenways.

When flooded, the square can absorb runoff from the surrounding area in sunken rain gardens and still have dry areas that can function as public space.



Interior Architecture

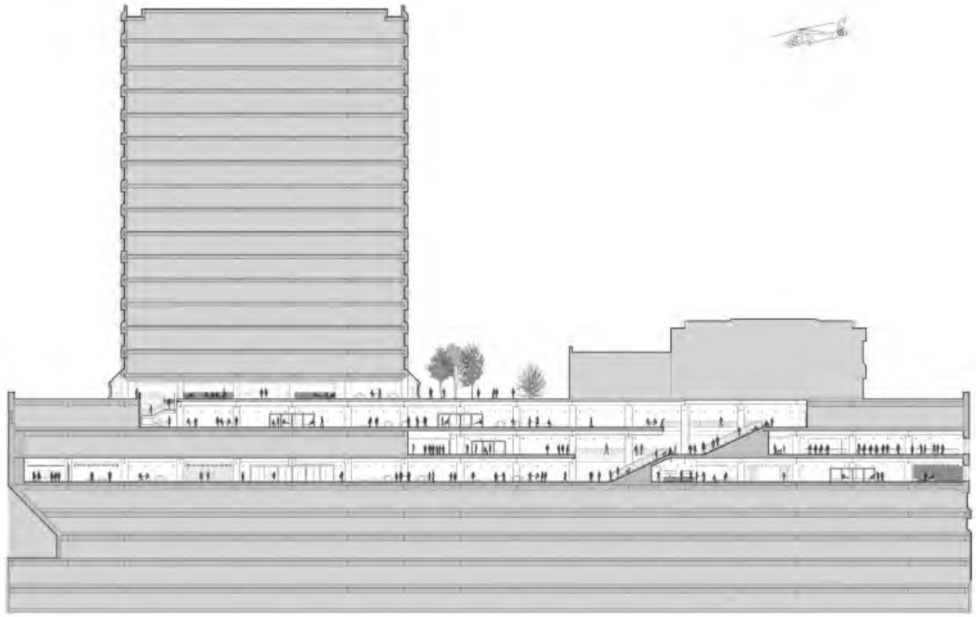
Square Headquarters
San Francisco
Bohlin Cywinski Jackson

"Simple, direct, and quite beautiful. It's a pleasant surprise to find this inside an existing building."

—Jury statement

PHOTOS BY MATTHEW MILLMAN

Section A–A1



Sixth-Floor Plan

Anyone who's bought a vase at a pop-up boutique or artisanal cheese from a farmer's market has encountered Square, the smartphone extension that allows even the smallest businesses to quickly and easily process credit card transactions. Small, svelte, quadrangular (as befits the name), Square's square is one of the more appealing design objects to emerge from the digital sector, and the people that make them now have a correspondingly design-forward headquarters in San Francisco. Created by a team in the San Francisco office of Bohlin Cywinski Jackson, the 295,000-square-foot interior is charged with all the hipness one would expect of a Bay Area tech firm, but has an ease and airiness that suggests a company more assured and mature than the typical startup.

Unfolding across floors six through nine of an existing office building, the space is organized around long central axes. The procession carries the visitor past assorted programmatic features like private work booths, shared tables, and glassed-in conference rooms, creating an interior landscape that's both visually and functionally diverse. The main event is a sweeping amphitheater-staircase that connects three floors and is activated by tables whose staggered legs—like dogs sitting up and begging for treats—straddle the steps, allowing employees to work and socialize in a lounge-like setting with a clear line of sight to the windows and their enchanting views of the cityscape beyond.

Quiet finishes in white and light wood contribute to an overall effect of a harmonious creative laboratory, one where ideas can become reality in a process that can only be described (to borrow one of the tech world's favorite terms) as "frictionless."

1. Lobby
2. Open office
3. Boardroom
4. Team room
5. Interview suites
6. Coffee bar
7. Library

Previous Spread: Central stair connecting three of four floors

Top, Left: Coffee bar

Top, Right: View over central stair into open workspace

Above: Skylit stair connecting uppermost two floors

Open office interior with spaces for solo work and collaboration

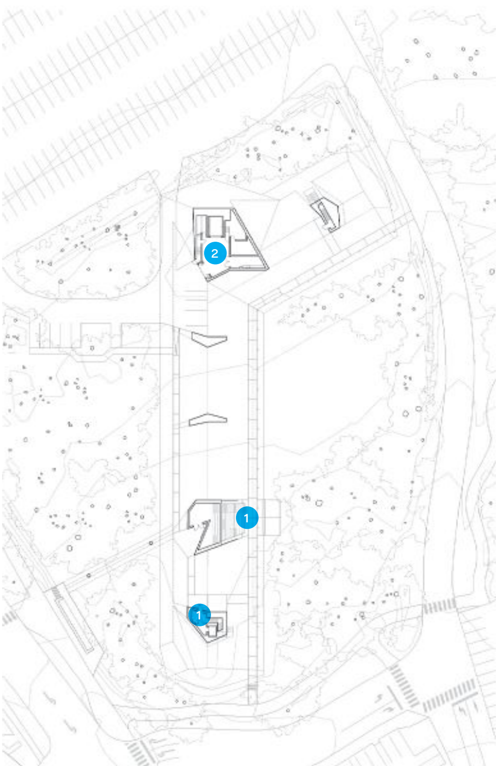
Audain Art Museum
Whistler, British Columbia
Patkau Architects

"A beautiful, dynamic project that literally wraps users around nature, blurring the boundaries between manmade and natural."

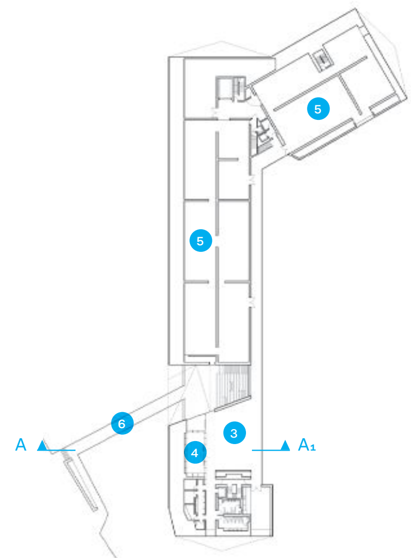
—Jury statement

PHOTOS BY JAMES DOW/PATKAU ARCHITECTS

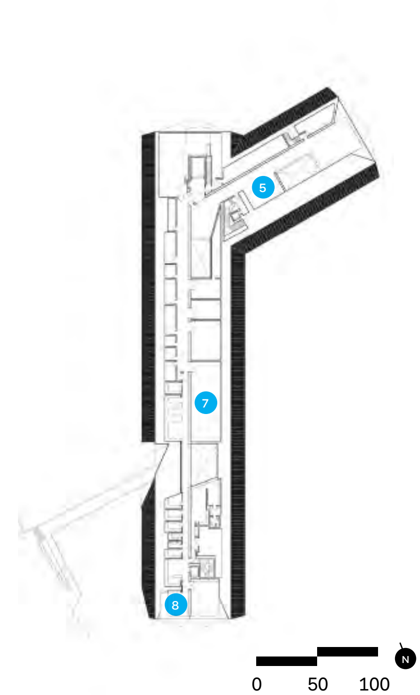
Ground-Floor Plan



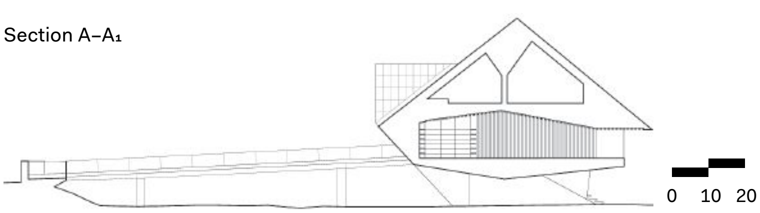
Second-Floor Plan



Third-Floor Plan



Section A–A₁



1. Entrance
2. Loading
3. Lobby
4. Museum store
5. Gallery
6. Pedestrian bridge
7. Storage
8. Offices

Michael Audain is one of Canada's most prominent real estate developers and philanthropists, as well as a major art collector with a special affinity for both traditional and modern paintings and sculpture from his native British Columbia. To house his considerable stash of local masterworks, Audain commissioned Vancouver-based Patkau Architects to create a 56,000-square-foot private museum just outside the scenic ski resort of Whistler, and the designers responded with a building whose siting and style chimes with the regional themes of the collection and the cultural values of the client.

With a site located in a grassy plain that has hills on one side and a narrow stream on the other, the team recognized that the project would have to contend with immense annual precipitation plus additional runoff from the spring thaws, which flow down the slopes and soak into the marshy soil. Their solution was to lift the central volume off the ground, tethering it to the earth with an elegant staircase that opens up from a hatch in the belly of the building like the gangway of some mysterious spacecraft.

The seasonal blizzards that dump masses of snow atop the exhibition spaces are addressed by a pitched roof along the main body of the building, as well as other gabled appurtenances for windows and entryways, ensuring that the nearly 15 feet of white stuff that can fall in an average year are conducted to the ground as quickly as possible. And under that roof, crisp interiors in white and wood underline the Audain Art Museum's remarkable blend of earthiness and ethereality.

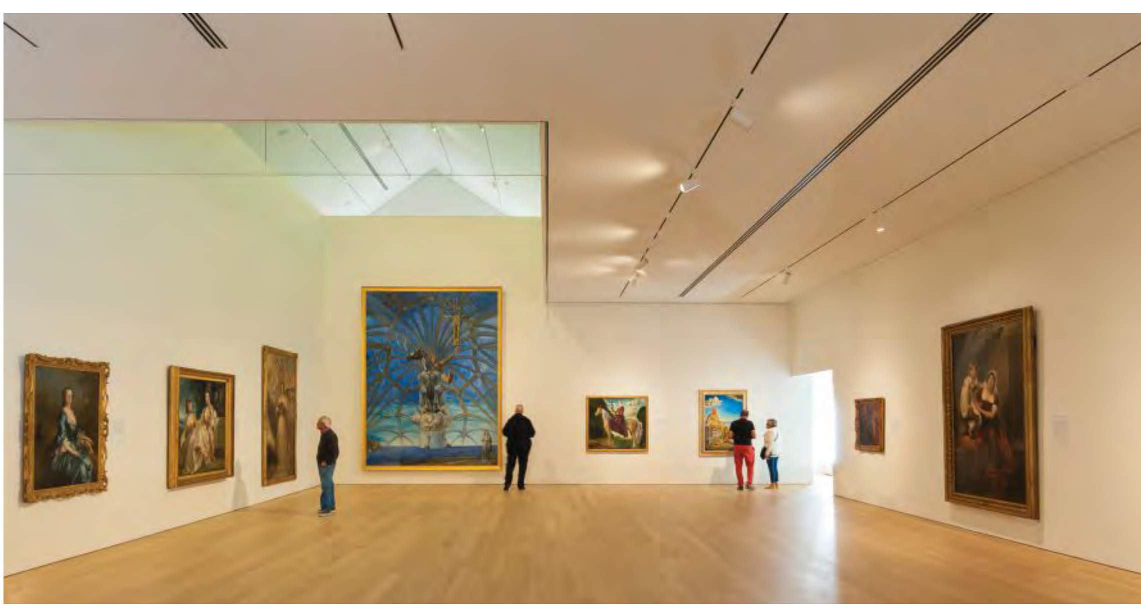
Top: View along museum's angled southern flank

Previous Spread: Cantilevered eastern side of museum

Above: Pedestrian bridge leading to second-floor lobby

Stair leading to second-floor lobby, from east

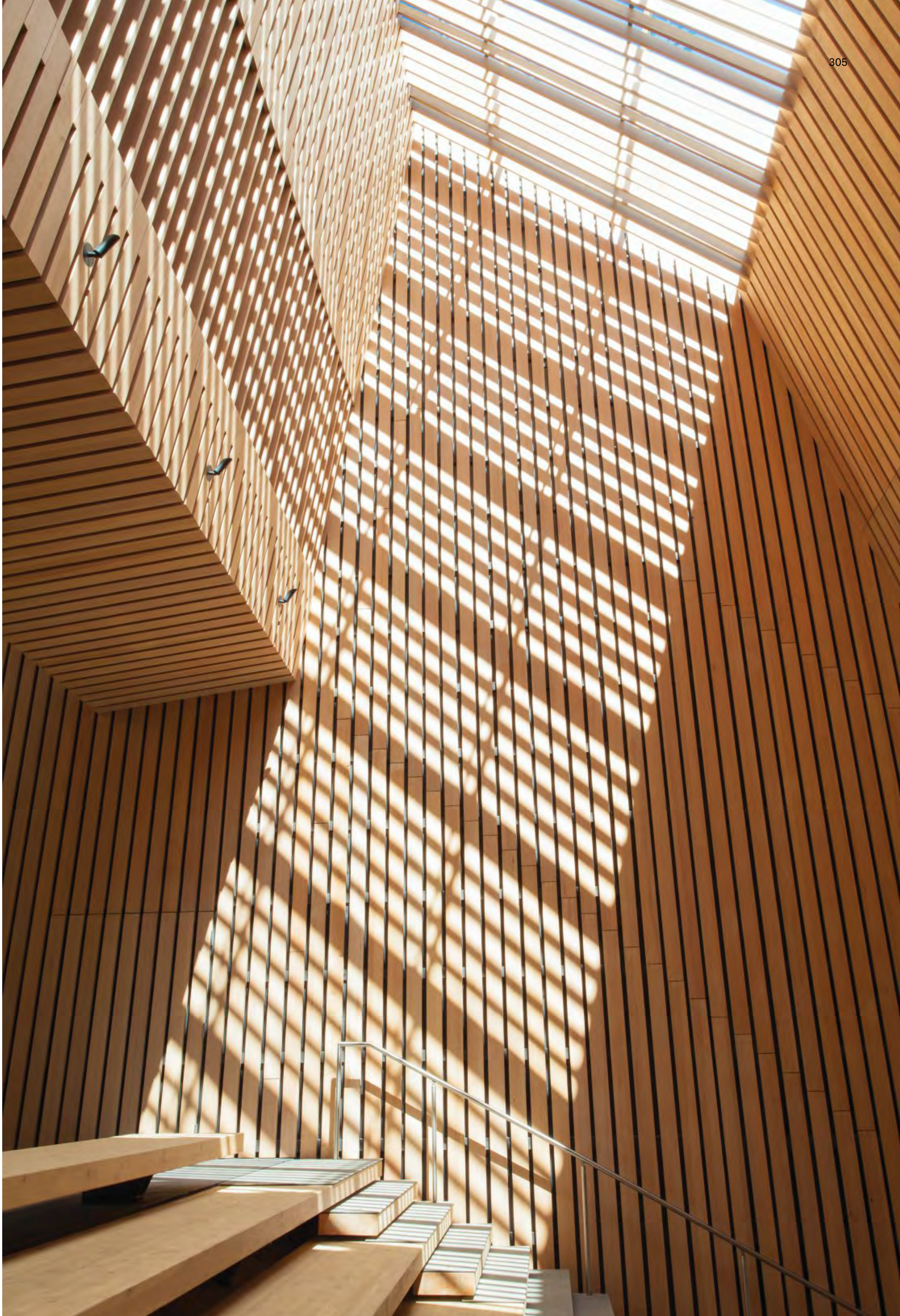
Tk tk



Top: Wood-lined hallway along south façade connects second-level galleries to one another

Above: Second-level gallery

Opposite: Skylit stairway to lobby



Chicago Public Library, Chinatown Branch
Chicago
Skidmore, Owings & Merrill

"This is an exceptional project that responds and engages in a highly successful manner while being understated and fun."

—Jury statement

PHOTOS BY JON MILLER/HEDRICH BLESSING

Previous Spread: Central stair with children's area beyond

Opposite Top: Exterior from southeast

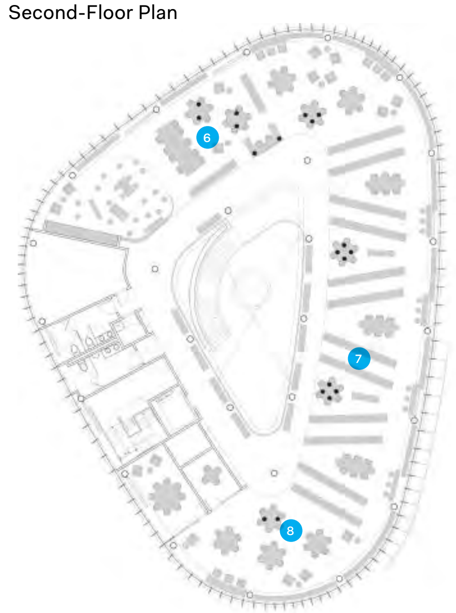
Opposite Bottom: Reading area in second-floor stacks

It's a long way from the hutongs of China to the streets of the Windy City, but the design for the newest branch of the Chicago Public Library system brings the two just a little bit closer. Created by Skidmore, Owings & Merrill in consultation with AEC firm Wight & Co., the building serves a community that knows a thing or two about East Asia's intimate courtyard buildings—the residents of Chicago's Chinatown, who also happen to be among the most avid patrons of the city's 79-branch library system.

Mirroring the communal hutong arrangement, the interiors of the new 16,000-square-foot outpost are arrayed around a commodious atrium, with almost entirely unenclosed floors that allow direct visual and circulatory connections between the reading rooms and the airy void at the center with its grand-yet-understated staircase. The whole building takes its cues from traditional Chinese design—its triangular lozenge-shaped plan sprang from an attempt to align the building with the street grid in a manner congruent with the geomantic traditions of feng shui.

The effect on the inside is a gently curving perimeter wall, entirely faced in glass, that provides more than ample light for the event spaces, lounges, media rooms and more that make up the building's highly flexible program. On the top floor, painter C.J. Hungerman has added an artistic grace note, a 60-foot-long mural whose lotus motifs and eye-popping swatches of red and yellow tie together the cultural themes and vibrant color palette of the building as a whole.

Second-Floor Plan



First-Floor Plan

1. Entrance
2. Circulation
3. Office
4. Community room
5. Children's area
6. Teen area
7. Stacks
8. Reading area

0 10 20


CHICAGO PUBLIC LIBRARY CHINA
OWN BRANCH

Early
Fiction
My Bus

Small stack in first-floor children's area
with glazed community room

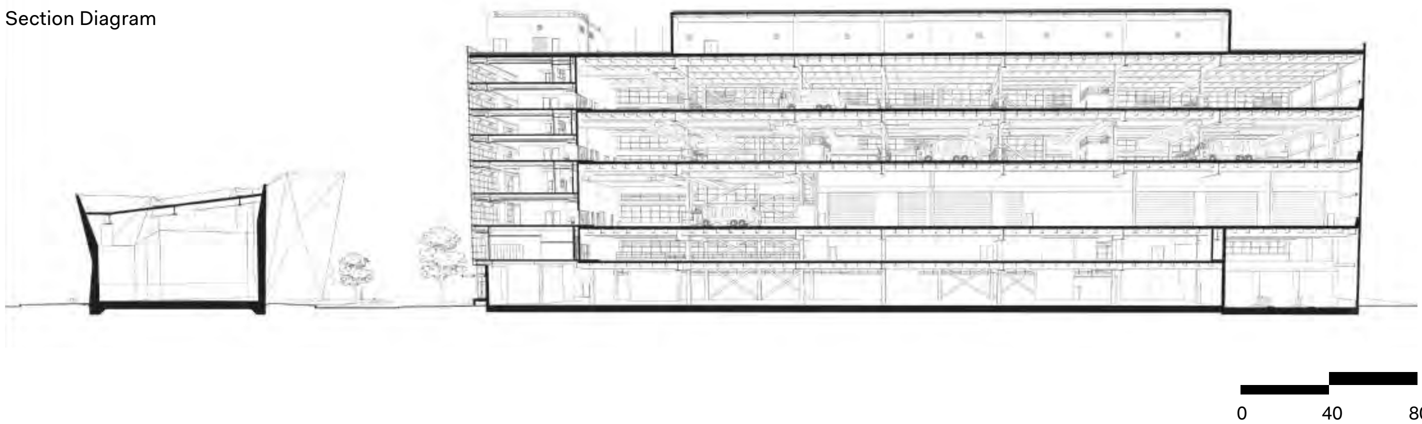
Manhattan Districts 1/2/5 Garage and Spring Street Salt Shed
New York
Dattner Architects and WXY Architecture + Urban Design

"A commitment to civic expression, environmental responsibility, and sensitivity to the urban context results in a design solution that successfully integrates critical services into the neighborhood. It raises the bar significantly for civic infrastructure."

—Jury statement

PHOTOS BY ALBERT VECERKA/ESTO

Section Diagram

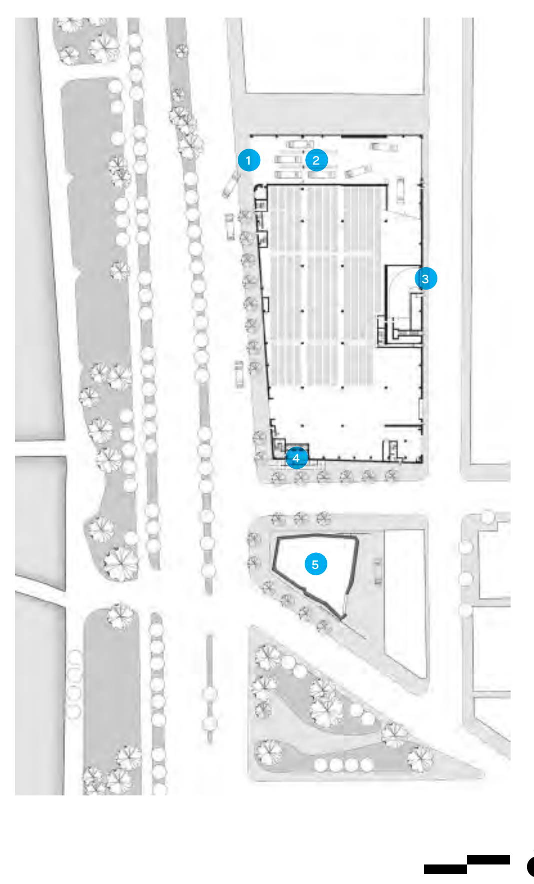


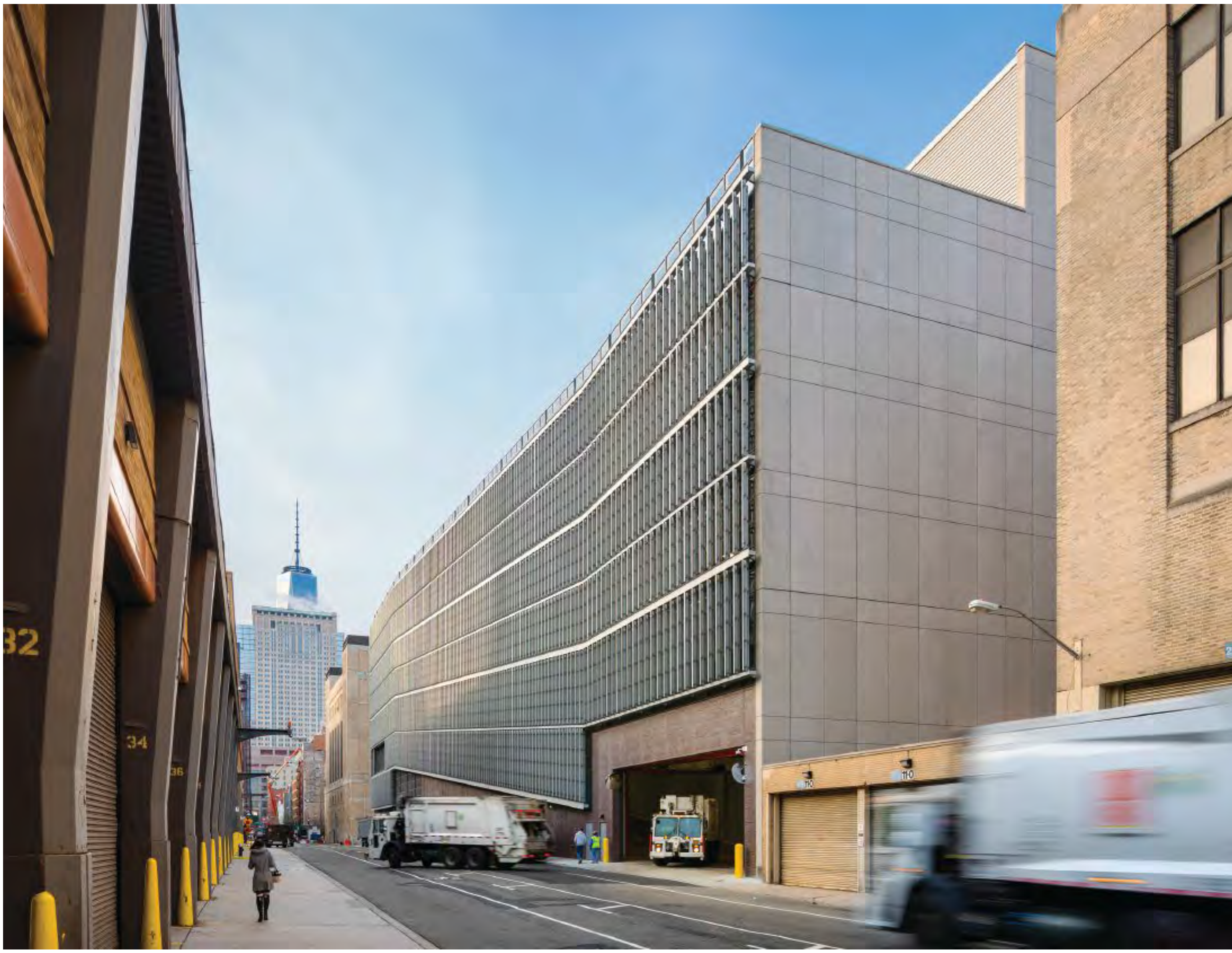
Years of NIMBY-ish bureaucratic wrangling preceded the birth of the Manhattan Districts 1/2/5 Garage and the adjacent Spring Street Salt Shed in New York City's SoHo neighborhood. With home prices in the area rising swiftly—and the newer, ever more affluent residents expecting a correspondingly plush environment—the prospect of two gigantic pieces of municipal infrastructure being plopped down on prime riverfront real estate was a cause for considerable uproar among a certain segment of the community.

But the designs for the paired structures, the work of local firms Dattner Architects and WXY Architecture + Urban Design, have stymied all expectations, becoming genuine adornments to the streetscape. At 425,000 square feet, the garage is a massive block of a building rendered startlingly light, almost delicate, thanks to a façade treatment that features a reticulated translucent sheath of perforated aluminum fins over a glass curtainwall. At night, the building really comes to life, as the carefully graded interior painting scheme peeks out from behind the ribbed veil and turns the building into a multicolored magic lantern.

More austere, if no less subtle, is the Salt Shed, a wedge of raw concrete whose jagged, faceted geometry appears to take its cue from the world of mineralogy, resembling the crystalline structure of salt itself as seen under an electron microscope. As with its companion across the street, the building's true drama is revealed only after sundown, when lighting embedded in the surrounding sidewalk turns it into a monumental sculptural object that seems almost museum-worthy.

Ground-Floor Plan

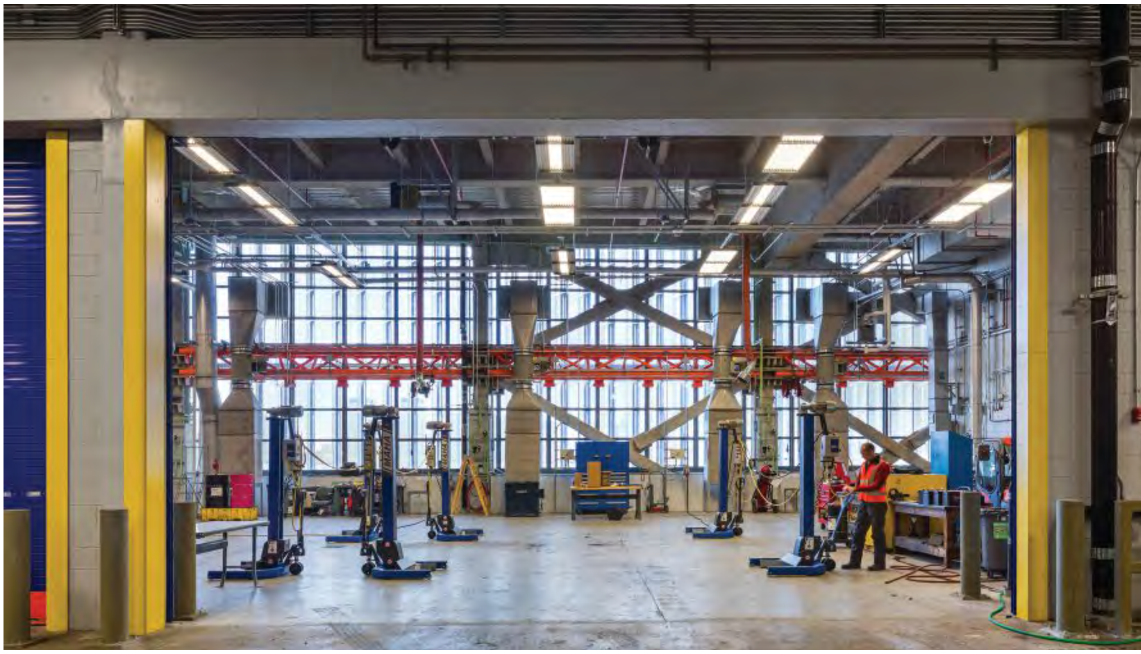




1. Truck entrance
2. Fueling station
3. Small vehicle entrance
4. Personnel lobby
5. Salt storage

Previous Spread: Spring Street Salt Shed in use during winter

Above: View of Manhattan District 1/2/5 Garage façade and vehicle access from northwest



Top: Automotive shop

Above: Salt Shed structure, as seen from garage to the north

Opposite: Salt Shed and garage illuminated at night

BOTTOM: VANNI ARCHIVE


sanitation
STOP HERE ON RED SIGNAL
SPEED LIMIT 35
ONE WAY
DO NOT ENTER
CANAL St
Spring St

Architecture

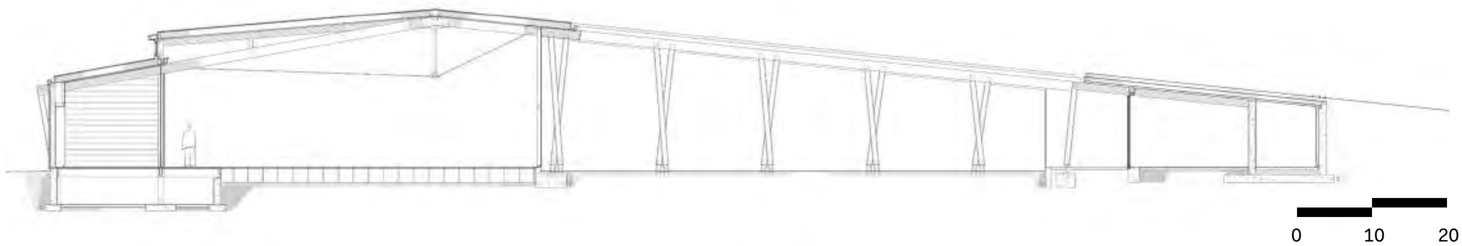
Washington Fruit & Produce Co. Headquarters
Yakima, Wash.
Graham Baba Architects

"This oasis among warehouses is functional, sustainable, spatial, and formal. It is a workspace that encourages quiet contemplation, community, and productivity."

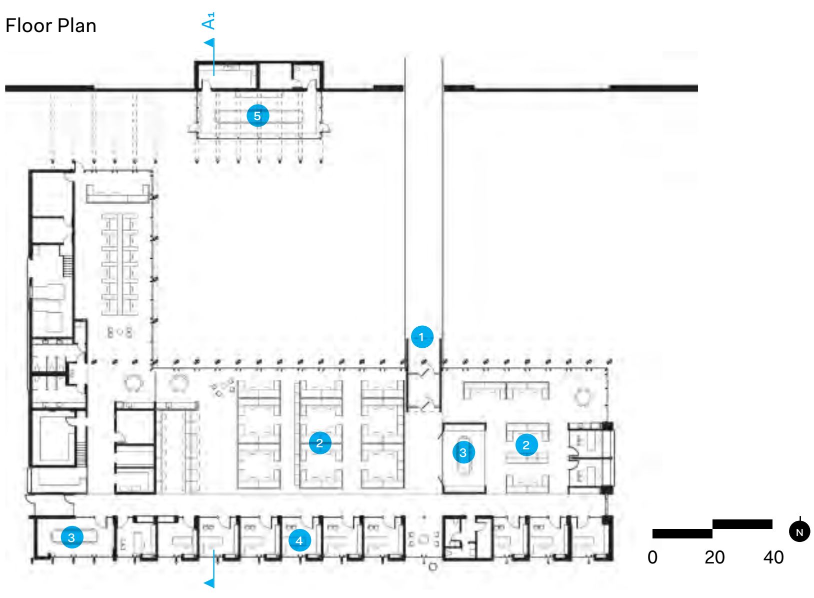
—Jury statement

PHOTOS BY KEVIN SCOTT

Section A–A1



Floor Plan

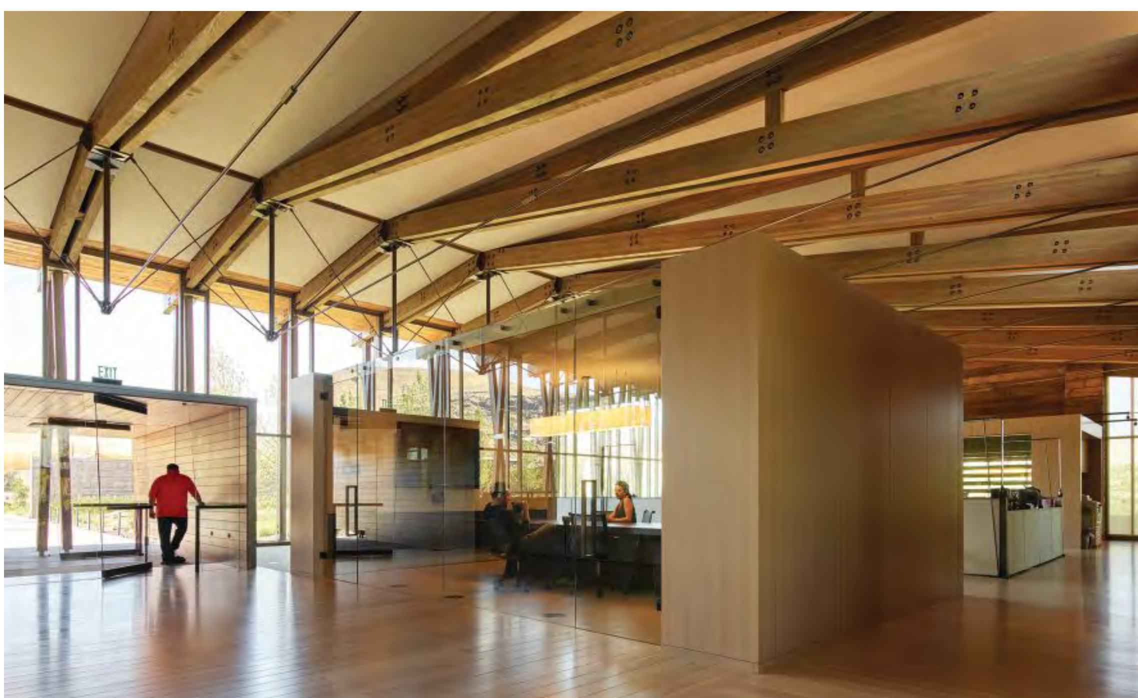


1. Entrance
2. Open office
3. Conference
4. Private offices
5. Lunch room

Long gone are the idyllic red-roofed barns and wooden silos of old: Today, the contemporary American pastoral landscape is very often one of big metal-clad boxes and the occasional ranch house, neither possessed of a great deal of architectural character. Seattle-based Graham Baba Architects' headquarters for the Washington Fruit & Produce Co. of Yakima, Wash., is intended as an antidote to this condition, a strong dose of organic elegance on par with the rolling hills and open fields of the breadbasket of the Pacific Northwest.

A structural exoskeleton of laminated wood buttresses removes the need for any interior supports, simultaneously establishing a steady rhythm around the perimeter of the horseshoe-shaped, one-story groundscraper and allowing for a column-free interior. That 16,500-square-foot space, faced in floor-to-ceiling glass, looks on one side onto a courtyard with plantings and paths, and on the other to a sweeping view across the countryside. A berm on the edge of the site cleverly obscures a nearby highway so that nothing disturbs the bucolic scene. There's even a portion of an aging barn on site—just a little reminder of the area's picturesque past.

As important as what workers can see are all the things they'll probably never notice: From the siding made of recycled wood salvaged from a former barn, to the high-performance glass in the tall windows, the building is a paragon of eco-friendliness, making it a true breath of fresh air for the standard architecture of agrobusiness.



Top: Green roof atop the lunch room (at left), a discrete volume which is embedded in a berm on site

Previous Spread: Main entrance

Bottom: View of office interior

Top: Wood columns line the glazed office block

Right: A courtyard separates the offices (at left) from the lunch room (at right)

Architecture and Regional/Urban Design

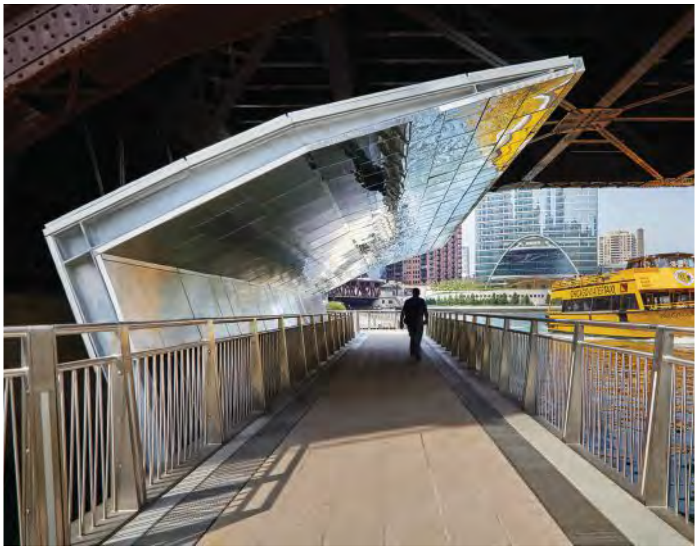
Chicago Riverwalk
Chicago
Ross Barney Architects

"A gift to the city, it embraces Chicago's layered, diverse history by providing a range of amenities that transform the once-neglected riverfront into a vast public space."

—Jury statement

PHOTOS BY KATE JOYCE


WELLS STREET



Working with a dynamic team of collaborators from across the design, engineering, and public works sectors—including Jacobs/Ryan Associates, Sasaki, Benesch, Collins Engineers, and Schuler Shook—local firm Ross Barney Architects has accomplished a long-cherished urban dream: giving the Chicago River back to Chicagoans after generations of quasi-neglect.

For nearly a century, the very feature that has made the Loop such a remarkable instance of city planning—the multitiered infrastructural layer cake that is Wacker Drive—has also had the perverse effect of isolating the river's edge, making it feel like the damp perimeter of a truck-clogged service basement.

The new Chicago Riverwalk project—opened to the public in three phases, and wholly completed in 2016—puts the south side of the waterway back on the map courtesy of a grab bag of programmatic attractions lining its banks, as well as increased access points that make those functional nodes easier to reach.

Operating within a scant 96-foot-deep margin between the water and Lower Wacker Drive, the design team managed to squeeze spaces for such varied activities as boat rentals, outdoor dining, interpretive interactives on river ecology, and public performance venues, all within an elegantly landscaped corridor featuring staircase-style seating with embedded LED lighting, wood-lined benches, and lush greenery.

Operating as a scenic and convenient pedestrian route between the western reaches of the Loop and the Lake Michigan waterfront, the riverwalk is a radical new way to encounter Chicago—one that seems bound to spur future development and ultimately reshape overall patterns of life in the city.

Previous Spread: Jetties over river at western end of Riverwalk

Top, Left: Mirrored panels naturally illuminate pathways under bridges

Top, Right: Interactive installations

Site Plan

1. Phase 1: Opened 2009
2. Phase 2: Opened 2015
3. Phase 3: Opened 2016

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Top, Left: Fountains at water plaza

Top, Right: Seating built into planters along riverfront

Terraced seating at
the River Theater at
N. LaSalle Street

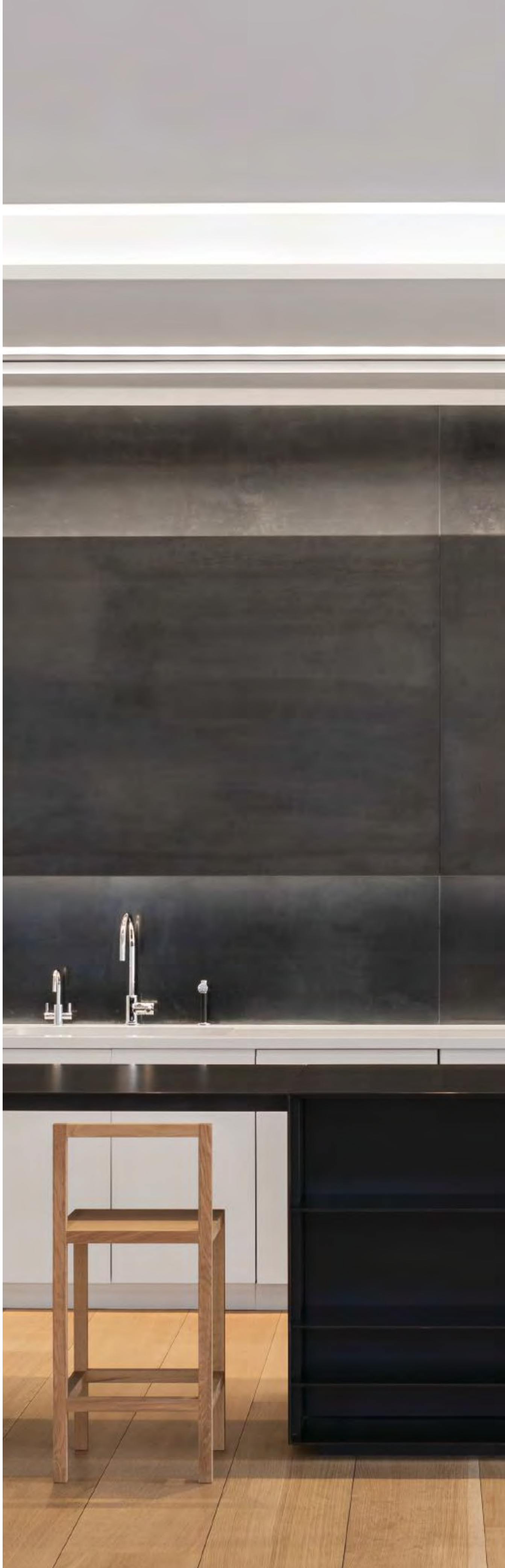
Interior Architecture

Photographer's Loft
New York
Desai Chia Architecture

"Exquisitely detailed and crafted—so much so that it appears one would be living in artwork. It has a beautiful implementation of light."

—Jury statement

PHOTOS BY PAUL WARCHOL

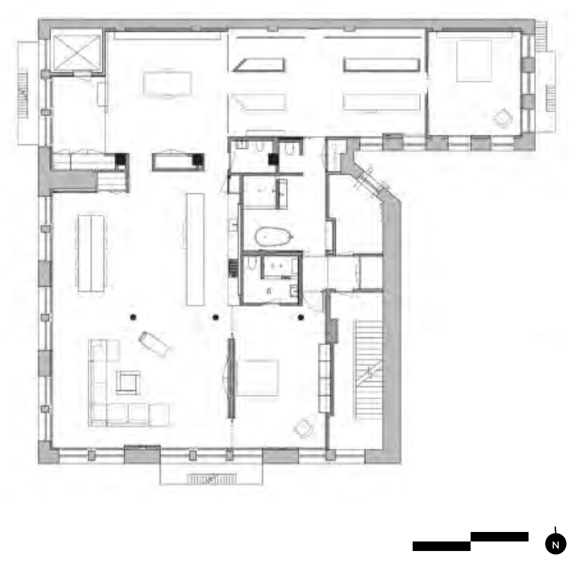


At 5,000 square feet, there was a lot of space in this Manhattan live/work loft conversion for local firm Desai Chia Architecture to fill. The magic was in how little they used to fill it: Making a subtle nod to the work of James Turrell, the designers set a sequence of soffits and skylights into the ceilings, permeating the interior with ambient natural light reminiscent of the artist's famously sublime installations. At eye level, they took a similar tack, inserting semi-engaged walls and oblong console tables that seem to float—pure abstract forms hovering in the radiant space.

With the mood of gauzy dreaminess firmly established, the team then sat back and did as little as possible, selecting unobtrusively elegant material treatments like striated stone and solid oak (for the floors), raw steel (for the kitchen countertops), and white resin (for the bathroom walls, with additional resin for the work tables) to create a subdued palette that allows the light to remain front and center.

The minimalist approach was an appropriate one under the circumstances—the occupant is a photographer who works in the space as well as lives there, and is an avid collector of modern furniture and the work of Donald Judd, Minimalism's most prolific theorist. But the design's visual simplicity belies a subtle and complex plan, one that required a thorough analysis of the client's needs. By subtle gradations, the apartment's functional zones flow into one another, with just enough separation left to preserve the subtle balance between the public and the private spheres, between life and work.

Floor Plan



Previous Spread: Kitchen, with bedroom beyond at right

Above: Library, with Donald Judd furniture

Opposite: View from foyer with library, dressing area, and photo studio beyond

Architecture

Gohar Khatoon Girls' School
Mazar-i-Sharif, Afghanistan
Robert Hull in collaboration with the University of Washington, Department of Architecture

"A beautiful and restrained aesthetic that was achieved with limited means. This space communicates a new era for girls and women very powerfully."

—Jury statement

PHOTOS BY NIC LEHOUX


BURJ GHAZANFAR
برج غضنفر

Previous Spread: Children in north courtyard, as seen from bridge between classroom buildings

Opposite, Top: Classroom buildings, seen from north

Opposite, Bottom: One-story classroom block at northern perimeter of complex

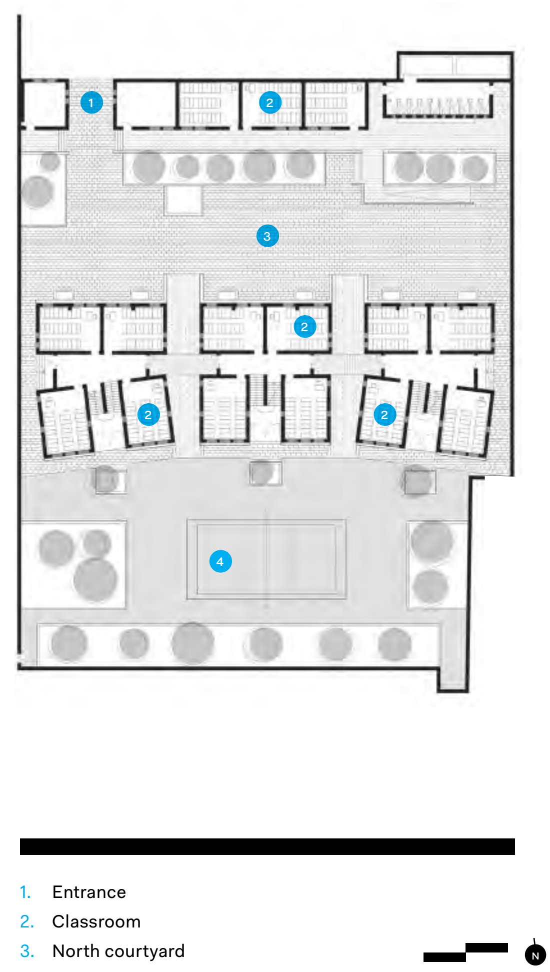
Beautiful and rich in culture, yet riven by years of ethnic and political conflict, Afghanistan has struggled to find its way since well before the United States invasion of the country in 2001. Among the most urgent priorities facing Afghans today is the issue of women's education, a problem that prompted local leaders and an international nonprofit to enlist architect Robert Hull (the late founding partner of Seattle- and San Diego–based the Miller Hull Partnership) and the University of Washington's Department of Architecture to design the Gohar Khatoon Girls' School.

Located in the city of Mazar-i-Sharif, the capital of the northern province of Balkh, the building is a frankly stated ensemble in sable-toned brick, cut with windows that are outlined in vivid red, blue, and yellow frames, and set back on a plaza that can host schoolwide events as well as public functions. Its no-nonsense urbanism is tempered by a rustic simplicity in construction, including ceilings with exposed wooden trusses that soften the interior and recall traditional building techniques from the region.

In a country with a limited industrial capacity and spotty infrastructure, the simplicity and ingenuity of the design approach was also a practical necessity, but one that dovetails conveniently with Hull's commitment to sustainability: The scant available resources all but required the designer to pursue the greatest possible economies in materials and energy consumption. Most importantly, what the Gohar Khatoon School does is project an image of strength, stability, and openness, declaring that the education of Afghan girls is—and should—be an integral part of the nation's mission as it looks to live up to its nearly boundless promise.

Second-Floor Plan

Ground-Floor Plan



1. Entrance
2. Classroom
3. North courtyard
4. Athletic court

Previous Spread: TK tk.

Tk tk

Opposite: Students play soccer on athletic court south of classroom buildings

Above: First-floor classroom, with views to south

Above: Perimeter classroom with larger window to maximize light

Opposite: Stair to second level with clerestory windows that allow rising hot air to vent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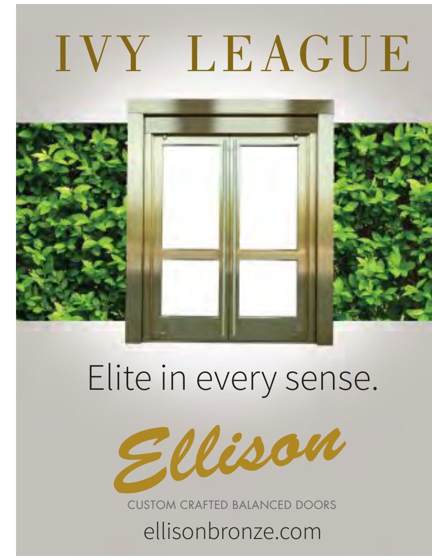
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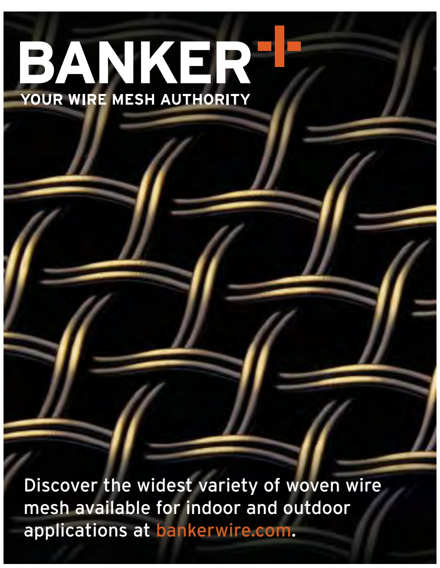
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Editorial: Dirty Money, Shiny Architecture

Have you ever wondered how the median home value in San Francisco is $1.34 million, while someone who makes minimum wage can afford a market-rate one-bedroom apartment in only 12 of 3,007 U.S. counties? The reason, in large part, is that the rich these days have so much money that they don't know what to do with it. If some latter-day Croesus wants to spend, say, $450 million for a Leonardo da Vinci painting of dubious provenance, as happened last fall, that's his business. But the effect of the top-heavy wealth distribution on housing prices and availability is unconscionable.

It's not just rich Americans. The post–Cold War economy has unleashed a vast international upper class of Russian oligarchs, Middle Eastern royals, and African presidents-for-life. China alone has minted 1.34 million millionaires since privatization began there in the late 1980s. The savvy plutocrat is always looking for safe places to stash cash—and the fewer questions asked, the better. If it's not a private bank in the Caymans or a vault full of art in Switzerland, it's a condo someplace nice, or four of them, or an entire office building for that matter.

Few places are safer, and less scrutinized, than real estate. Money laundering pervades the global property market and, as a result, turns architects into unwitting collaborators—ethically, if not legally. One might expect this kind of thing to happen in the 'stans of Central Asia or the less salubrious Latin American republics, and it does. But in Australia? Canada? France? The U.K.? Here in the United States?

Yes, yes, yes, yes, and yes.

Until lately, regulators have largely ignored the mysterious backers of the limited liability companies and other shell corporations that are investing in U.S. property at such exorbitant prices. A few days before Barack Obama left office last year, however, the Treasury Department announced that it would begin identifying and monitoring anonymous buyers. In August 2017, the department reported that about a third of such deals "involve a beneficial owner or purchaser representative that was also the subject of a previous suspicious activity report."

Floods of dirty money have helped make home-ownership impossible for residents of many cities and compounding the problem, thousands upon thousands of these investment properties often sit empty. Housing vacancy data, from the U.S. Census Bureau, are mind-blowing. In San Francisco's South Beach neighborhood, 20 percent of residences are unoccupied. In Manhattan's Upper East Side, 40 percent are. In Malibu, Calif., it's 33 percent. In San Diego's Oceanside neighborhood, 50 percent. And in Florida's Bal Harbor, Miami Beach, and South Beach, more than half of waterfront properties are vacant.

Dirty money is paying for a great many shiny buildings—even a few one might call masterpieces, if one were to ignore the ethics. But we shouldn't. Architecture can serve higher purposes. The winning projects, people, and groups in this issue of ARCHITECT offer many cases in point: a resilient master plan for a small town in Arkansas, a practitioner who prioritizes the well-being of her Native American clients, a nonprofit that teaches developers of affordable housing about design. These are qualities of great architecture.


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