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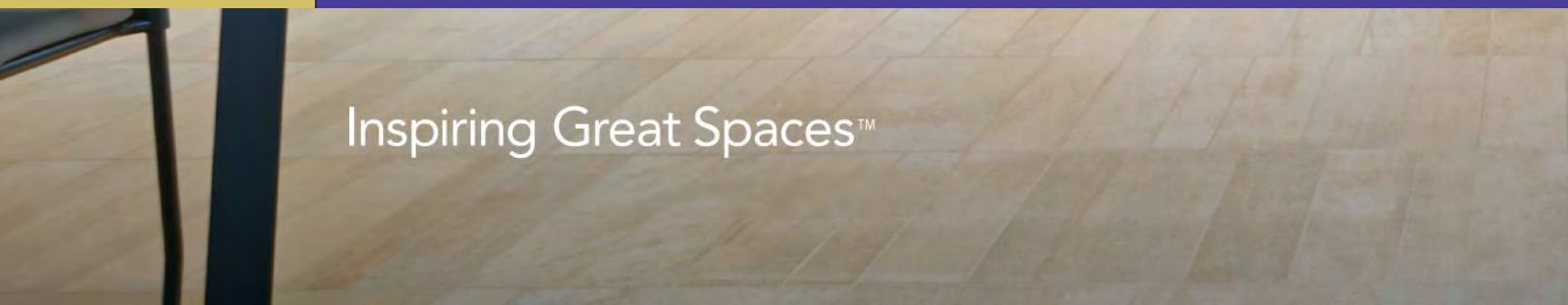

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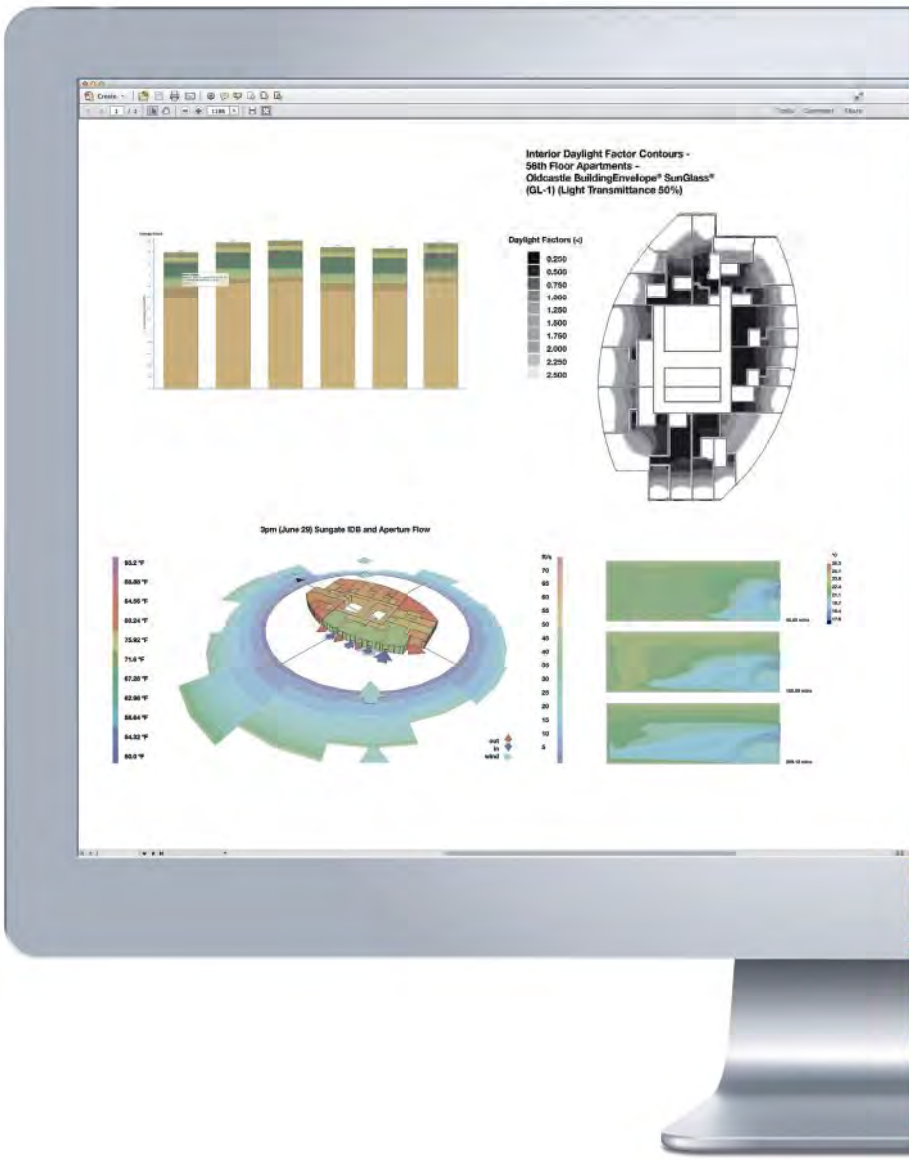

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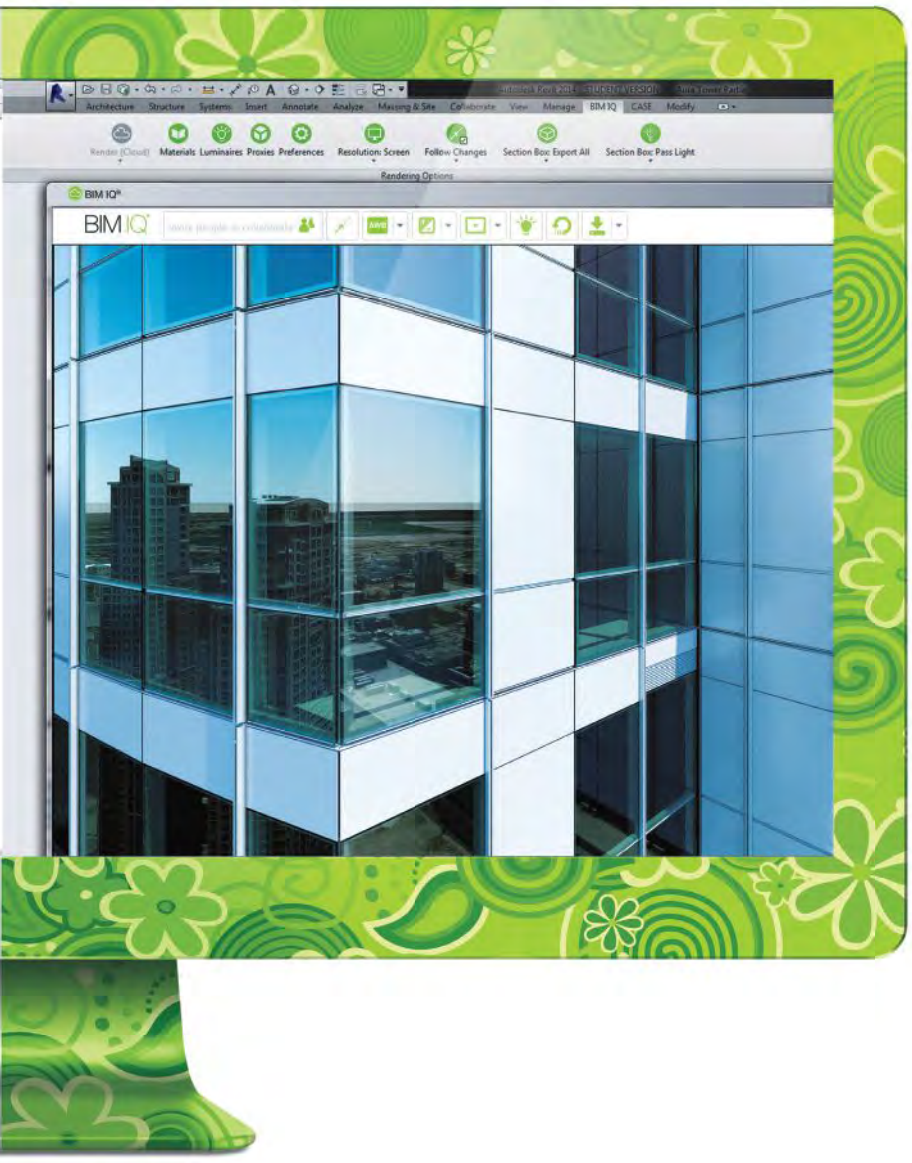

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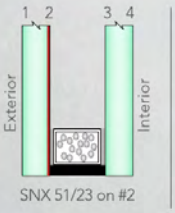

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INSIDE OUT

Want to know what goes on at the **New School**? Passersby need only glance at the institution's new **University Center** in Greenwich Village to understand that progressive design education happens here. The building by **Skidmore, Owings & Merrill** expresses the school's interdisciplinary approach through a brass-shingled facade crisscrossed by a series of glass-enclosed stairways that highlight a vivid tableau of students circulating within. The unique system encourages collaboration—and a new dialogue between campus and community that is sure to be conversation for decades to come.

Architect: Skidmore, Owings & Merrill
Photograph: Tex Jernigan

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SUCCESS STORY:
THE HOTEL WILSHIRE, LOS ANGELES

In 2011, in the heart of Los Angeles' Miracle Mile, something truly amazing was born. Amidst the densely populated streets of Hollywood and Beverly Hills stood a relic. An old 1950s medical building destined to be turned into a pile of rubble. What happened next was nothing short of magical.

When real estate developers Michael Orwitz, Spence Mitchum and Justin Khorvash went looking for a location to create their Four Diamond boutique hotel, The Hotel Wilshire, even they couldn't have imagined the hidden gem they would find in this dilapidated six-story medical building. But, after assembling some of the best professionals in the hospitality business, it was clear that their endeavor was about to become a reality.

After finding a design team that shared their views on the importance of sustainability, they set their sights on making The Hotel Wilshire LEED Silver Certified. Which meant air quality, as well as occupant comfort, would be important factors.

Enter Mitsubishi Electric's VRF zoning systems. Mitchum had experience using the VRF zoning system with a previous boutique hotel. He knew the system's flexibility, performance and efficiency would play an important role in obtaining LEED certification for this 74-room boutique hotel.

The Mitsubishi Electric VRF zoning system proved to be a perfect fit. Twelve months after its opening, The Hotel Wilshire boasted a LEED Silver certification, 17 percent less energy use, and one of the best views in L.A. from its chic rooftop pool. Just the type of epic performance you'd expect from a star in the hospitality industry.

PROJECT SUMMARY

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AN EISENHOWER IMPASSE

NOBODY SEEMS TO LIKE GEHRY PARTNERS' DESIGN FOR IKE'S MEMORIAL ON THE NATIONAL MALL. WHERE'S THE DISCONNECT?

SUSAN EISENHOWER COMPARED THE SCHEME'S ENORMOUS WOVEN-METAL TAPESTRIES DEPICTING THE KANSAS PLAINS TO THE BARBED WIRE FENCES OF NAZI DEATH CAMPS.

THE DEBATE OVER Frank Gehry, FAIA's design for the Dwight D. Eisenhower Memorial in Washington, D.C., has been heated, and that's putting it mildly. At one point, presidential granddaughter Susan Eisenhower compared the scheme's enormous woven-metal tapestries depicting the Kansas plains to the barbed-wire fences of Nazi death camps. And in April, the National Capital Planning Commission threw up a regulatory hurdle, disapproving the design due to concerns that the tapestries and their 80-foot supporting columns would obstruct views of the U.S. Capitol.

It only gets worse. Last month, the architects offered up a revision with fewer tapestries. Rep. Darrell Issa, R.-Calif., aiming for compromise, suggested the tapestries be cut altogether. Gehry Partners threatened to disown the project if that happens. And Susan Eisenhower and her sister Anne Eisenhower called for "a complete redesign, which is open to all, including Gehry Partners." Lines have been drawn in the sand on the beaches of Normandy.

The conflict bears the taint of partisan politics, but the collective animus toward the design seems visceral, almost feral. What gives? Compared to Gehry's signature extreme geometries, the memorial design is sober and deeply rooted in the classical tradition. The giant rectangle of columns and tapestries is a lineal descendant of the agoras and forums of western antiquity, just as John Russell Pope's Jefferson Memorial recalls the Pantheon in Rome. It's the kind of precedent that should appeal to even the most conservative audience.

The problem, at least in part, is that Gehry's columns lack acanthus leaves. By adhering to modernist conventions of raw material and abstract form, the memorial design is wide open to interpretation. Fair-minded literalists—which is to say, many if not the majority of Americans—won't necessarily read it as an echo of Periclean Athens, writ in stainless steel and concrete. Instead, they easily might perceive it as an affront to Eisenhower's memory—inappropriately industrialized and, perhaps worse, oversized. In *The Washington Post*, Roger K. Lewis, FAIA—a thoughtful critic, and no literalist—used the word "bloat" to describe Gehry's expansive (and expensive) approach to the 4-acre site.

So what would be preferable? That's easy. Eisenhower, his descendants say, was a modest man, and he would want a modest memorial. Before his death last year, the president's son, John Eisenhower, offered an alternative vision: "a green open space with a simple statue in the middle, and quotations from his most important sayings." It sounds nice.

To a generation and more, Eisenhower was a hero, and it must be bewildering that Gehry doesn't treat him as such in a conventional way. But here's the catch: Critically approved progressive artists don't do straight portraiture, any more than their architect counterparts do straight classicism. Those who do, do so at their peril. One of my predecessors as AIA magazine editor, Deborah Deitsch, Hon. AIA, likened Friedrich St. Florian's World War II Memorial, with its twin triumphal arches, to the work of Adolf Hitler's architect Albert Speer. (So, you see, the insult rubs both ways.)

Many architects and artists are skeptical of the Great Man approach to commemoration. Apotheosis isn't part of the creative vocabulary anymore, at least not without a big dose of irony. Gehry sidestepped the issue and depicted the landscape of Eisenhower's home state, rather than the Normandy landings, portrayed him as a barefoot boy, rather than a warrior on horseback or statesman enthroned. In this, the architect certainly means no disrespect. His instinct is to humanize the man, not deify him.

As painful as it may be, if Gehry Partners withdraws, the scheme should be scrapped and a new design competition should be held. In this tale of two cultures colliding, the architect's viewpoint deserves as much respect as the Eisenhower family's.

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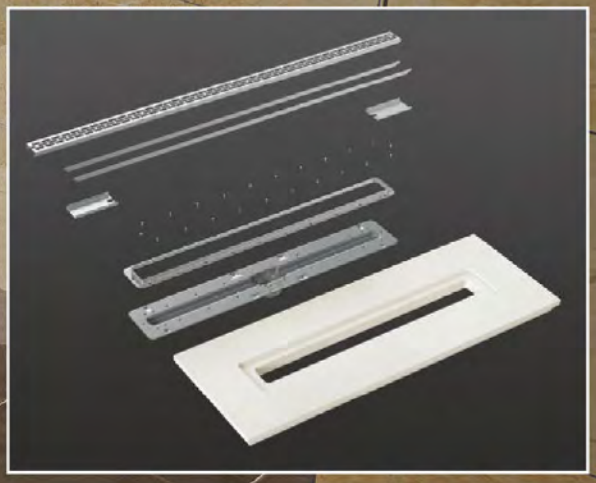

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CONTRIBUTORS

PETER ARKLE

Peter Arkle is a freelance illustrator who lives in the East Village in New York City. He has recently drawn portraits of various famous French politicians for *M* (*Le Monde*'s style magazine), a bunch of innovative business people for *Outside* magazine, and a collection of young poets for *The New York Times Book Review*. *This is Pollock*, an illustrated life story of Jackson Pollock (written by Catherine Ingram) was published this year by Laurence King Publishing. "Pollock's gloomy expression was very satisfying to capture," Arkle says.

Arkle enjoys the challenge of drawing portraits. "Most people are far more complicated than a few black ink lines, so it can be challenging to do a portrait in such a simple way," he says. "The lines have to land in exactly the right place and it can be really easy to draw too many lines. It's easy to make people look old or to put emphasis on the wrong features. Dark-haired people are easier. Dark-haired people with glasses and beards are really easy. But easiest and quickest of all are bald men with glasses."

He is currently working on hundreds of complicated illustrations for a textbook on human communication for Bedford/St. Martin's, which will appear next year.

In addition to the illustrations on this page, you'll find Arkle's portraits in "The Emerging Role of the Design Editor" on page 72.

KARRIE JACOBS

Karrie Jacobs is a professional observer of the built environment. She writes regularly for ARCHITECT (where she's a contributing editor), *Travel + Leisure*, and *Fast Company*'s Co.Design website. She's also a faculty member at School of Visual Arts' graduate program in Design Research, Writing and Criticism. The author of *The Perfect $100,000 House: A Trip Across America and Back in Pursuit of a Place to Call Home* (Viking, 2006), Jacobs was the founding editor-in-chief of *Dwell* magazine. Prior to launching *Dwell*, she served as the architecture critic for *New York* magazine and was also the founding executive editor of Benetton's *Colors* magazine.

Read about Jacobs's recent visit to Houston and whether that city can embrace a walkable future on page 100.


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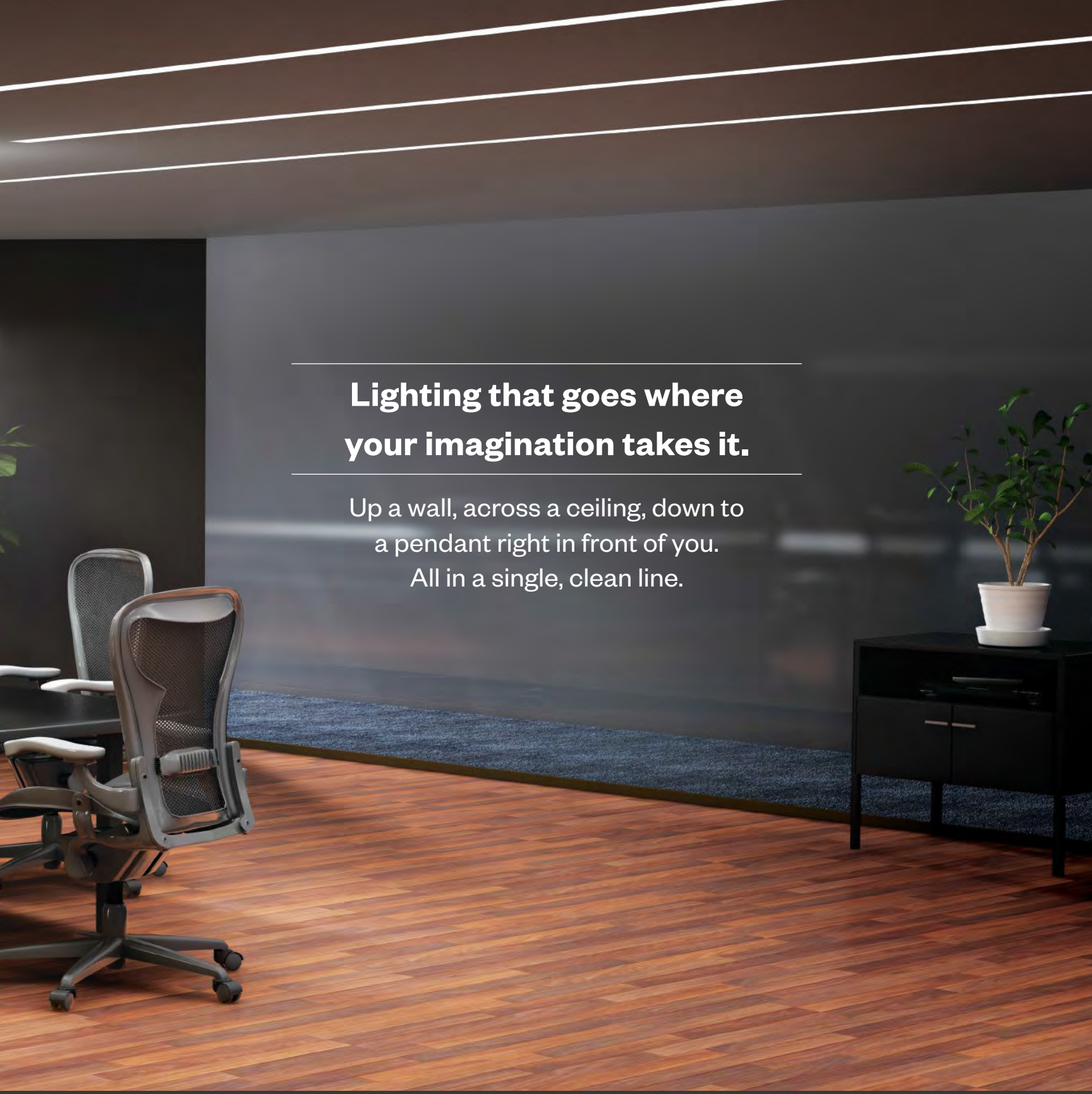

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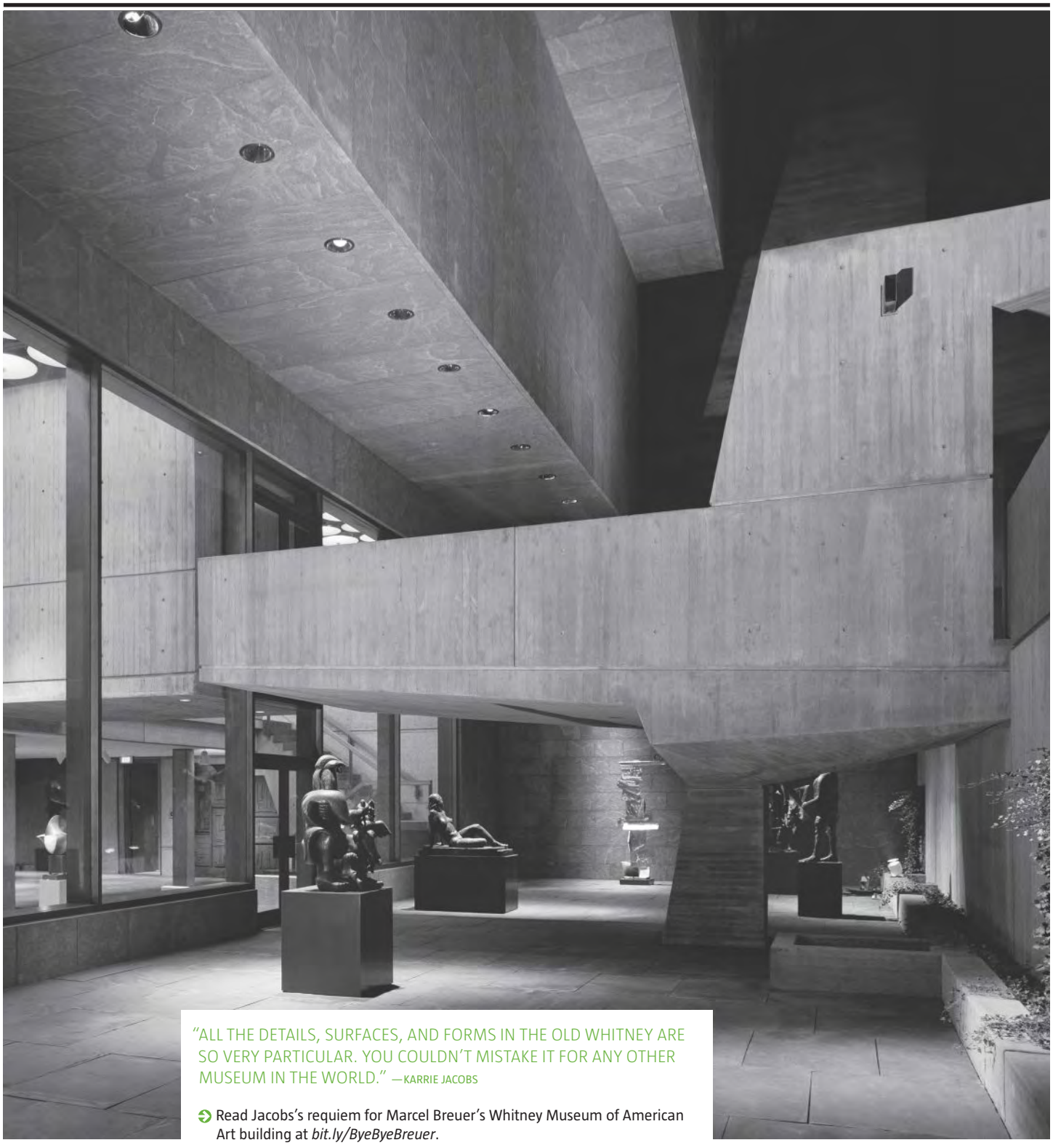


"ALL THE DETAILS, SURFACES, AND FORMS IN THE OLD WHITNEY ARE SO VERY PARTICULAR. YOU COULDN'T MISTAKE IT FOR ANY OTHER MUSEUM IN THE WORLD." —KARRIE JACOBS

Read Jacobs's requiem for Marcel Breuer's Whitney Museum of American Art building at *bit.ly/ByeByeBreuer*.

EZRA STOLLER/ESTO

DETAIL:
HEYDAR ALIYEV INTERNATIONAL AIRPORT

AUTOBAN CREATES A WOODEN VILLAGE TO ENCOURAGE WANDERING IN A VAST TERMINAL.

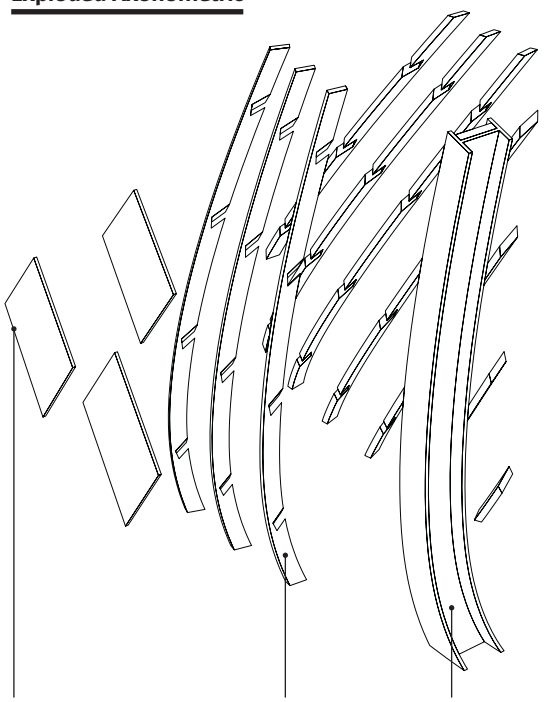
SINCE GAINING independence in 1991, Azerbaijan has sought to elevate its design stature. In June 2012, the government commissioned the Istanbul-based architecture studio Autoban to design the 645,835-square-foot interior of Baku's Heydar Aliyev International Airport, designed by Arup.

The centerpiece of Autoban's work is a series of 16 wooden cocoons, which house everything from a ticket kiosk to cafés and give a human scale to the spacious terminal. The firm designed five types of cocoons, ranging from 305 square feet to 3,700 square feet, 20 feet to 34 feet in height, and 20 feet and 39 feet in diameter. The structures comprise a latticework of bent timber members slotted together. "To make the cocoons, we played with natural materials and worked with craftsmen, but we also used CNC milling and laser-cutting," Autoban partner Seyhan Özdemir says.

CNC machines created molds to curve the structural beams and cladding panels, which were laser-cut by contractor Mapa, in Ankara, Turkey. The largest cocoon uses 2,050 panels in 40 different sizes. "We're interested in creating a balance between ornament and control," Autoban partner Sefer Çağlar says. "Things here are usually overdesigned. This airport represents a new Baku."

SHONQUIS MORENO

Exploded Axonometric



Laser-cut birch plywood panels with oak veneer, 0.87" thick

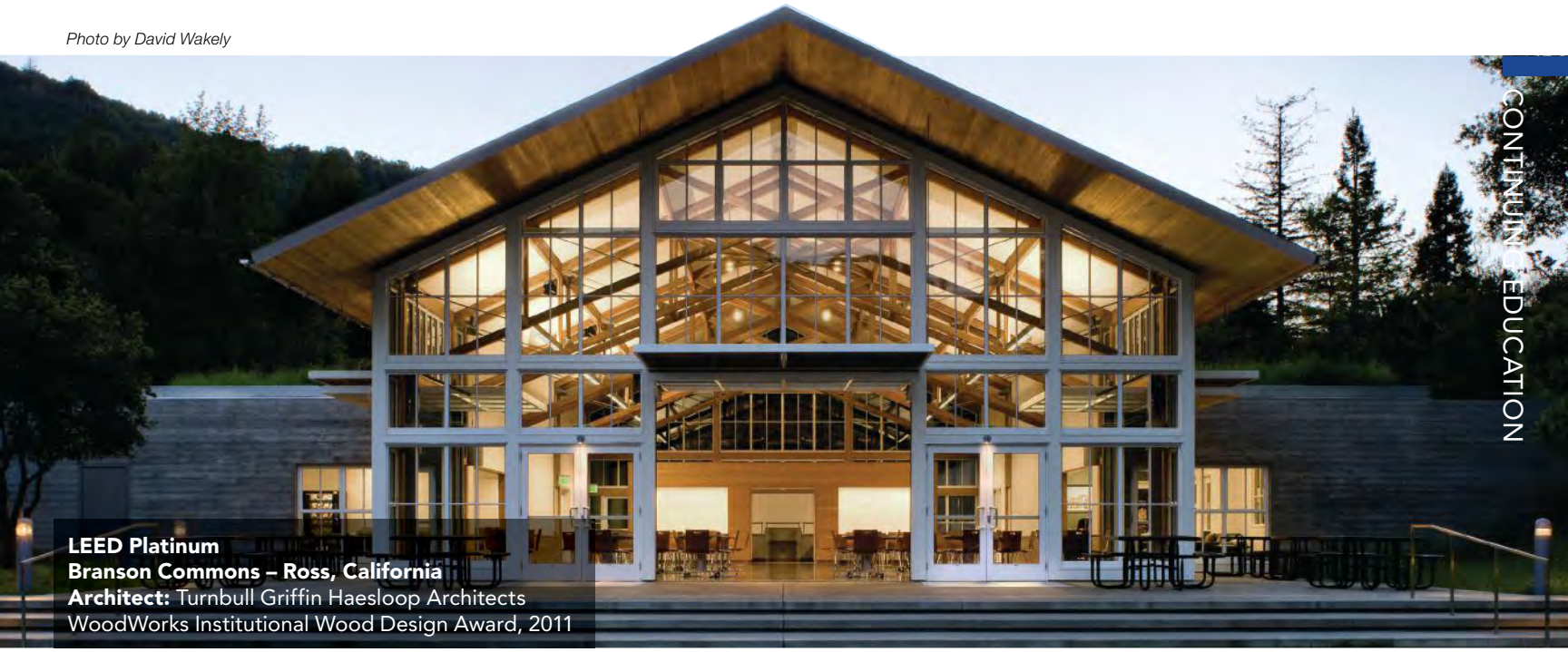
Laminated ayous wood beams

Curved steel column at cocoon openings

KEREM SANLIMAN

See more of Autoban's custom wood cocoons and finishes used inside the Heydar Aliyev International Airport at *architectmagazine.com*.

Photo by David Wakely



LEED Platinum
Branson Commons – Ross, California
Architect: Turnbull Griffin Haesloop Architects
WoodWorks Institutional Wood Design Award, 2011

Wood Products and Green Building

Rating systems increasingly recognize wood's environmental advantages

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

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

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

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

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

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Learning Objectives

After reading this article, you should be able to:

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

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

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Q+A:
AJAITA SHAH

THE FOUNDER AND CEO OF FRONTIER MARKETS IS EMPOWERING A POPULATION IN NEED OF RELIABLE ELECTRICITY WITH SOLAR ENERGY.

Learn more from Greenbuild master speaker Ajaita Shah and earn an AIA HSW Learning Unit on Friday, Oct. 24 at 8 a.m. (New Orleans Theater).

WITHOUT DEPENDABLE access to electricity, more than half of the world's population turns to unsafe lighting and cooking practices, which lead to 2 million deaths each year. Having lived in such circumstances, Ajaita Shah founded Frontier Markets (FM) in 2010 to bring solar-powered products to people in remote rural areas in India.

Shah, who was born in New York and studied international relations at Tufts University, found that a lack of education, access, affordability, and trust in the technology has hindered its use in India. Inspired by Sears, Roebuck and Co.'s on-the-ground efforts to sell services alongside its products at the turn of the 20th century, Shah created a localized solar economy—one that educates sales personnel, distributes products to remote customers, and services the products sold—in the Indian states of Rajasthan and Andhra Pradesh.

Today, FM has 35 staff members who have sold about 50,000 solar-powered products—from flashlights to home lighting kits, street lights, and power packs—to 25,000 households and businesses. ARCHITECT spoke with Shah about converting a nation once skeptical of solar. WANDA LAU

How do you train your staff and vet your products?
We have a lot of engineers and we take on local folks who understand wiring and batteries, and then train them in solar solutions. We get feedback on what households need and then [research] the market. Our engineering team [tests the products], and then we take the products back into the market for more feedback. The products are not necessarily the best quality because it's also a price-point issue, but we manage customer expectations. We also work with the International Finance Corp. on its Lighting Africa initiative, and look at what products they qualify as high quality.

How do you generate revenue?
It's strictly from product sales. On the Frontier Innovations Foundation's side, which is based in the U.S., we do a lot of consulting work and research as well. Until now, the market focused on maximizing the first dollar immediately. That should be your long-term goal. The first goal is build a relationship of trust and get [households] to transition. If that happens, money follows.

How would you convince U.S. households to use solar?
In America, the cost of electricity is very low and it's a given that you'll have access to electricity. Converting [American households] to solar is a lot harder. We do it well [in India], but I've spent 10 years here building a team and viewing the market and the customer.

How can architects help?
Get in touch. It would be amazing to get a renowned architect—or someone who is interested—to come to India and help out. We always are looking for partnerships and trying to bridge the different verticals. We're starting to work with universities in the U.S. on thinking through design affordability. They don't understand working on the ground, so FM and Frontier Innovations can bridge that gap.

What design skills are useful?
We can come up with the typical amount of solar required to cover a household's energy requirements, but, at the end of the day, an architect who can make [solar solutions] gel into the infrastructure is naturally important.

JEFF SINGER

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TOO BIG

At the end of August, officials in Park City, Utah, rejected Copenhagen, Denmark–based Bjarke Ingels Group's (BIG) second proposal (below) for an expansion to the Kimball Art Center, deeming it incompatible with both the historic Kimball building and the city's Main Street. BIG's first proposal (above), which had won a 2013 P/A Award but also had exceeded the Park City's 48-foot height limit, drew the ire of locals—spurring the more subdued revision. With the addition, the museum seeks to double its size to 30,000 square feet, and had planned to start construction in 2015. DEANE MADSEN

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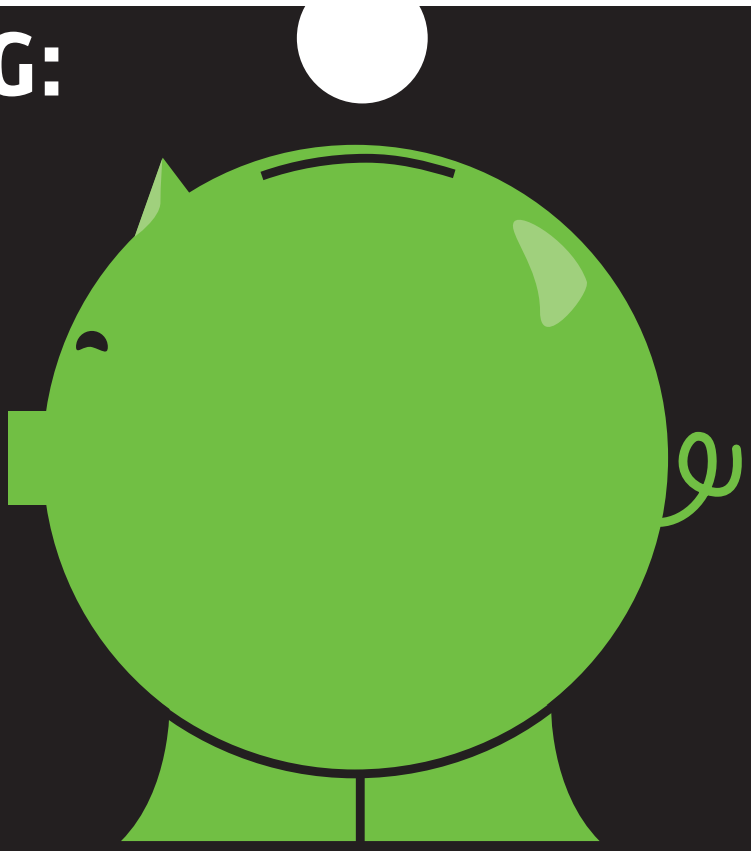

How can you find the right space and the appropriate tools at a reasonable price to guarantee that the investments you make will be beneficial for your firm? Aside from salaries and benefits to its employees, the largest investments that a firm makes are on its physical office space and the tools it needs to get the job done. Choosing the best and most appropriate setting for a practice can be daunting. So can pouring tens of thousands of dollars into software. But with the right considerations, firms can help ensure that their investments pay off. NATE BERG

TIP 1:

It seems like you need a crystal ball to pick the right amount of office space. Given market fluctuations—let alone economic meltdowns—it's difficult to predict if your firm will double or dwindle. So you can only make an educated guess about the near future. Herbert Cannon, president of AEC Management Solutions, suggests negotiating your lease to provide a way out if things change dramatically. "I would be willing to pay a little bit more per square foot or per month in exchange for an option of getting out of the lease early if need be," he says.

TIP 2:

Sometimes it might make more sense to buy office space than to rent it. This is especially true if your firm and its practice area are already well established. But Cannon notes that if you decide to buy, you will need to budget for greater costs up front. "Generally, if you own the building, your short-term rent expense is going to be higher," he says. Renters typically pay about 5 percent of their net revenues on basics like rent and utilities, while owners can expect to pay 7 to 7.5 percent.

TIP 3:

Architects should use their offices as examples of their work. "Linking their space to the value of their design is imperative," says Lisa Henry, CEO of Norcross, Ga.–based Greenway Group. While the firm's physical look is important, Cannon advises weighing functionality against a desire to impress. "One of the big mistakes that firms make is investing too much money in interior fit-outs and doing built-ins," he says. Instead, go with "either a minimalistic approach or some sort of pre-fab products that you can break down and take with you."

TIP 4:

Investing in hardware and software should be a staple of your business plan. Most major software offers annual license fees, and keeping up with the licenses ensures everyone is using the latest version of the program. Henry tells her clients to think before they license, to ensure that the biggest and best programs are necessary. "You really need to budget that it's going to be completely replaced every three years," Cannon says. That may seem drastic, but it's the cost of doing business—and investing in the future.

Up and Running, a monthly series on starting your own firm, is proudly supported by Graphisoft. For more Up and Running, visit *architectmagazine.com*.

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Awards: Ma Yansong won the first China Architecture Design in 21st Century award in 2013.
On The Boards: Harbin Cultural Center, Harbin, China (above, est. completion 2015); Chaoyang Park Plaza, Beijing (below, est. completion 2016). MAD Architects won the commission for Chicago's Lucas Museum of Narrative Art (not pictured), to be built in collaboration with Chicago's Studio Gang Architects. Read more in our Q+A at *architectmagazine.com*.
Notable Work: Absolute Towers, Mississauga, Ontario (right, completed 2012), which won a Building of the Year Award for Housing from ArchDaily.

Every month we dedicate this space to work that architects have uploaded to our online Project Gallery. Publish yourself at *architectmagazine.com/projects*.

RIGHT: IWAN BAAN

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GEHRY'S EISENHOWER CHANGES MEET MORE RESISTANCE

ISSA TRIES TO RALLY SUPPORT AT SEPTEMBER NATIONAL CAPITAL PLANNING COMMISSION HEARING.

THE SAGA OF the design for the Dwight D. Eisenhower Memorial by Frank Gehry, FAIA, continues. Last April, the National Capital Planning Commission (NCPC), one of the federal agencies that must approve the memorial, turned thumbs down on the design. On Sept. 4, one of Gehry's partners, Craig Webb, AIA, returned to the NCPC to present a revised plan.

The changes are considerable. The tapestry side panels included in the original design have been removed entirely, and now single columns mark two corners of what the architects call an "urban room." This change opens up the view shed along Maryland Avenue to the U.S. Capitol from 95 feet to 135 feet, which was one of the NCPC's concerns, and it also allows the existing federal buildings on the east and west of the site to define the memorial square, which was another.

The NCPC, which "represents federal and local constituencies with a stake in planning for the nation's capital," is charged with overseeing urban planning; aesthetic matters are the purview of the U.S. Commission of Fine Arts, the other federal agency that reviews memorials in D.C.

Nevertheless, at least in the case of the Eisenhower Memorial, the NCPC seems intent on making judgments about design. Listening to the commissioners struggling to elucidate subjects such as "scale" and "spatial definition," their lack of architectural or artistic expertise was painfully evident.

The most cogent remarks came from Rep. Darrell Issa, R-Calif., who is one of seven ex officio members on the commission. Issa is in favor of going ahead with the memorial design in its current state. "We can't go back to square one," he said. "We can't throw away 15 years, based on the idea that for another $10 or $20 million, starting from scratch, somehow we will get to anything other than another opportunity for it not to be perfect for someone."

Unlike his fellow commissioners, Issa seemed to understand that Gehry's redesign is mainly a (reluctant) response to the NCPC staff chipping away at his concept. More chipping, Issa observed, would only further weaken the project.

Issa recounted that he recently visited Gehry's Los Angeles office and was shown "the rejected designs, the semi-rejected designs, and the you-think-we-would-reject-them designs." He let slip that Gehry told him that he would be willing to give up the tapestry altogether and take his name off the project. It may yet come to that.

Although Issa offered a compromise—approve the design but start by building only the landscape elements—the critics of Gehry's concept haven't budged.

In mid-September, Anne and Susan Eisenhower, the late president's grandchildren, wrote a letter to the commission stating that Gehry's changes had failed to solve the issues raised by various stakeholders.

Later this year, Gehry is expected to seek final approval from the NCPC. Judging from the tenor of the latest meeting, his chances are slim. But as Issa told his fellow commissioners, "Our support will still face a number of challenges that undoubtedly will delay it."

WITOLD RYBCZYNSKI, HON. FAIA

Rybczynski was a member of the U.S. Commission of Fine Arts when it approved Gehry's concept design for the memorial in 2011.

COURTESY EISENHOWER MEMORIAL COMMISSION

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BRANCHING OUT

WHOLETREES ARCHITECTURE & STRUCTURES USES SCRAP TREES AND STEEL TO REDEFINE STRUCTURAL TIMBER.

A TREE'S NATURAL strength is often compromised in wood-frame construction. But WholeTrees Architecture & Structures in Madison, Wis., is recouping it by engineering tree trunks and small-diameter (4 to 21 inches), round timber—removed as scrap during routine forest thinning—as columns, beams, and trusses. The firm says the wood rivals steel's strength-to-weight ratio and costs slightly less.

The trick is to preserve the naturally occurring pre-tensioned structural fibers that allow trees to grow upwards against axial loads while withstanding lateral ones, say Roald Gundersen, AIA, and Amelia Baxter, who founded WholeTrees in 2007. Their 14-person team sources species such as ash, black locust, oak, and pine from public and private forests in the upper Midwest. It visually grades wood with uniform dimensions based on ASTM standards for structural poles while the non-uniform pieces are scanned as a 3D mesh and analyzed digitally to identify structural weak spots.

Since 2010, WholeTrees has worked with the U.S. Department of Agriculture's (USDA's) Forest Products Lab in Madison to refine its analysis algorithm and to engineer a steel–wood connection for its truss products that replicates tree branches' innate joinery.

Now, the firm wants to take the material mainstream with licensable software that processes 3D tree scans to improve ASTM grading, help assign design loads to non-uniform elements, and create an online model library of engineered trees. A $504,000 USDA grant is supporting a pilot of the software at two timber staging yards. And the firm hopes imperfect round timber will soon join materials like steel and concrete in BIM.

HALLIE BUSTA

A 26-foot-tall, load-bearing black willow tree replaces a steel column at the Myrick Hixon EcoPark (top) in La Crosse, Wis., while branched timber frames a bandshell at Organic Valley's LaFarge, Wis., headquarters (above).

While you're at Greenbuild, visit WholeTrees Architecture & Structures at *Booth 2557*.

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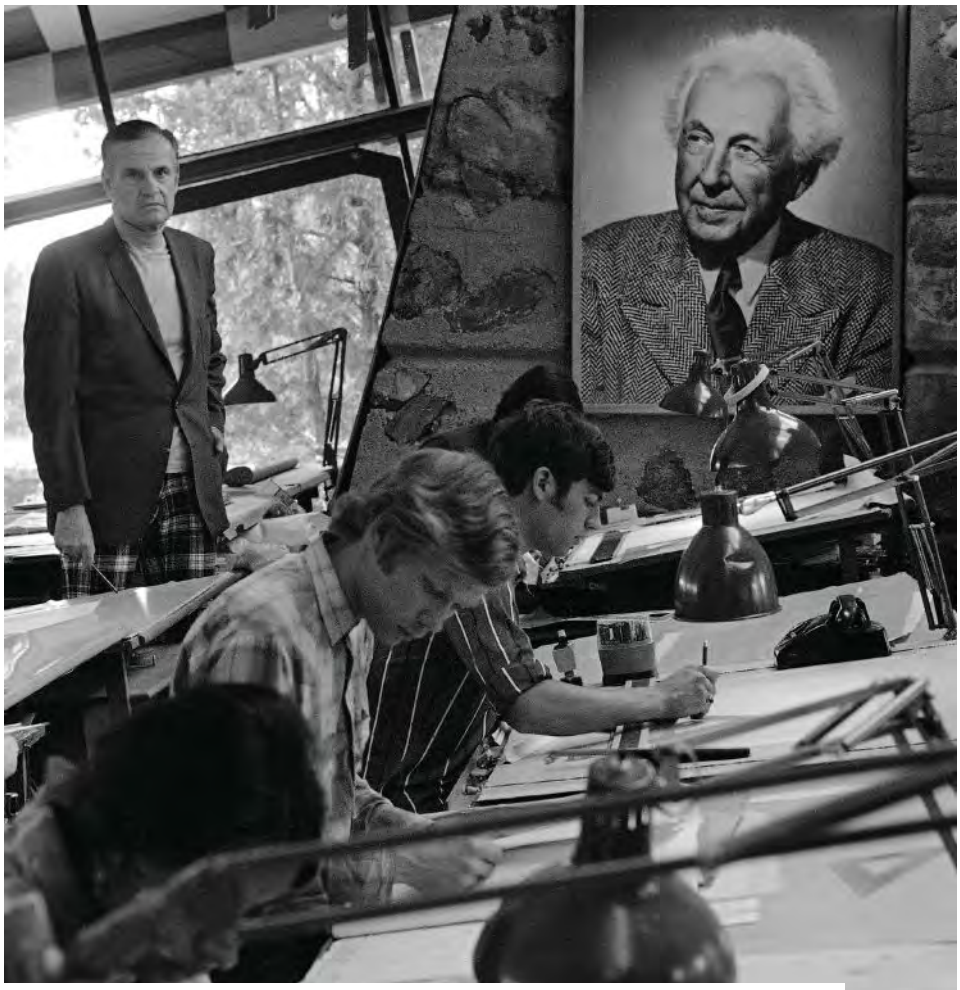

TURMOIL AT TALIESIN

DUE TO BY-LAW CHANGES ESTABLISHED BY THE HIGHER LEARNING COMMISSION IN 2012, THE FRANK LLOYD WRIGHT SCHOOL OF ARCHITECTURE COULD LOSE ITS ACCREDITATION IN 2017.

THE FRANK LLOYD WRIGHT School of Architecture faces accreditation loss in 2017, due to new rules instated by the Higher Learning Commission (HLC), a Chicago-based regional accrediting body. HLC accreditation is required by the National Architectural Accrediting Board (NAAB), the agency that evaluates all U.S. master's degree programs in the field.

The HLC adopted by-law changes in 2012, stating that accredited institutions must be separately incorporated from sponsoring organizations. The school—which includes campuses at Taliesin West in Scottsdale, Ariz., and Taliesin in Spring Green, Wis.—is part of the Frank Lloyd Wright Foundation, which also runs the two Taliesins, and helps maintain collections of Wright's work.

The HLC's by-law changes require the Frank Lloyd Wright School of Architecture to file for incorporation as an institution with a primary purpose of offering higher education. The HLC has offered the school a two- to three-year time frame for it to file for incorporation to meet the requirement. Now, it is up to the school to decide whether or not to make that change.

"The foundation had concerns when the HLC conveyed the simultaneous need for significant financial guarantees and true autonomy—no direct governance and no operational control," Frank Lloyd Wright Foundation President and CEO Sean Malone said in an interview with ARCHITECT. "We worked, for some time, on the basic premise of whether the foundation itself could be considered an institution of higher education, because we are involved so heavily in higher education, it's so central to our mission, and we've been doing it for so long."

The school, which dates back to 1932, earned NAAB accreditation in 1992. And this is not its first HLC warning—the accrediting body put it on notice in June 2005, and again in November 2010, for issues related to governance.

Malone broke the news to the school's 20 students on Aug. 21. All currently enrolled students will be able to complete their accredited education with their current program.

The school is exploring its options, which, at this time, include a post-professional program that would not require HLC accreditation and potential academic partnerships with accredited institutions that might allow the school to continue to offer an M.Arch. degree beyond 2017.

But the school's leaders do not share a unified vision. Jerry van Eyck, a member of the school's Board of Governors, told ARCHITECT, "What has come to light is a difference of vision, of opinion, of where the school goes. ... The path the foundation is currently on will inevitably lead to [the school's closing]."

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August 2014

Architecture Billings Index

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Institutional

54.0

↑ 0.4 pt

Mixed Practice

57.1

↓ 0.4 pt

Commercial

50.4

↓ 0.3 pt

Multifamily Residential

58.1

↑ 1.7 pts

NOT IN MY FRONT YARD

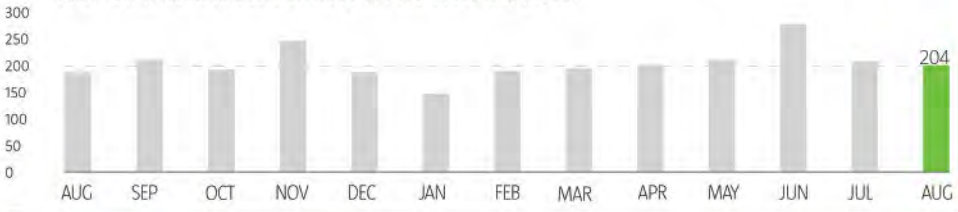
On Sept. 11, Raleigh Superior Court Judge Elaine Bushfan said that she will rule in favor of local architect Louis Cherry, FAIA, and the contemporary home he designed in Raleigh's Oakwood Historic District. Construction of the house, halted since November, can now be completed. Last October, the Raleigh Historic Development Commission (RHDC) granted Cherry the necessary certification to build the house on Euclid Street for himself and his wife. Then in November, neighbor Gail Wiesner appealed the RHDC's ruling to the city's Board of Adjustment (BOA). Wiesner, a real estate agent, said the new house did not match the Oakwood district's historical character and threatened the value of her own home, and filed appeals for the next four months. In February, the BOA reversed the RHDC's approval. On Aug. 25, the case went to Wake County Superior Court, and, to ensure fairness, Bushfan was brought in from Durham, a neighboring city of Raleigh. **CHELSEA BLAHUT**

25

Number of bacterial cultures and fungus strains that researchers at Italy's University of Bologna and Sweden's Royal Institute of Technology in Stockholm have discovered that can degrade petroleum-based polymers such as PVC, polystyrene, polypropylene, and polyethylene.
BLAINE BROWNELL, AIA

Read the full story at *bit.ly/MicrobesEatPlastic*.

ADP NATIONAL JOB GROWTH IN THOUSANDS



BOB BERKEBILE AND MAKE IT RIGHT WIN HANLEY AWARDS

BNIM's longtime principal is the 2014 winner of The Hanley Award for Vision and Leadership in Sustainability, and Make It Right of New Orleans is the 2014 winner of the first annual Hanley Award for Community Service in Sustainability. Berkebile, FAIA, the "B" in the Kansas City, Mo.–based firm, will receive $50,000, making the Hanley Award the largest annual award for sustainability in the built environment. Make It Right will receive $25,000 for its award, which was created to recognize community-based and nonprofit organizations working to advance sustainability and environmental awareness in the host cities of the annual Greenbuild International Conference and Expo, which takes place this year in New Orleans. The two awards will be presented at The Hanley Award dinner during Greenbuild, which, this year, will be on Oct. 21.

August Jobs Report

New construction jobs reported by the U.S. Department of Labor's Bureau of Labor Statistics

13,200	+	900	+	5,500	+	2,700	=	**22,300**
Residential Construction		Heavy and Civil Engineering		Nonresidential Construction		Architectural and Engineering Services		Total Construction Jobs Added

STEP UP

Hernan Diaz Alonso
Director
Southern California Institute of Architecture

Alonso will be the SCI-Arc's director starting in the next academic year, replacing Eric Owen Moss, FAIA.

Charlie Rose
Vincent Scully Prize

The National Building Museum selected the TV journalist and interviewer as the 16th laureate of this prize that honors excellent work in architecture, historic preservation, and urban design. [Note: Our editor-in-chief Ned Cramer was a member of the jury.]

Sheila Kennedy, AIA
Berkeley-Rupp Architecture Professorship and Prize

The architect and professor won the $100,000 prize, which includes a professorship, public lecture, and gallery exhibition.

Chris van Duijn
Ippolito Pestellini Laparelli
Jason Long
Michael Kokora
Partners
The Office for Metropolitan Architecture, Rotterdam

John Chau, AIA
Stephen Van Dyck, AIA
Rafael Viñoly-Menendez, AIA
Partners
LMN Architects, Seattle

William Turner, AIA
Principal
Valerio Dewalt Train Associates, Chicago and Palo Alto, Calif.

Roland Binker, AIA
Associate principal and senior medical planner
Perkins+Will, Washington, D.C.

Steve Pearson, AIA
Principal and national director of military programs
RNL, Denver

Robert Cull, AIA
Senior vice president and managing principal
HOK's Los Angeles office

STEP DOWN

David Neuman, FAIA
The architect for the University of Virginia is stepping down in October.

David Brussat
The architecture columnist is no longer writing for *The Providence Journal*, but is still writing for his blog *Architecture Here and There*.

Bruce Guenther
The Portland Art Museum chief curator is retiring on Oct. 20.

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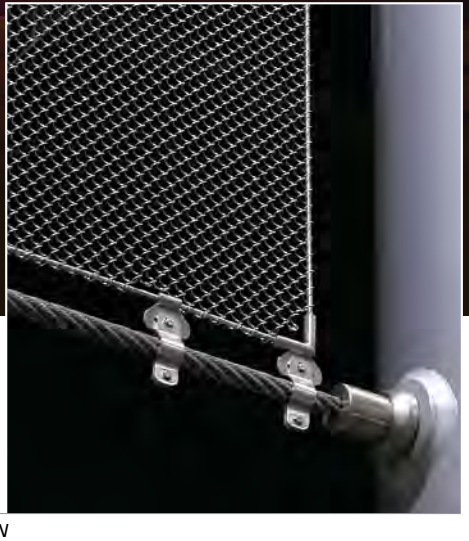

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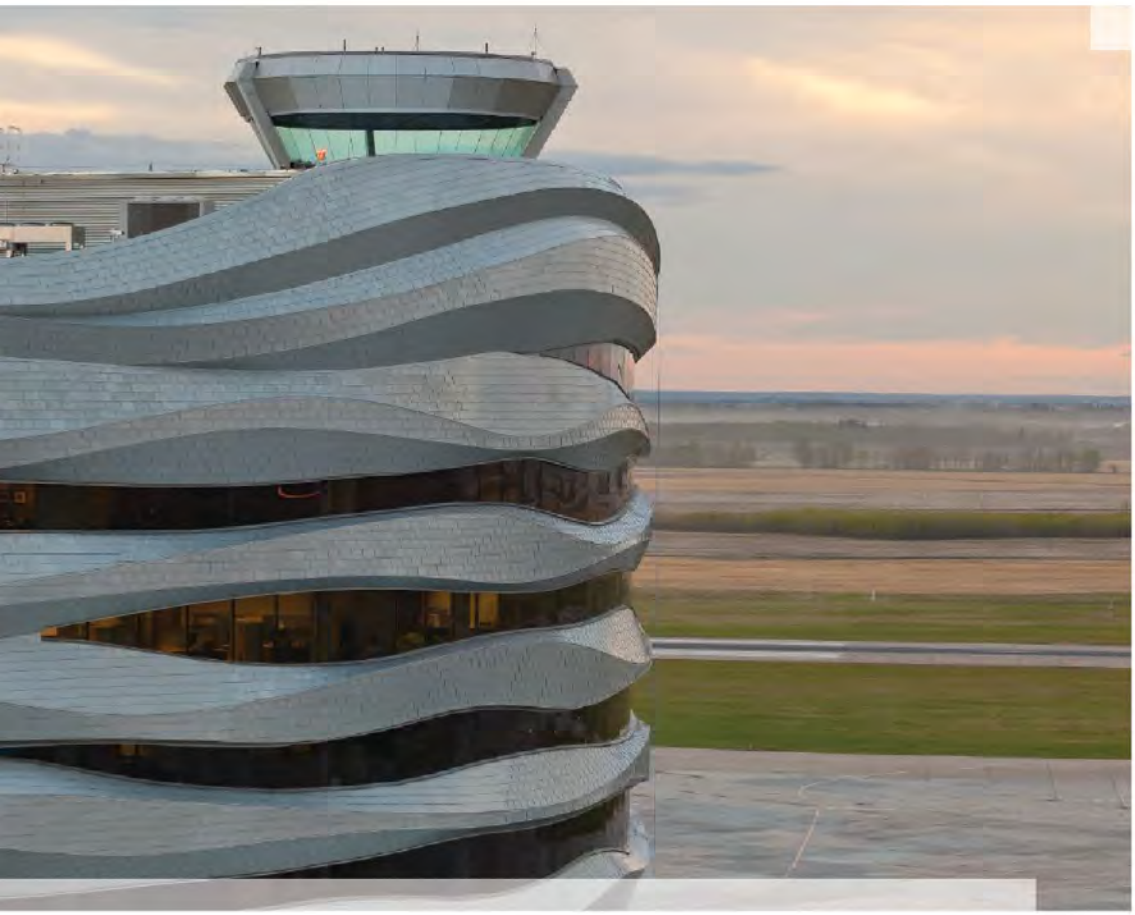

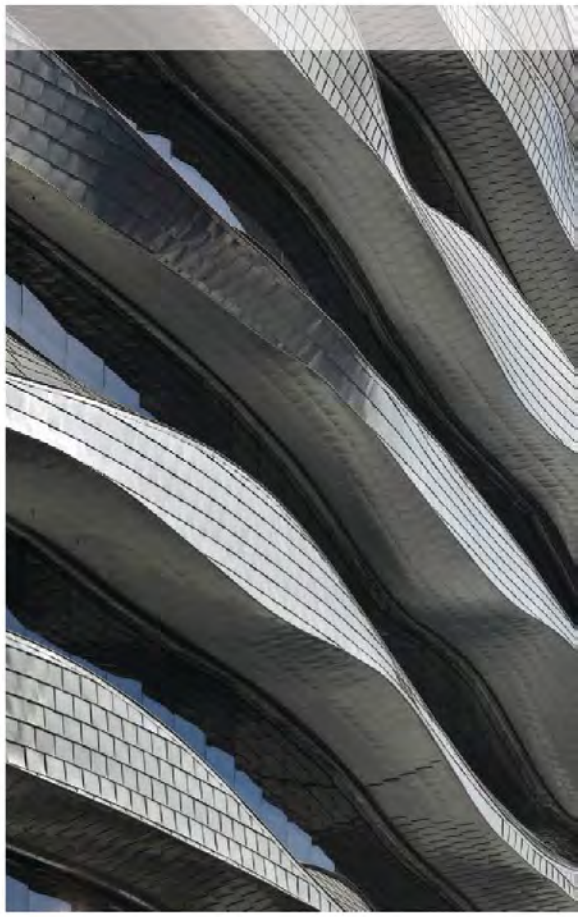

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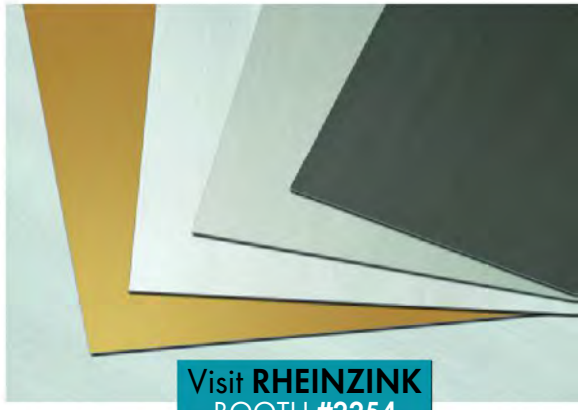

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AIAVOICES

ORDINAL SCALES | RATING RESEARCH'S FUTURE

Keith Diaz Moore, AIA, is the new dean of the University of Utah College of Architecture + Planning and the current president of the Architectural Research Centers Consortium. "Architects have been engaged in research, even if we haven't always called it that," says Moore, who holds a doctorate in architecture from the University of Wisconsin-Milwaukee School of Architecture & Urban Planning. "Looking anew at the term, we can see a continuum of purpose that drives design innovation."

FOR ME, THE VALUE OF ARCHITECTS AND ARCHITECTURE IS VERY personal. Research should matter to architects because what we do has such an impact on quality of life. So having the best understanding we can of building performance, for instance, improves the quality of our work. To me, research is about inspiring creativity. When you know more, you see things from different perspectives—it's that simple. What we can then provide to our community is innovation. Certainly, we can start off in a participatory process with the community and our clients, but it's the feedback after the fact that matters immensely. We need partnerships with our clients, in other words, to build a knowledge base for successive generations of buildings, whose architects are working smarter and better than ever before.

To me, data is an overlay for architectural education. Aggregating data, looking for themes and patterns, and designing accordingly is really an important component of architectural education, one that enriches the design fundamentals that students need to learn. We may respond to new technologies or new conditions pedagogically, but as educators we are still trying to train students to be creative about ensuring the health and well-being of our communities and environments.

One of the issues, in terms of research in architecture, has been cultural assumptions of what research means. When architects hear "research," sometimes they confront a mental hurdle that has to do with onerous statistical calculations. But interviews, focus groups, surveys, observational data, mapping—the things architects have always done—are all legitimate qualitative spheres of research. In the last decade or so, and thanks in large part to sustainability as a unifying focus and cause, architects are learning to be both qualitative and quantitative—and increasingly rigorous with both.

Here in Utah, there's a strong sense of community resilience at play—in terms of preservation, conservation, resource management, and infrastructure. Since we sit in a valley, there's also an air-quality issue here, with all of the automobiles driving around the basin. This is exacerbated by the fact that we're also experiencing one of the fastest urban growth rates in America. Utahans are very proud of the fact that they have five national parks in the state, so there's a strong spirit of ecological awareness. If our students can harness that spirit, we can drive the conversation about resilience research in this arid mountainous setting and create more ecologically caring environments. *—As told to William Richards*

Bernard Jester, Assoc. AIA
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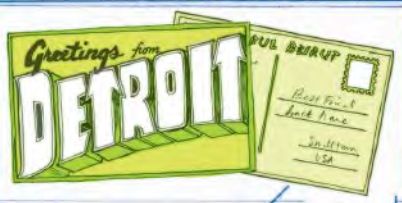
AIANOW

By William Richards
Art Direction by Jelena Schulz



2 ***Leg It.*** London's Architectural Association (AA) has embraced Fit City ideals and will host its monthly AA Night School Run Club, through Southbank this time (on Nov. 3), in a 10k jaunt past the London Eye, undercroft graffiti, and skater territory with "animating urban commentary."

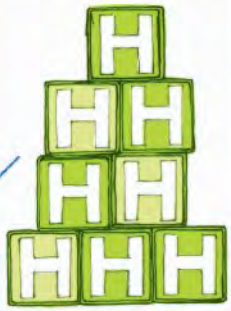
↗ Learn more at *nightschool.aaschool.ac.uk.*

1 ***Urban Analogies.*** Cities evoke associations. Detroit used to be the Motor City, but now it's the Shrinking City. Beirut used to be the Paris of the Middle East, but its beauty has been eclipsed by strife and abject destruction. "Composite Cities Istanbul," this year's European Symposium on Research in Architecture and Urban Design (Nov. 12–14 in Istanbul), will address urban evolution (and devolution) as it impacts our attitudes toward placemaking.

↗ Learn more at *eurau.org.*

3 ***Past Forward.*** The Savannah Historic District is one of the largest of its kind in the U.S. and, fittingly, the National Trust for Historic Preservation will hold its annual conference there (Nov. 11–14), with an emphasis this year on preservation activism, entrepreneurship, and climate change.

↗ Learn more and access the virtual option, TrustLive, at *pastforward2014.com.*

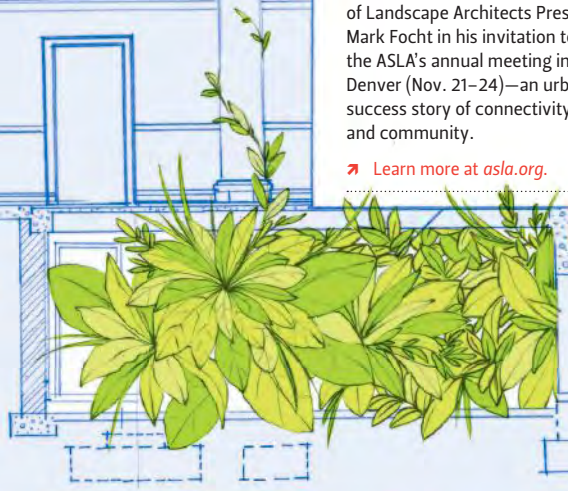


4 ***Spatially Speaking.*** Nov. 15–18 in San Diego, the Healthcare Design Conference (in association with the AIA Academy of Architecture for Health) will take a typological approach to pushing healthcare forward. As medicine advances, so do the spaces for preventative care, diagnostics, treatment, and recovery. As salutogenic approaches to health evolve, so must architects in their thinking.

↗ Learn more at *aia.org/aah.*

5 ***Land Ho!*** "Resiliency is inherent to how landscape architects are wired," says 2014 American Society of Landscape Architects President Mark Focht in his invitation to the ASLA's annual meeting in Denver (Nov. 21–24)—an urban success story of connectivity and community.

↗ Learn more at *asla.org.*



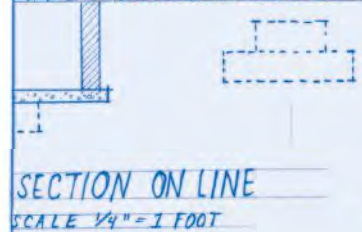


ILLUSTRATION: LAUREN NASSEF

FINIS ORIGINE PENDET

Research & Design *and the science of art*

AIAFEATURE

LEFT JITTERY BY THE OIL EMBARGO OF 1973, AND WORKING IN THE shadow of the oncoming energy crisis that 1979 would eventually bring, architects were greeted with a graphic of a purple sun rising above the eaves of a home on the cover of the inaugural issue of *Research & Design*, a short-lived quarterly publication produced by the AIA Research Corp. from 1978 to 1980.

While it would exist for only another two years (nine issues in total), the magazine represented a big step forward for presenting research—long written off as the domain of stuffy academics in starched lab coats—in an accessible manner to a profession that was slowly beginning to realize its necessity.

"*Research & Design* was intended to build an appetite and habit among architects for learning about and using reliable, meaningful research," says Thomas Vonier, FAIA, who, for three years, was an administrator at the AIA Research Corp., overseeing a portion of the staff that was working on several millions of dollars of research related to energy conservation and seismic safety.

Founded in 1972 and headed by John Eberhard, FAIA, the AIA Research Corp. was envisioned by the AIA as a vehicle to takeon architecture and urbanism research projects as a successor to the AIA Urban Design & Development Corp., founded in 1969 and shuttered in 1972. By the late 1970s, the AIA Research Corp. focused its efforts on the government grants made available during the Carter administration, working predominantly on energy conservation with government agencies such as the Department of Energy and the Department of Housing and Urban Development.

"Most research in the buildings sector was, and still is, about improving the technical basis of product manufacture—making better widgets, windows, doorknobs, claddings, and so on faster, at lower cost, and sometimes for greater reliability and performance," Vonier says. "The research that interested us was directed at improving overall building performance in terms of human factors and requirements: comfort, safety, functionality, economy of operation, and productivity, among others."

During its first five years, the Research Corp. proved that, regardless of whether or not architects accepted research as a valuable piece of their practice, it was undeniably big business. Under Eberhard's direction, the Research Corp. grew into a $10 million, 60-employee business, and *Research & Design*—distributed to all AIA members, more than 9,000 design firms, and numerous design schools—was its mouthpiece.

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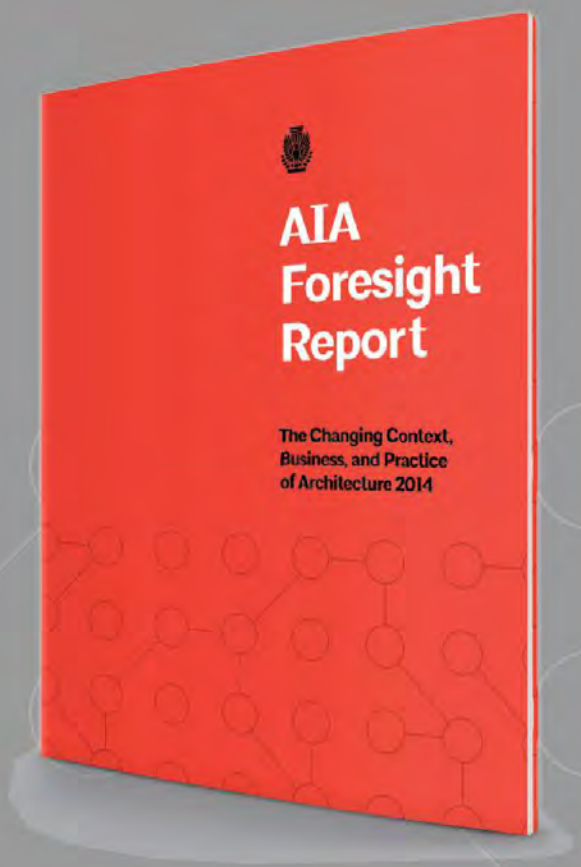

FREE to AIA members to download

In his opening letter in the magazine's first issue, Eberhard mused that getting the profession to embrace research held the potential to double the $2.5 billion in architectural fees generated annually at the time, while laying out the magazine's mission to "demystify research."

"Without a doubt, that was our goal," says James Scheeler, FAIA, who served as the AIA's interim executive vice president during the Research Corp.'s heyday. "A lot of our members had the veil lifted on the mystique of research."

While the AIA published *The Journal of Architectural Research* jointly with the Royal Institute of British Architects from 1972 to 1980, *Research & Design* was that drier publication's more laid-back companion. In that first issue, dedicated to solar design, editor Kevin Green set *Research & Design*'s tone, presenting solar design concepts in a lighthearted, accessible, and readily digestible fashion while still respecting the work's technical aspects.

The magazine briefly profiled Village Homes, a planned eco-friendly community in Davis, Calif., noting that it was not "just another free-spirited commune whose members feast on organic bean sprouts and drive around in pick-up trucks," but rather a 70-acre subdivision that was implementing smart solar design features such as north–south orientation, narrower roads that minimized the amount of heat absorbed and re-radiated into the environment, and rooftop solar collectors.

Later in the first issue, in the feature piece that surmised the Research Corp.'s solar research and opinions, Green used as an example the hermetically sealed structure created to transport Ireland's ancient Book of Kells during its late-1970s U.S. museum tour as a device to discuss modern design's "very complex architecture based on very complex systems contrived to control climate for human comfort."

According to Green, the magazine was, for most of its run, predominantly a two-man show. After being hired by Eberhard, Green turned to graphic designer Jack Beveridge, whose style graced the pages of publications such as *Smithsonian* and *Saturday Review*, to create the quarterly's signature look. Fred Greenberg took over the graphic reins after Beveridge, and he became responsible for the production of the magazine, while Green interpreted the corporation's research and presented it in his accessible style.

While there were a handful of architecture-focused magazines that existed at the time, none were taking a serious look at research, says Green, who left the architecture world in 2000, and has run a large floral and interior design business in suburban Washington, D.C., for the last 15 years.

"They would do technical features from time to time but nothing regular," he says. "But there was always a big proportion of architects who were interested in technical issues, not to mention cutting-edge issues."

Throughout its nine-issue run, *Research & Design* tackled a number of those issues, many of which are still being discussed in architectural publications today: seismic design, post-occupancy evaluation, and climate and architecture. The quarterly had an immediate impact. In a 1979 editor's letter, Green noted that the publication's very first issue generated more letters than the year's most controversial issue of *Time*—based on the percentage of its readers—and requests for back issues quickly exhausted the Research Corp.'s supply. After having glossed over energy issues in a major article on new American architecture, Green noted, *Newsweek* was planning a piece on energy-conscious design, and *Progressive Architecture* magazine would present some of the Research Corp.'s techniques in its own pages.

Research & Design even drew the attention of British billionaire and book, magazine, and newspaper publishing magnate Robert Maxwell, whom Green recalls meeting as he toured the Research Corp.'s offices with Eberhard.

Unfortunately, *Research & Design* would end its brief run shortly after it began to generate significant traction. As quickly as President Carter's solar panels were torn from the roof of the White House in 1980, the government grants dried up. Eberhard's departure in 1978, and the AIA's internal questioning regarding how much it should be directly involved in research, eventually led to the shuttering of the Research Corp., as well as *Research & Design* and *The Journal of Architectural Research* (both of which were almost completely grant-funded), in 1980.

> "We are better able to understand the effects of exposure to building materials and the urgent concerns of resiliency ... and see a much bigger picture about overall healthfulness." —*Thomas Vonier, FAIA*

Today, *Research & Design* has emerged from the Institute's archive and lives on as PDFs available on aia.org which also heralds the AIA's renewed commitment to research. In an attempt to create a spirit of collaboration between academics and practitioners, the Institute has, over the last decade, convened a handful of research summits and implemented two of its own research grant programs, something Vonier says was a key mission of the Research Corp.

The AIA has also partnered with the National Institute of Building Sciences to create the 21st-century descendant of *Research & Design*: the Building Research Information Knowledgebase (BRIK), a digital portal for peer-reviewed research and case studies. Earle Kennett, senior vice president and COO of the National Institute of Building Sciences, as well as a Research Corp. alum, says that the resource contains nearly 1,200 historical and contemporary papers and counts roughly 800,000 users.

A look through the abstracts generated by the AIA show that, nearly 40 years later, the work of the Research Corp. still reverberates, and many architects, academics, and building-science researchers continue to invest their intellectual capital into energy efficiency and building performance. As Vonier points out, however, sustainability mandates center squarely on both short-term goals and long-term impact on building inhabitants.

"Today," he says, "we are better able to understand the effects of exposure to building materials and the urgent concerns of resiliency—in the form of resistance to disasters, deliberate attacks, and accidents—and see a much bigger picture about overall healthfulness." —*Dominic Mercier* AIA

↗ Read back issues of *Research & Design* at *aia.org/practicing/research* and visit the AIA's Research Resource Center at *aia.org/practicing/rrc*.

ILLUSTRATION (PREVIOUS PAGE): VIKTOR KOEN

AIAPERSPECTIVE

AIAU ASCENDANT | ADULT EDUCATION IS A WONDERFUL THING

PHOTO: WILLIAM STEWART

THE LAUNCH LAST MONTH OF AIA UNIVERSITY (AIAU) IS AN important milestone in the AIA's Repositioning initiative and, I would argue, for our profession. AIAU is the latest, most comprehensive way that the AIA addresses the markers of real value for members: creating and expanding the sharing of knowledge.

Before the Institute dramatically shifted gears to better serve a 21st-century profession, the AIA undertook Repositioning, an unprecedented research and assessment effort. Not just AIA members, but non-members, related design professionals, clients, and the public were asked to describe their ideal AIA. Surprisingly, lowering the dues was not high on the list of asks—although I'd be less than candid if I said the issue wasn't raised.

Instead, the overwhelming weight of the feedback focused on real value. Those who responded painted a picture of a modern AIA that played a quarterback role in leading the profession, rather than reacting to events like a spectator in the stands—an AIA that delivered real value to today's architects and those served by a rapidly evolving profession, not to mention the world we serve. Thankfully, the research went a long way to define what was meant by real value.

Communication was one of the standouts: communication to elevate the profession, tell our story, and to demystify a profession respected by the public—but in truth hardly known, if known at all. Of course, advocacy on behalf of the profession was right up there, running a close second. And the fact that members identify knowledge as key to their investment in the AIA is not surprising. After all, the gathering and sharing of knowledge was a decisive driver that led to the creation of the AIA over 157 years ago during the first Industrial Revolution. Then, as now, architects were challenged by breathtaking advancements in technology and research that directly affected design and practice. The profession's survival called for a collective approach.

But I believe something even more fundamental than survival is revealed about our profession in its never-quite-satisfied passion for the most up-to-date knowledge about the what, why, and how of design and practice. This desire to continue learning is what keeps us sharp and relevant as a profession. Henry Ford captured the essence of life-giving curiosity when he said, "Anyone who stops learning is old, whether 20 or 80. Anyone who keeps learning stays young."

And this brings me to the significance of AIAU in keeping us youthfully nimble, creative, and innovative as a profession. New knowledge gives us the freedom to wander. By challenging the familiar and accepted wisdom, knowledge opens up new horizons. Indeed, it's the divine spark of every art and science. Giving us easy, cost-effective access to the resources needed to prosper is further evidence of a repositioned AIA. It's also a tacit admission that we will never know all that needs to be known about the career path we have chosen. Admitting our need to continually learn and relearn speaks not only to our curiosity, but also to our deep passion for our profession. As Julia Child once said, "You'll never know everything about anything, especially something you love." AIA

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SUMMARY

Variable Refrigerant Flow (VRF) zoning technology is transforming the way commercial buildings are cooled and heated. This smart, energy-efficient, and fully customizable HVAC technology not only provides comfortable air to occupants, but also opens design possibilities for architects and maximizes profitability for building owners. Mitsubishi Electric is leading the HVAC industry with its advanced VRF zoning solutions as America's #1 selling brand in this market.

ANALYSIS

According to Paul Doppel, Senior Director, Industry & Government Relations for Mitsubishi Electric Cooling & Heating, one of the biggest complaints about offices, schools, or medical buildings is that they are too hot or too cold. Because traditional boiler and chiller systems heat or cool air at a central location and then move it through the building, they expend a lot of energy and cannot customize space temperature effectively. They can also be massive in size, requiring significant space to accommodate an equipment room and ductwork, as well as adding tonnage to the building.

"Mitsubishi Electric's VRF zoning systems are significantly smaller and can be placed strategically throughout the building, delivering refrigerant directly to the zone where it is needed so no energy is lost," explains Doppel. "It features INVERTER compressor technology, which ramps up quickly to achieve setpoint temperature and then varies its speed to maintain the desired temperature, rather than simple on/off operation. The systems perform at the minimum energy level necessary to maintain desired space temperature, minimizing wasted energy when partial load conditions are present, which is 97 percent of the time on average." Another big plus: these systems offer superb quiet operation.

ADVANTAGES

For architects, designing a building with a Mitsubishi Electric VRF zoning system means the plans will not need to accommodate heavy equipment and large ceiling spaces for ducts. This reduces the load-bearing requirements and height needed for each floor. For existing buildings, VRF zoning systems provide installation flexibility to meet space constraints and minimally impact the structure.

For building owners, reducing the amount of ceiling space needed for ductwork in a new building means either more height for each floor or potentially adding more floors for additional revenue-generating tenants. And keeping those tenants happy with quiet, comfortable air will help keep spaces filled. Not to mention, the energy efficiency of Mitsubishi Electric's VRF zoning systems results in lower energy bills.

A BOUTIQUE HOTEL IN LOS ANGELES

In 2011, real estate developers Michael Orwitz, Spence Mitchum, and Justin Khorvash transformed a dilapidated 1950s medical building into a Four Diamond boutique hotel, the Hotel Wilshire, with sustainability in mind. Mitchum had experience using Mitsubishi Electric's VRF zoning system and knew the system's flexibility, performance, and efficiency made it a perfect fit. The smaller, lighter-weight system worked well with the building's space restrictions, and a year after opening, the hotel boasted 17 percent less energy use and a LEED® Silver certification.

NEW HEADQUARTERS IN WISCONSIN

Franklin Energy Services, LLC, of Port Washington, Wisconsin, creates energy efficiency programs for commercial, industrial, agricultural, and residential clients. When its headquarters moved into a historic structure in 2011, the company chose a Mitsubishi Electric VRF zoning system for its efficiency, ease of installation, individual comfort control, and quiet operation.

As a result, Franklin Energy has documented 32 percent electric energy savings and 48 percent gas energy savings when compared to the average Commercial Buildings Energy Consumption Survey (CBECS) energy usage for a building its size. CEO Paul Schueller reports that the system has been a lifesaver for individual comfort, keeping the perimeter offices in the old building comfortable all year. ●

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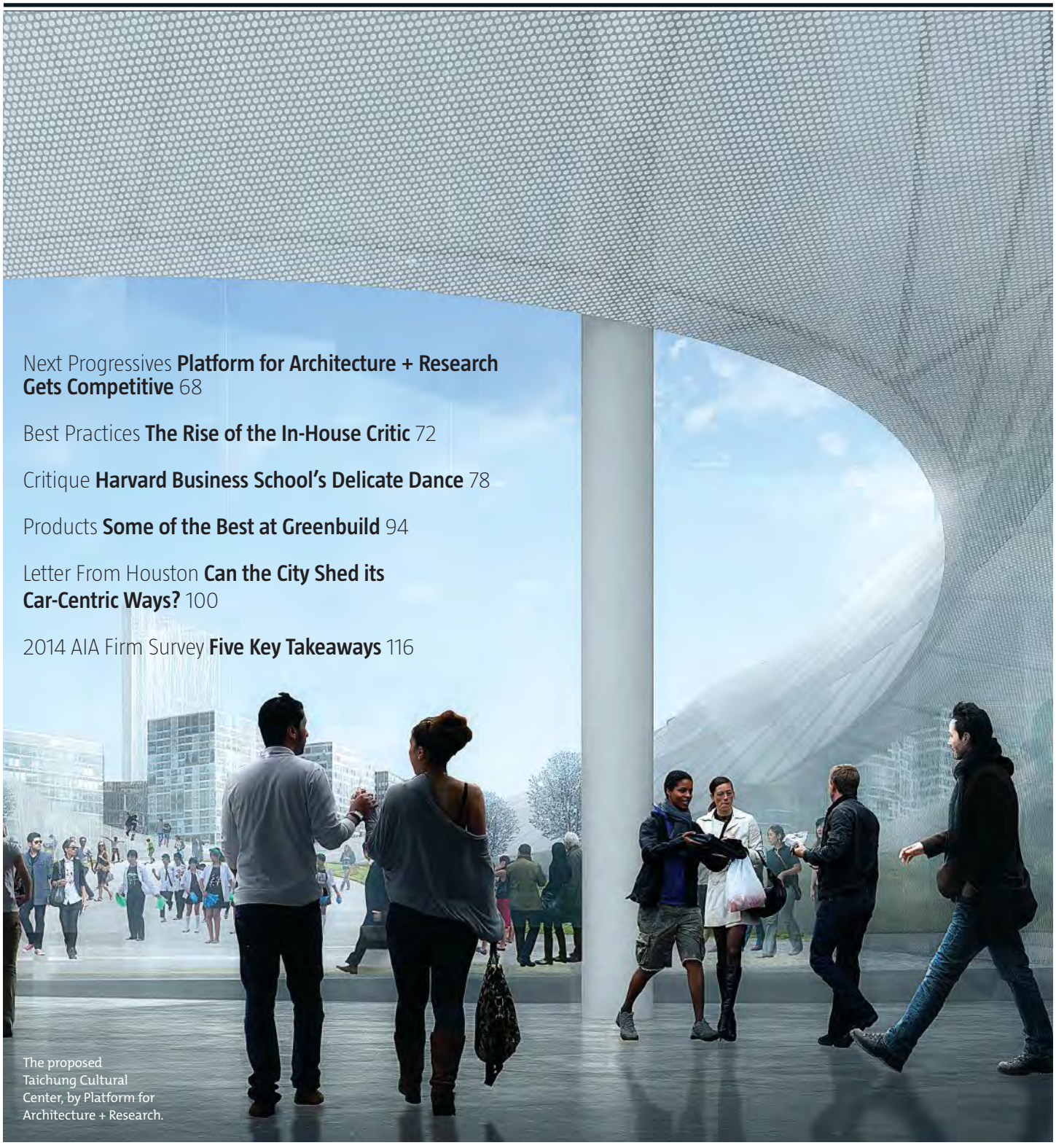

The proposed Taichung Cultural Center, by Platform for Architecture + Research.

NEXT PROGRESSIVES

FRIENDLY COMPETITION

LOS ANGELES FIRM PLATFORM FOR ARCHITECTURE + RESEARCH SEES COMPETITIONS AS VEHICLES FOR BUILDING WORKING RELATIONSHIPS, REGARDLESS OF THEIR OUTCOMES.

Jennifer Marmon stands beside a section model for PAR's Helsinki Central Library proposal. The firm collaborated with Arup on a highly technical, transparent façade with thermal properties.

Text by **Deane Madsen**
Portrait by **Andy J. Scott**

THE LOS ANGELES OFFICES of Platform for Architecture + Research (PAR)—winner of the 2014 Presidential Emerging Practice Award from AIA Los Angeles—claim a portion of the ninth floor of the American Cement Building, designed in 1964 by DMJM (which was subsequently acquired by AECOM), as part of a pilot program for the state of California to investigate new seismic engineering strategies. The deep, X-shaped braces of the building's concrete exoskeleton frame views of the Hollywood Hills to the northwest, Koreatown directly north, and to the edges of MacArthur Park to the northeast. It's within this structurally expressive setting that, on the last day of preparations for a submittal to the Guggenheim Helsinki Design Competition, PAR founder Jennifer Marmon, AIA, discusses the possibilities afforded by participation—and measured success—in high-profile architectural competitions.

Strategic planning: Marmon sees the competition process as an opportunity to build and demonstrate the firm's skillsets. By working on competition entries, PAR can build relationships with leading structural engineering firms like Arup and BuroHappold. "Obviously we're not demonstrating to the same level as we would if we had won," Marmon says. "However, we're developing potential architecture to a level that's taken quite seriously by our collaborators, by ourselves, and now also by prospective clients. For us, when we're pursuing these

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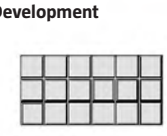

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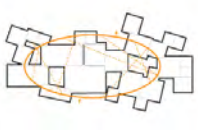

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competitions, it's a 'less is more' approach. We don't do every one that comes along. We take them very seriously in terms of the selection and the team building."

Win some, lose some: PAR didn't win the competition for a different project in Finland, the Helsinki Central Library—that went to a Finnish firm from a shortlist of Scandinavians. "In the end, it seemed that the competition was quite political even though it was advertised as an open international competition," Marmon says.

"But for us," she says, "it was an opportunity to cultivate our skill sets and our relationships with consultants, and to elevate our working methods. We were working with Russell Fortmeyer from Arup on this project, which was set in a master plan that Alvar Aalto had designed. Besides the question of what a 21st century library would be in this context, the competition required a zero-carbon building. We became very interested in how the massing would achieve that mandate.

"Urbanistically, we wanted the building to read as a monolith in the landscape, that would have a crystalline quality and a degree of transparency that we felt would reflect the culture of that place. We were using [Autodesk] Ecotect linked into our initial formal studies, and understood that utilizing a concave geometry on the envelope would allow us to optimize access to daylight for programmatic purposes. We also carried that through to the scale of the skin."

The skin and its development have caught enough attention within the industry that Marmon and Fortmeyer ended up presenting the proposal, dubbed "Extreme Ocularity," at the Façades + Innovation conference in 2012, before the competition jury even had announced the shortlist.

Origins of a practice: Marmon says that earning her M.Arch. at the Southern California Institute of Architecture (SCI-Arc) was highly influential to the direction of her practice. "Toward the end of my studies, during my thesis, I was fortunate enough to have two mentors: Jeffrey Inaba, [Assoc. AIA,] a very inspiring, brilliant architect, who was coming from Harvard and had been working as a principal of AMO at the time. So he was bringing a depth of research and analysis to our discussion. And Neil Denari, [AIA, against whom Marmon was competing for the Keelung Harbor Gateway,] who was the director of SCI-Arc at the time, and has since gone to UCLA.

"Both of them had a very strong impact on me, given their sets of interests and their intelligence. I was really interested in developing a design process that would incorporate research

TOP: LABTOP; MIDDLE: COURTESY PAR

Opposite top: PAR's shortlisted entry for the Keelung Harbor Gateway pitted Marmon against former mentor—and eventual winner—Neil Denari. **Opposite middle and bottom:** The Cagliari Galleria d'Arte in Italy breaks down museum program elements into discreet modules before rearranging them as a cohesive whole. **This page:** PAR's entries for the Helsinki Central Library (top) and Taichung Cultural Center in Taiwan (left) entailed collaborations with Arup and BuroHappold, respectively, through the design process.

and analysis that would be of a depth where I felt we were uncovering information that could add value for a final design product for a client. It's a design process that probably aligns closely with a Dutch or Danish design process, as a counterpoint to what is maybe more predominant in Los Angeles. For me, I see form as a resultant of analysis."

Guiding principles: For PAR, the work tends to evolve along trajectories informed by three fundamentals that Marmon pursues in every project: The urbanistic response to site conditions, a response to environmental performance, and the programmatic and social performance. "We see the programmatic and the social as being very linked," Marmon says. "I recognize that most architects practicing address these three fundamentals, but I think the differentiation is in small decisions that are made along the way that make the work unique. Well, we're not striving to be unique, and we're not really formally driven with a capital F, but rather really interested in a process of analysis that brings multiple factors or parameters together in a very synthesized response to the problem."

Looking ahead: As Marmon and her team wrap up the final renderings for their Guggenheim Helsinki entry, she mentions a few other commissions that will keep the office busy over the next several months. Up the hill from one of PAR's completed residences, the M House, a client has purchased an empty lot with which Marmon is already familiar. "Oddly enough," she says, "I'd already designed a preliminary scheme for this vacant lot for a prospective buyer of the land several years ago, ... [and] now this new buyer contacted us. Sometimes in L.A., you kind of have expertise in a certain neighborhood, and people hear about you, and you end up designing multiple projects in the same neighborhood."

Another long-term project is a ranch in the beach town of José Ignacio, Uruguay, with its own equestrian facilities. And the recent AIA|LA award, in addition to validating the avenues of design and research that the firm pursues, may prove to be good for business as well. "It's really too soon to say what will come of it," Marmon says, "but this award is opening channels to a few prospective clients and developers."

TOP: LABTOP; BOTTOM: LUXIGON

BEST PRACTICES

THE EMERGING ROLE OF THE DESIGN EDITOR

SKIDMORE, OWINGS & MERRILL AND SHOP ARCHITECTS RECENTLY CREATED NEW POSITIONS TO DEVELOP IN-HOUSE CONTENT CREATION.

Text by **Ian Volner**
Illustration by **Shout**

ONE OFTEN HEARS a pair of weasel words bandied about wherever design-media types congregate: "sponsored content." Corporate-subsidized journalism—be it urbanism websites funded by carmakers or lifestyle blogs owned by bottled water brands—is not exactly new. All publications rely on sponsorship, and the line between "church" and "state"—editorial and advertising sales—has always been blurrier than either side has cared to admit. But now, if decisions by two celebrated architecture firms are any indication, there appears to be a different kind of sponsored content afoot.

Chicago-based Skidmore, Owings & Merrill (SOM) and New York's SHoP Architects have recently made moves that threaten to cut out the journalistic middleman altogether. Longtime design magazine hand Jenna McKnight, who's worked for *Architectural Record* and database-cum-blog Architizer, became SOM's new digital editor in May 2013. Scarcely a year later, SHoP announced that its newly created post of editorial director would be held by critic Philip Nobel, whose byline has been a staple of ARCHITECT, *The New York Times*, and *Architectural Digest* for almost two decades.

McKnight's duties thus far have included re-launching SOM's website, creating content for Tumblr and Instagram accounts, and readying the launch of a firmwide Twitter account—writing editorials for print publications may fall within her future bailiwick. "They just needed somebody in an editorial position" to guide the firm's online presence, "establishing a voice, creating a style

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DIGITAL EDITOR,
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EDITORIAL DIRECTOR,
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guide, sifting through thousands and thousands of images," says McKnight. Her goals include not only burnishing SOM's exterior image but keeping the sprawling firm in touch with itself, using digital media as a common forum for staffers spread out across three continents.

Nobel, on the other hand, has a more nebulous job description. Certainly it entails writing: "I've written more words since I've been here than I've written as a journalist in the last 10 years," he claims, and his "deliverables" run the gamut from supplementary text for client proposals to high-minded essays for books on design theory. But what SHoP needs Nobel for most is to act as a kind of hybrid critic and cheerleader, a philosopher-at-large with license to drift from project meeting to project meeting, offering advice. "My allegiance is to the ideals of the firm," says Nobel: Namely, this means to SHoP's image as an earnest practitioner of socially conscious design.

Neither McKnight nor Nobel want to displace traditional forms of design reportage. "I'm looking to other media organizations as inspiration," says McKnight, "not as competition." Nobel, meanwhile, intends to remain active as a writer outside of his work at SHoP, and sees the emerging role of the company sage not as limiting the purview of the critic but as extending it—"an opportunity in this new media world for people to tell their own stories in a different way." He even sees a future where design offices routinely keep someone like him on retainer. "Every architecture firm that has some kind of mission to begin with should put someone on the job to make sure that it's met," he says.

Whether other firms will follow suit will hinge on the tangible results that firm editors like Nobel and McKnight are able to produce. As McKnight says, "Our engagement and our followers are skyrocketing," which could be a result of her writing sensibility—though whether prospective clients will be swayed remains uncertain. Objective metrics at SHoP, meanwhile, are cloudier still. The firm's upcoming suite of projects doesn't quite suggest that it's lost its scrappy, small-studio soul—but even if it did, would that mean Nobel had failed? Publicists can demonstrate that their public relations has garnered press for their clients; but what kind of pudding bears the proof for these new in-house editors?

And there's the hitch: the possible danger of this new demi-trend is less about the damage it could do to the vaunted independence of design journalism. It may simply expose (for any who didn't know it already) how tenuous the position of design thinkers and critics really is, and how indeterminate their effect on practice can really be.

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CRITIQUE

BUILDING THE BRAND

OVER THE YEARS, THE HARVARD BUSINESS SCHOOL CAMPUS HAS PRESENTED ARCHITECTS WITH A CONSIDERABLE CHALLENGE: HOW DO YOU DESIGN FOR THE FUTURE WHILE RESPECTING THE PAST?

William Rawn Associates, Architects' Tata Hall overlooks the Charles River.

BRUCE T. MARTIN PHOTOGRAPHY

Text by **Witold Rybczynski, Hon. FAIA**
Photos by **Peter Vanderwarker**

TATA HALL, a $100 million executive-education classroom and residence building designed by Boston's William Rawn Associates, Architects, is a distinctive new presence on the Harvard Business School campus—and the latest addition by a distinguished architect to the historic fabric of the school. Over the last three decades, Moshe Safdie, FAIA; Robert A. M. Stern, FAIA; and now Rawn, FAIA, have each embraced this challenge in different ways, illustrating how delicate it can be to bridge the gap between past and present.

Located in Boston's Allston neighborhood, across the Charles River from Cambridge, the idyllic business school campus was laid out almost a century ago by McKim, Mead & White, which won the commission in a design competition in 1925. By that time, the firm's founders were either dead or retired, and the partners in charge were White's son, Lawrence Grant White, and James Kellum Smith. White and Smith explicitly connected the new campus to Harvard's existing one by adopting the Georgian Revival style, which their firm had used earlier for the gates of Harvard Yard, Robinson Hall (the school of architecture), and the Harvard Union.

The original buildings of the business school are competently designed but unremarkable; what is key are the spaces between the buildings. The long dormitories surround different-sized, treed quadrangles, whose pleasant scale is further modulated by interspersed house-sized pavilions. The two dormitory groups flank a green (the landscape architect was Olmsted Brothers); at its head stands the cupola-topped Baker Library. It's a Georgian version of Jefferson's plan at the University of Virginia. The curving "main street," Harvard Way, ends in what was to be an auditorium, but was changed to a dining hall. In a subtle urban design move, the whole plan is slightly cranked to follow the bend of the Charles.


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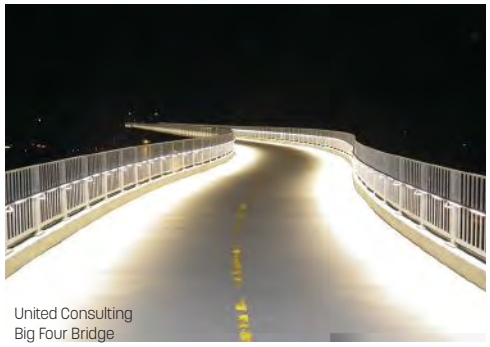
This image: The original Georgian Revival buildings constructed on the campus included Baker Library, which stands at the head of a green designed by the Olmsted Brothers. **Below:** The master plan for the business school campus.

The dormitories, library, and an administration building (named after J.P. Morgan) were built in a two-year flurry of construction, but it took another 40 years to complete the master plan. The various architects adhered to the existing red-brick-and-white-trim style; the last Georgian Revival building, Cotting House, was built as late as 1967.

The following year, Philip Johnson was commissioned to design Burden Hall, an 800-seat auditorium. Following the fashion of that time, Johnson's solution to building in a historic setting was to simply ignore it. The auditorium is a polygonal volume composed entirely of brutally plain brick walls; the only openings are the emergency exits and a glazed entrance that is about as lyrical as a truck dock. (The university's current plan is to demolish Burden and replace it with a new facility.)

Burden Hall opened the stylistic floodgates—several undistinguished modernist buildings followed. The final insult was Benjamin Thompson's graduate student housing, not part of the business school but a major presence on the campus—an alien presence. Like Johnson, Thompson stuck to brick, but his idiosyncratic buildings are all

1. Cotting House
2. Morgan Hall
3. Class of 1959 Chapel
4. Baker Library
5. Spangler Center
6. Burden Hall
7. Chao Center (in design)
8. Tata Hall
9. Dormitories
10. Soldiers Field



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Big Four Bridge

CENTER

Top: Burden Hall, an auditorium designed by Philip Johnson in 1968, was the first building to depart from the original campus's Georgian Revival style. **Middle and Bottom:** The two façades of Morgan Hall, the original designed by McKim, Mead & White, and the 1980s-era one (bottom) designed by Moshe Safdie when he expanded the building.

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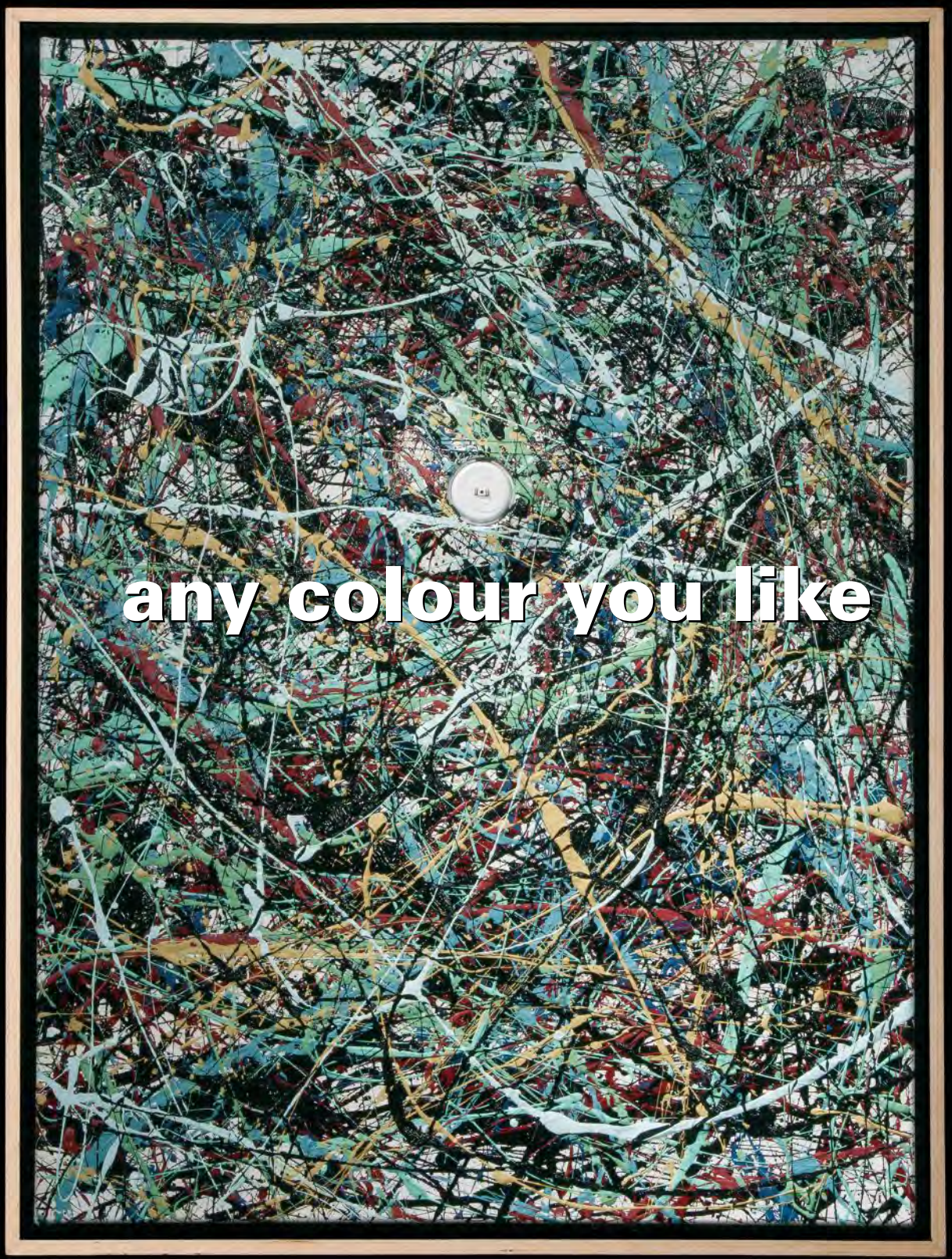
angles and curves. A young Nicholas Lemann, reviewing the project in a 1976 *Harvard Crimson* article, wrote: "The building shapes that look so pleasing in schematic drawings in real life form a confusing jumble, one in which it's hard to tell where the order is. The red brick, while offset by inset balconies and windows, is still massive and intimidating."

THE MCKIM, MEAD & WHITE PLAN did not envisage additions to the campus, but as more buildings appeared it was evident that the school would continue to expand. In 1984, Moshe Safdie, who was then in charge of Harvard's urban design program, was asked to prepare a master plan to guide future growth. In addition, he was charged with enlarging McKim, Mead & White's original administration building, Morgan Hall.

The doubling in size of Morgan Hall involved demolishing part of the old structure, adding a floor, rebuilding the end façades, adding new space, and building a brand new façade along one side. Capitalizing on his experience fitting buildings into Jerusalem's Old City, Safdie took a pragmatic approach. The bright, modern interior includes a very un-Georgian skylit spine, but the rebuilt parts of the old façade, with rearranged windows, replicate the original. On the other hand, the brick and precast concrete façade of the new portion has its own character: Alternating bay and bow windows remind me of the buildings along Commonwealth Avenue in Boston's Back Bay. So while Morgan Hall has two faces, it doesn't feel disjointed.

Safdie's façade is neither textbook Georgian, nor a postmodern Georgian pastiche. Instead, it achieves something quite rare and difficult: stylistic coherence without stylistic explicitness. The considered design of Morgan makes the chapel that Safdie later designed next door (it was completed in 1992) all the more baffling. There is a tradition of college chapels as object buildings, but the copper drum intersected by a glass prism is as self-contained—and as mute—as Johnson's polygonal block.

In 1997, the business school chose Robert A.M. Stern Architects to design a new student center. Stern's goal, as he put it, was "to rebuild the brand." Spangler Center does this in several ways. To begin with, the building uses the architectural language of the original campus, resulting in a literal—if slightly more assertive—rendition of 1920s Georgian Revival. Spangler also repeats the pattern established by McKim, Mead & White, by enclosing a quadrangle on one side, and creating a courtyard on the other, both using the slightly canted geometry of the original. Lastly, this large building emulates the



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Robert A. M. Stern's Spangler Center, completed in 2001, was designed to "rebuild the brand" of the business school.

domestic scale of the original; the south façade, for example, incorporates a stucco portion that specifically refers to the house pavilions of the original quadrangles.

The central lounge of Spangler is a tall room with a paneled and vaulted ceiling. There are club chairs, working (gas) fireplaces, glass bowl pendants, torchères, and wall sconces—not a recessed pot light in sight. It is so well done that at first it feels a little like walking into the set of Downton Abbey—I expect a uniformed footman to bring me tea. Instead, there are casually dressed students with backpacks and laptops, and I get my own tea from the basement cafeteria. As I sit writing up my notes, the comfortable ambience grows on me. The 1925 competition program for the Harvard Business School called for buildings "with as much domestic feeling as is reasonable." Spangler, which resembles a large country house, more than fulfills this requirement.

THEN THERE'S TATA HALL, completed in December. The building's lobby is dominated by two large sculptural wooden benches (the work of Matthias Pliessnig) that resemble huge distorted baskets—or maybe lobster pots. Like the benches, Tata's architecture is untraditional. Moreover, the building willfully repudiates the architectural legacy of the campus. Instead of red brick, there is buff limestone and very large areas of plate glass; instead of enclosure, there is transparency. The large scale is not broken down, and the building curves in a long arc. Instead of quadrangles there are—well, it's hard to know what to call the undefined bits of lawn.

Tata Hall overlooks Soldiers Field Road, a riverside drive that swings by the north edge of the campus. The building is like a curved seven-story billboard—a very handsome billboard—advertising to the drivers passing by that this is a progressive, future-oriented place. Not your grandfather's business school.

"Anything but Georgian" is very different from "rebuilding the brand." What happened? Different architect, different patron, different times, but also a change in leadership. The dean who commissioned Safdie's Morgan addition, John H. McArthur, also built the fitness center, a large building designed by Boston's Kallmann, McKinnell & Wood Architecture in a style similarly sympathetic to the old campus. His successor, Kim B. Clark, commissioned Stern to build Spangler, and to reconfigure—and add to—the library. The seamless addition continues Spangler's revival style. Clark's tenure also saw the construction of a low-key historicist wing that completed the quadrangle next to the library, as called for in the McKim, Mead & White plan.

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The interior of the Spangler Center.

Judging from Tata Hall, the current dean, Nitin Nohria, does not share his predecessors' interest in the past—or maybe it's just a matter of taste. The next new building, just starting construction, will be the Chao Center, an executive education facility that replaces the rather lackluster 1950s-era dining hall. The business school's brief to Boston-based firm Goody Clancy describes the desired character of the new building as "linking to the rich context of the McKim, Mead & White campus and landscape, particularly the Harvard Way axis, while relating to the contemporary design of adjacent Tata Hall."

This strikes me as a tall order. Queen Anne front and Lady Gaga behind? Goody Clancy's design for Chao is a mix of not-quite Georgian and not-quite modern: traditional windows with mullions face the campus, elsewhere two-story glazed openings are trimmed in limestone, and a three-story glass box faces Tata. Whether this stylistic cocktail will turn out to be contextual or merely confusing remains to be seen.

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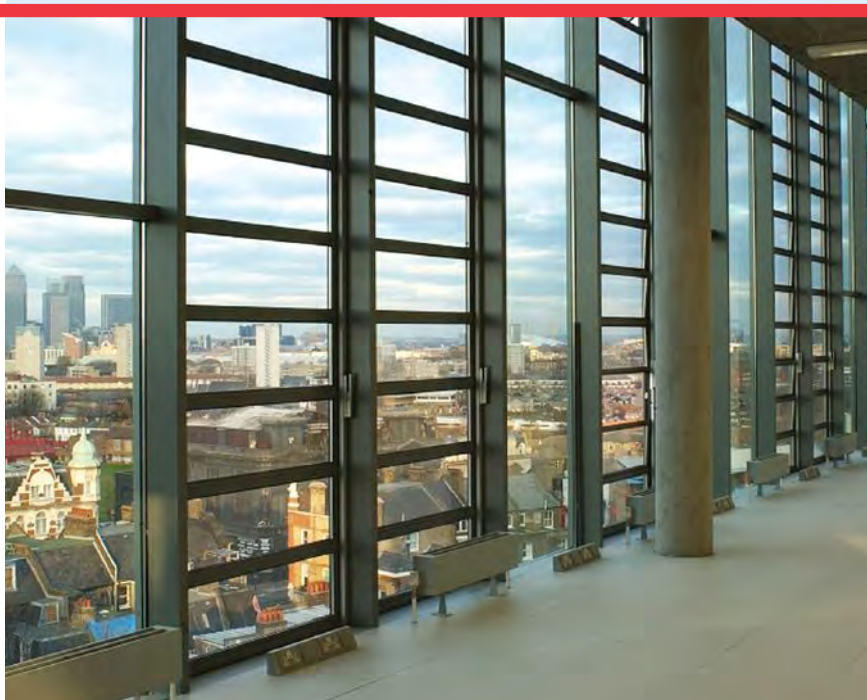
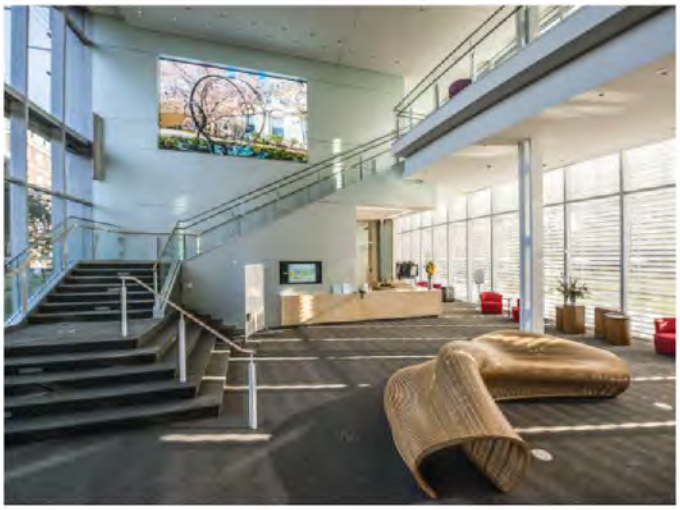


This image: Tata Hall also departs from the campus's original Georgian Revival legacy. **Below:** The lobby features two sculptural wooden benches designed by Matthias Pliessnig.



IT'S NOT EASY to connect the present to the past. You have to decide when to connect and when not to—and exactly what to connect to. It is a nuanced business. Connecting doesn't mean simply replicating. An architectural revival can be specific or vague, the past can be real or imagined. H. H. Richardson's Trinity Church reminds you of Romanesque France, while at the same time it's an integral part of flinty Boston. At the business school, Stern connected to the Georgian Revival of the early 20th century, just as McKim, Mead & White connected to the 18th century—thoughtfully and selectively. In both cases, historical continuity reinforces a sense of place.

Fitting in or sticking out? Too many architects aim only for the latter, assuming that the best way for a new building to connect to the past is through contrast. The problem with this strategy is that it tends to produce one-liners: once you have experienced the contrast, there's nothing else. All the building has to say is, "That was then, this is now."

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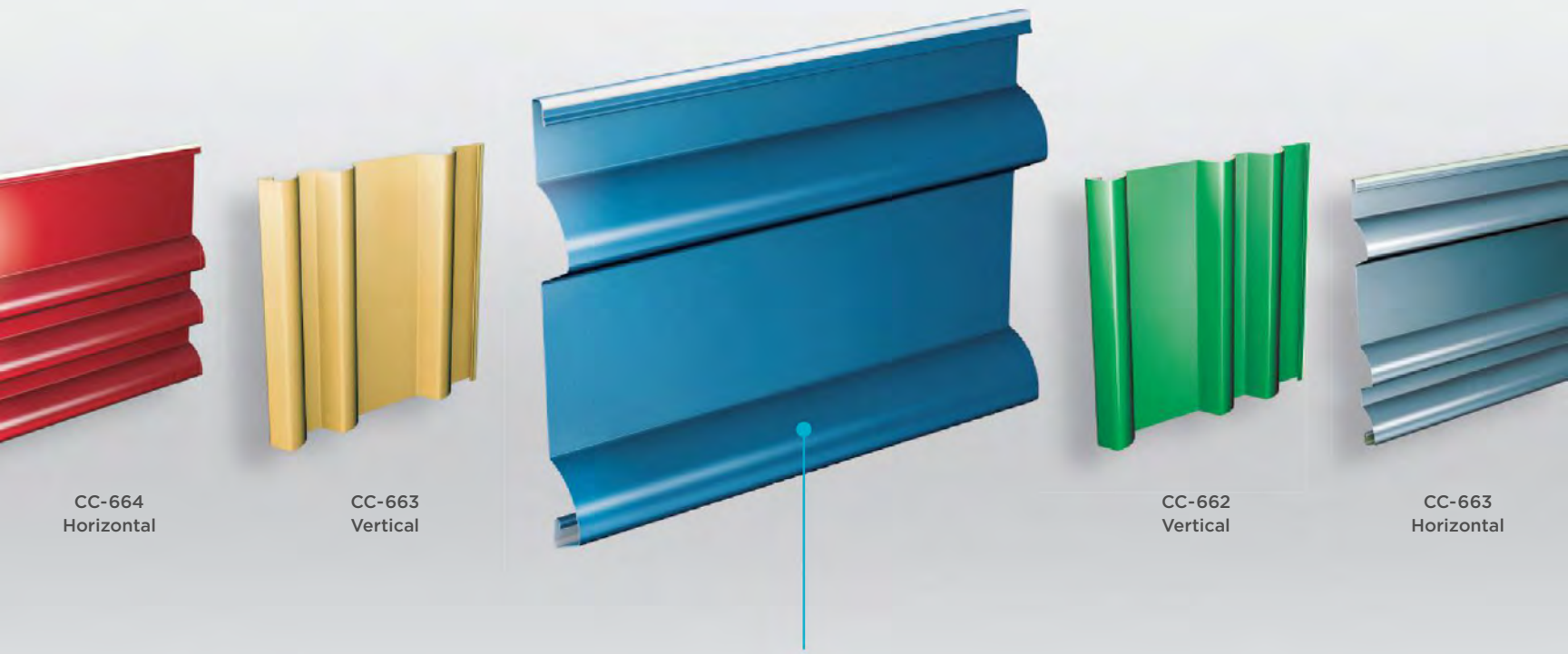

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Text by **Hallie Busta**

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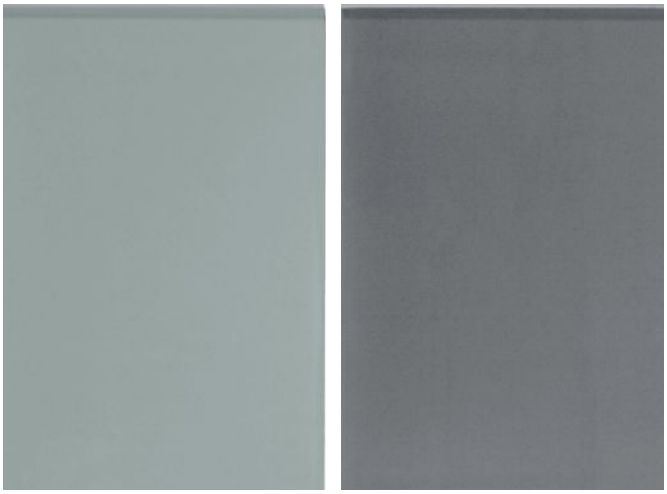

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LETTER FROM HOUSTON

PLANNING THE BOOM

AS HOUSTON ENJOYS STAGGERING GROWTH, CAN A CITY KNOWN FOR ITS LACK OF ZONING AND CAR-CENTRIC WAYS EMBRACE A MORE PEDESTRIAN-FRIENDLY URBANISM?

Text by **Karrie Jacobs**
Photos by **Paul Hester**

AT THE END OF JULY, Houston, with a population of over 2 million spread haphazardly across some 630 square miles, started work on its very first comprehensive city plan. The concept, according to the city's website, is to prepare Houston for its next million residents, scheduled to arrive within 20 years or so.

"In addition to not having zoning, we're one of the only cities in the country that doesn't have what's called a general plan," says Guy Hagstette, FAIA, the former director of planning and development for the Houston Downtown Management District. He's had a hand in most major planning efforts in the city's recent history, including this one. Scheduled to be completed sometime next year, the general plan aims to craft a coherent vision and knit together myriad scattershot efforts undertaken by individual agencies, commercial developers, neighborhoods, and other odd entities. The purpose, Hagstette says, is to help the city figure out "what we want to be when we grow up, and how we're going to get there."

So what does Houston want to be?

When I visited recently, everyone I met with spoke of the city's growth and increasing density, especially in the Inner Loop, the area inside I-610, where McMansions have replaced modest homes, multifamily complexes have usurped garden apartments, and high-rise residential towers have sprouted in low-rise districts.

Growth, of course, is Houston's *raison d'etre*. According to a recent *The Wall Street*

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Right: The city of Houston is expected to double in population in the next two decades. The Texas Medical Center can be seen at left, Rice University at right. **Bottom:** The city's light-rail system (here running by the Museum of Fine Arts, Houston) transports about 38,000 riders a day.

Journal article, "Success and the City," Houston has added jobs at a prodigious rate: 263,000 since 2008 (the New York metro area, by contrast, has added 100,000 during the same period). The article preaches the gospel of Houston: lack of formal zoning makes it easy to obtain building permits there and enables the city to be responsive to changing land-use demands.

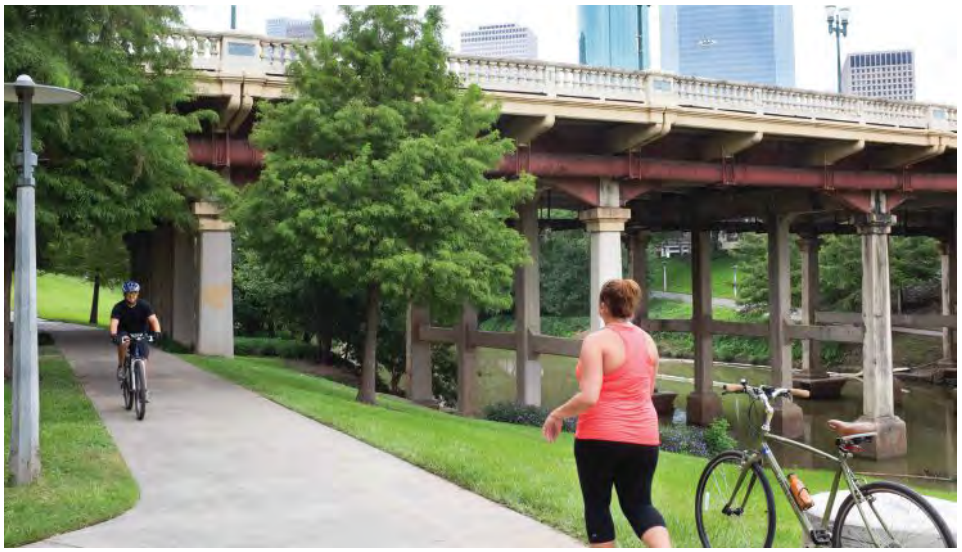
A lot of things, many of them good, can happen in the absence of zoning. The laissez-faire philosophy enables a certain dynamism. Things can develop here—like the uncanny proliferation of tin-clad modernist houses in one Inner Loop neighborhood—that would never be permitted in a more precious city. Houston has tremendous energy and a copious amount of intellect. Industries like oil and aerospace have long attracted smart, ambitious people. The population is immensely diverse. Houston (though Dallas might argue otherwise) can be thought of as Los Angeles to Austin's San Francisco. But is an interesting city the same as a good city?

The questions that I kept asking on my visit, and in a series of conversations I've had since, are: How much can Houston grow without cultivating more of a walkable, urban ethic? How long can a city that is clearly becoming denser continue to be almost completely car-dependent? Can a city that doesn't believe in zoning find a way to create streetscapes that are not lined with multilevel parking garages?

"I think there's a danger that in many cases we're getting the density with none of the benefits," Hagstette told me, "because the types of projects that are being developed aren't being developed with the pedestrian and alternative modes of transportation, transit—bicycles, things like that—in mind. The development community is still thinking about, everyone is entering and exiting their property via an automobile."

I experienced this firsthand during my trip, when Hagstette led me on a bicycle tour of Buffalo Bayou Park, where he's the project manager. The park includes an impressive 20-mile network of bicycle and pedestrian trails that line the bayou and wend beneath a maze of elevated highways. It's a shining example of an urban no-man's land turned amenity.

After the tour, I had planned to ride my B-cycle, a red three-speed from the city's bike

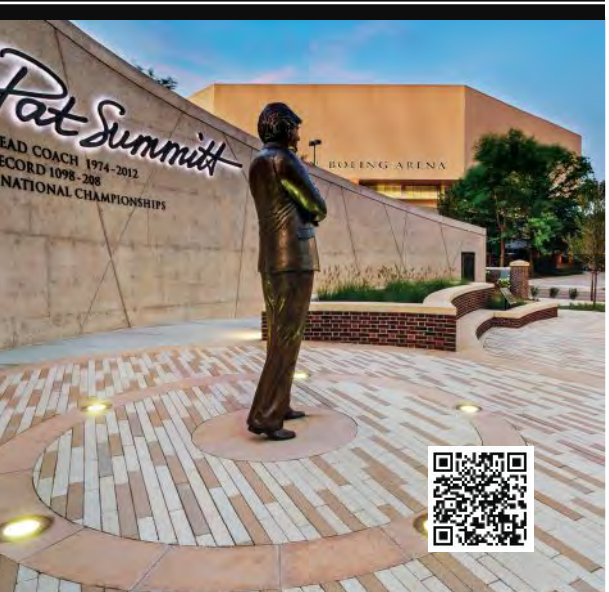


Buffalo Bayou Park, near the center of downtown Houston, features 20 miles of bike and pedestrian trails at what was once a no-man's-land of highway underpasses.

share system, back to a bike station in the Museum District where I was staying—a 3-mile trip. But then the president of the Buffalo Bayou Partnership, Anne Olson, who had driven me to the park, regaled me with stories about bicyclists killed by motorists (23 in five years, according to a *Houston Chronicle* investigation).

"In cities like Houston that are contemporary, you drive there, and then you do your urban thing, and then get back in your car and drive home," says Susan Rogers, the director of the University of Houston's Community Design Resource Center. "It's a curious kind of urbanism to me."

Indeed, the city is currently pursuing a Bayou Greenways initiative, which will feature a collection of 80 miles of bicycle trails (sometimes dubbed a freeway system for bikes). In 2012, taxpayers voted to fund the project partially (at least $100 million of a projected $215 million cost). In May, Houston also struck a deal with CenterPoint Energy to build more bikeways along the rights-of-way under high-voltage utility lines. The problem is that there's no viable network of on-street bike lanes to feed the greenways. People will have to drive to ride. "The connectivity is just not there," Rogers says, "the thinking of things as a system."



Top: The purple line, which runs from downtown through Houston's Third Ward, has helped spur transit-oriented development. **Middle:** Food trucks gather near Populous's BBVA Compass Stadium, which is serviced by the purple and green lines (bottom).

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"THE FACT THAT WE DON'T HAVE ZONING DOESN'T MEAN THAT WE DON'T HAVE PLANNING. IT DOESN'T MEAN WE DON'T HAVE DEED RESTRICTIONS." —GARY TINTEROW

STILL, THERE HAS been plenty of promising new development, as I discovered when I went cruising with Cindi Strauss, design curator of the Museum of Fine Arts, Houston (MFAH), in her red Mercedes convertible. She showed me lots of new townhouse developments, the best of them under construction along the route of the new southeast light-rail line scheduled to open by the end of the year. The purple line, stretching 6 miles from downtown through Houston's Third Ward, a historically working class, African-American neighborhood, is attracting an interesting collection of conspicuously modern, urbane developments. Strauss drove me past Discovery Green, a heavily programmed 12-acre park, opened in 2008, that has inspired high-rise residential development downtown. She also showed me the BBVA Compass Stadium, designed by Populous and home to Major League Soccer's Houston Dynamo. Set on the fringe of downtown, it is a lattice-work sculpture, a bit like Beijing's famous Bird's Nest, but done with a low-budget industrial palette. It's a spirited design that contrasts nicely with the pastiche that is Minute Maid Park (HOK), which opened in 2000 as Enron Field and is home to Major League Baseball's Houston Astros.

The MFAH, meanwhile, is working with Steven Holl, FAIA, on an expansion plan that is intended to help enhance the urbanity of its complex. As Gary Tinterow, the MFAH director, explains, the plan will create "wider sidewalks, better crosswalks, bringing some retail café life, to not only the center of the campus, but to the two ends of the campus." (The plans haven't been finalized or made public yet.) Tinterow speculates that Houstonians will ride the city's light rail to the museum and then stroll to other cultural institutions in the area. Although he cautions that there are limits. "The Menil is only 15 minutes away," he tells me, "but most Houstonians are not going to walk that."

Tinterow, a native Houstonian who spent much of his career at the Metropolitan Museum of Art in New York, is—generally speaking—a Houston defender. He points out that even though Houston famously goes without zoning, that doesn't mean there aren't restrictions. "I'm always quick to add, the fact that we don't have zoning doesn't mean we don't have planning," says Tinterow, uttering a phrase that's something of a mantra for Houston civic types. "It doesn't mean that we don't have deed restrictions, which are more powerful than zoning, in that nobody can change them." The deed restrictions, he explains, "pass from owner to owner, specifying the setbacks, the volume, the massing, the height. And those pass on in perpetuity, as opposed to zoning, which can be changed by any city administration."

As I listened to Tinterow, it occurred to me that what zoning is about, ideally, isn't freezing streetscapes in "perpetuity," but about managing change. Restrictions specifying setbacks, volume, massing, and height that can't be changed suggest that Houston isn't the city it's reputed to be, the one that effortlessly responds to market demands. Instead, it may be a city that lacks the means to respond. For one thing, the market, even in sprawling Houston, is beginning to demand walkability.

JAY BLAZEK CROSSLEY, policy analyst at Houston Tomorrow, an organization founded in 1998 to tackle quality of life issues, points out that the greater Houston metropolitan area is going to hit a population of 10 million by 2040. "A lot of people think growth is terrible," he says. By contrast, he believes that "the next 4 million people are what is going to let us fix our city." Interestingly, one of the problems Crossley sees is that the local ordinances are too inflexible. "Houston is the most restrictive place to build an urban style building in the nation," Crossley contends. He cites "excessive parking requirements" and "huge" setback requirements. To get around them, developers have to apply to a planning commission for variances. And that process demands political skill and, perhaps, connections. "We've heard from developers who have tried to come into Houston," says Crossley. "The national, big developers don't build in Houston because they believe the system is rigged towards local developers, and it's too weird and complex to get through."

Another thing Crossley brings up is the Kinder Institute Houston Area Survey, a public opinion poll that has been conducted in Houston annually for 33 years. Transit, biking, and walking enthusiasts like Crossley insist that the survey shows public preference skewing their way. "At this point, for the last several years, a majority of people in Harris County would prefer to live in a smaller home where they could walk to things," Crossley contends.

The catch is that Harris County only represents two-thirds of metro Houston's population. What the survey actually shows is something like a 50–50 split in the city as a whole, what the Kinder website calls a "divided preference for car-centered vs. transit-oriented developments." The stated desire for mixed-use development has inched up steadily since 2009, but the concept of having a smaller home in an area where there are some things in walking distance peaked in 2012, with 51 percent being in favor and 47 percent wishing to "drive everywhere." In the most recent survey those numbers reversed with 51 percent in the "drive everywhere" column. Nonetheless, a majority—49 to 46 percent—prefer spending to improve rail and buses to expanding existing highways. Overall, Houstonians seem to be closely divided over whether they want their city to remain a "drive everywhere" town.

The strongest evidence of the division is the light-rail system itself. The city voted to build it in 1988 and, after years of political battles—in which former Congressman Tom DeLay (R-Texas) stripped the project of federal funding—the first 7.5 miles of the red line opened in 2004. A 5.3-mile extension opened last year, and the line enjoys a high level of use, about 38,000 riders a day. Two new lines,

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MAYBE IT'S BEST TO THINK OF HOUSTON'S CITY PLAN AS A RITE OF PASSAGE, A RITUAL THAT SIGNALS THE CITY'S READINESS FOR MATURITY.

green and purple, are scheduled to open early next year.

But one local congressman, Rep. John Culberson (R), keeps adding language to federal transportation bills barring the construction of the line through his district. Meanwhile, the representative of the adjacent district, Ted Poe (R), has been fighting to keep the rail lines funded. According to the *Houston Chronicle*, Culberson insisted that his constituents didn't want a rail line anywhere near them: "Imagine if you did not want to put a pool in your back yard," he told the paper, "and your neighbor changed the deed restrictions to make you build a pool in your backyard."

Culberson's argument only makes sense if you regard cities as agglomerations of backyards, rather than organized arrangements of private and public space. It's hard to say whether this narrow view is the cause of governing by deed restrictions instead of by zoning, or its effect.

Meanwhile, Houston Mayor Annise Parker (D) issued an executive order late last year calling for the city to remake itself with "complete streets," ones that are usable by pedestrians and bicyclists. Presumably, this means that the pedestrian experience in Houston—which longtime residents liken to the video game Frogger—will change for the better. But then, there has to be someplace to walk or bike to. And, with the exception of some surprisingly vital sections of downtown (Market Square, Discovery Green) and parts of the adjacent Midtown area, there isn't much emphasis on things like street-level retail.

"If you build high-density multifamily and there's nothing to walk to," Rogers argues, "it's not going to increase the kind of culture of urbanity in the city at all. I think that the cultural aspects of what makes a good city—as Saskia Sassen calls the 'cityness' of a place—is more difficult to put your finger on. And I think Houston doesn't have that culture."

SO HOW EFFECTIVE can a city plan be? Can it create a framework for urbanity that lays out what Houston wants to be when it grows up, as Hagstette puts it? The plan will replace some 200 local area plans and allow the city to "stop reacting in a scattershot manner" and "start proactively adopting approaches." That's about as specific as the current discussion gets. What the plan will not do, as the mayor told the *Chronicle*, is promote zoning.

For his part, Hagstette acknowledges that the city plan is unlikely "to result in any tangible change on the ground." So maybe it's best to think of it as a rite of passage, a ritual that signals Houston's newfound maturity in its quest to embrace a culture of "cityness."

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AIA FIRM SURVEY

FIVE FIRM CHANGES

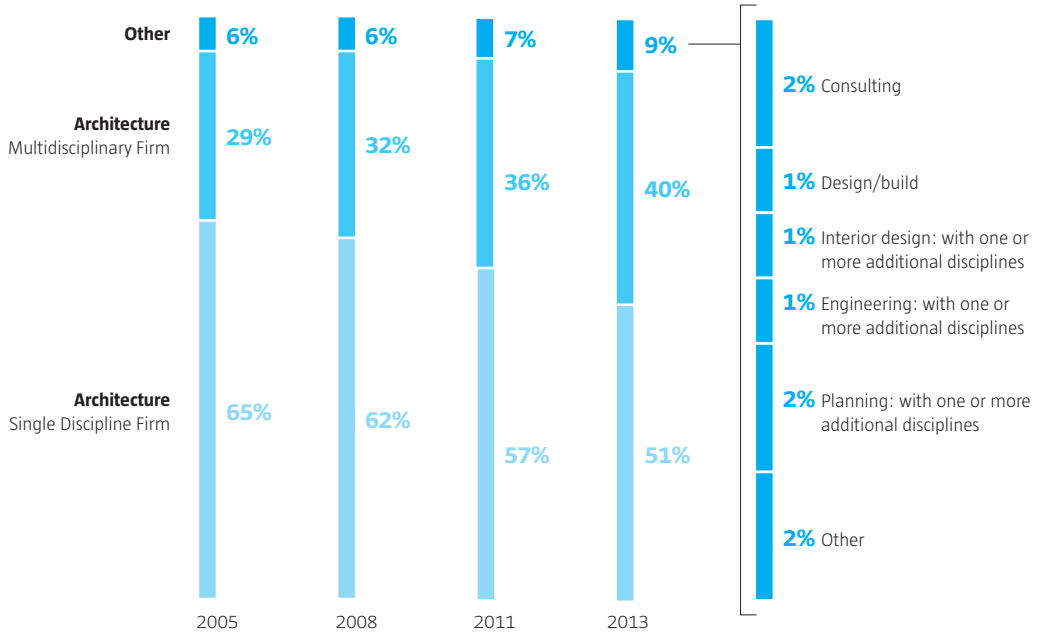
THE 2014 AIA FIRM SURVEY REPORT, RELEASED IN SEPTEMBER, SHEDS LIGHT ON WAYS THAT ARCHITECTURE FIRMS RESPONDED TO THE GREAT RECESSION. HERE ARE FIVE KEY METRICS THAT SHOW HOW THE PROFESSION HAS (OR HASN'T) CHANGED SINCE THE DOWNTURN.

Text by **Eric Wills**

1 ONE-STOP SHOPS ARE ON THE RISE

In the wake of the recession, firms have increasingly positioned themselves as multidisciplinary practices, offering architecture as the main discipline but also making available other in-house services, such as engineering, design/build, or planning. In 2013, 40 percent of firms classified themselves as multidiscplinary, a rise of 11 percentage points from 2005.

PERCENTAGE OF FIRM SERVICE OFFERINGS, BY TYPE OF FIRM



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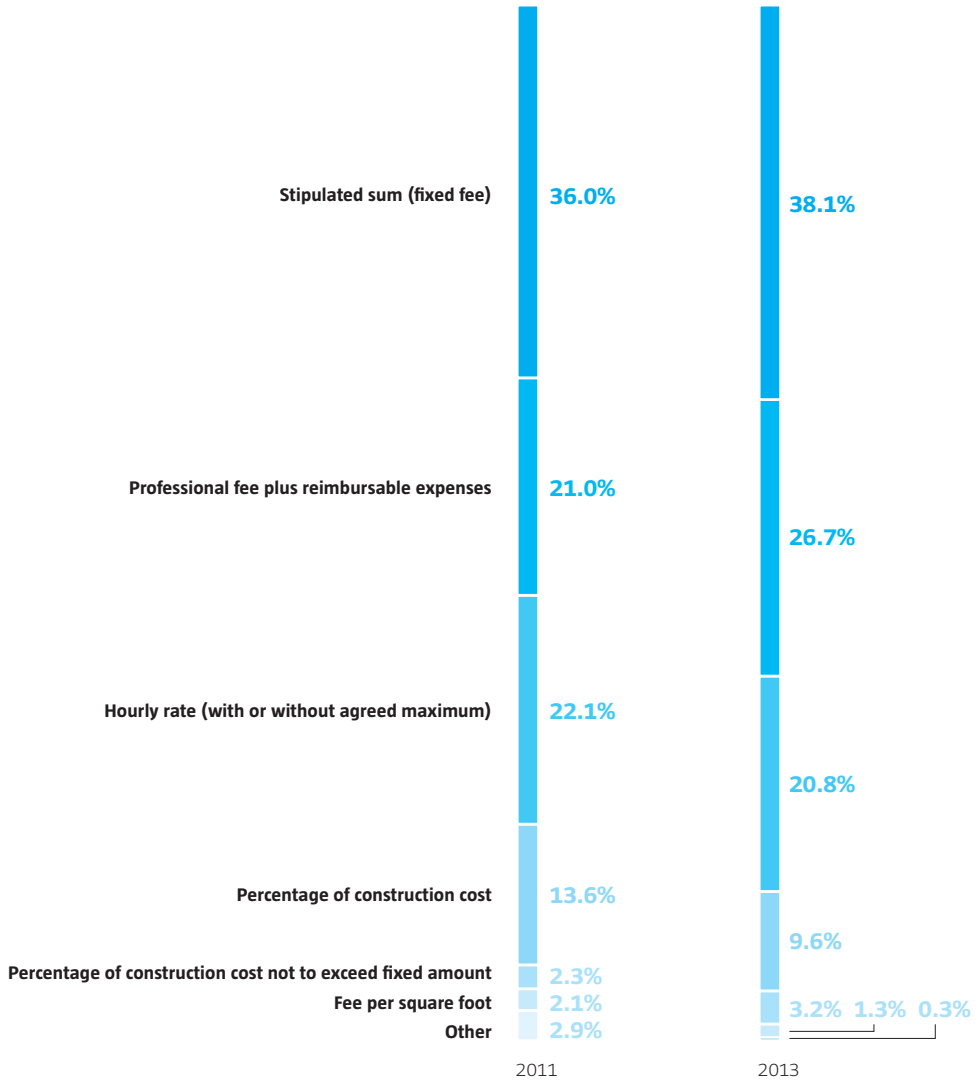
2 ARCHITECTS ARE STILL GETTING SQUEEZED

Even post-recession, firms have continued to rely on the use of stipulated-sum (fixed-fee) payments for projects. The share of firms relying on such payments rose from 36 percent in 2011 to 38.1 percent in 2013.

PERCENTAGE OF FIRM BILLINGS BY BILLING METHOD



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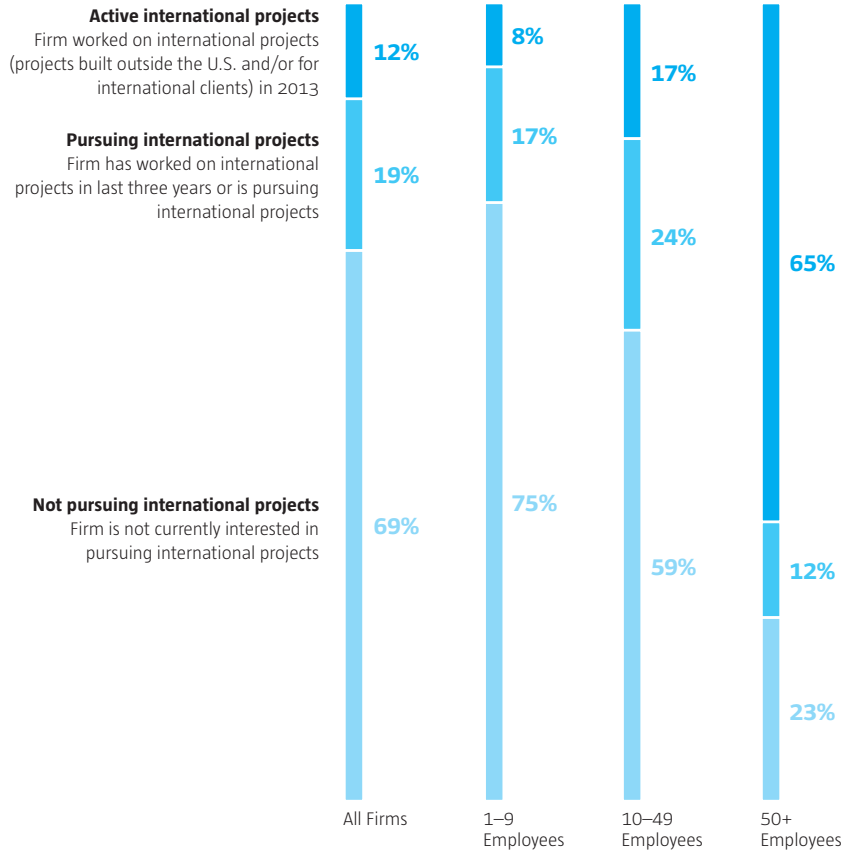
3 A FEW BIG FIRMS DOMINATE INTERNATIONAL MARKETS

Just 12 percent of firms reported that they had international projects in 2013, and the majority of those firms had 50 or more employees. An additional 19 percent of firms reported that they have had international work in the last three years or were actively pursuing it.

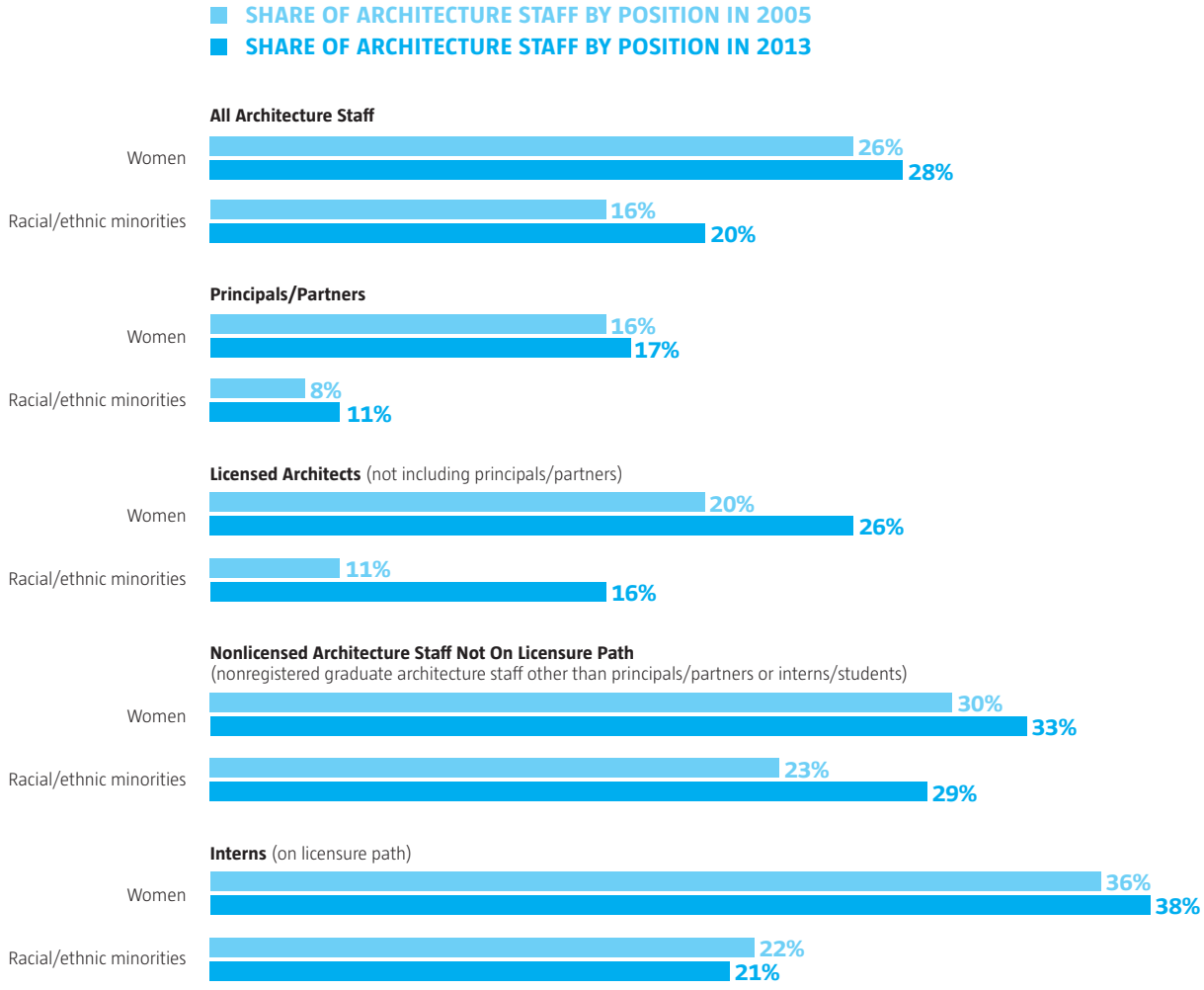
International work accounted for 5.5 percent of total gross firm billings in 2013, down from 6.8 percent in 2008, due in part to the recession. Nevertheless, total gross billings at all U.S. architecture firms from international work doubled over the past decade, from an estimated $765 million in 2002 to $1.7 billion in 2013. The Middle East and North Africa—followed closely by China—were the most popular regions for projects.

PERCENTAGE OF FIRMS, STATUS OF WORK ON INTERNATIONAL PROJECTS, 2013



4 WOMEN AND MINORITIES ARE MAKING INROADS

Racial and ethnic minorities made large gains in the last decade, and now represent about 20 percent of staff at firms, an increase of 4 percent from 2005. The percentage of minority licensed architects also witnessed a nice bump. Women also made inroads at firms, especially among licensed architects: 26 percent are women, versus 20 percent in 2005. But the percentage of women principals and partners only ticked up slightly.



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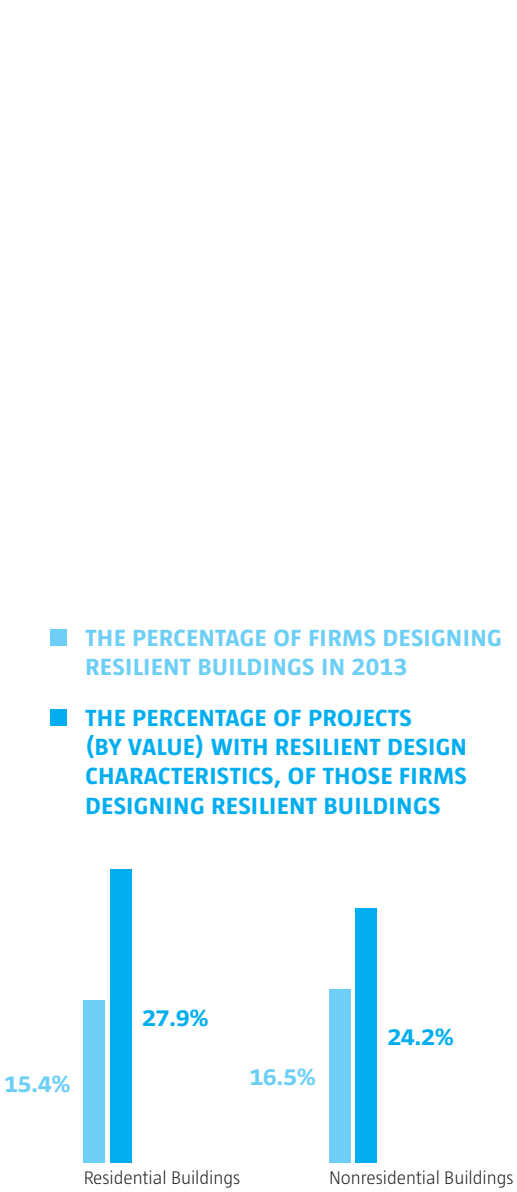
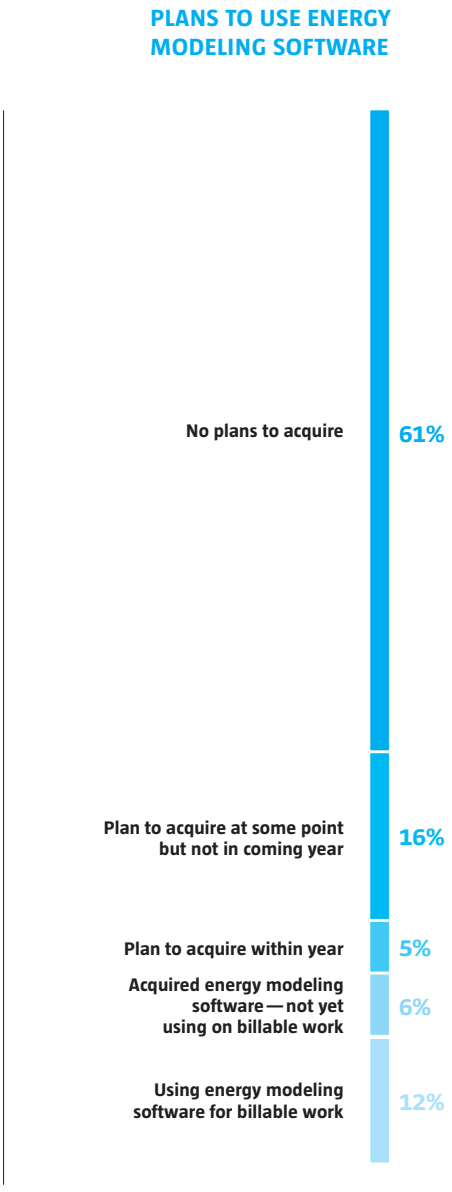
5 PERFORMANCE MUST IMPROVE

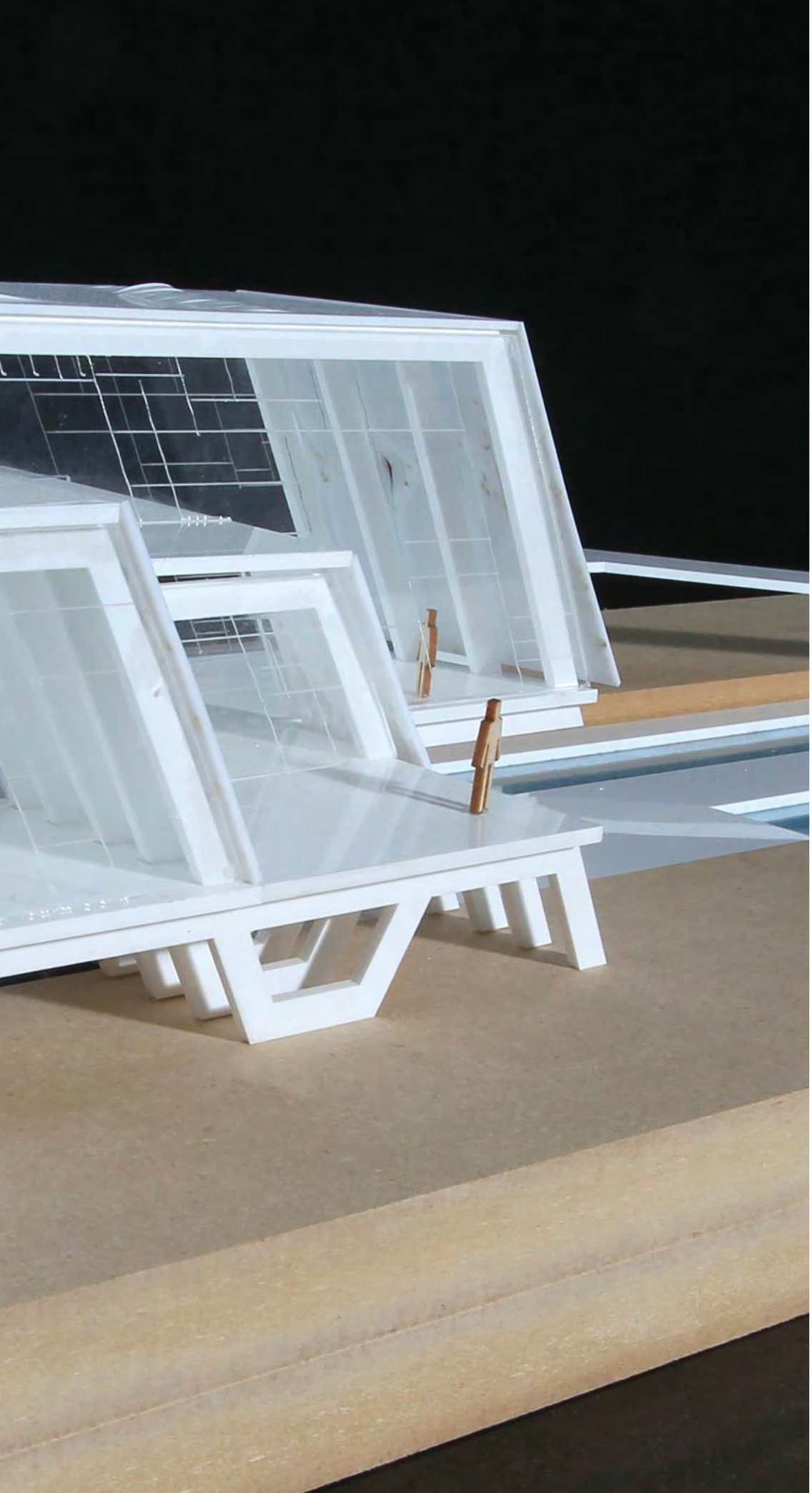
The numbers weren't great when it came to energy modeling. Twelve percent of firms were using the software for projects in 2013, with another 6 percent owning it but not yet using it for billable work. More than 60 percent of firms had no plans to acquire any software.

The numbers relating to resilient design also left something to be desired. Firms reported that 16.5 percent of nonresidential projects and 15.4 percent of residential projects incorporated resilient design characteristics.





Methodology: The AIA, working with independent research company Readex Research, contacted 8,309 offices of U.S. architecture firms and received 2,038 usable survey responses. For more, visit the AIA's Firm Survey Report site at *aia.org/firmsurvey*. To purchase the full report, visit *aia.org/store*.



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AN INTRODUCTION TO ETFE ARCHITECTURE

LEARNING OBJECTIVES

By the end of this educational unit you will be able to:

1. Compare and contrast the benefits of ETFE architecture and structures over traditional building techniques.
2. Identify the complete process—from design through construction—for creating an ETFE structure.
3. Learn how to select the right ETFE and describe key properties and performance attributes of each.
4. Explore the new innovations and see how these allow you to design according to the new building requirements and codes while still keeping your freedom of design.

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By Benoit Fauchon, in collaboration with Marissa Hovraluck

INTRODUCTION

Tensile structures have been used for thousands of years. Their simplicity and efficiency have brought about a recent increased awareness of, and demand for, tensile architecture. Ethylene tetrafluoroethylene, or ETFE, is a relatively new product within the tensile membrane industry in the United States, and it is growing in popularity. It is a fluorine based plastic that was developed to be strong across a wide range of temperatures and be highly resistive to corrosion. This course provides a brief background on the following: ETFE architecture; the benefits of ETFE structures over traditional building techniques; identifying the complete design through construction process for creating an ETFE structure; as well as learning how to select the correct ETFE system and the key properties and performance measures of each.

HISTORY OF TENSILE STRUCTURES

Before looking specifically at ETFE, it is important to understand how tensile structures have developed over time. Tensile structures date back to early nomadic people, such as indigenous North Americans, North Africans and East Asians. These groups required shelter that was lightweight and portable, yet structurally sound enough to withstand harsh winds, driving snow, sandstorms, and torrential rains. Combining lightweight fabric, animal hides and small, easily transportable structural elements was the most viable solution. Over time, these structures became symbols of the cultures that used them and other cultures have adopted fabric architecture throughout history. Tensile solutions have appeared in structures like the retractable Roman Velarium that provided sun shading for a more comfortable spectator experience at the Coliseum.

Many credit the rise of modern tensile architecture to 20th century American engineer Walter Bird. As an engineer at Cornell Aeronautical Laboratories during World War II, Bird worked on the design and development of late generation fighter aircraft. After the war, Bird's work shifted to the development of air-supported tensile cladding structures to be used as radomes—the protective weatherproof enclosures for radar antennae. This air-supported concept permitted minimal material thickness and avoided structural frame members that would interfere with RF signals.

In Europe, the German architect Frei Otto started to look a tensile and lightweight constructions right after WWII with the first PVC structure constructed in 1955, but most notably the German Pavilion at the 1967 Expo in Montreal.

At his home in Amherst, New York, Bird installed a similar air-supported structure over his swimming pool to extend the swimming season for his family. The revolutionary pool enclosure was depicted on the cover of Life Magazine in November of 1957, highlighting how the air-supported dome allowed for year round swimming. Seeing the tremendous potential for these new air-supported structures in real world applications, Bird left Cornell Aeronautical Laboratories and launched a new company focused on tensile structures.

In the mid-1960s, Bird learned of new advancements being made in tensile membrane materials that were triggered by the U.S. space program. NASA and DuPont were developing a strong, lightweight, fire-retardant fabric membrane for space exploration apparel. The result was the introduction of a fabric, woven with glass fibers and coated with polytetra-fluoroethylene, or PTFE, also known as Teflon. This lightweight membrane per mass proved to be stronger than steel and non-combustible. Bird recognized that these characteristics could make this new material also viable for a variety of architectural applications. He noted the material's self-cleaning attributes could offer significant maintenance benefits in roofing and exterior applications.

Bird's new company partnered with a supplier of the new membrane material and became the first to design and build a permanent inflated roofing structure with the material.

Bird's successful introduction of tensioned PTFE fiberglass membrane led to its extensive use in the architectural community. A 1972 commercial installation at the University of LaVerne in California is still in use to this day. The structure requires little maintenance and continues to perform to its specified structural capacity. Today, after more than 40 years, it shows no sign of needing to be replaced.

First ETFE Structure, Arnheim Burgers' Zoo, 1982

As a further development of the PTFE, Dupont created ETFE film as a protective coating used in the aircraft industry. Later in the 1980s it was discovered as a building material to create transparent envelopes.

WHAT IS ETFE?

ETFE, or Ethylene Tetrafluoroethylene, film is durable, highly transparent and very lightweight in comparison to glass structures. ETFE film, conventionally used in agricultural applications such as greenhouses or for the coating of solar cells, has demonstrated its worth in the architectural sectors, as well.

The raw granulate is extruded into sheets called foil or film with a density of 1.012 oz. per cubic inch. ETFE is one of the most lightweight and transparent cladding materials in the building products industry. Due to the low coefficient of friction on its surface, dust or dirt does not stick on the film. As the film is UV transparent, it will not discolor or structurally weaken over time. ETFE can also be fully recycled.

The first ETFE application in the building industry took place in the early 1980s in Europe. Now, ETFE is considered the material of choice for a variety of projects, from traditional skylight applications to long span structures and building facades. Plus, when you want a structure that stands out from the crowd, few building materials can match ETFE for its impact or presence.

With the Eden Project in Cornwall, UK in 1988, the tremendous potential of ETFE was shown. With two major projects, the Allianz Arena for the 2006 Soccer World Cup and the "Water Cube" at the 2008 Beijing Olympics, ETFE film has gained recognition and is now considered the premium material for transparent cladding applications whether in roofing or facade construction.

ETFE structures offer flexibility with design (Project: DWI Aachen by Carpus+Partner)

CHARACTERISTICS OF ETFE

There are many benefits to using ETFE film for a building or structure. ETFE films can be highly transparent, from 90 percent to 95 percent, and allow for the passing of UVs which are responsible for the promotion of photosynthesis, thus facilitating plant growth.

ETFE film systems can incorporate a number of frit patterns on one or multiple layers to alter their solar performance. The foil is printed with various standard or custom patterns. During the extrusion process, color can also be applied, providing a consistent tint in various tones ranging from red to violet, contributing to ETFE's solar control and shading properties.

While ETFE films are very elastic, up to 600% at breaking point, they are still structurally resistant. The tensile strength at the limit of elasticity/plasticity is 21–23 N/mm², but tensile strength to breaking point is 52/Nmm². For the structural calculation, a limit of 15 N/mm² conservatively is usually taken.

ETFE does not degrade under exposure to environmental pollution, UV light, harsh chemicals or extreme temperature variations. This helps to make ETFE a long lasting material, especially in its outdoor applications.

ETFE film has approximately 70% acoustic transmission. Acoustically, the cushions are fairly transparent and dramatically reduce reverberations. This quality can be beneficial when used in a project that expects loud noises, since the sound will not be reflected back into the building.

From the extruding of the film to the transportation to the site, ETFE is sustainable and energy efficient. Compared to other similar cladding material, little energy is consumed in this process, thus reducing the overall carbon footprint. In addition to this, the nature of the product enhances the building physics through insulation and daylighting, therefore contributing to the global low-energy aspect of the building.

Due to the lightweight nature of ETFE, substructure support systems and concrete foundations can be designed more efficiently, making it a cost effective material.

ETFE is fully recyclable. The waste from the manufacturing process or even old ETFE elements can be remolded into new ETFE products such as tubing components, wires or castings, making it an easily recyclable material.

Comparable to a glass system, the increased thermal performance of ETFE is possible for a multi-layered system. For a double or triple layer pneumatic system, multiple layers of film are welded into panels that are inflated with low pressurized air to stabilize the film and providing the thermal property of the system. In a single layered application, an R-Value of approximately 1 can be achieved. In a two-layer system, approximately an R-Value of 1.6 can be reached. Whereas, a three- layer ETFE system has an R-Value around 2.9 degrees F h / Btu or a U-Value around.35 BTU/ (h degrees F ft 2). In addition, integrating internal blankets of aerogel into the system will substantially increase the system's thermal properties.

Another key characteristic of ETFE is the Air Inflation System and Energy Consumption. A pneumatic ETFE cushion system is generally fed by one or more inflation units. Each unit consists of two redundant blowers forming a backup system for guaranteed structural stability. When entering the machine, the air will be pre-dried to avoid any condensation forming within the cushions. A series of pressure sensors will continuously monitor the internal pressure of the ETFE cushions maintaining them between 5 PSF and 6 PSF. In case of high wind or snow loads, if necessary, sensors can automatically and continuously adapt the pressure to compensate external loading up to 30 PSF.

Depending on air temperature and humidity, one unit can feed a roof of 15,000 square feet up to 25,000 square feet. They are UL certified and run on an 110V power, and the power consumption is minimal with less than 1kW.

Due to the non-adhesive surface properties of the ETFE, deposits of dirt, dust, and debris do not stick and are washed away by the rain resulting in a "self-cleaning" effect. ETFE requires minimal cleaning and the structure is easily maintained. However, as in all mechanical equipment, it is necessary to perform a yearly inspection. The inspection includes all necessary checks on the air blower system and filter replacements. The ETFE film and its attachments will also be inspected for possible damages to prevent any further deterioration.

When looking at fire resistance properties, ETFE films have been rated under various national and international standards as self-extinguishing with no burning drops. The film melts away at around 500 degrees Fahrenheit. ETFE is classified under several different standards, including ASTM E84 class A, UL 94VTM class 0, EN 13501-1 class B-s1-d0 and NFPA 701.

Safety is another important characteristic of ETFE film installations. Due to the high resistance and elasticity of the ETFE, it is an ideal building component where sudden extreme loads, such as earthquakes or blasts, may occur. Unlike glass, that will shatter and cause major concerns under similar shock load situations, ETFE will either deflect under the heavy load or, even in the case of any breakage, is unlikely to cause any major damage. ETFE is, however, not suitable as vertical railing and cannot prevent an intrusion.

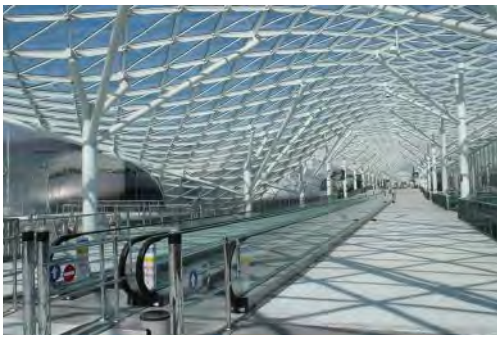
CONVENTIONAL VERSUS ETFE

With a greater understanding of the history of tensile structures, it is important to explore some basic differences between conventional construction and ETFE construction. With conventional construction, heavy weight and rigidity are the standard requirements, as these materials are placed in compression to create structural integrity. In order to support conventional construction, the design must follow limited geometry and often leads to high construction and development costs.

However, with ETFE construction, lightweight, flexible and elastic materials are preferred and structural form and integrity is achieved by placing these materials in tension. Using ETFE allows architects to break away from traditional geometric shapes and create free form designs while using these cost effective materials.

In conventional post-and-beam construction, structure is created through compression. Vertically aligned posts work in compression with horizontally aligned beams to create structure.

With ETFE, structural loads are carried by internal air pressure compensating the external wind and snow pressures. This creates a very light weight structural element.



The above glass canopy at the exhibition fair in Milan, Italy, (by Architect Massimiliano Fukas) is a masterpiece of engineering construction. However, due to the limited span capacity and the rigidity of glass, a very heavy steel structure with a triangulated configuration was required to achieve the organic shape.

Using conventional construction, it is difficult to span great distances without providing support columns to accommodate the suspended loads.

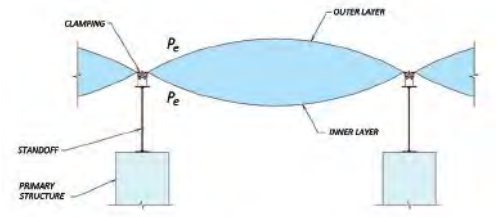
However, with tensile construction, spanning great horizontal distances is easy because weight is almost negligible, especially compared to conventional construction materials and methods. Standards spans are between eight to sixteen feet.

But with ETFE construction, free forms and larger spans can be readily achieved because of the great flexibility of the material.

The numerous and unique benefits of tensile architecture are well summarized here by British Architect, Sir Michael Hopkins. He wrote, "Increasingly we are exploring highly-efficient multi-functional elements, where structural performance, enclosure, light and thermal transmittance are combined in a single element. These are the reasons we use membrane."

THE DESIGN PROCESS

Again, a key benefit of tensile architecture is the ability to achieve dynamic forms. There are two basic forms of ETFE construction: single layer, where the tension in the ETFE is achieved through mechanically tensioning the ETFE, and double or triple layer cushion constructions,



where the tension in the ETFE is achieved through pressurization or inflation.

A variety of standard connection details are used in ETFE structures. Design-build contractors who specialize in tensile structures work with architects to provide details best suited for project conditions. These details are then often included in the construction documents, or, more frequently, in the design-build specifications included for the specialty contractor.

PROCESS STEPS

More often than not, ETFE architecture requires a design strategy involving the interaction of a wide variety of geometric forms, materials and tensioning options. Design involves sophisticated engineering programs to help architects and engineers create nearly any imaginable design. However, it's likely difficult to source the information you'll need from your firm's resource library. Consultation with a design-build contractor who specializes in ETFE architecture is an important and extremely valuable step, as successful ETFE structures are designed, engineered and constructed in close cooperation with such companies. Architects who work extensively with ETFE structures recognize this cooperative effort as a standard of best practices. Cooperation with an ETFE architecture specialty contracting firm, with in-house design and fabrication resources, minimizes undue risk for the client, designers, architects and engineers. Using third-party brokerage firms is not recommended and can lead to problems in the construction and performance of the structure.

ETFE Cushion System being installed at Empire City's Casino, Yonkers, NY

QUIZ

1. True or False: Bird's successful introduction of tensioned PTFE fiberglass membrane led to its extensive use in the architectural community.

2. In comparison to glass structures, ETFE film is:
   a. durable. b. highly transparent.
   c. lightweight. d. All of the above

3. True or False: ETFE films are not very elastic, up to 60% at their breaking point, meaning they are not structurally resistant.

4. ETFE is considered the material of choice for a variety of projects, such as:
   a. traditional skylight applications. b. long span structures.
   c. building facades. d. all of the above.

5. True or False: Due to the non-adhesive surface properties of the ETFE, deposits of dirt, dust, and debris do not stick and are washed away by the rain resulting in a "self-cleaning" effect.

6. What are inflated ETFE structures usually called due to their form? (Select all that apply)
   a. Blanket b. Cushion
   c. Pillow d. Sheet

7. Which of the following refers to the increase in temperature in a space, object or structure that results from solar radiation?
   a. Solar Heat Gain b. Global Warming
   c. HVAC Installation d. None of the above

8. True or False: The first ETFE application in the building industry took place in the early 1980s in Europe.

9. Which of the following is a test performed on ETFE?
   a. Crease fold tensile test b. Flame resistance
   c. Uniaxal test d. All of the above

10. ETFE film has approximately what percentage of acoustic transmission?
   a. 20% b. 45%
   c. 70% d. 90%

ETFE structures are generally specified as design-build projects. When designing an ETFE structure, the desired geometry and form need to be addressed first. Then, an analysis of how the membrane will interact with the support structure will help determine which type and details may be used to meet the load requirements.

It is important to remember the interfacing details between steel and the ETFE system. Proper coordination is critical to the overall aesthetic and performance of a structure. Involvement with an ETFE specialty contractor early in the process can assist in this effort.

This article continues on http://go.hw.net/AR1014Course1. Go online to read the rest of the article and complete the corresponding quiz for credit.

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LEARNING OBJECTIVES

By the end of this educational unit you will be able to:

1. Describe what acetylated wood is and the process used to manufacture the product.
2. Identify the performance benefits of acetylated wood.
3. Examine the applications for acetylated wood.
4. Review two case studies where acetylated wood was use.

CONTINUING EDUCATION

CREDIT: 1 LU

COURSE NUMBER: ARoct2014.2

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WHAT IS ACETYLATED WOOD?

Acetylated wood is sustainably grown softwood and non-durable hardwoods from New Zealand, Chile, Europe and North America that has been modified to the core through the acetylation process. Acetylation creates a nontoxic product, in a revolutionary process, which increases the amount of natural occurring acetyl molecules and reduces the amount of hydroxyls in wood; this process improves the wood's durability, dimensional stability, insect resistance and coatings service life. Acetylated wood is ideal for exterior applications where high performance is required such as windows, doors, siding, decking, outdoor furniture and structural projects such as bridges and canal linings.

Acetylation has been studied by scientists around the world for more than 90 years. This method of improving wood has been proven to deliver such superior performance that it has long been used as the "gold standard" against which other methods are measured. The earliest known scientific paper on the acetylation of wood dates back to 1928 and the first patent was granted in 1930. There have been various unsuccessful attempts to commercialize acetylated wood but now there is only one commercially successful operating plant in the World, most notable in The Netherlands, central Europe, which have been fully commercially operational since 2007 and selling in 60+ countries.

UNDERSTANDING THE ACETYLATION PROCESS

The physical properties of any material are determined by its chemical structure. Wood contains an abundance of chemical groups called "free hydroxyls". Free hydroxyl groups adsorb and release water according to changes in the climatic conditions to which the wood is exposed; this is the main reason why wood swells and shrinks. It is also believed that the digestion of wood by enzymes initiates at the free hydroxyl sites, which is one of the principal reasons why wood is prone to decay.

Acetylation effectively changes the free hydroxyls within the wood into stable acetyl groups. This is done by reacting the wood with acetic anhydride, which comes from acetic acid

(known as vinegar when in its dilute form). When the free hydroxyl group is transformed to an acetyl group, the ability of the wood to absorb water is greatly reduced, rendering the wood more dimensionally stable and, because it is no longer digestible, making it extremely durable.

Acetyl groups, which are simply comprised of oxygen, hydrogen and carbon, are already naturally present in all wood as well as in humans and other mammals. This means that the manufacturing process adds nothing to the wood that does not already naturally occur within it and the end product does not add toxins to the environment. Incidentally, the only by-products from the manufacture of acetic anhydride are a small amount of valuable fertilizer and trace amounts of acetic acid, which can be biodegraded.

The effect of altering the wood's chemical structure, as opposed to merely altering its chemical content, essentially creates a new product that is pure, natural and more durable. By contrast, virtually all other treatments merely insert chemicals (such as oils, ammonia or metal compounds) into the cell walls of the wood.

The revolutionary and unique acetylation process modifies the wood right through to the core, achieving class 1 durability 100% throughout the wood. Other modifications and envelope treatment processes fail to achieve this gold standard. The acetylation process offers irreversible performance and there is no risk of the treatment leaching or loss of performance.

Quality control is paramount and every batch is tested 19 times to ensure that class 1 durability and exceptional stability is achieved. Only product that passes these stringent tests are released for sale in North America and around the world. This consistent quality enables an industry leading 50 year warranty for rot, decay and stability to be offered, giving peace of mind and an assurance of outstanding performance.

The revolutionary and unique acetylation process modifies the wood right through to the core, achieving class 1 durability 100% throughout the wood.

American School. Photo courtesy of Accsys Technologies.

KEY CHARACTERISTICS AND PERFORMANCE BENEFITS

Acetylated wood offers outstanding performance benefits such as superior durability, dimensional stability, insect resistance, sustainability, and ease of use.

Durability—The World's Most Durable Timber Class Achieved

Cellulose is the primary structural ingredient of wood but it is also a major food source for several different insects and fungi. Rot causes wood to degrade, particularly when it is used outdoors and exposed to moisture, limiting its service life. Thankfully an alternative exists in acetylated wood, which offers an environmentally compatible, durable product that can be used with confidence in outdoor applications and will last for many, many years.

The durability of acetylated wood is class 1, the world's highest rating possible; it matches and in many cases exceeds the world's most durable hardwoods. While some wood species are naturally durable, natural durability is known to be a variable and inconsistent property, which can cause subsequent problems. For example, Teak can range from class 1 to 3 and Meranti can range from class 2 to 4, whereas acetylated wood is consistently class 1 durable right through the cross section of the wood. The properties of every batch are analyzed by standard scientific measurements after modification, enabling its durability to at least match and even exceed the performance of nature's most durable species, including Teak.

Additionally, durable woods tend to be slower growing species, whereas acetylated wood is made using fast growing, sustainably forested Radiata Pine, so old growth forests are not threatened or depleted to create the product.

Acetylated wood comes with a guarantee to last 50 years above ground and 25 years in direct soil contact or freshwater. Also, it is virtually rot proof. The longer lifespan means lower material consumption over the same period compared to most other materials. This also means that acetylated wood has certain carbon sequestration advantages.

The wood also offers retained strength and hardness; the acetylation process does not compromise the wood's strength, but rather increases hardness. Because of this property acetylated wood offers a high strength to weight ratio, making it suitable for challenging applications.

Acetylated Wood Carbon Negative Windows, Oakleigh USA. Photo courtesy of Accsys Technologies.

Durability Testing

Product testing and third party validation has been undertaken from many different aspects on a worldwide basis. Some of these tests have been conducted in real-world conditions over many years using independent institutes in North America, Australia, Asia and Europe.

Scion, formerly known as New Zealand Forest Research Institute Ltd, undertakes research, science and technology development in forestry, wood products, biomaterials and bio-energy. Scion tested the durability of acetylated wood against other naturally durable and preservative treated timbers. The harsh test site runs exposed timbers in accelerated decay chambers and in exterior ground contact tests at the Whakarewarewa site. The tests have run continuously for eight years and show acetylated wood performing better than Teak, Merbau, Cypress, Cedar and H3.2 (above ground, uncoated horizontal) and H4 (in ground contact) preservative (CCA) treated timbers, proving that acetylated wood has the highest possible durability classification.

In February 1998, L-joints were installed at the BRE Garston field exposure site in Watford, UK facing the prevailing south westerly weather on an elevated testing. The test remains in progress with inspections at regular intervals. The BRE reported: "In simulated accelerated joinery field trials that represent a worst case scenario joinery product by enabling moisture ingress into the joint pine, sapwood L-joints acetylated to a slightly lower modification level than acetylated wood, after 13 years exposure in the UK are performing very well. The trial indicates that a permeable timber species that is acetylated through the cross section to a Durability class 1 level, would have a grading lower than the reference preservative TnBTO—and thus acetylated wood would exceed the biological reference value and would be deemed to provide sufficient protection for long life window joinery."

Dimensional Stability—The World's Most Stable Wood

Temperature and humidity are critical factors with many building materials, including wood. Wood swells in damp or wet conditions and shrinks in dry, hot conditions, which can have unwelcome implications. Windows and doors may jam or let in drafts; wood may warp or split, leading to insect degradation and more frequent maintenance cycles; and structures may become unstable.

Acetylated wood is not only durable but also offers outstanding dimensional stability in both radial and tangential directions (thickness and width) meaning that it has minimal swelling and shrinkage and may be confidently used in applications where it will encounter varying moisture conditions—even in freshwater immersion. Dimensional stability can be defined as the degree to which a material maintains its original dimensions when subjected to environmental changes.

Recent independent tests by the Timber Research and Development Association (TRADA) show that acetylated wood has minimal cupping, shrinking and swelling after harsh testing and can offer a stable wood product with consistent performance. Tests have shown a reduction in swelling caused by moisture uptake of 75% or more. From oven dry to water saturated conditions, the swelling and shrinkage of acetylated wood is only minimal and, in fact, better than tropical hardwoods. Acetylated wood's superior dimensional stability matches or exceeds all the best species in the world, including Teak, Sapele, Iroko and Western Red Cedar.

The excellent dimensional stability of acetylated wood ensures swelling and shrinkage reduced to 1.5% in either direction. Window joints do not crack and split, tolerances remain tight, and twist is dramatically reduced. There is less stress exerted on coatings which ensures that the coating life is extended up to 3 times longer, which lengthens the maintenance cycle and reduces maintenance costs. With these benefits in mind acetylated wood enables more flexible design.

TRADA was commissioned to provide an update on a series of exposure trials. The on-going trials using the same coating began in February 2007 in Buckinghamshire, England and tested acetylated wood cladding boards' resistance to natural weathering and splitting in comparison to Pine and Siberian Larch.

After 42-months, acetylated wood was found to outperform the competing cladding boards in a number of ways, showing excellent coating performance. The Pine cladding boards showed severe levels of fissuring, resin exudation, end fissuring, paint peeling over fissures, shelling, surface checking and board distortion; Siberian Larch was found to have extensive surface checking and burst resin pockets.

Acetylated wood, however, had a flat cladding surface with no grain raising, virtually no shelling, cracking, checking or fissuring. External dirt was easily cleaned off revealing a sound clean surface with no rot, decay or coating issues. This harsh test proves that acetylated wood has superior coating performance compared to many competing materials in independent trials.

Moses Bridge. Photo courtesy of Accsys Technologies.

Acetylated Wood Performs in Extreme Conditions

Acetylated wood has been tested over prolonged periods in all types of extreme weathering conditions, including above ground, below ground and in freshwater, and has been proven to withstand even the toughest and most challenging of environments. Even after a prolonged period of immersion, window frames operate smoothly without jamming.

The wood has even been used for replacement windows in two lighthouse restoration projects. Owner of Belle Tout Lighthouse in East Sussex, England says, "The new windows have made a vast improvement to the property visually and in terms of energy and heat retention and have made a significant reduction in noise from the wind in such an exposed location."

Insect Resistance

Acetylated wood serves as an insect barrier because it is indigestible to a wide variety of insects, including termites, and greatly reduces vulnerability. Many regions in the United States have issues with termites. Coptotermes formosanus, known as Formosan termites, are considered one of the world's most aggressive termite. Louisiana State University conducted a 99 day Formosan termite 'choice' test, using untreated Radiata Pine and acetylated wood (2" x 4" lumber). All four sides of the untreated Radiata Pine were attacked and left structurally compromised. In stark contrast, acetylated wood only exhibited slight grazing. The results of standardized testing show that acetylated wood was 22 times better than the untreated Radiata when measured by sample weight loss.

Sustainability—Carbon Negative Windows and C2C Gold Certified

Now that we've discussed how the acetylation process significantly enhances the durability and dimensional stability of fast-growing and abundantly available certified wood, let's discuss the wood's sustainability. Acetylated wood provides compelling environmental advantages over slow-growing hardwoods (which are often unsustainably sourced), woods treated with toxic chemicals, and non-renewable carbon-intensive materials such as plastics, steel and concrete.

Wood sourced from sustainably managed forests and plantations is an environmentally responsible choice that is theoretically inexhaustible. However, supplies of certified slow-growing tropical hardwoods suitable for outdoor use are limited, resulting in illegal logging which in turn leads to the deforestation of tropical rainforests.

The responsible procurement of wood plays a fundamental role in positioning acetylated wood as an environmentally compatible product. Look for acetylated wood that is produced from well-managed, sustainable sources including Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC) and other regionally certified woods. The world's largest manufacturers of acetylated wood have their procedures and practices assessed annually by the independent certification body Control Union (www.controlunion.com) to ensure that it meets FSC® and PEFC™ Chain of Custody guidelines.

Fast-growing softwood species, such as Radiata Pine, are primarily used to produce acetylated wood. The use of wood species that produce larger volumes of wood over the same time span for the same area of land offers obvious environmental advantages. Radiata Pine even outperforms giant bamboo, known to grow incredibly fast, in terms of annual yield. This means that there is an ample supply of timber from certified sources for production to replace scarcely available certified tropical hardwood.

In order to assess the environmental impact of a material or product, all stages of its life cycle, from cradle to grave, must be taken into account. There are a number of options for use at the end of this product's life. One model follows the guidelines of the Cradle to Cradle philosophy, developed by William McDonough and Michael Braungart, to close biological and technological cycles as much as possible and reuse materials in applications with the same or even higher added value. Acetylated wood is non-toxic and eliminates the chance of poisons used in other wood treatments leaching into the earth. Acetylated wood can be handled in the same manner as untreated wood at the end of its life and may be safely reused and recycled, as the manufacturing process adds nothing to the wood that does not already occur naturally within it.

Regarding this eco-friendly product is that compared to other durable wood species, acetylated wood offers superior thermal insulation. It is naturally insulating, which provides energy conservation advantages when used in applications such as window frames and doors.

Leading independent institutes have found that acetylated wood, when used in windows, are carbon negative. The tests have shown, taking into account transportation, durability, and manufacturing, that acetylated wood is a truly sustainable and environmentally friendly wood product.

QUIZ

1. True or False: Acetylated wood is sustainably grown softwoods and non-durable hardwoods that have been modified through to the core.

2. The earliest known scientific paper on the acetylation of wood dates back to:
   a. 1776 b. 1928
   c. 1985 d. 1887

3. True or False: Acetylation transforms stable acetyls into free hydroxyls which makes the wood less durable, less stable and removes a barrier to insect decay.

4. Which of the following are performance benefits of acetylated wood? (Select all that apply)
   a. Outstanding durability b. Dimensionally stable
   c. Insect resistant d. Extended coatings life

5. What class of durability is acetylated wood, giving it the world's highest rating possible?
   a. Class 1 b. Class A
   c. Class Superior d. Class 100

6. True or False: The acetylation process is reversible.

7. What is one of the most extreme environments for using wood?
   a. Residential windows b. Commercial siding
   c. Canal linings d. Telephone poles

8. What type of wood did acetylated wood outperform in the TRADA testing?
   a. Hardwoods b. Softwoods
   c. Other modified woods d. All of the above

9. True or False: Acetylated wood offers outstanding dimensionally stability and ensures swelling and shrinkage reduced to 1.5% in either direction.

10. True or False: Acetylated wood is non-toxic and can be handled in the same manner as untreated wood at the end of its life.

This article continues on http://go.hw.net/AR1014Course2. Go online to read the rest of the article and complete the corresponding quiz for credit.

SPONSOR INFORMATION

Accsys Technologies PLC is a chemical technology group, focused on the acetylation of wood. The primary focus is on the production and licensing of Accoya® solid wood and Tricoya® wood elements technology. Manufactured through the company's proprietary acetylation process, these products exhibit superior dimensional stability and durability compared with other natural and treated timber and wood elements.

BETTER EDUCATION IMPROVES THE NATION

ASSESSING THE NATIONWIDE NEED FOR HIGH PERFORMANCE SCHOOLS

At Cherry Crest Elementary School in Bellevue, WA, NAC|Architecture incorporated a wealth of windows and window-walls to provide outdoor vistas and optimize daylighting. NAC|Architecture is a leader in high performance educational facility design and has completed the design of more than 160 major PK-12 school projects for 60-plus school districts with a total construction volume exceeding $1 billion. Photo Courtesy of Benjamin Benschneider/OTTO

LEARNING OBJECTIVES

By the end of this educational unit you will be able to:

1. Define what constitutes a high performance building and how these structures relate to the overall growth of the green building industry.
2. Identify organizations that can assist with the high performance school design process.
3. Examine how high performance schools benefit health, comfort, and the learning environment and how to incorporate high performance design principles to meet these goals.
4. Describe how high performance schools improve facility operations and maintenance and how to incorporate high performance design principles to meet these goals.

CONTINUING EDUCATION

CREDIT: 1 HSW LU

COURSE NUMBER: ARoct2014.3

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By Paige Lozier

SCHOOLS BATTLE DEFERRED MAINTENANCE

According to the U.S. Green Building Council (USGBC), approximately 25 percent of Americans go to school or college every day as students, teachers, staff, faculty, and administrators. Educational facilities are ubiquitous, found in every community throughout the nation, dotting suburban neighborhoods, city blocks, and rural townships. Many of these schools are severely outdated, with aging structure and systems in need of repair, possibly riddled with toxins such as lead, asbestos, mold, and bacteria.

A lack of resources and diminishing budgets result in deferred maintenance and hinder progress in truly updating and improving the schools that our children attend. But, as these schools continue to age without proper maintenance there will eventually be no other choice than to repair or replace the current stock of education facilities. Whether a retrofit or new construction, the perfect opportunity arises to incorporate high performance measures into school design.

The American Institute of Architects (AIA) defines high performance buildings as those that increase occupant productivity and comfort, last longer, are safer and more sustainable, and cost less to maintain over their life cycles. The 2005 Energy Policy Act defines a high performance building as one that integrates and optimizes all major high-performance building attributes, including energy efficiency, durability, life-cycle performance, and occupant productivity.

A high performance building integrates and optimizes all major high-performance building attributes, including energy efficiency, durability, life-cycle performance, and occupant productivity.

Some innovative school districts have already made high performance and green building a

priority, with innovative systems and learning environments in place. Imagine if we could provide a safe, healthy, energy efficient environment for ALL students to spend their days, not to mention a cost efficient structure that improves building operations and maintenance for the school district. Other schools can take cues from completed projects, if only in small measures, to improve the learning environment for students and increase operational efficiency. Imagine if this same environment was a learning laboratory for sustainability, teaching children how they can participate in moving the world forward into a progressive era of green. High performance schools cultivating high performing students could become a reality.

A lack of resources and diminishing budgets result in deferred maintenance and hinder progress in truly updating and improving the schools that our children attend.

GROWTH POTENTIAL FOR THE INSTITUTIONAL SECTOR IN THE GREEN BUILDING MARKET

Over the past several years the green building market has exploded and continues to accelerate. According to McGraw-Hill Construction's *2013 Dodge Construction Green Outlook* report, the value of green building construction has grown from $10 billion in 2005 to an expected $204 to $248 billion by 2016. In addition, the U.S. green building market represented 2 percent of all commercial and institutional construction in 2005, grew to 44 percent in 2012, and is expected to reach 55 percent by 2016.

Another study, Turner Construction Company's *2012 Green Building Market Barometer*, surveyed more than 700 executives regarding their commitment to constructing environmentally sustainable buildings. The vast majority of the executives surveyed said they would incorporate green features if they were undertaking a construction or renovation project. Fifty-six percent said their companies were extremely or very committed to following environmentally sustainable practices in their operations, while an additional 34 percent said they were somewhat committed.

This growth in the green building market reflects a broader commitment to environmentally-sustainable practices by corporate America. Customers, investors, employees, and the general public increasingly expect companies to following sustainable practices. If corporate America is taking such a leap to make green building practices par for the course, the atmosphere is ripe for public institutions such as school districts to get on board.

The future of green building is not exclusive to one building type. For example, McGraw-Hill Construction's *2013 World Green Building Trends Smart Market Report* reports the institutional construction sector has significant plans for green building activity through 2015, placing these structures in the top tier of priorities for the building industry.

Overall, between 2012 and 2015, the sectors with the largest opportunity for green building in the U.S. include new commercial buildings, with 57 percent of firms reporting planned green projects through 2015. Retrofits of existing buildings are nearly equivalent at 56 percent. Rounding out the top three are new institutional buildings. Fifty-two percent of firms have green building plans for new institutional buildings such as schools and hospitals through 2015. It is time for school districts across the nation to take advantage of this momentum and market innovations to provide a safe, healthy, energy efficient environment for all who spend their days in school.

The institutional construction sector has significant plans for green building activity through 2015, placing these structures in the top tier of priorities for the building industry.

SEEK HELP FROM THE EXPERTS

There are several organizations and useful tools interested parties should be aware of when working and designing within the high performance building and education sector. We'll discuss a few of the organizations leading the charge, with the understanding that numerous other resources are at your disposal.

The USGBC's **Center for Green Schools** was established to drive the transformation of all schools into sustainable and healthy places to live, learn, work, and play. The Center promotes the design and construction of green schools, as well as greening the operations and maintenance of existing schools. The Center works directly with teachers, students, administrators, elected officials, and communities to create programs, resources, and partnerships that transform all schools into healthy learning environments. The USGBC administers the LEED program as well, where there are opportunities for both new and existing schools to seek LEED certification.

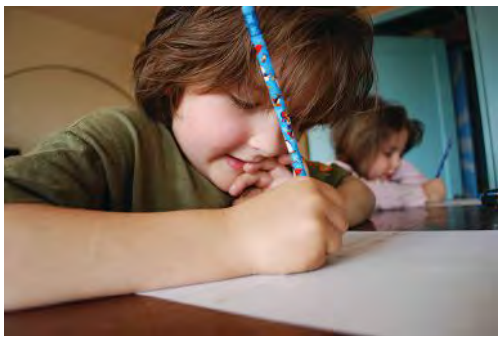
The **Collaborative for High Performance Schools** (CHPS) is an organization leading a national movement to improve student performance and the entire educational experience by building the best possible schools. CHPS offers states a National Core Criteria which addresses indoor environmental quality, energy and water efficiency, site and materials selection, strategies for integration and innovation, and operations and metrics. The Core Criteria has three priorities: 1) improve health and student performance; 2) reduce operating costs; and 3) mitigate environmental impacts. States then use the Core Criteria to build in state priorities, local climate and code issues, and other regional variations that make each state's rating system unique.

Another resource is the **CHPS Operations Report Card**. The CHPS Operations Report Card helps interested parties understand and improve the performance of existing school facilities. The CHPS Best Practice Manual also offers technical resources for schools, districts, and practitioners on the design, construction, maintenance, and operations of high performance schools.

The **High Performance Building Council** (HPBC) is an organization with the overall goal to put standards in place to define the performance goals of a high performance building in order to facilitate the design, construction, financing, and operation of buildings with an emphasis on life cycle issues rather than initial costs. The HPBC identifies the metrics and level of required

performance for specific design objectives for building products, subsystems and systems. The HPBC then references industry standards for validating these performance requirements.

Another important resource is the **National Clearinghouse for Educational Facilities** (NCEF). NCEF provides comprehensive information on planning, designing, funding, constructing, improving, and maintaining safe, healthy, high-performance schools. NCEF identifies, abstracts, and disseminates information on the planning, design, construction, renovation, operation and maintenance of the nation's schools.



Improving environmental factors enhances learning, results in higher test scores, and increases daily attendance.

IMPROVING STUDENT HEALTH, COMFORT, AND PERFORMANCE

There is a strong correlation between students' academic performance and a school's physical condition. Distractions and even health issues arise when indoor air quality, lighting, acoustics, or thermal comfort is poor. Improving these environmental factors enhances learning, results in higher test scores, and increases daily attendance.

When incorporating high performance design into education architecture, there are two broad goals to consider and subsequent measures to take in meeting those goals. First and foremost, the highest priority should be the health and safety of students, faculty, and staff. The second priority is to reduce costs for school districts, which we will discuss later in the article. Now that you know the importance of high performance education design, let's discuss the specific measures that architects can take to make it a reality.

Indoor Air Quality

Excellent indoor air quality is essential to occupant health and requires minimizing pollutant sources, providing adequate ventilation and air filtration, and preventing moisture accumulation. Reducing these sources of health problems inhibits the spread of airborne infections and helps keep pollutants, stale air and mold growth out of the classroom. The result is fewer sick days for students and teachers, especially those suffering from asthma or other respiratory problems.

According to the Environmental Protection Agency (EPA), asthma is a leading cause of school absenteeism (U.S. students miss 10.5 million school days per year because of asthma). Controlling exposure to indoor environmental factors such as carbon monoxide, dust, and pollen could prevent more than 65% of asthma cases among elementary school-age children, according to a recent report by the American Journal of Respiratory and Critical Care Medicine. Schools rely on their Average Daily Attendance (ADA) rates to receive federal funding, so even a small increase in ADA performance can significantly boost operating funding.

Low-emitting materials and products should be used where possible. When toxic chemicals found in paint, flooring, furniture, and conventional cleaning, pest management and snow removal products are eliminated, students and staff report less eye, nose, and throat irritation. Asthma-related incidents decline as well. By requiring the use of green building materials and cleaning products, schools ensure safe and healthy work environments for both students and staff.

A high-performing HVAC system limits the presence of airborne toxins and mold-causing dampness. It may also help to maintain classrooms at temperatures optimal for comfort and focused learning. A typical HVAC system can consume up to two-thirds of the energy used in a school. However, there are opportunities to substantially reduce energy costs by improving the efficiency of the system's components. A high performing air handling system can significantly improve air quality and ventilation rates. Regular maintenance inspections, performance monitoring and calibrations will ensure that the system continues to work effectively. The design of the system must be properly sized according to the regional climate, the age and structure of the school building, and other expected thermal improvements such as new windows and insulation.

Moisture can cause numerous problems affecting the indoor air quality of a building and the longevity of building components. Persistent moisture can lead to rot, corrosion, and other forms of deterioration. Moisture also supports insect infestation, ranging from mites to cockroaches and ants. If elevated moisture levels persist, they can lead to the growth of microorganisms such as mold and bacteria which create microbiological volatile organic compounds (MVOCs) that adversely affect indoor air quality.

Mold can only grow in the presence of high levels of moisture. Mold spores can cause asthma, allergies, lung disease, and a compromised immune system. Most mold exposure symptoms result from inhaling or touching mold. The most common symptoms are nasal or sinus congestion, sensitivity to light, skin irritation, shortness of breath, headache, fatigue, and burning eyes.

Moisture problems in schools can result from scheduling maintenance activities when school is not in session (and the HVAC system is not in use or under reduced use). For example, painting or carpet cleaning increases moisture in the air and if the air conditioning or heating system is not in operation, this can lead to high humidity and moisture issues. Schools should establish policies that restrict moisture generating activities during vacation unless moisture removing equipment is operating. Cycling the air conditioning system several hours every day or running portable dehumidifiers is often beneficial.

Due to the significant amount of time that students and teachers spend inside schools during their educational career, combined with children's increased susceptibility to indoor pollutants, the importance of optimal indoor environmental quality cannot be emphasized enough.

When toxic chemicals found in paint, flooring, furniture, and conventional cleaning, pest management and snow removal products are eliminated, students and staff report less eye, nose, and throat irritation.

Acoustics

Poor acoustics such as low level background noise can significantly impact a student's ability to hear class instructions, leading to diminished performance. Acoustic comfort means teachers and students can hear one another easily. Scott Dickmeyer, Ph.D., reports in his article, *Invest in Excellence: High Performance Schools and Improved Test Scores*, "Research on classroom acoustics found that as many as one-third of all students miss up to 33 percent of the oral communication that occurs in the classroom. Additionally, children under age 16 lack the knowledge and maturity to correctly infer meaning from missed and misheard words. In fact, research has identified that poor school acoustics create extra challenges for students who are coping with learning disabilities, hindered by impaired hearing, or struggling to learn in a non-native language."

Noisy ventilation systems should be eliminated, minimizing the amount of disruptive outdoor and indoor noise affecting the classroom. Incorporating acoustical ceiling tiles, lined ductwork, and HVAC systems with vents placed appropriately are simple solutions to provide an environment where the student can hear well.

Thermal Comfort

Thermal comfort means that teachers, students, and administrators are neither hot nor cold as they teach, learn, and work. Comfortable indoor temperatures enhance productivity and keep students more alert. Good insulation techniques can help to keep a building in a desirable thermal state, as insulation reduces cooling and heating loads, improves occupant comfort, reduces noise transmittance, and increases the building's overall durability.

Some ideas for improving insulation in a school building are to add insulation to the roof and ceiling, add or replace outdated insulation in wall cavities, and always insulate mechanical equipment, ducts, and piping to decrease unwanted heat dissipation and improve the efficiency of the heating and cooling systems. Consider adding a single-ply cool roof membrane, which deflects radiant heat from the sun and helps to maintain a stable internal building temperature. Or, install a green roof with natural vegetation to help insulate the building and reduce any heat island effect.

This article continues on http://go.hw.net/AR1014Course3. Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. According to the U.S. Green Building Council, approximately _____ percent of Americans go to school or college every day as students, teachers, staff, faculty, and administrators.
   a. 50
   b. 10
   c. 25
   d. 15

2. According to Turner Construction Company's 2012 Green Building Market Barometer, _____ percent of firms have green building plans for new institutional buildings such as schools and hospitals through 2015.
   a. 95
   b. 52
   c. 10
   d. 25

3. Which organization offers states a National Core Criteria, an Operations Report Card and a Best Practice Manual to assist in designing high performance schools?
   a. The Center for Green Schools
   b. The Collaborative for High Performance Schools
   c. The High Performance Building Council

4. Which of the following measures can be used to improve classroom acoustics? Choose all that apply.
   a. Acoustical ceiling tiles
   b. Wind turbines
   c. Lined ductwork
   d. Appropriately placed HVAC vents
   e. Large vision windows

5. True or False: A typical HVAC system can consume up to two-thirds of the energy used in a school.

6. Which of the following daylighting strategies is a popped-up extension of the roof, with vertical glazing along the sidewalls?
   a. Light monitor
   b. Skylight
   c. Clerestory window
   d. Vertical louvers

7. True or False: If all new U.S. school construction and renovation went green today, the total energy savings alone would be $20 billion over the next 10 years.

8. Which of the following renewable energy sources provide heating, cooling, and hot water to a school?
   a. Photovoltaics
   b. Ground source heat pumps
   c. Wind turbines

9. Which of the following site considerations can be incorporated into a high performance school?
   a. Biofiltration swales
   b. Permeable surfaces
   c. Rainwater and graywater collection systems
   d. Native plantings
   e. All of the above

10. The National Commission on Teaching and America's Future (NCTAF) estimates that the nation's school districts spend at least _____ a year on teacher turnover.
    a. $1 billion
    b. $2 million
    c. $20 billion
    d. $7.2 billion

SPONSOR INFORMATION

Presented by:

Amerimax WINDOWS & DOORS

COMPRESSION-SEAL TECHNOLOGY

A SUSTAINABLE SOLUTION FOR HIGH-PERFORMANCE WINDOWS AND DOORS

LEARNING OBJECTIVES

By the end of this educational unit you will be able to:

1. State the definition of compression-seal technology as applied to high-performance window and door systems.
2. Explain how a compression seal works and list the product configurations using compression-seal technology.
3. Explain the performance benefits of compression-seal technology for windows and doors.
4. Know the requirements for noise and sound abatement.
5. Recognize the best applications of compression-seal technology.

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By Tyson Jones, Business Development Manager—Amerimax Windows and Doors

Project: The Hilton—Embassy Suites Napa Valley, CA

Window and Door Requirement
Provide a robust solution that meets stringent acoustical demands (STC 40 and a U-value of .30) with aesthetics that complement the sophisticated Mediterranean look and feel of the hotel.

Project Details
The Hilton—Embassy Suites Napa Valley provides a level of relaxation and sophistication that is well-matched to the experiences of the surrounding world-renowned wine region. Set on seven acres of landscaped grounds just one mile from downtown Napa, the 205-suite property is a haven for guests looking to unwind.

To ensure the highest quality experience for its scrutinizing guests, management of the Embassy Suites Napa Valley commenced an extensive two-year renovation in December 2011.Originally constructed in 1985, the hotel was in need of several updates in all its common areas and guest suites, which included upgrades to all guest suite windows and doors.

The original windows and doors had 30 years behind them and had seen better days. Most notably, noise and outdoor air infiltration had become an issue. Seeking a high-performance window and door solution, hotel management initially installed a mock-up aluminum-frame door to test sound abatement and aesthetic appeal. When the door did not perform to the required standards an alternative uPVC profile featuring something called compression-seal technology was reviewed as a possible solution.

After reviewing the many benefits that the uPVC profile windows provided, it was an easy decision to specify and install a total of 80 windows and 130 doors. Ultimately this decision allowed the facility to achieve the desired acoustical requirements and contributed to the hotel receiving overwhelmingly positive guest feedback. The facility is now much more aesthetically reflective of Napa's image regionally and across the globe and performs as required.

Compression-seal technology within windows and doors can help projects meet increasingly stringent energy standards and codes.

ENERGY STANDARDS AND CODES BECOME MORE STRINGENT

Recent changes in energy standards and codes, and federal and voluntary initiatives, are transforming the entire building landscape. In the past, a variety of different state and local codes existed but there is now a trend towards increasing the standardization with more stringent codes. As part of this initiative, window and door systems will be required to perform at a higher level in order to achieve the new codes, standards and mandates. Currently, there are a great number of fenestration solutions available in the market but many do not and will not fulfill these new required performance specifications. Architects and engineers will need to be diligent in identifying and specifying the high-performance window systems that meet the new energy performance criteria.

As the building envelope tightens and energy, air, water, and noise codes become even tougher, the window and door industry is challenging itself to meet the ever growing demand to not only exceed all requirements but offer architecturally appealing design and performance standards. In order to meet these demands, technologies have to evolve and a new way of looking at window and door systems needs to be incorporated in the design of projects, taking into account not only the form, but the function of the system and how it can directly impact the building envelope from an aesthetic, structural, and mechanical point of view. Compression-seal technology within windows and doors is one way to enhance the project from the ground up.

Let's start by defining what Compression-Seal Technology (CST) is; it involves compressing a special gasket between the operable sash and frame of a window or door, to seal the joint by resisting air, noise and water infiltration for thermal and acoustical performance. CST is not a new concept and some examples, outside of the window and door industry, include airplane doors, car doors and refrigerator doors.

Regardless of the type of aircraft, compression seals are crucial to their performance. Passenger jets will have a compression seal system on their doors that prevents the loss of cabin pressure at high altitudes due to extreme negative air pressure. Smaller airplanes also rely on compression seals to keep the cabin safe and secure. In all cases, CST is critical to noise reduction and cabin comfort in these demanding applications.

A bit less crucial than an airplane door, but still important to our comfort and safety, car doors rely on compression seals. On the road, we encounter many of the same challenges as we do in our houses. Rain, snow, wind, noise, temperatures and safety are all issues that we want to control as much as possible. Compression seals help to maintain a dry, comfortable and quiet environment inside our vehicles when combined with the door locking system.

Entirely focused on the control of temperature, refrigerators require an effective sealing system to keep the warm air out and the cold air in. In commercial refrigerators, mechanical latches help to create the compression seal between the door and the refrigeration area.

You will notice that in all applications, the compression seal technology works together with the locking mechanism to create a proper environment conducive to the safety, comfort, and wellness of the specified application.

With compression seals, sash movement is in/out using gaskets that are usually a flexible polymer material (referred to as uPVC).

HOW COMPRESSION-SEAL TECHNOLOGY WORKS WITHIN WINDOW AND DOOR FRAMING SYSTEMS

With traditional window and door configurations, sash movement is side-to-side within the frame using seals that are usually composed of fibrous materials. This is often referred to as a friction based system. With compression seals, sash movement is in/out using gaskets that are usually a flexible polymer material (referred to as uPVC). A window or door performance relies heavily upon the ability of the gasket to stop infiltration of air, water, and noise. The shape and properties of the gasket are important for the compression seal to function correctly.

Specialized gaskets are designed for the rigors of the critical compression seal. These specialized gaskets have several key attributes that ensure their effective performance in CST. Some of these attributes include: color, shape, position, thickness, UV resistance, tear and peel resistance, resistance to aging and oxidation, tensile strength, co-extrudability, and durability. Uniform compression and consistent lineal contact are critical to forming an effective compression seal. The materials the gaskets are made of must have a perfect balance of flexibility, even in cold weather, and stability, even in hot weather. High quality compression seal gaskets are typically made of EPDM type/s Shore A40-55. This material provides flexibility down to -50°C and a maximum working temperature of 150°C. Various materials may be co-extruded to add stiffness and flexibility where needed.

Specialized gaskets are designed for the rigors of the critical compression seal.

Pressure is applied to the gasket through the use of hardware. The hardware is positioned on both the sash and frame so that the gasket is compressed, like a garden hose. The correct amount of pressure is enough to firmly grip the gasket, but not too much as to crush or permanently deform. Compression is usually the most effective at the pressure points (location of the hardware); the farther you move away from the pressure points, the weaker the compression forces may become. With continuous and adequate pressure on the gasket, fairly equal contact between the sash and frame can be established and maintained. Most compression seal hardware today incorporates adjustment capabilities so that over time compensation can be made for

weathering, expansion/contraction, and aging of the structure.

Compression seal technology allows for additional performance locking points.

Not all compression seal designs perform the same based on profile design and the type of hardware that is applied. Multi-locking is the most effective method of creating consistent pressure all around the sash and frame. Compression seals can be so effective that some designs will require pressure equalization—allowing air into the system at higher performance levels so that any water that enters the system is capable of draining at an adequate rate.

As a recap:

- Pressure is applied to the gasket through the use of hardware.
- The hardware is positioned on both the sash and frame so that the gasket is compressed.
- The correct amount of pressure is enough to firmly grip the gasket.
- With continuous and adequate pressure on the gasket, fairly equal contact between the sash and frame can be established and maintained.
- Multi-point locking is the most effective method of creating consistent pressure all around the sash and frame.

Window CST configurations include fixed, tilt-turn, casement, awning, and hopper windows.

PRODUCT CONFIGURATIONS

There are many configurations of windows and doors that are available with CST. Window CST configurations include fixed, tilt-turn, casement, awning, and hopper windows. Sliders, single-hung and double-hung windows do not utilize CST as they are friction based. Door CST configurations include hinged (single and French style), tilt-turn, tilt-slide, and some, but not all, multi-folding.

Tilt-turn window and door designs deliver high performance with a European flair. The tilt or turn operation provides ventilation and egress. Multi-point locking hardware adds security to the design. Glass and insulated panel options provide added versatility in both design and performance. These systems meet high wind-load, high-rise, and hurricane impact requirements. The optional frame depths make the system ideal for Insulated Concrete Form (ICF) construction, new construction, and replacement. The tilt-turn window design is three styles in one: an inward opening casement in the turn position, a secure top venting hopper in the tilt position, and a tightly-sealed picture window when closed. Casement designs open completely, allowing for effective ventilation. The most popular hardware sets are supported by this window design, and fixed window designs can create a variety of architectural shapes.

Two best applications featuring compression technology in varying configurations include:

Project: The Mission Valley Doubletree Hotel, San Diego, CA

Window and Door Requirement
The hotel was seeking window and door replacements that would contribute to a more sustainable building envelope while also offering high acoustical ratings due to the property's close proximity to the San Diego airport, three major freeway systems, and San Diego stadium.

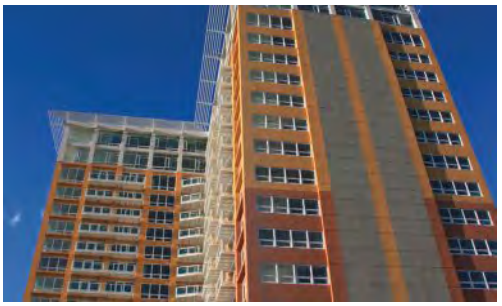
Project Details
Hilton Worldwide's 300-room, 11-story Mission Valley Doubletree hotel is a popular spot for San Diego area visitors. The property's existing aluminum windows and doors, installed during mid-1990s construction, had become challenging to operate and had begun to leak during rainy weather.

After evaluating the overall needs of the project, it was determined that uPVC steel-reinforced CST commercial windows and doors would be an ideal fit.

The construction team and fabrication partner provided an initial project mock-up of compression-sealed vinyl windows and tilt-slide doors, which outperformed their aluminum counterparts in a side-by-side evaluation against the criteria for the project.

In all, 215 fixed windows with center mullions and 130 tilt-slide doors were designed, fabricated, delivered and installed within a compressed six-week installation schedule. Not only are the new vinyl windows and doors much more visually appealing and completely leak-free, there is also an obvious difference in the evenness of temperature and absence of noise in the updated guest rooms. The performance ratings of the new windows and doors were included in a third-party test of the energy efficiency and coefficient properties of the building prior to and following construction installation of all systems. The tests showed that the installation of windows and doors directly contributed to an estimated energy savings of 24,1000 kWh and a 1,698 therms kW demand reduction of 29.4.

As a result of this project's success, the supplier has become an approved vendor for Hilton and their CST uPVC steel reinforced window system is an appropriate alternate for Hilton's design standards. The supplier was also featured in the company's internal communications as a key player in helping the Mission Valley Doubletree to achieve its sustainable building goals.



At The Montage, Reno, NV, project coordinators opted to install uPVC CST tilt-turn windows for their exceptional energy-saving performance and aesthetic appeal.

Project: The Montage, Reno, NV

Window and Door Requirement
Provide a solution that meets high-performance structural demands and superior sound abatement proprieties while enhancing the energy efficiency, overall aesthetics and environmental impact of the property.

Project Details
Denoted the United States' largest building conversion adaptive re-use project at the time of its completion, The Montage is a 23 story, ecologically-minded reclamation of the former

Golden Phoenix Hotel and Casino in Reno, Nevada. This residential community features 380 tower, loft, penthouse, pool terrace, and row house units, as well as three levels of underground parking, a 1,700 sq ft (158 sq m) owner's lounge, a 3,000 sq ft (279 sq m) workout facility and more than 25,000 sq ft (2,323 sq m) of retail and restaurant space.

While the residential units' floor-to-ceiling windows, incorporated to maximize daylighting, were initially specified as commercial grade, aluminum-frame systems, project coordinators opted to install the uPVC CST tilt-turn windows for their exceptional energy-saving performance and aesthetic appeal. The system is also more ideally aligned with the overall sustainable building aims of the project, offering a substantial long-term reduction in environmental impact.

The tilt-turn window design selected is a top-of-the line commercial fenestration product offering. This design allows the window to operate in either a tilt or turn position, offering three separate functions in one window: traditional casement look in the turn position, convenient top ventilation in the tilt position, and elegant picture window when closed.

This article continues on http://go.hw.net/AR1014Course4. Go online to read the rest of the article and complete the corresponding quiz for credit.

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QUIZ

1. Which of the following is defined as a special gasket compressed between the operable sash and frame of a window or door that seals the joint by resisting air, noise and water infiltration for improved thermal and acoustical performance?.
   a. Compression-seal technology
   b. Sliding seal application

2. What are key attributes of the specialized gaskets used in a compression-seal technology system?
   a. UV resistance
   b. Tear and peel resistance
   c. Tensile strength
   d. Resistance to aging and oxidation
   e. All of the above

3. True or False: To create a compression seal pressure is applied to the gasket through the use of hardware that is positioned on both the sash and frame so that the gasket is compressed, like a garden hose.

4. What types of product configurations use compression-seal technology? Choose all that apply.
   a. Double-hung
   b. Tilt-turn
   c. Awning
   d. Sliders
   e. Casement

5. What performance benefits can a compression-seal system provide?
   a. Improved security
   b. Energy efficiency
   c. Resistance to air and water infiltration
   d. Resistance to hurricanes and storms
   e. All of the above

6. True or False: A compression-seal technology system is less effective when combined with uPVC framing.

7. True or False: A compression-seal system controls sound by creating an air-tight barrier with multiple locking points and polymer gaskets.

8. Which of the following ASTM standards are related to sound measurement?
   a. ASTM E90-09
   b. ASTM E413-10
   c. ASTM E1332-10A
   d. ASTM E1425-07
   e. All of the above

9. What are four performance factors a uPVC system provides?
   a. Sound abatement
   b. Water resistance
   c. Reduced maintenance
   d. Improved thermal efficiency
   e. Reduced and blocked air movement

10. What types of applications are ideal for compression-seal technology systems?
    a. Hotel
    b. Mixed-use
    c. Casino
    d. All of the above

FLORIDA POLYTECHNIC UNIVERSITY

WILL SANTIAGO CALATRAVA'S INNOVATION, SCIENCE AND TECHNOLOGY BUILDING HELP REPAIR THE ARCHITECT'S TROUBLED REPUTATION?

Text by **Christopher Hawthorne**
Photos by **Alan Karchmer**

SANTIAGO CALATRAVA, FAIA, has had a tough couple of years.

What should have been a glamorous and career-capping commission for the 63-year-old Spanish architect, the new transit hub at the rebuilt World Trade Center, has instead been plagued by extensive delays and massive budget overruns. In the end, it will likely take roughly twice as long to build and cost twice as much ($4 billion versus $2 billion) as originally planned. In the process, it's become a symbol of larger bureaucratic problems at Ground Zero, a money pit half-buried next door to the National September 11 Memorial and Museum.

Meanwhile, what had been a steady trickle of complaints about Calatrava's high fees and complicated, tough-to-build designs, which often feature elaborate moving parts, turned suddenly into a flood. A front-page article in *The New York Times* last September slammed Calatrava as an aloof, uncaring "star architect" who charges absurdly high fees—$127 million for his City of Arts and Sciences in Valencia, Spain, alone—and whose all-white buildings often crack, leak, or buckle.

It went on to mention a Spanish website devoted to criticizing the architect, helpfully pointing out that its URL loosely translates to the phrase "Calatrava bleeds you dry," before concluding that "other cities may be reluctant to hire Mr. Calatrava again."

Given that shift in Calatrava's professional persona—before the World Trade Center job, after all, he was more often cast in the role of civic savior—I have to admit that I paused and laughed out loud right into the soupy central Florida afternoon when, walking toward the front door of the architect's latest American project, the Innovation, Science and Technology Building (IST) at the new campus of Florida Polytechnic University near Orlando, I saw a white sign with red letters installed near one of the ponds that Calatrava designed along the building's southern edge.

Previous spread: Calatrava's building is the first structure on the Florida Polytechnic University campus, which will be built around the linear lake. **This page:** A hydraulic brise-soleil shades the central Commons when closed (this image). and admits daylight when open (right).

The sign showed a green animal with snapping jaws inside a circle with a line through it. Below that, in capital letters, were the words DO NOT FEED THE ALLIGATORS.

It seemed an admonition as much to Calatrava as to the students who began using the building at the end of August. Do not give your critics any more ammunition. Do not produce another pricey, preening, overcomplicated, and underperforming piece of architecture. Do not leave another client fuming and ready to complain, at colorful length, to a reporter from *The New York Times*.

Or maybe, if we want to be slightly more nuanced about it, do not lightly take on high-profile commissions at deeply fraught sites of spectacular terrorist violence that are run by opaque and multilayered bureaucracies—especially at a time when the media is ready to take scalps in its quest to expose the excesses, architectural and otherwise, of the pre-crash boom years. Do not, in other words, produce buildings that turn you into a tantalizingly convenient straw man.

The IST is a 162,000-square-foot, oval-shaped, two-story building that cost $60 million to put up. (That's 1.5 percent of the Ground Zero hub's estimated final tab.) It holds offices for faculty and the university's president as well as classroom space and a library that has already attracted headlines for not including a single printed book. Though the first stories about Calatrava's hiring, in 2009, mentioned a 2012 target date and budget of $45 million, university officials say the building did meet more recent timelines and cost projections.

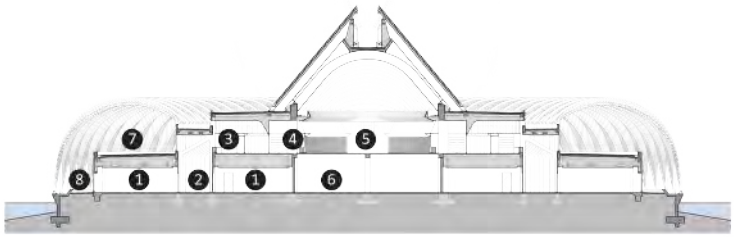
Early photographs released over the summer certainly made clear that Calatrava has given Florida Polytechnic the kind of architectural symbol that it can put on coffee mugs and the brochures it mails to high school students and their parents. And the school's PR staff has done its best to get out in front of any stories about Calatrava's fee, freely letting reporters know that his firm earned $13 million for the project. To what extent the Lakeland building will do the more complicated work of recalibrating Calatrava's place in the profession is a tougher question to answer, and one that I'd flown to Florida to try to answer.

THE BRAND-NEW CAMPUS of Florida Polytechnic University, created by an act of the state legislature, sits in what was very recently farmland about 50 miles southwest of Orlando. (When I asked my university tour guide what used to occupy the site, she had a one-word answer: "Cows.") But this is hardly a remote part of the world—or one untouched by the work of prominent architects. Florida's Interstate 4 runs right along the northeastern edge of the campus. Florida Southern College, which includes 18 buildings by Frank Lloyd Wright, is 13 miles away, and Celebration, Disney's new town featuring a post office by Michael Graves, FAIA, and a bank by Robert Venturi, FAIA, and Denise Scott Brown, is reachable by car in about 35 minutes, as is Disney World.

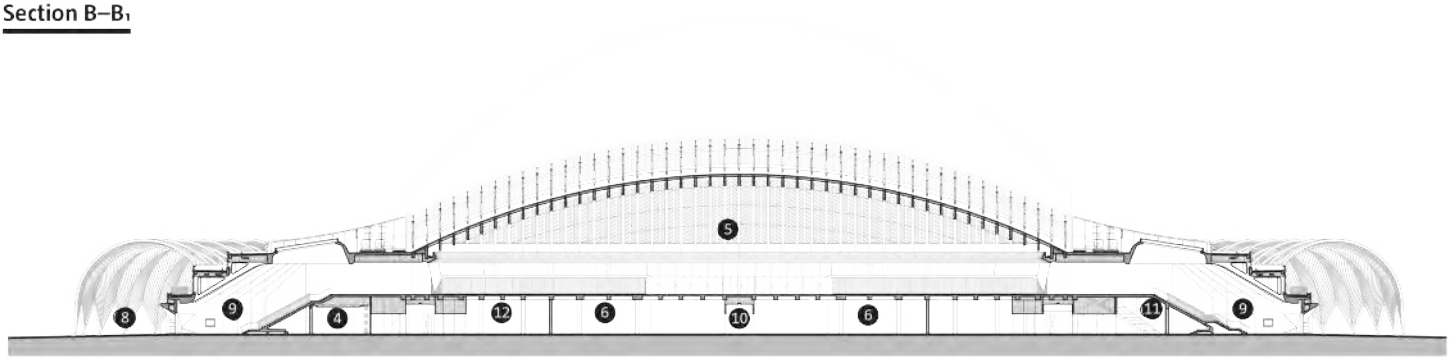
Still, when Calatrava was hired to design a master plan and the IST building, he was handed a blank slate. That is the first clue that this foray into American architecture was perhaps destined from the start to work out better than Calatrava's star-crossed effort at the World Trade Center site—or for that matter in Wisconsin, where his 2001 Milwaukee Art Museum addition, complete with giant movable brise-soleil and stretching between the original building and Lake Michigan, was initially praised by many critics before drawing fire as an example of wasteful spending.

Simply put, Calatrava, even more than most architects, works best when he has both political and architectural elbow room. In Florida, he was given space to operate and a healthy, though not extravagant, budget. For an

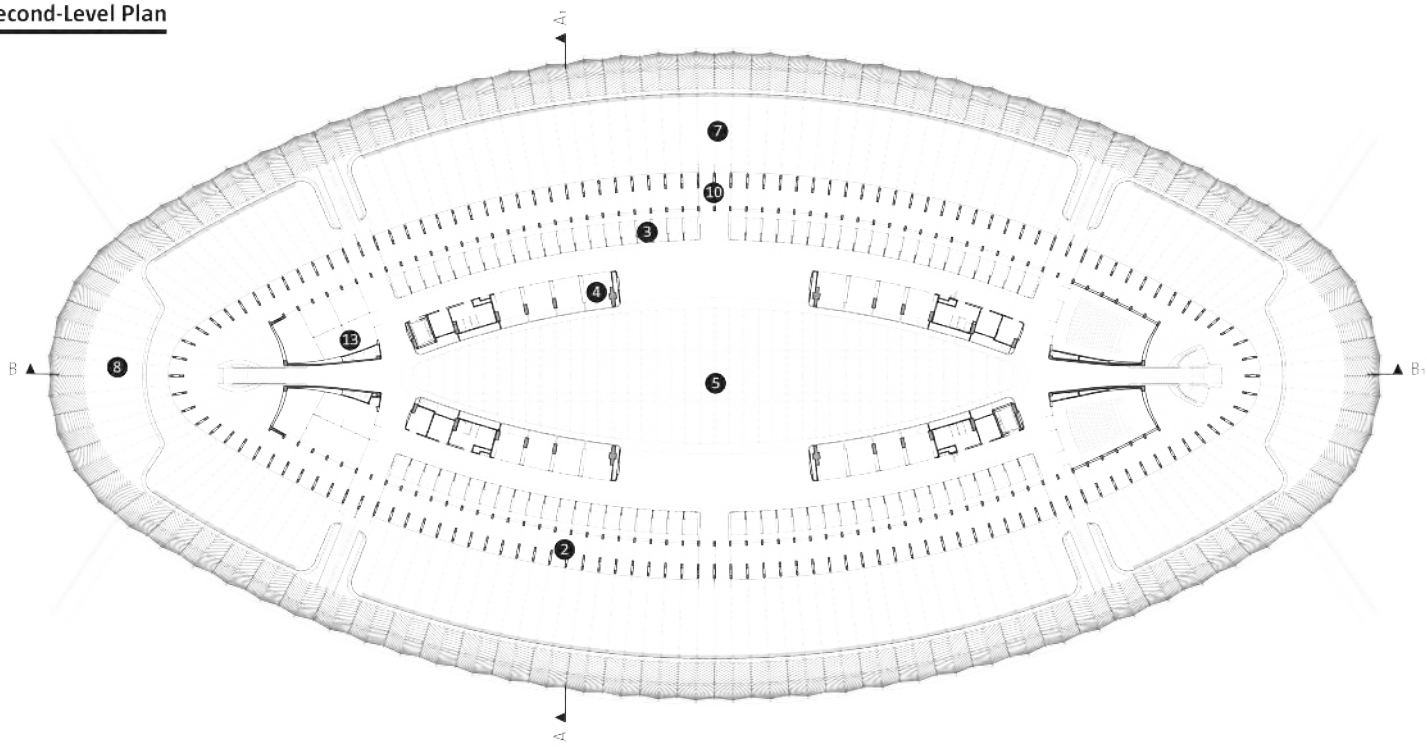
Section A–A1



Section B–B1



Second-Level Plan



1. Classroom/laboratory
2. Longitudinal corridor
3. Faculty office
4. Meeting room
5. Commons
6. Mechanical room
7. Terrace
8. Arcade
9. Entry lobby
10. Corridor
11. Great hall
12. Storage
13. Administration suite

This image: White concrete ribs establish a clear structural rhythm within the school building. **Right:** The 160,000-square-foot signature building houses 26 teaching labs and classrooms as well as offices and an amphitheater. **Below:** A white-painted pergola shades an outdoor terrace and plaza while reducing solar load on the building.

architect up to his neck in bad press, it is hard to imagine a more useful or timely combination. At the same time, Calatrava has no excuses in this case, with a generous site and clients who were pleased—thrilled!—to have him.

In fact, the final product, produced in collaboration with local firm Alfonso Architects and built of reinforced concrete, strikes me as an example of Calatrava's architectural approach and creative sensibility distilled, for better and worse, to its essence. There are all the usual influences on view—the Eero Saarinen forms rendered in the Richard Meier, FAIA, palette—and they are remarkably legible and easy to parse here, since they are laid out on a flat, unsullied, Oscar Niemeyer–Lucio Costa site and complemented by those ponds, which Calatrava arranged to navigate a subtle descent from south to north. The landscape barely mitigates the punishing Florida sun; it is, more than anything, a frame that provides dramatic and flattering views of the new building. In time, as other buildings fill in what is now empty space—there is a workmanlike (and white) dormitory and a small student services center about 100 yards south, but nothing else—the Calatrava design will have to deal with a bit more context.

In plan, the building is straightforward and elegant. Two double-loaded corridors lined in polished concrete, one at ground level and another on the second floor, curve in a gentle oval arc around the building. The lower one opens onto classrooms on its outer edge and to studio space, labs, and an auditorium in the center of the building. Upstairs, the corridor has faculty and administrative offices on the outside and, to the inside, some small conference and study rooms as well as the building's functional and architectural heart: a multipurpose library and study space with a soaring ceiling that is known as "the Commons." Two grand staircases, one on each end of the oval, lead to the upper floor.

The skylight above the Commons is shaded by a complex system of aluminum louvers that can be raised or lowered depending on the intensity and position of the sun; on the day I visited, all 94 louvers were down, casting a series of geometric shadows onto the floor but giving the room plenty of natural light.

This roof system—at 250 feet, twice as long as the one at the Milwaukee Art Museum—is perhaps the closest thing the building has to a statement of principles. Given the recent criticism Calatrava has faced, it is something of a defiant one. *My buildings will still take on anthropomorphic form*, this project says, *and they will still be movable and bone-white and instantly recognizable as my work.*

Of more interest to me was the room beneath that roof, which is among the calmest and most assured that Calatrava has ever designed, even if Florida Polytechnic made the odd decision to fill its library, near the north end of the space, with zero actual books. Instead, students will be directed to e-books and other digital resources.

The exterior of the building is ringed by pergolas, covering and lightly shading an upper terrace and a wide walkway at ground level. The pergolas provide a delicacy that is lacking in some of his other work, in Valencia and at Ground Zero. Here the effect is less skeletal and more filigreed.

There are sure to be some complaints from faculty about the almost punitively small size of their offices, and the fact that those offices lack ceilings, so that conversations drift easily from one to the next. And who knows what surprises the operation of the roof system has in store. In general, though, the allocation of space, resources, and even architectural attention is weighted encouragingly toward the students and the spaces where they will spend the most time.

ALL OF WHICH LEAVES THE LINGERING QUESTION: What will this building mean for Calatrava's place among the leading architects in the world and for his reputation with critics? Assuming the system of louvers doesn't turn balky, probably not a huge amount either way. The IST will buy him a bit of time and good will, but it doesn't suggest anything resembling a reckoning or major philosophical shift.

The building is full of handsome and even some very impressive spaces, but none of the singularly breathtaking ones that have made Calatrava, despite his price tag, so attractive to clients looking for marketing splash to go with their museum wing or train station. It reflects serious attention to detail and the bottom line; this is the work of an architect actively trying to prove, or at least re-emphasize, his bona fides.

If that seems odd for a figure of Calatrava's stature, it is also a sign of the post-boom era in architecture and city-making. The object building, the gleaming icon designed as much for a photo spread as for its users, is something we now distrust almost reflexively. This is especially the case when it occupies a former greenfield location most easily reached by private car, as this one most certainly does.

The size of the hill that Calatrava has to climb to regain the perch he once enjoyed is not entirely his fault; his buildings have had their problems, aesthetically and practically, but he has also been made one of the poster children for boom-time excesses that in the end had more to do with economics than with architecture.

That hill is dauntingly large nonetheless. The results in Florida, more about damage control than image overhaul, are at least a step back toward the top. They don't play to Calatrava's harshest critics or suggest a bombastic architect unwilling to learn from earlier missteps. They don't feed the alligators.

Opposite: The 11,000-square-foot, multipurpose Commons room. **This page:** The hydraulic shading system.

FONDATION LOUIS VUITTON

FRANK GEHRY DISCUSSES THE INCEPTION OF HIS PAVILION-LIKE CULTURAL CENTER IN PARIS'S BOIS DE BOULOGNE, AND HOW HIS DESIGN PROCESS INFLUENCED THE RESULT.

Interview by **Joseph Giovannini**
Photos by **Todd Eberle**

How did you get involved in this project?
Frank Gehry, FAIA: I have met Bernard Arnault [the chairman and CEO of LVMH Moët Hennessy-Louis Vuitton] before and talked to him about another project, about which we didn't hear from him. He then called and invited me to see a site for a museum he wanted to build for himself. The site is a hinge point between the Bois de Boulogne and the Jardin d'Acclimatation, so it's a pretty powerful site. I was heavy into Marcel Proust that week or something—I go back in and out of Proust over my lifetime. I like to read *Remembrance of Things Past* over and over again. The visit brought tears to my eyes because I realized it was a pretty emotional site and he wanted to do something special, so that's how it started.

Did the site itself influence the design of the building?
The heights we were allowed to use had to do with an existing bowling alley, which we could tear down to build the museum. It was two stories high, and that was the legal height we could have if we made a solid building. We met with the mayor at one point, Arnault and I, and we talked to him about the site. It was clear that this would have to be a garden building—something that fits into a garden. I did some sketches and showed them what that would be like, with the glass— the metaphor is Joseph Paxton's Crystal Palace, those recognized 19th century park buildings which are made of glass. We did five or six very small models—maybe a foot long. He picked one and I said: 'Don't pick it, just look at them. We'll discuss them and then we can work and create solutions.' I never trust the first sketch, although sometimes, like for the Guggenheim Bilbao, it's pretty close, pretty resonant.

So it had to be a glass building because it's a pavilion that is appropriate for a garden?
In order to go higher than the two stories allowed for a solid building, it had to be glass. We have the gallery structure with its solid walls that is two stories, so then you had two buildings in one: a pavilion and galleries. And you can imagine, you do a sketch of a solid building and then you do a sketch of a glass building over it. And you know, there are 50 different ways you could do that, but the first five or six models did it similar to what we ended up building.

You've always said that if you already know what you're going to do, why do it? What was new for you with the design of this building?
I don't ever know where I'm going to push it. I start and I just work intuitively along the way. I don't have a prearranged destination, which is complicated for the French because the Beaux-Arts way is that you fix on the model and then that's it. That is not the way I work, but we managed to work within both his discipline and mine in the end.

You mention this two-story height limitation, but some of the galleries are much taller than that. How did you find loopholes to allow you to develop the structure vertically?
Because of the glass enclosure, we were allowed to go to the height we did. Once we had the big, basic premise that there was a solid piece (which we started to call the icebergs) and then the glass sails, we started to work them independently. The reality was that the galleries had to be classical because the curator wanted the simpler galleries that people usually want in art museums. Once the galleries became what they were, the structure became clunky, but the metaphor of the icebergs allowed us to rationalize the shapes. We developed the glass sails independently and then we spent time getting the forms to dance together.

This project marks one of the first times that you've used a ground plane very actively as part of the building. Why did you go into the ground?
We were only allowed to have two levels of galleries above grade, but there's a total of three levels of galleries. We dug a hole and made a grotto level to house the third level. A lot of the development of the concept grew out of those first sketches, which Arnault loved—the program, the reality of being in the park, and then the reality of galleries. In the case of the galleries, we pushed the variety, using the skylights and circulation, so you have different heights in the galleries and they don't all look the same. I love the grotto as that evolved. I was worried about going down there, but the potential of it for art is great.

Paris is such a rich context. It is intuitive to build the Fondation Louis Vuitton with these design aspirations, but Parisians have their own expectations as well. How did you address that context?
The only thing that we were thinking about with the height of the glass sails was that it worked beautifully in the park. From a distance, you can see the glass coming up through the trees, and I think that worked—we emphasize the relationship with that context. We didn't think there was going to be anybody viewing it from above, so we prioritized putting the money on the elevations, and not on what it looks like from 10 stories up.

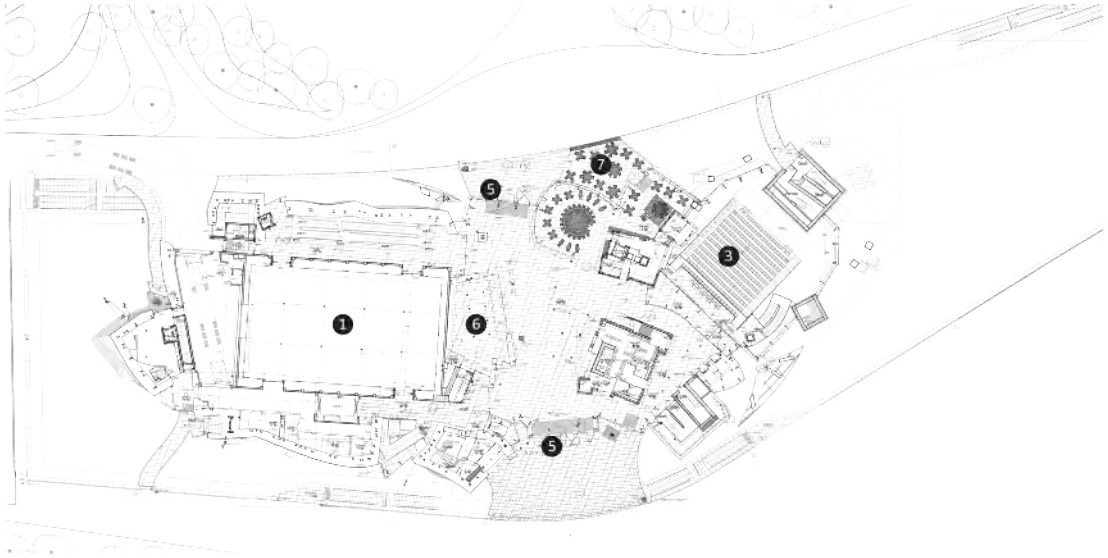
Tell me about the introduction of the wood into the structure supporting the glass sails. How did you develop that materials palette?
Well, that was complicated: Here's an all-field structure and there's a kind of a purity to it. And the client was very involved with the decisions for the color of the mullions and the clarity of the glass—he was involved with all of it. So when I proposed the wood, it was a kind of a shocking intervention to that whole aesthetic that we were developing. It took awhile, but he got it finally. And thank God we did it: It makes a whole hell of a lot of difference. You can imagine if the wood hadn't been there, that it would have been a more sterile building. They all love it now, but it was precarious at first—it wasn't a slam dunk to get that decision.

Well, and so was there anything new that you developed in this building that was surprising to you?
I was surprised at what I would call the chaotic circulation. The French have a kind of a detail thing—when you get into the bureaucracy of the way the stairs work, and the distances between things, and the building codes—it's not clear. I worked on other buildings in France, and it was always like that. Wherever we had to have an opening, or a stairway, we built them into the icebergs or into the glass. We had this sort of chaotic dance going on and we just let the stairs and stuff happen. I was very worried about it, I didn't think that it would come together like it did—but I'm quite pleased with it now.

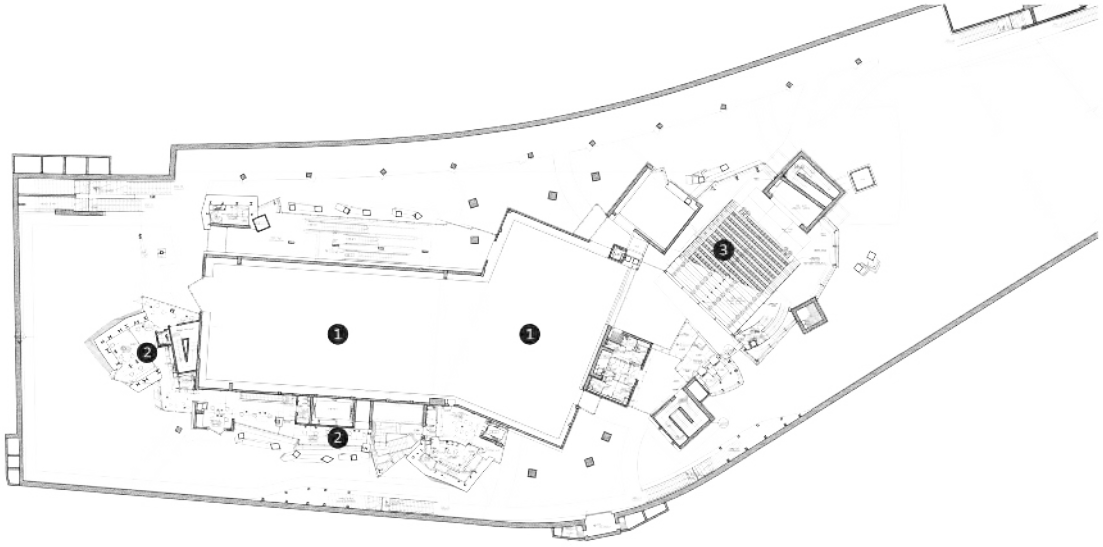
France has brought Baroque and Neoclassical tradition to such a refined level. Where does your building, with its episodic promenade and the asymmetries, fit into that context? Is it just different?
[Laughs] Wow! You're going to open 10 doors. Oy vey! I do not consciously try to create disorder, however, I think disorder has its own order. I said that once: The new order is disorder. Nature has an order, but it doesn't all look like Greek temples. And I think since a human being is designing a structure, that, for me, it has to do with humanizing and engaging the user and being episodic instead of singular in its experience.

Previous spread: The glass sails enveloping the Fondation Louis Vuitton were developed to increase the overall height of the structure, while still staying within city codes. **This image:** The building rises from a grotto-like level below grade.

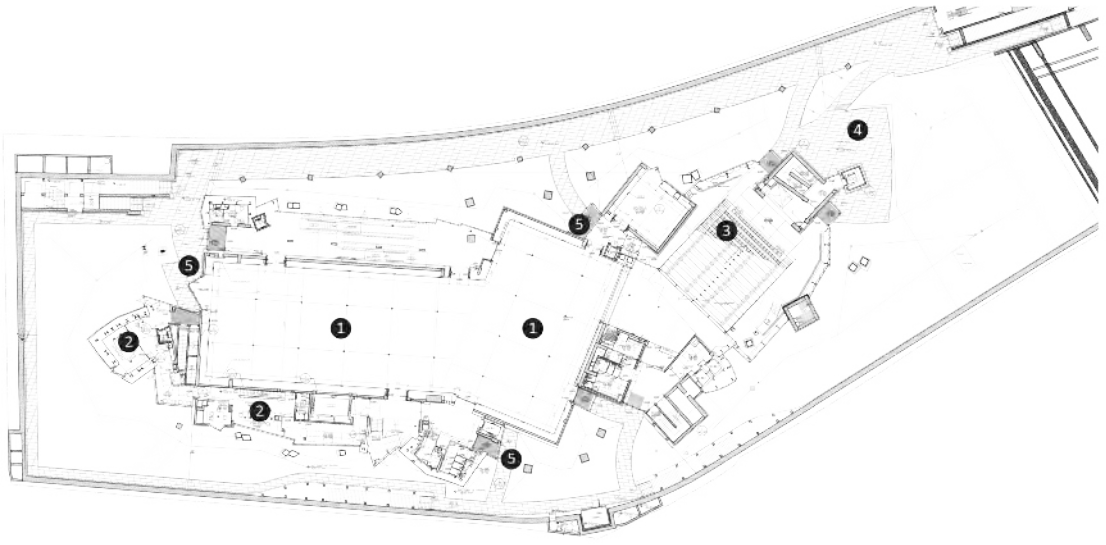
Ground-Floor Plan



Lower-Level Mezzanine



Lower-Level Plan



1. Gallery
2. Office
3. Auditorium
4. Terrace
5. Entrance
6. Library
7. Café
8. VIP Suite
9. Young Artists Studio

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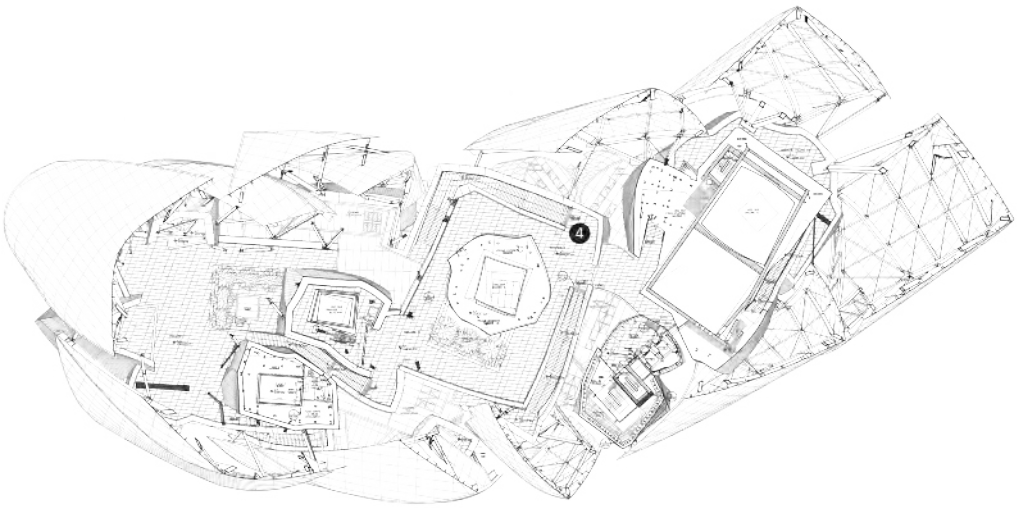
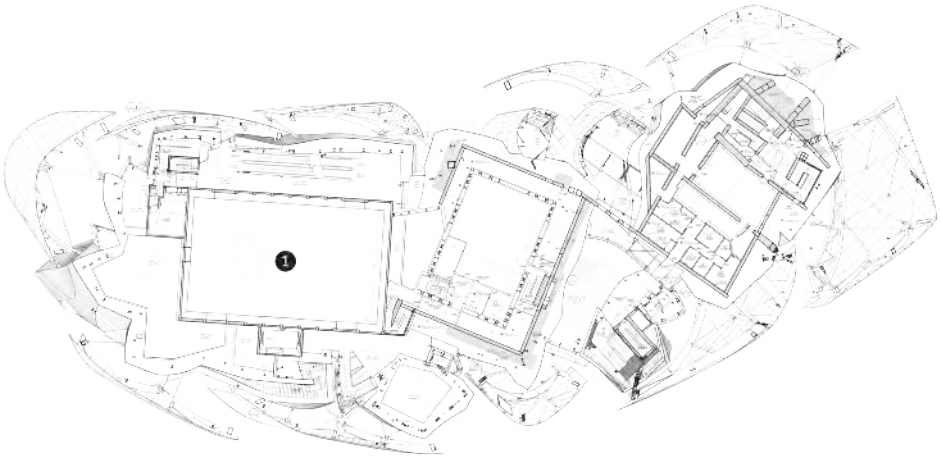
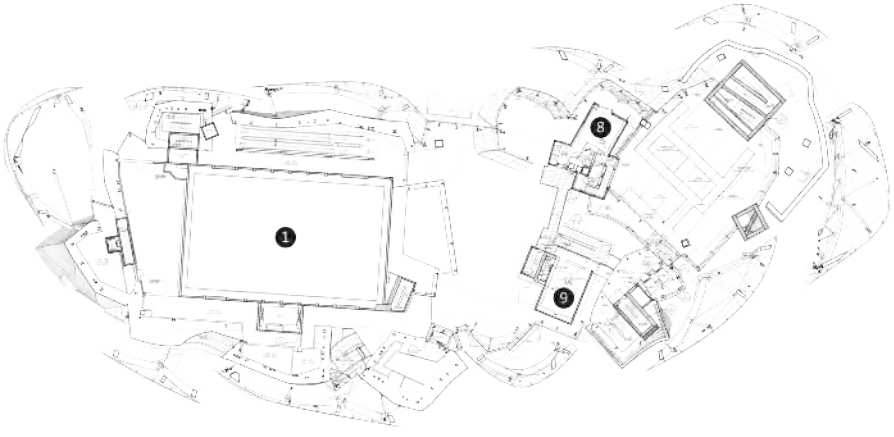
Roof-Terrace Plan



Second-Floor Mezzanine



Second-Floor Plan

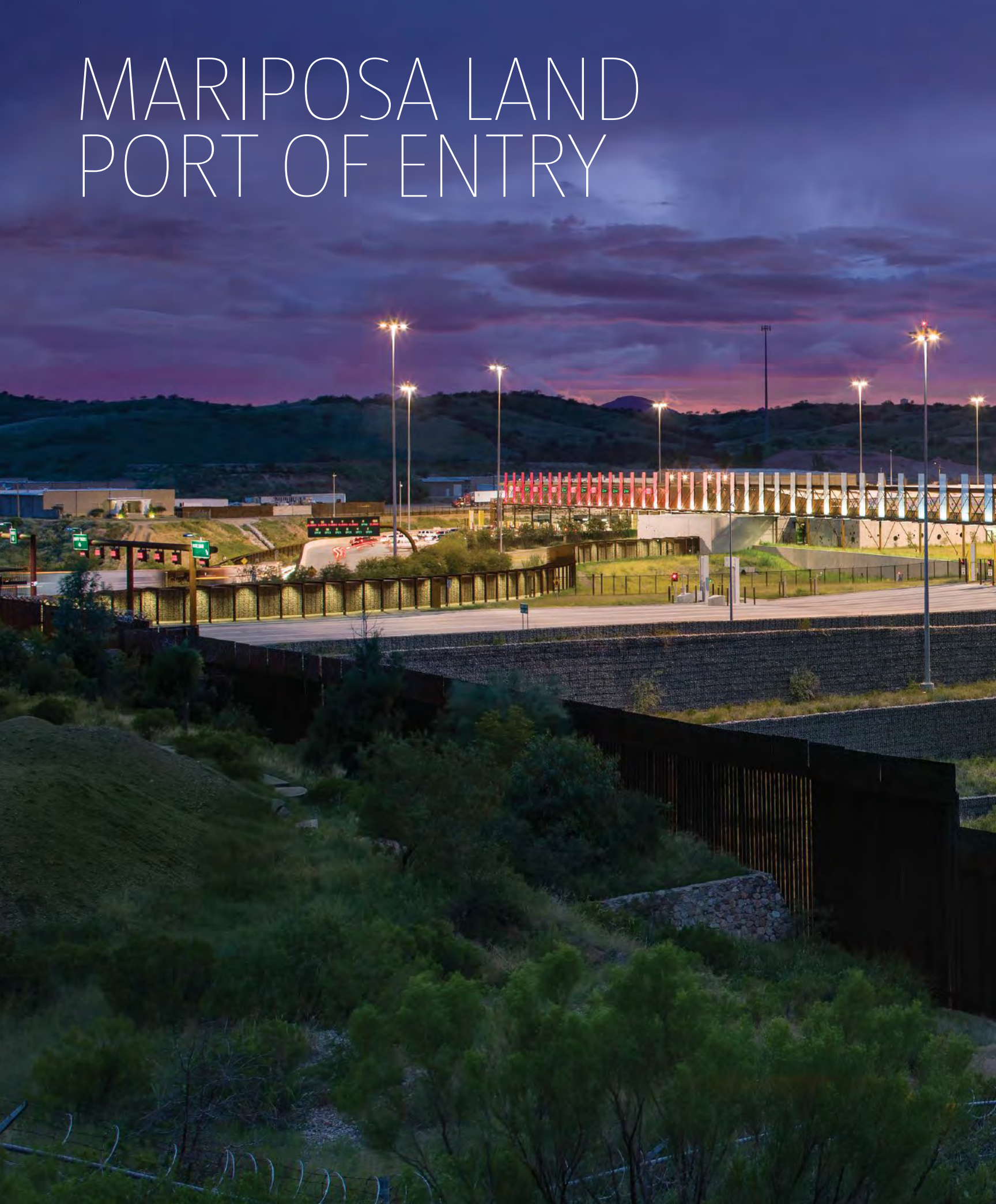


Below: The galleries were developed as orthogonal spaces to showcase art, but in above-grade galleries a hidden sculptural element is present: a torquing lightwell. **Opposite:** The circulation was fit into and around the galleries and other programmed volumes. But wherever possible, the architect established view lines to the surrounding park.

The outdoor grotto level is defined by terraces, pools, and pathways. Bridges overhead provide access to the main entrances at the ground level.

The volumes on the roof terrace are small pavilions in and of themselves. Some contain circulation, others the skylights that illuminate galleries below.

MARIPOSA LAND PORT OF ENTRY



PHOENIX-BASED JONES STUDIO BALANCED SECURITY AND SERENITY IN ITS DESIGN FOR ONE OF THE BUSIEST BORDER STATIONS IN THE UNITED STATES, SITED IN NOGALES, ARIZ.

Satellite Site View

1. Vehicle entry
2. Port buildings
3. Oasis

The GSA declined permission to publish drawings of this project, citing security concerns.

Text by **Reed Karaim**
Photos by **Bill Timmerman**

U.S. BORDER FACILITIES can be unfriendly places in our post-9/11 world, seemingly focused on security above all else. But when Eddie Jones, AIA, principal at Jones Studio in Phoenix, designed the new Mariposa Land Port of Entry in Nogales, Ariz., he didn't start with traffic barriers or inspection lines. He started with the poem "Border Lines," by Arizona poet laureate Alberto Ríos, who grew up in Nogales. It concludes: "Let us turn the map until we see clearly:/The border is what joins us,/Not what separates us."

The government's priorities, however, were more practical: Mariposa is one of the United States' busiest land ports for vehicle and commercial truck traffic. The existing port facilities were 35 years old, and could no longer efficiently handle the volume of traffic or meet new environmental, inspection, and security requirements, says Traci Madison, a General Services Administration spokesperson.

The question was whether Jones' vision could be joined with the government's concerns. "We had to produce a more efficient port and a safer port," he says. "The practical considerations are essential. ... But if all we did is create a more functional port, it wouldn't be healthier, it wouldn't be less intimidating and it damn sure wouldn't say, 'Welcome to the United States.'"

The design involved a reconception of the port, reworking the bones of the existing structures into a facility that included 216,000 square feet of new facilities. The American Recovery and Reinvestment Act, commonly known as the stimulus, provided $173 million of the approximately $187 million cost, Madison says.

Previous spread: The new Mariposa Land Port of Entry is one of the busiest vehicular ports into the United States. **Opposite top:** The traffic is funneled through checkpoints beneath a Cor-Ten canopy. **Opposite bottom:** Cor-Ten canopies also shade small plazas and seating areas where post officials can gather. The landscape was designed as part of a rainwater retention system, while echoing the surrounding Sonoran desert.

GOOGLE EARTH


CLOSED
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16' - 6" CLEARANCE

Cor-Ten steel canopies line the landscaped plaza between the long, barlike structures at Mariposa that hold offices, processing, and port facilities. Steel scuppers and a rainwater harvesting system from StormTech funnel run off into a million-gallon cistern under the site.

Jones Studio's contract with the GSA was to produce three master plans for the 54-acre site for peer review. It took 45 plans and revisions before the studio satisfied U.S. Customs and Border Protection officials. Yet Jones embraced the challenge. "I loved the disparity in the two forces at work," he says.

The final design for the expansion—which was one of 11 national GSA Design Award winners while still on the boards in 2010—orients its two main structures running north and south. This presents the short end of the structures to the border and lets the "buildings get out of the way of the vehicles," Jones says, expediting traffic flow and inspection by creating a natural division that allows commercial trucks to be routed to one side and private vehicles to another.

Between the two buildings is a planted corridor that Jones describes as "a safe zone," for officers and staff to relax. "It's a little street with lots of landscaping, places to sit down and have your lunch," he says. "Here in the middle of the Sonoran Desert, you're surrounded by shade and nature."

Landscaping also plays an important role in the experience of approaching the facility. Chris Winters & Associates, a Phoenix-based landscape architecture firm, divided the site into three zones, intended to create a sense of welcome. The outer zone is a restored Sonoran Desert landscape that uses native plants. Closer to the facility, especially along the pedestrian pathway, the vegetation becomes denser and more lush. The final zone, within the complex, uses water features and more plantings to create a desert oasis. The idea, says Chris Winters, the firm's principal, is to "shelter people coming in."

The abundant landscaping and the water features are made possible by a rainwater harvesting system that captures runoff from roofs and paved areas and stores it in a million-gallon underground tank. "Once we connected the system, the first monsoon totally filled it, and it's never been empty since," says Jones. "All this beautiful landscaping survives on rainwater in the desert." The buildings also incorporate solar hot-water heating, advanced lighting, and other energy efficiency features that are expected to receive a LEED Gold rating.

The processing areas incorporate security requirements—agents need to have clear lines of sight and to be able to get to each other for support. But their openness, natural colors, and sense of ordered progression also are designed to relieve the tension and sense of dislocation that comes with a border crossing.

Physical shading is manipulated to provide a feeling of growing comfort and arrival. As you approach the passport booths, Cor-Ten steel trellises slowly decrease the level of light (which can be blinding) at the roadway-level. "The Tohono O'odham"—a Native American group—"used saguaros to filter light hundreds of years ago, and we simply use steel angle to do the same thing," Jones says. "The spacing of the trellis gets closer together as you finally reach the full shade."

Nogales, Ariz., sits just across the border from Nogales, Mexico. Two pieces of art at Mariposa, commissioned through the GSA's Art in Architecture Program, reference the connections between north and south. "An Album: Sewing into Borderlines" by the Korean visual artist Kimsooja projects silent videos of community members who commute daily between the two countries. Above a walkway, the sculpture "Passage" by Arizona artist Matthew Moore depicts the inverted topography of the Baboquivari Mountains, which run along the border, to represent the geographical landmarks that have guided people in the Sonoran Desert for centuries.

The concrete-and-steel structures have another detail that expresses the reality of a border that, despite a public focus on illegal crossings and drug traffic, remains one of the busiest peaceful borders in the world: Life-sized footprints are scattered across the concrete. Like the intertwined history between the two countries, "they're traveling and they're moving forward," says Jones. "They're always advancing."

Opposite: The plaza between the buildings is reserved for staff. **Below:** Visitors can see the plaza from public areas such as the lobby (shown). The glass is from Guardian and LTI, and windows from Border Glass & Aluminum.

Top: Security concerns are apparent in areas such as the K9 facility, which houses the dogs that assist officers in searching vehicles and making patrols. **Above:** Offices, however, are enclosed in glass walls to promote a sense of procedural transparency. **Opposite:** "Passage," by local artist Matthew Moore, is installed over one of the site's many walkways.

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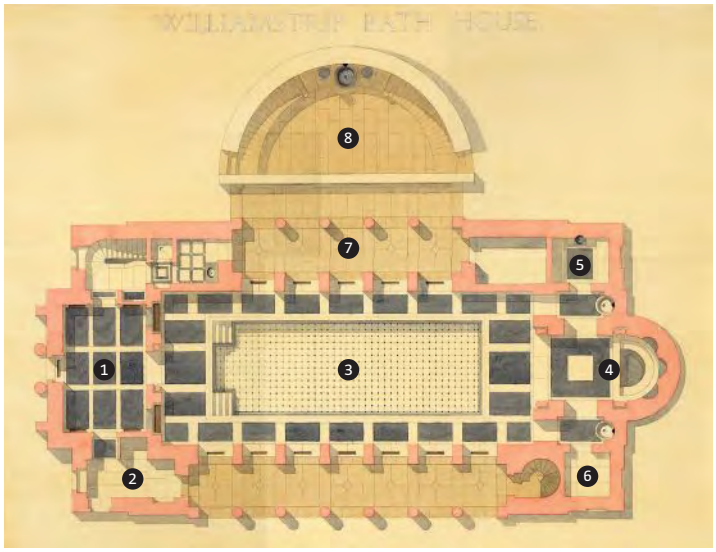
WILLIAMSTRIP BATH HOUSE

CRAIG HAMILTON ARCHITECTS LOOKS TO ANTIQUITY, BRITISH ARCHITECTURAL HISTORY, AND EVEN THE GODDESS APHRODITE TO CREATE A CLASSICAL BATHHOUSE IN THE COTSWOLDS.

Ground-Floor Plan



1. Entrance hall
2. Changing room
3. Pool
4. Spa Bath
5. Steam room
6. Sauna
7. Colonnade
8. Courtyard

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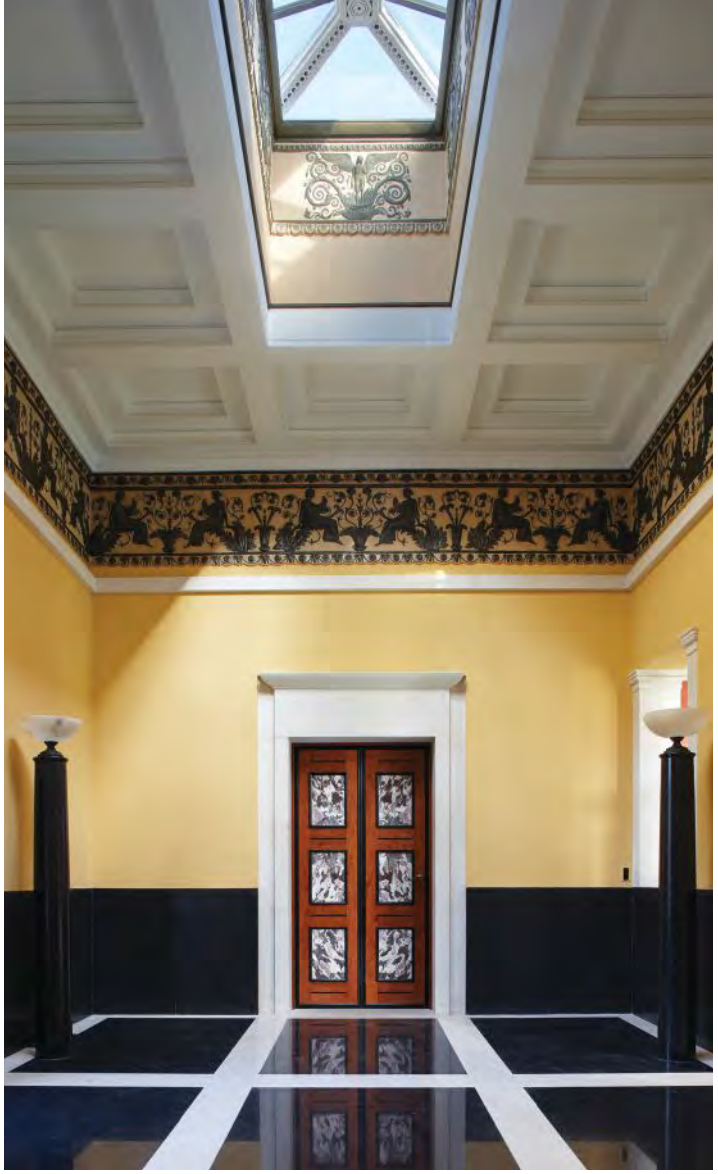
Text by **Katie Gerfen**
Photos by **Paul Highnam**

RARE IS THE COMMISSION, in the 21st century, for a classically styled pool house. But the Williamstrip Bath House in Gloucestershire, England, came as a matter of course. "In the United Kingdom, there is a wonderful tradition of building pavilions for pleasure in the grounds of great country houses," says Craig Hamilton, director of Craig Hamilton Architects in Powys, Wales, "and there are historic examples of bathhouses in the 18th century." After Hamilton completed a renovation on the main house of the estate—a 17th century pile reworked by Sir John Soane in the 1790s—the client, Creath Estates, tasked him to add a bathhouse to the grounds.

For the renovation of the main house, "one cannot work on a property designed by a great architect without paying homage to that architect," Hamilton says. "However, when it came to the bathhouse, which is an independent structure, then I hope that Mr. Soane would approve that I took references from much later classical sources." Hamilton, who considers his style to be one of "progressive classicism," looks to architects such as Edwin Lutyens and Charles Holden, who redefined the classical tradition in the early 20th century. Here at Williamstrip, Hamilton follows in their tradition, pulling examples from antiquity and making them his own. For

Previous page: The entrance façade. **This image:** The limestone blocks were cut off site and have a tolerance of less than 1/8-inch. **Below left and right:** A sunken semicircular courtyard leads to a gym on the lower level.



example, on the entrance façade he reinterprets Ionic columns at the Temple of Apollo Epicurius in Bassae, Greece, exaggerating the volutes to the point of creating his own chambered-nautilus-like nonce order.

The tie to the sea is intentional: All good templelike structures must be dedicated to a deity, and here Hamilton has chosen Aphrodite, the goddess of beauty who arose from the sea. The theme emerged in concert with sculptor Alexander Stoddart, whose tripartite frieze over the door depicts the goddess and her attendants, and it carries inside, with door hardware in the shape of dolphins and a cast bronze plate depicting Aphrodite as a light switch panel cover in the entrance hall.

Along an axis from the entrance, a vaulted foyer gives way to the pool hall, which then culminates in an apse—completed with gilded half dome and alabaster windows—that holds a hot tub. Pompeian red is used on the walls of the pool hall, and cherry wood doors are inset with panels of fior de pesco, a rare Italian marble. There are many custom details and other bespoke touches, and, as a result, very few products with SKUs.

"We have so many historic buildings in the United Kingdom which require special care, so there are a range of craftsmen with skills to restore historic buildings," Hamilton says. "We're now being able to use those craftsmen to construct new buildings and, as an architect, I feel it is an absolute obligation to try and keep them inspired and with work."

Opposite: The yellow-toned entrance hall, with its marble detailing, is meant to provide a contrast against the austere materiality of the exterior. **This image:** The marble floors continue into the pool hall, which is lined with Pompeian red walls. The hot tub in the apse is flanked by a sauna and a steam room.

Florida Polytechnic University, PAGE 142

Project Florida Polytechnic University Innovation, Science, and Technology Building and Campus Infrastructure, Lakeland, Fla.
Client Florida Polytechnic University
Architect Santiago Calatrava—Santiago Calatrava, FAIA
Structural Engineer Thornton Tomasetti
Architect of Record Alfonso Architects
M/E/P Engineer TLC Engineering for Architecture
Operable Component Consultant Hardesty & Hanover
Civil Engineer AndersonLane
Landscape Architect Studio Jefre
GMGC Skanska USA Building
Size 200,000 square feet (gross); 120,000 square feet (net)
Cost Withheld

Fondation Louis Vuitton, PAGE 150

Project Fondation Louis Vuitton, Paris
Client Fondation Louis Vuitton—Bernard Arnault (president)
Architect Gehry Partners, Los Angeles—Frank Gehry, FAIA (design partner)
Consultants Gehry Technologies
Executive Architect Studios Architecture
M/E/P Engineer Setec Bâtiment
Lighting Design L'Observatoire International; Ingélux
Civil Engineer Setec Bâtiment
Building Façade Consultant RFR; T/E/S/S - atelier d'ingénierie
Acoustical Engineer Lamoureux Acoustics (base building)
Sound Designer Nagata Acoustics (auditorium)
General Contractor Vinci Construction
Landscape Architect Atelier Lieux Et Paysages
Theater/Audiovisual dUCKS sceno
Sustainable Building Consultants S'Pace; Terao
Building Maintenance TAW
Size 125,938 square feet (building floor area)
Cost Withheld

Mariposa Land Port of Entry, PAGE 160

Project Mariposa Land Port of Entry, Nogales, Ariz.
Client General Services Administration
Architect Jones Studio, Phoenix—Neal Jones, AIA (principal in charge), Eddie Jones, AIA (principal designer), Brian Farling (lead designer), Jacob Benyi (project director), Melissa Farling, FAIA, Maria Salenger, AIA, Joanna Noonan, Rob Viergutz, Bill Osborne, AIA, J. Barry Moffitt, AIA, Tom Conner, Kevin Jones, Brian Lee, Ashley Kenneally, Brett Marinoff, Nick Nevels, David Takeuchi, Amit Upadhye, Eric Weber
Civil Engineering/Transportation Engineering/Security Engineering/Surveying Stantec
Mechanical Engineer Associated Mechanical Engineers
Structural Engineer Bakkum Noelke Consulting Structural Engineers
Electrical Engineer/Lighting Design Woodward Engineering
Geotechnical Engineer West Technologies
Construction Manager Vanir Construction Management (phase 1); Heery International (phase 2-4b)
General Contractor Hensel Phelps
Landscape Architect Chris Winters & Associates; ARC Studios
Wayfinding Stantec; Jones Studio
LEED Consultant Green Ideas
Fire Protection EJ Engineering Group; Stantec
Artists Matthew Moore ("Passage"); Kimsooja ("An Album: Sewing into Borderlines")
Size 115,722 square feet (building); 130,840 square feet (canopy)
Cost $187 million

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Williamstrip Bath House, PAGE 171

Project Williamstrip Bath House, Gloucestershire, England
Client Creath Estates
Architect Craig Hamilton Architects, Powys, Wales—Craig Hamilton (founding director)
Contractor Meysey Construction
Structural Engineer Frank W. Haywood and Associates
Stonemasonry Contractor Ketton Stone Masonry & Fixings
Bronzework Tramway Forge
Cost Withheld

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MBCI	177	430	www.mbci.com/davidson	877.713.6224
Mermet Contract	28-29	232	mermetusa.com	
Metal Construction Association -MCA	112	265	insulatedmetalpanels.org	
Metl-Span	73	99	ENVOLUTION.COM	877.585.9969
Mitsubishi Electric Cooling & Heating	20, 66	289	MitsubishiPro.com	800.433.4822
Mitsubishi Plastics Composites/Alpolic	113	173	alpolic-americas.com	
modularArts	26	-	modulararts.com	206.788.4210
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Nana Wall	25	163	nanawall.com	800.873.5673
National Terrazzo & Mosaic Association	65	274	www.NTMA.com	800.323.9736
NSG Pilkington	32	34	www.pilkington.com/na	800.221.0444
Nudura	77	81	nudura.com/innovation	866.468.6299
Oldcastle BuildingEnvelope®	2-3	217	bimiq.com	866-Oldcastle
Ornamental Metal Institute of New York	16	177	www.ominy.org	212-697-5554
Owens Corning	C4	255	CavityComplete.com	844-CAV-COMP
Pella	119	242	efcocorp.com	800.221.4169
Petersen Aluminum	15	383	WWW.PAC-CLAD.COM	800.PAC.CLAD
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PPG Flat Glass	41	264	ppgideascapes.com/sb67	888-PPG-IDEA
Raven Window	90	85	RavenWindow.com	720.360.3083
Renin	80a-b	-	renincorp.com	
Reinvention	69	-	registernow.reinventionconf.com	
reThink Wood	37	75	www.rethinkwood.com/greenbuilding	
Rheinzink	53	181	www.rheinzink.us	781-729-0813
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Rulon	64	395	www.rulonco.com	800-227-8566
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The Airolite Company	84	387	airolite.com	715.841.8757
The Reinforced Earth Company	86	42	www.reinforcedearth.com	800.446.5700
Tamlyn Wrap	4-5	439	www.TamlynWrap.com	800-334-1676
Trex	23	98	trex.com	
Tyco	85	168	www.RavenStudioSprinkler.com	
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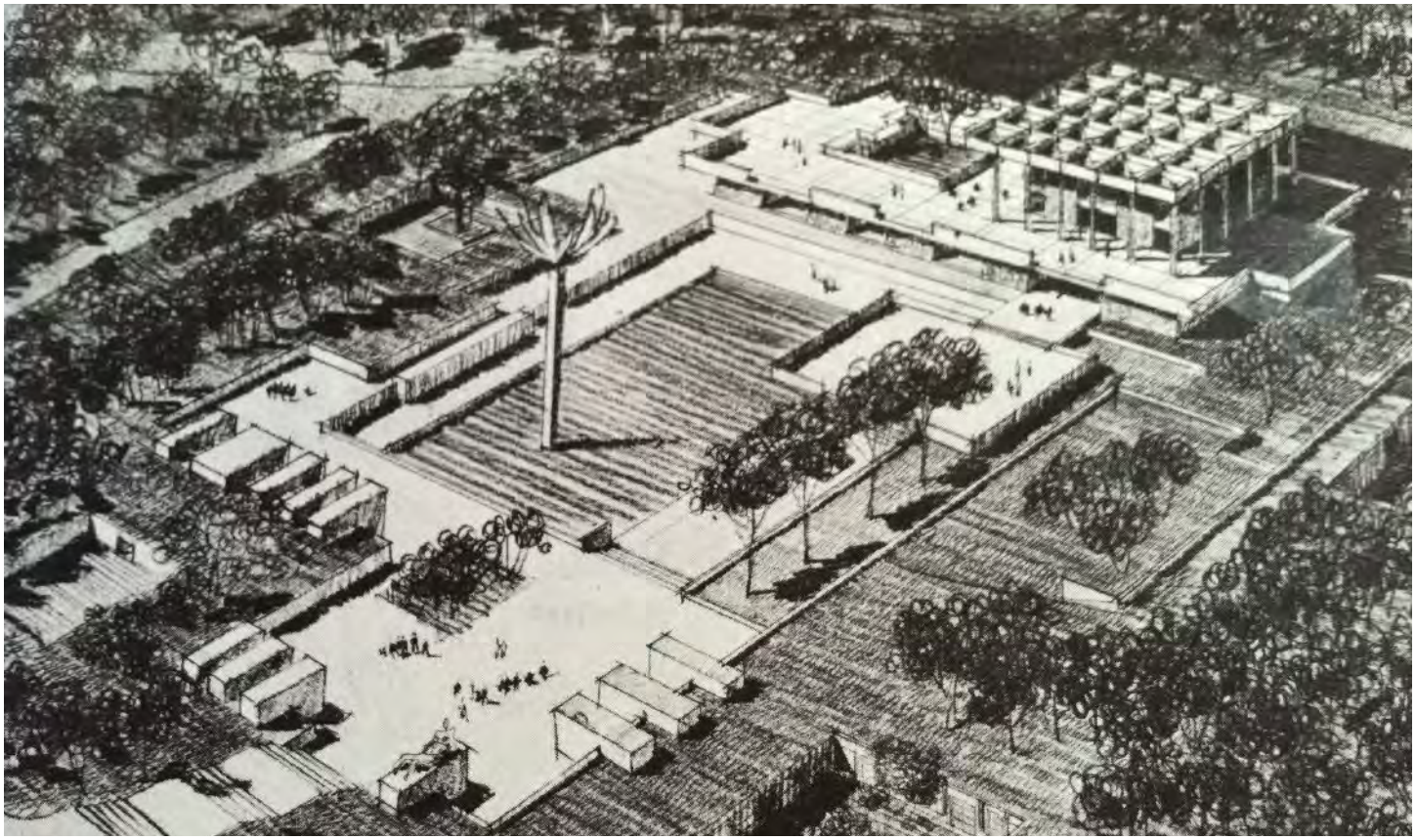
W.R. Meadows	123	193	wrmeadows.com	800-342-5976
Xypex Chemical Corporation	81	79	xypex.com	800.961.4477



AWARD

1968 P/A Awards Jury
Lawrence Anderson
Gunnar Birkerts, FAIA
Richard Dober
Romaldo Giurgola, FAIA
Fazlur Khan

PAST PROGRESSIVES

DEAD, BUT NOT FORGOTTEN

HGA'S LAUDED 2012 MAUSOLEUM IN MINNEAPOLIS RECALLS RALPH RAPSON'S P/A-AWARD-WINNING DESIGN FOR THE SITE.

Text by **Thomas Fisher, Assoc. AIA**

LIKE PEOPLE, architectural projects can die, and yet, in remembering them, we can also bring them back to life. That happened with Ralph Rapson's 1968 P/A Award–winning design for a mausoleum in Minneapolis's Lakewood Cemetery. His scheme remained unbuilt—and largely forgotten—until HGA Architects and Engineers received the mausoleum commission nearly 50 years later. The two designs do differ in important ways. Notably, Rapson envisioned a glassy, concrete-framed entry pavilion on axis with the cemetery's Neo-Romanesque chapel, while HGA's stone-clad, crypt-like structure stands more reservedly off to one side.

The ideas in both projects, though, still resonate. Both the Rapson and HGA schemes have a relatively small structure at grade but lead down to partly buried internment chambers, clad in marble and opening out to a sunken garden. Both have dynamic, asymmetrical layouts. Both use courtyards and skylights to illuminate the subterranean rooms. And both integrate building and landscape so well that the two seem inseparable. Although HGA's vision got built and Rapson's didn't, both deserve the recognition they received.

The similarities between the two speak to the response of equally talented architects to a particular site and program. By respecting the scale of the cemetery's other structures and by taking advantage of the elegant sunken garden, both Rapson and HGA's lead designer on the project, Joan Soranno, FAIA, beautifully honored the place and the people buried there.

RALPH RAPSON

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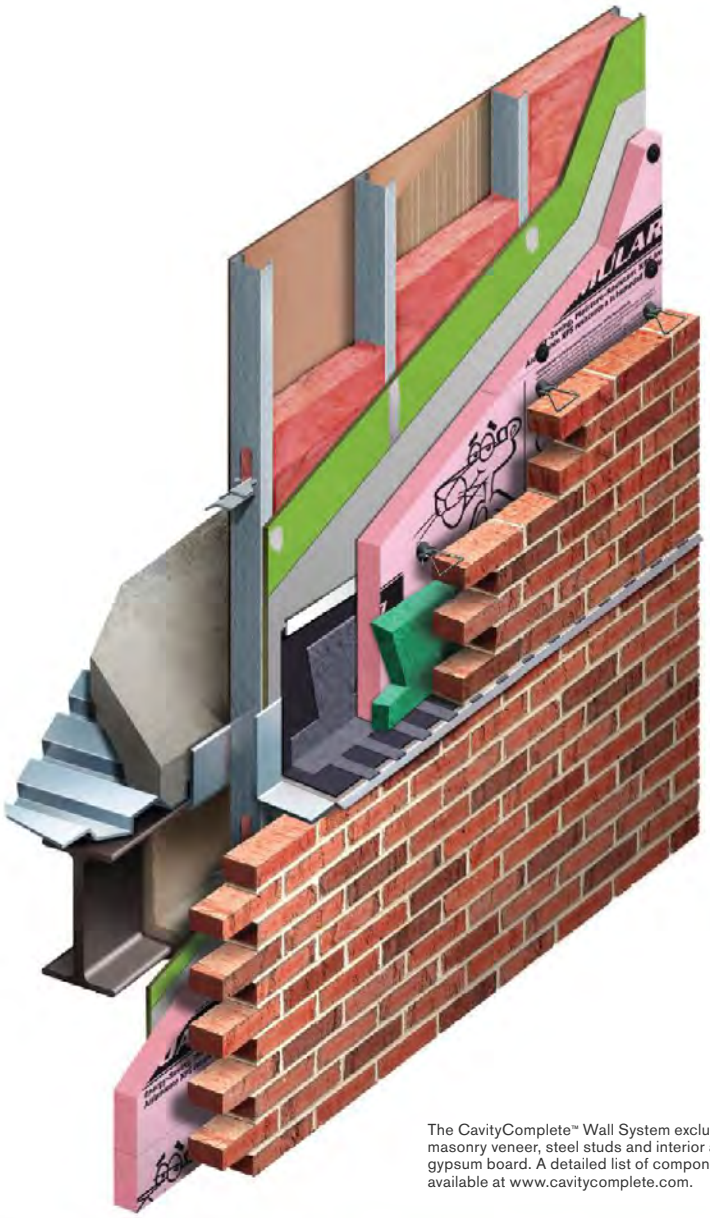

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