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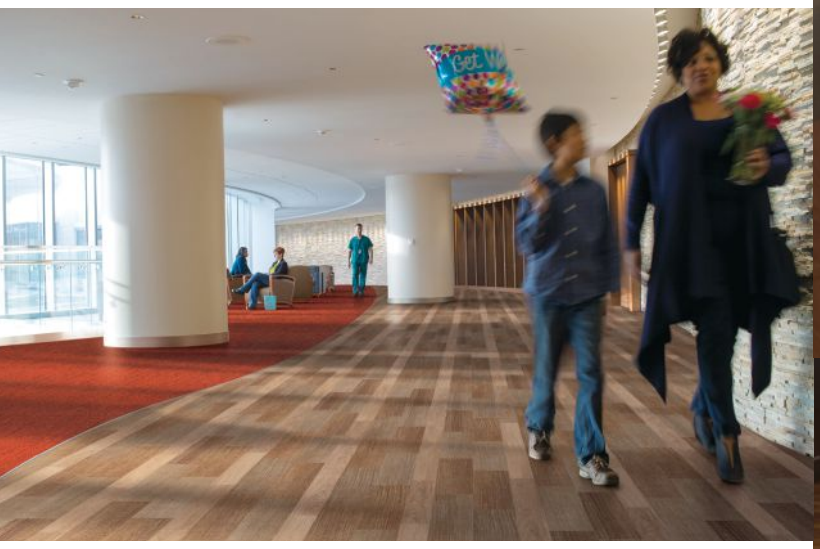
Kennedy & Violich

Tozzer Anthropology Building
Harvard University

8:23 A.M.

A NURSE CHECKS A PATIENT'S CHART AND VISITORS ARRIVE BEARING GIFTS WHILE A DOCTOR MAKES A PATIENT SMILE.



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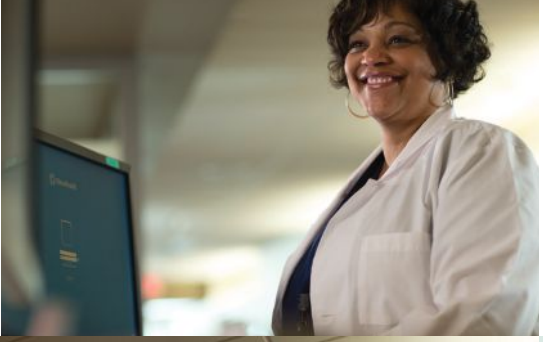

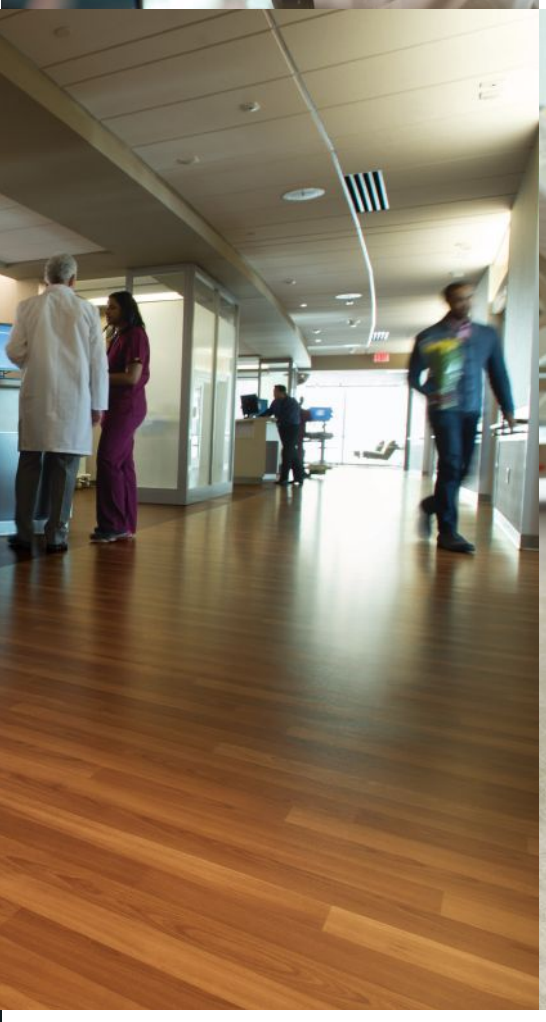

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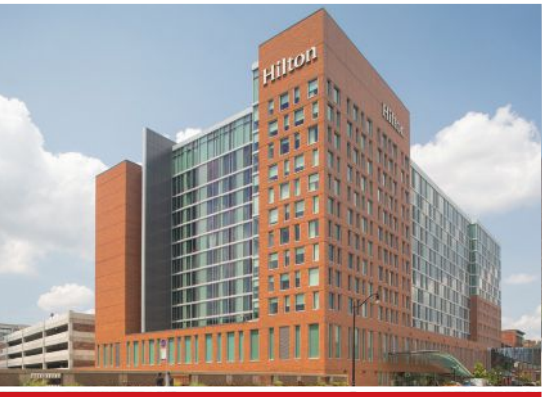

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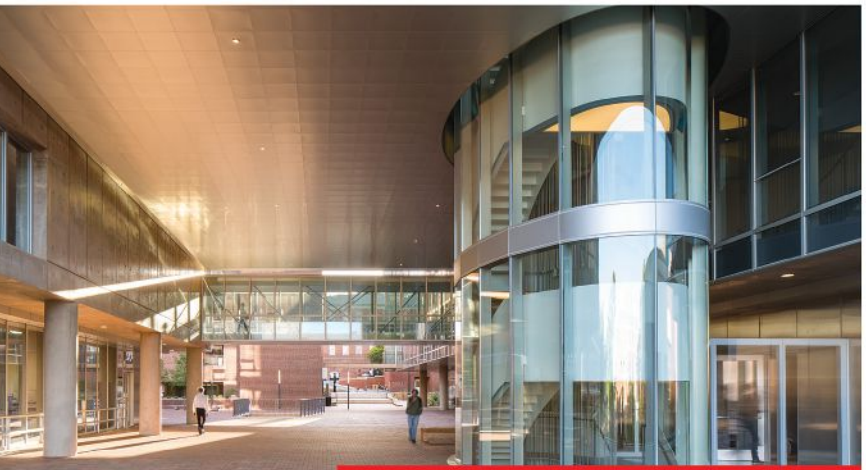

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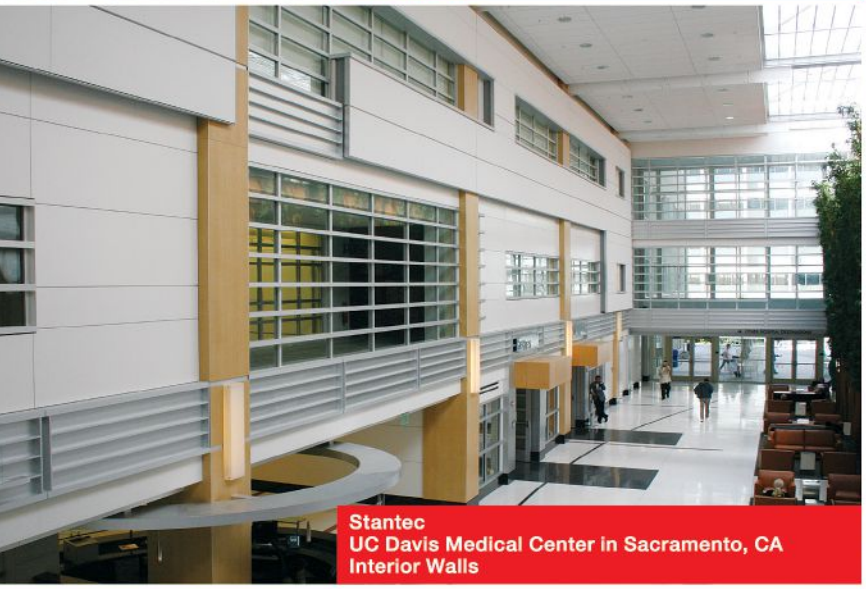
UNC Genome Sciences Building in Chapel Hill, NC
Exterior Wall



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Capitalism in the Casa

The Moroccan city of Casablanca is using an old decommissioned and demolished airport, southwest of the city center, as the site of its new special economic zone to entice global firms, to be called Casablanca Finance City. To anchor the new business district, the city selected Morphosis Architects to design the Casablanca Finance City Tower. Its two tapers, one at the apex and another at the base, will, the firm says, "serve as a symbol of the city's development and as a social node that nurtures an active streetlife." Construction, already underway, is expected to be finished in 2017.

> *For more, check out morphopedia.com/projects/casablanca-finance-city-tower.*

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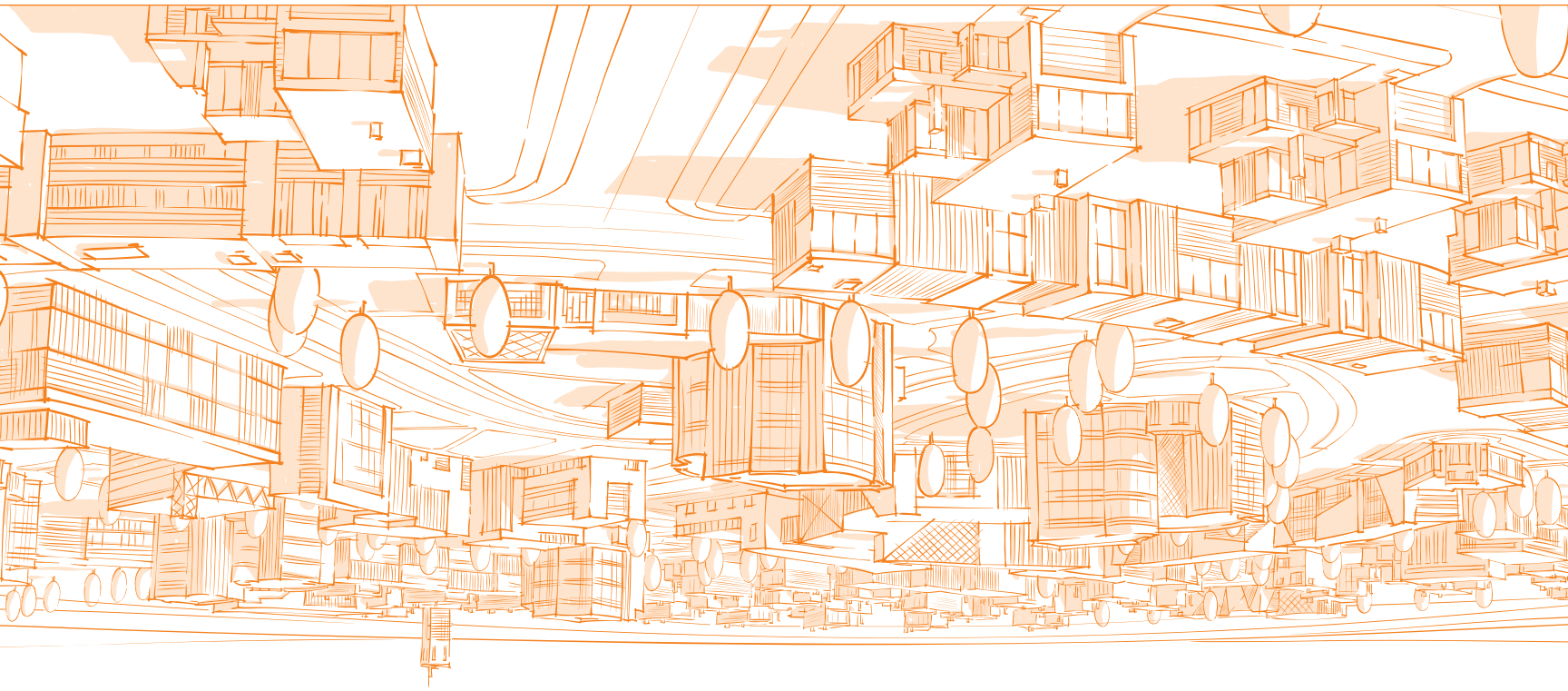

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MIGUEL DE GUZMÁN

A Playful Water Treatment Plant

For this year's MoMA PS1's Young Architects Program in Long Island City, N.Y., Andrés Jaque designed Cosmo, a movable fixture made of irrigation pipes. The tubes filter and recycle 3,000 gallons of water over the course of a four-day cycle—becoming purer with every rotation. The 44-year-old designer, who directs the Office for Political Innovation and teaches at Columbia University, wants Cosmo not only to build awareness of water scarcity but to be used as an example of infrastructure that can be reproduced to give more people access to safe drinking water. —CHELSEA BLAHUT

> *See our video of the opening of Cosmo at PS1, with Andrés Jaque explaining his design, at bit.ly/CosmoVid.*

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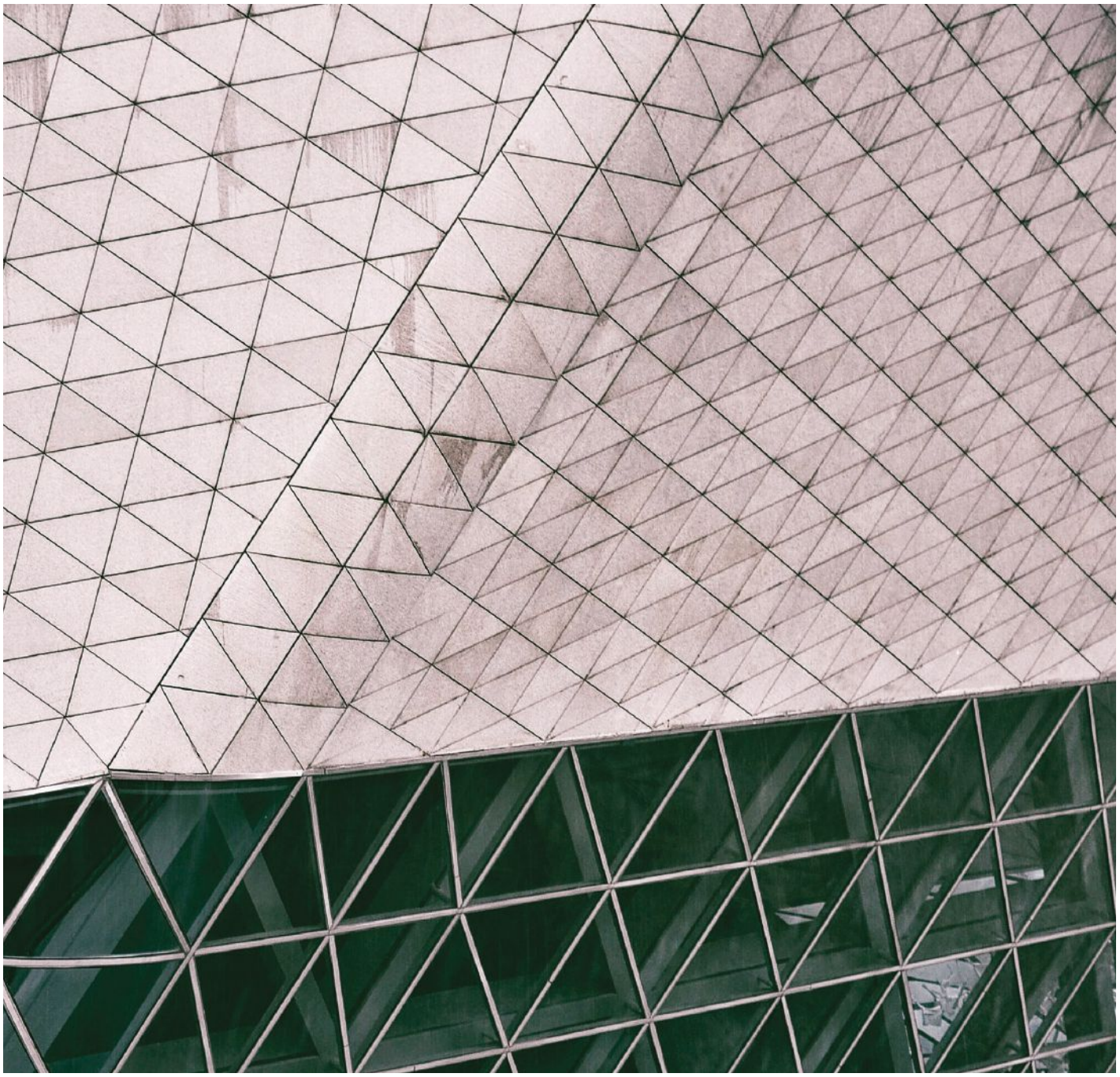
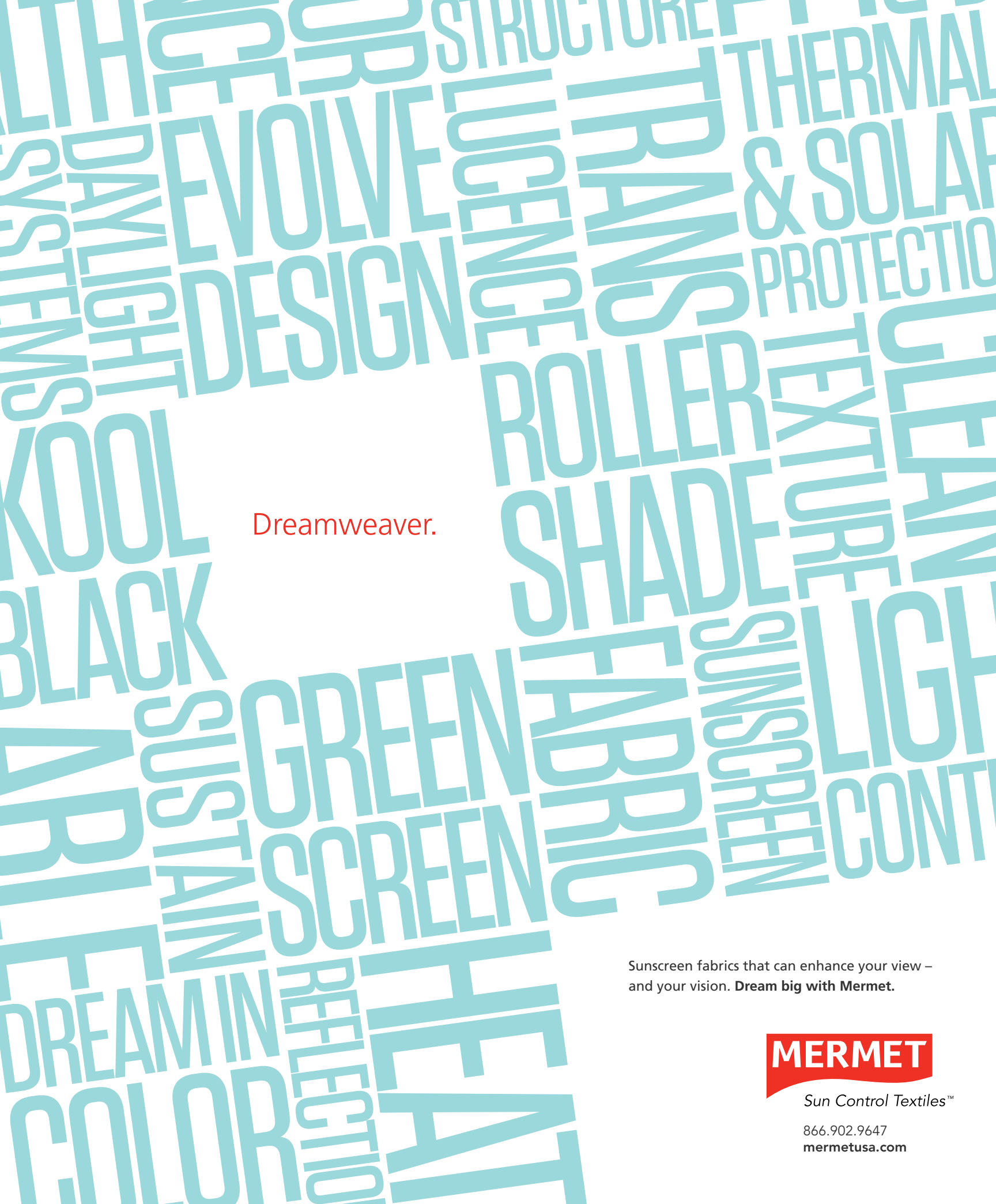


Not Ready for Its Closeup

Contemporary architecture in China (the granite cladding of Zaha Hadid Architects' 2010 Guangzhou Opera House can be seen above), presents a fascinating study in the relationship between conceptual aspirations and material execution for two primary reasons: First, Western architects and designers are inundated with images of provocative buildings in that country, but they are not easily able to visit them. Second, it is rare to find such an extreme range of quality—from construction that completely misses the aspirational mark to material execution that transcends a building's preliminary concepts. —BLAINE BROWNELL, AIA

BLAINE BROWNELL

> *Read Blaine Brownell's full two-part report from his three-week trip to China at bit.ly/BrownellChina1 and bit.ly/BrownellChina2.*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Pier as Icon

Replacing a historic pier in St. Petersburg, Fla., with its iconic 1973 inverted-pyramid building designed by local architect William B. Harvard Sr., turned into an opportunity for the team of Rogers Partners Architects + Urban Designers, ASD Interiors Architecture Graphics, and Ken Smith Landscape Architect. Their design was chosen in April by the city's Pier Selection Committee, and the city council approved the new 1,380-foot-long park in July. Final design, construction documents, and permitting are scheduled to be finished by the end of 2016, with construction due to be finished by the end of 2018.

> *See more images of the new pier and stay current with the status of the project at newstpetepier.com.*

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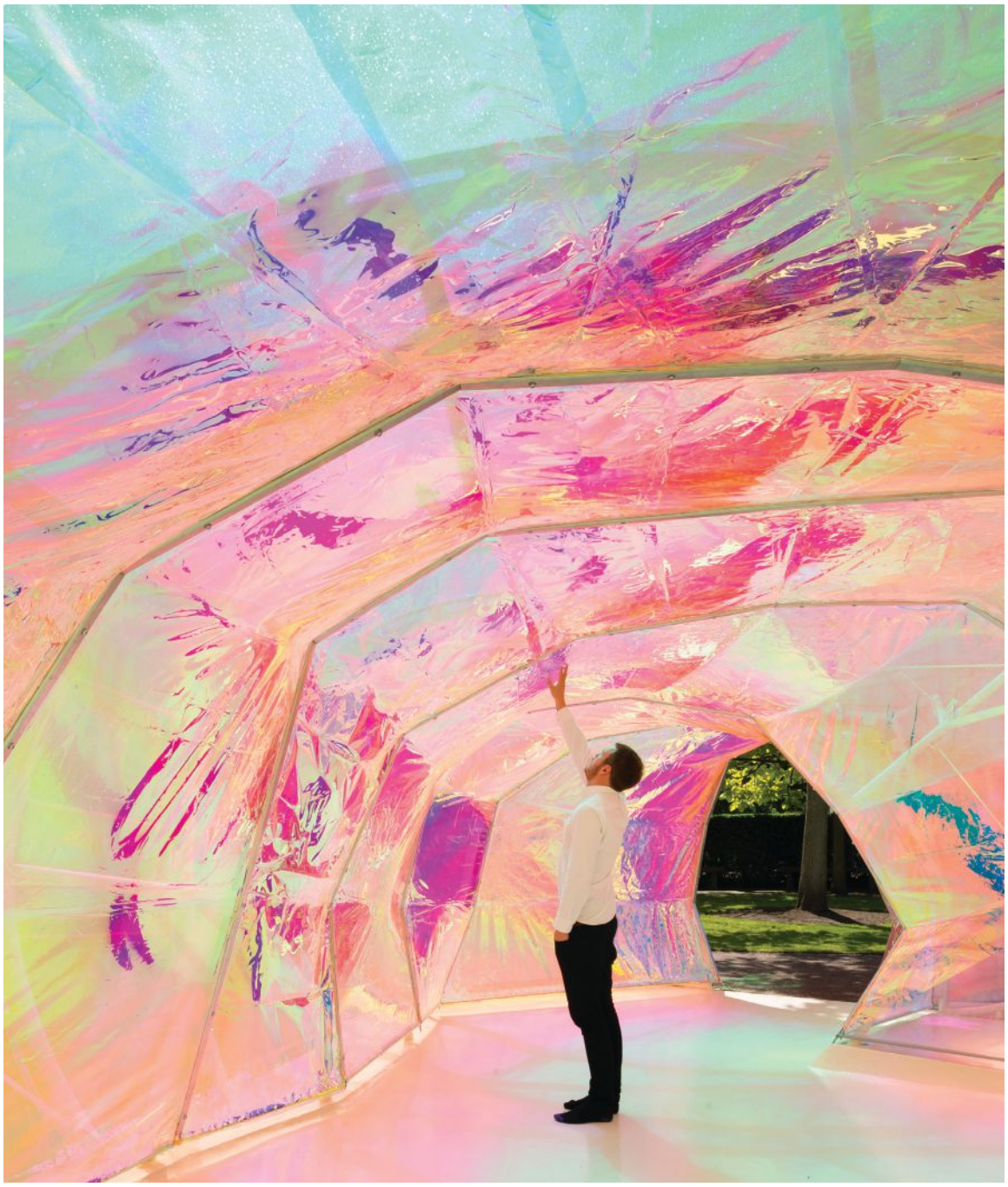

JIM STEPHENSON / VIEW PICTURES

A Selfie Paradise in London

An annual tradition since 2000, the summer pavilion at the Serpentine Galleries in London's Kensington Gardens opened this year on June 25. This time around, the pavilion is designed by José Selgas and Lucía Cano of Madrid-based SelgasCano, and it is by far the most colorful of the summertime installations yet. The 1,927-square-foot structure made of ethylene tetrafluoroethylene (ETFE) will be open through Oct. 18. According to *The Guardian*'s Oliver Wainwright, this curvy rainbow structure is an "Instagrammer's paradise." Judging by the influx of 'grams with the hashtags #serpentine and #serpentinepavilion, we'd say he was right. —SARA JOHNSON

> *See 46 of the best Instagrams of this year's Serpentine Pavilion that we could find at bit.ly/Serpentine2015Instagram.*


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IWAN BAAN

The Dark Continent in a New Light

The Louisiana Museum of Modern Art outside of Copenhagen is hosting “Africa: Architecture, Culture and Identity.” The exhibition, on view until Oct. 25, explores the diversity and cultural complexity of architecture and design from Sub-Saharan Africa. The installation features models, video, photography, and more, focusing on seven themed areas: belonging, co-existence, expanding cities, making space, rebuilding, new communities, and building features. One exhibit focuses on NLÉ’s Makoko Floating School (shown) which was built atop Lagos, Nigeria’s lagoon as an experiment in response to rapid urbanization and climate change.

> *Learn more about the exhibition at en.louisiana.dk/exhibition/africa.*


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Best Practices: When Architects Are Also Caregivers

TEXT BY ALICE LIAO

Traditional firm culture can be challenging for architects who are also primary caregivers. Rigid schedules, restrictive leave policies, and a studio culture that values long hours in the office can hinder those with personal responsibilities to children, the elderly, or the infirm. Increasingly, however, architecture firms are recognizing the importance of work–life balance and company policies that help staff tend to loved ones.

Accommodate Flexible Schedules

Some firms allow employees to determine how to allocate their hours. At Denver's JG Johnson Architects, staff members work a 40-hour week and are expected to be in the office during its core hours, but individual schedules are flexible and can adapt to a four-day week or shorter days during the standard five-day week, according to Carrie Turbow, an associate at the firm.

Reduce Hours When Needed

A shorter workweek can help transition an employee back in after a long absence. Cannon Moss Brygger Architects (CMBA) in Sioux City, Iowa, has employees who work 20- and 32-hour weeks, including one designer who shifts to 16 hours during the summer when her children are out of school.

Pay is typically pro-rated for those on a lighter schedule, while benefits may or may not be reduced, as firms define full-time status differently.

Offer Short-Term Disability

Although the Family and Medical Leave Act (FMLA) grants 12 weeks of job-protected absence for maternity, care of a family member, or personal illness, it is not mandatory for companies with fewer than 50 employees. The leave time is also unpaid. Some firms offer short-term disability insurance to buffer the loss of income; a handful of states mandate it. In the case of childbirth, Grand Rapids, Mich.–based Tower Pinkster's benefits typically pay 60 percent of an employee's salary for six weeks, which may be extended to 12 weeks with a doctor's recommendation.

Implement a Paid Family Leave Policy

Last month, Portland, Ore.–based Boora Architects, which has about 65 employees, instituted a paid family leave policy where the firm covers 60 percent of an employee's salary for six weeks for reasons specified by the Oregon Family Leave Act, which mirrors FMLA (and is also unpaid) but includes bereavement. Staff not fully vested are paid less than 60 percent; the amount is based on their number of years with the firm. The benefit is funded by an annual allowance added to the operating budget with the understanding that "some years, we may spend all of [it]; other years, we may spend little to none," says firm principal Amy Donohue, AIA. Because the cost of implementation is "surprisingly affordable," Donohue thinks similar-sized firms that don't have a paid family leave policy should consider establishing one.

> "We need to support people in their personal lives, so they can come to the office, focus, be creative, and do their best work."
>
> —Amy Donohue, AIA, principal, Boora Architects

Grant Paid Parental Leave

In June, Perkins+Will began offering four weeks of fully paid leave to all of its U.S. employees who are new parents, whether biological, adoptive, or foster. According to the firm's chief talent officer and principal Meg Brown, the four weeks are in addition to the six weeks minimum granted for childbirth for biological mothers under short-term disability, which employees also receive.

Provide Additional Support

Beyond formal benefits and financial assistance, firms can offer extended benefits and leave or more direct financial assistance. Tower Pinkster sends food to the home of staff caring for spouses who are seriously ill and helps defray the costs of travel for medical reasons. The firm also offers six floating, work–life balance days a year for employees to refresh. As Donohue notes, "We need to support people in their personal lives, so they can come to the office, focus, be creative, and do their best work."

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Detail:
St. Edward Catholic Church

TEXT BY JENNY JONES

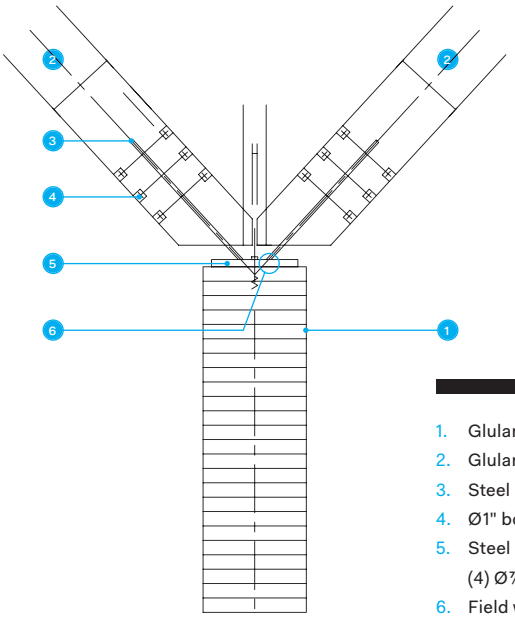
In Keizer, Ore., the prayers of St. Edward Catholic Church's parishioners were answered when Portland, Ore.–based DiLoreto Architecture employed a series of structural glulam arches to help meet their $4 million budget for a 12,000-square-foot contemporary Gothic-style church.

Six pointed arches made of locally sourced Douglas fir rise 38 feet atop concrete plinths, spanning the 65-foot-wide nave. Two additional pointed arches cap the ends of the nave at the sanctuary entrance and altar. "When ... you're surrounded by these arches, [it harks to the idea] that structure makes space," says lead designer Brian Melton.

Symbolizing energy radiating outward, 14 to 16 angled glulam struts act like flying buttresses to transfer the building's dead loads—the sanctuary roof, the soaring clerestories, and the lower roof—to each main arch. As many as three struts and three knife blades converge at points along the arches.

DiLoreto worked with Portland-based WDY Structural + Civil Engineers to position the struts using SAP2000. The process was "extremely difficult," Melton says, because each strut orients in three dimensions and originates from different points along the arches' curved forms.

Since its completion in February 2014, the church has become a beacon in the community, as was typical in Gothic times, Melton says. "I hope that the space is uplifting and enhances their spiritual connection to God and to their community for generations."



1. Glulam arch, 36" × 12"
2. Glulam strut, 6¾" × 7½"
3. Steel knife plate, ¼" × 5" × 18¾" in ⅜" kerf
4. Ø1" bolts, countersunk 1" and plug (typ.)
5. Steel plate, ¾" × 5¼" × 1'3" with (4) Ø⅞"× 8" lag screws at 4" o.c.
6. Field weld (typ.)

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Next Progressives: Geoffrey von Oeyen Design

TEXT BY DANIELLE RAGO
PORTRAIT BY KYLE MONK

Le Corbusier once wrote, "In every field of industry, new problems have presented themselves and new tools have been created capable of resolving them." He believed he had to look outside of the discipline—to the engineered designs of ocean liners, airplanes, and automobiles—to create architecture that captured the zeitgeist of the 20th century.

For Los Angeles–based Geoffrey von Oeyen, these modernist ideals remain applicable today, yet it is high-performance sailboats that represent the zeitgeist of the present. Trained in architecture at Stanford, Cambridge, and Harvard universities, von Oeyen cites Modernism and the work of Le Corbusier and Ludwig Mies van der Rohe as critical forces shaping his own work. "I always wrestle with [Modernism] in my practice; and make sure the work that I'm doing advances the discipline in some way."

After a six-year stint at Gehry Partners—where he combined his work with his love for sailing by racing Frank Gehry, FAIA's fiberglass-hulled Beneteau 44.7, *Foggy*—von Oeyen established his own firm in 2012. The small West Los Angeles practice focuses on a range of project types. Using technology and materials from the sailing industry as well as modernist principles, Geoffrey von Oeyen Design (GVOD) creates interactive spaces that leverage existing environmental forces.

For a recent project in the Pacific Palisades, the Project and Idea Realization Lab (PIRL) at St. Matthew's Parish School, GVOD created an interactive, educational environment in a new technology lab and middle school classroom using sailcloth and rigging to compose a retractable shade canopy covering an outdoor teaching space. When students operate the canopy, "they see the forces, how everything is designed, and how it all comes together," von Oeyen says.


Geoffrey von Oeyen

The firm also has two recent projects in Malibu. One reworks an existing ranch house from the 1960s. Aptly named the Horizon House, GVOD frames views of the horizon between cantilevered canopies above and the pool below, which work together to diffuse light on the ceiling surface.

The other, the Case Room, is a work room addition to a Malibu residence for two attorneys in which GVOD uses north-facing roof monitors and a zinc roof to bounce and diffuse light so that different portions of the ceiling are illuminated as the sun passes across the sky.

Von Oeyen has explored the interplay between sailing and architecture at great length in both practice and theory. At the University of Southern California (USC) School of Architecture, where he teaches, von Oeyen designed and built pavilions with students where he used sailing techniques, ropes, and tension members in addition to fiberglass resin to make stretched skin surfaces. Last November, he organized an exhibition at the school, "Performative Composites: Sailing Architecture," which included other designer/sailors like Greg Lynn and Bill Kreysler, to explore how new materials and techniques in sailing allow designers to reconsider spatial, formal, and environmental forces in architecture. The exhibition opened up the conversation about sailing to the architectural discipline and was later turned into a USC graduate studio in which students worked in teams to design future housing solutions at different scales using precedents in the sailing industry such as sails, rigging, hulls, and composite materials.

By looking at the way naval design leverages environmental forces like wind and water to deal with external forces—human occupation, space, and mechanical systems—while also creating elegant structures that are smarter, lighter, and stronger, von Oeyen is able to create innovative designs that have the potential to steer architecture through uncharted waters.

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Next Progressives:
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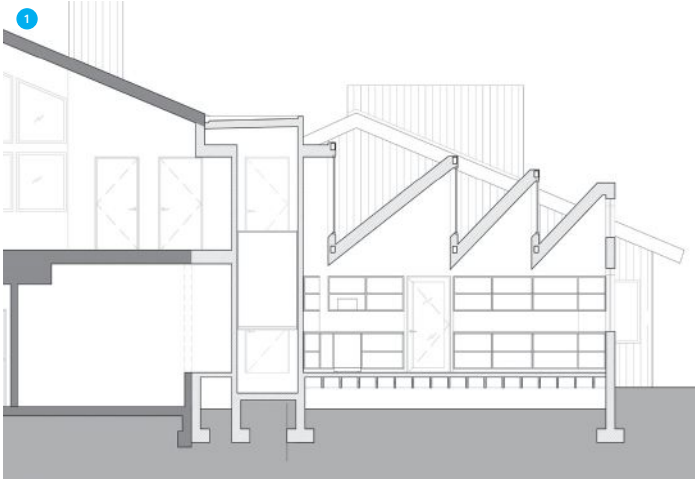

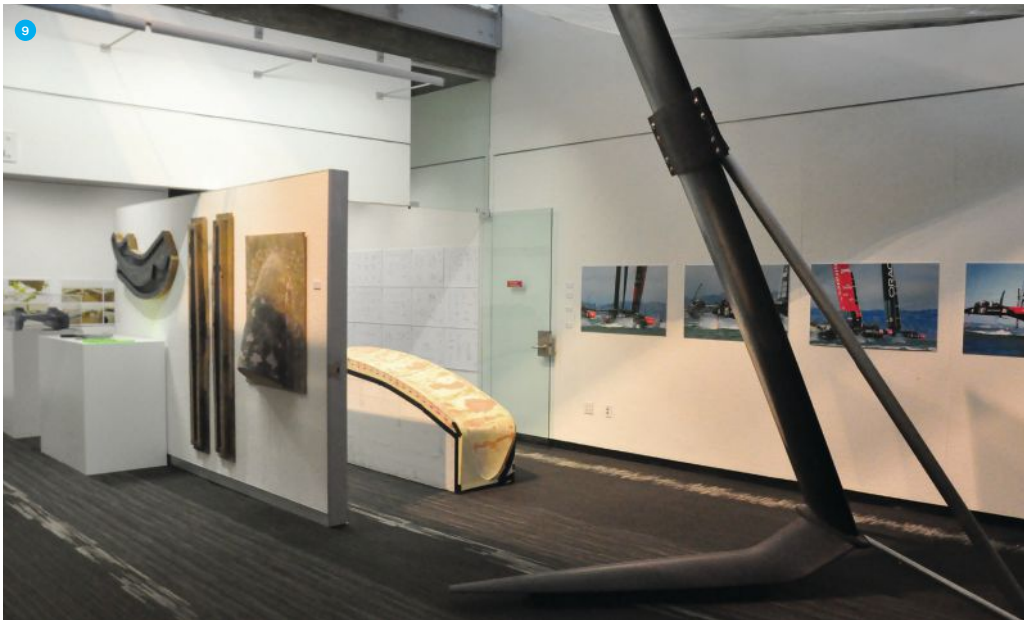

1,3. North-facing roof monitors in the Case Room, a residential addition in Malibu, Calif., create dynamic lighting through the course of the day. **2.** Casa Dunas, in Isabela, Puerto Rico, anticipates rising sea levels with non-plumb walls designed to resist wave impacts. **4.** Gateway Exchange, a multivendor retail complex in Winder, Ga., breaks down the strip mall typology into three volumes surrounding a landscaped parking court. **5,6.** A raised, bifurcated roof focuses views southward at the Horizon House in Malibu, Calif., with steel frames supporting the cantilevered canopies. **7,8.** Split volumes form the Y-House in Marfa, Texas, allowing multiple vantage points of the landscape. **9.** Von Oeyen's November 2014 exhibition at the University of Southern California, "Performative Composites: Sailing Architecture," included models and mock-ups of Greg Lynn's 42-foot trimaran as well as a carbon-fiber America's Cup hydrofoil.

Products: Healthcare Highlights

TEXT BY HALLIE BUSTA

Acczent Flourish, Tarkett
A 0.8mm wear layer and a polyurethane finish top this vinyl sheet flooring, which can be flash-coved and heat welded. Available in 10 colors. *tarkettna.com*

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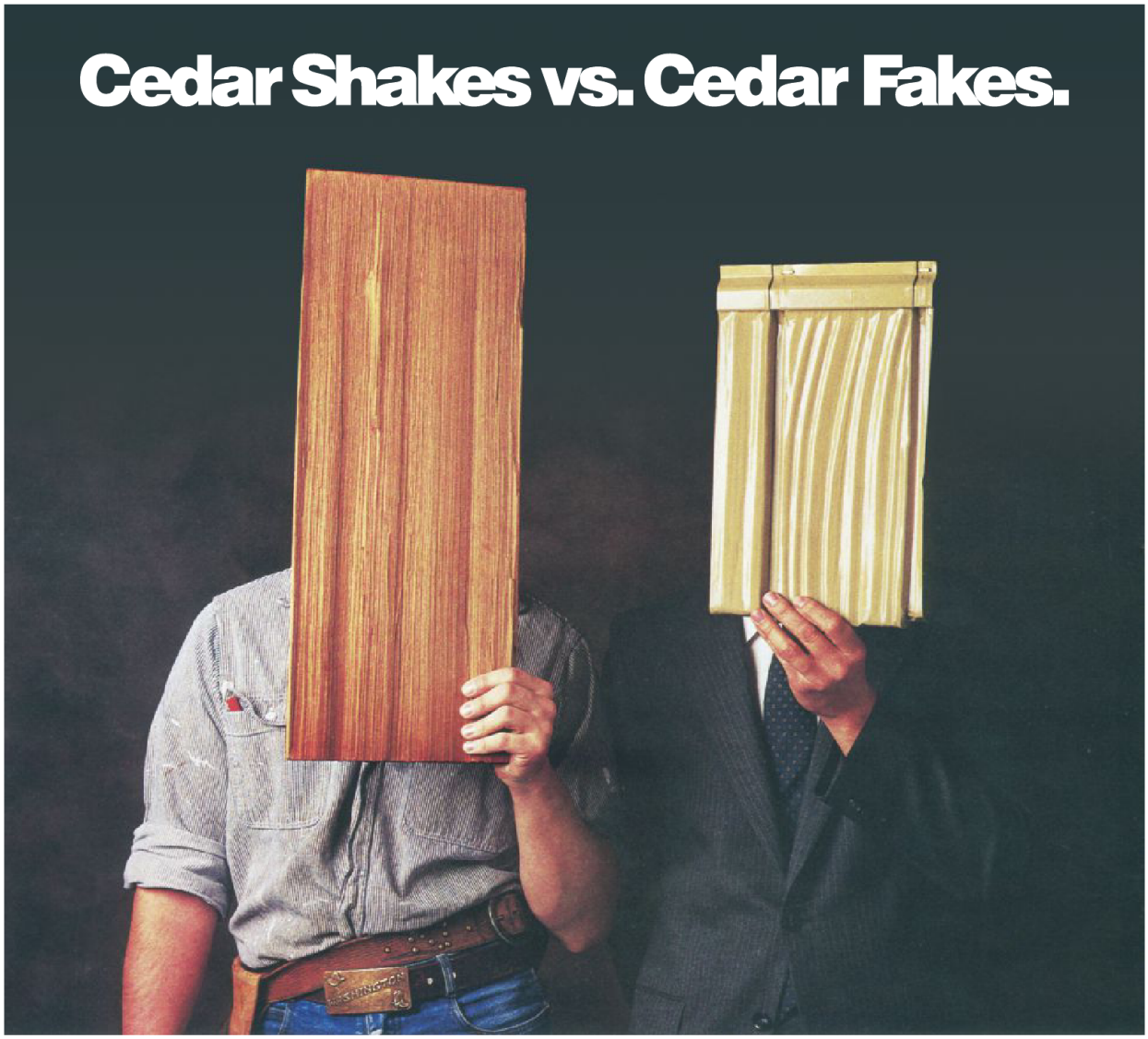
Regard Planter, Steelcase
Using greenery to enliven common spaces, this box planter joins Steelcase's Regard line of furniture for waiting and meeting areas in high-traffic zones. Offered in four sizes. *steelcase.com*

Check-Up Collection, Designtex
This set of 10 resilient, bleach-cleanable, stain-resistant upholsteries features polyurethane, nylon microfiber, and vinyl materials and comes with an optional antimicrobial finish. *designtex.com*

Accord, Wieland
Wide arms and deep, molded cushions add comfort to standard lounge-style patient seating. Accord reclines fully and can be steered single-handedly by a caregiver. *wielandhealthcare.com*

> *For more of the latest healthcare products, visit bit.ly/healthcarehighlights.*

Cedar Shakes vs. Cedar Fakes.



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Professional Development: Five Emerging Building Types to Master

TEXT BY ALISON GREGOR

For architects looking to expand their portfolios, vying for the longstanding building types—libraries, theaters, office towers—against a litany of established firms can seem futile. But, to take the road less traveled, here are five increasingly important typologies with room for more design experts.

Bioclimatic Buildings

By maintaining a connection to the outdoors and climate zone, bioclimatic buildings enhance occupant comfort with little need for energy-intensive HVAC systems. They are often oriented to leverage daylight and wind patterns, utilize local or site-sourced materials, and incorporate ancient, low-impact construction techniques adapted for modern use, says Andrew Lee, a senior consultant with Seattle-based Paladino and Co. But the big challenge, he says, is "connecting bioclimatic design to something financially beneficial, such as attracting better talent."

Data Centers

The desire for ever more computing power drives the demand for these specialized facilities. Getting a foot in the door can be daunting. "The clients tend to be quite savvy, so they do value a track record of experience," says Garr Di Salvo, a New York–based associate principal at Arup. Architects must also anticipate a client's future needs—retrofits are tricky in buildings that operate 24/7—as well as "densification," or the evolution of more powerful servers, he says. "That has implications on the facility's cooling systems."

Net-Zero Energy Buildings

All roads in sustainable design are leading to net-zero energy buildings: Title 24 of the California building code mandates that new commercial buildings be net-zero energy by 2030, the price of solar panels has plunged, and concern for the environment is up, says Brad Jacobson, AIA, a senior associate and sustainability leader at EHDD. Successful architects need to work in partnership with the owner from pre-construction to post-occupancy. Verifying building performance requires an exceptional level of diligence because tools for obtaining post-occupancy data remain "fairly archaic," he says.

Vertical Farms

At the juncture of architecture and agriculture, vertical farms, in which produce grows in multistory racks using hydroponic or aeroponic systems, are the wave of the future, says Jason Chmura, AIA, an associate at Princeton, N.J.–based KSS Architects. "The efficiency in their design is the small footprint," he says. The lack of available land in cities means that vertical farms are often also adaptive reuse projects, which adds complexity to their technical design and permitting process.

Resilient Buildings

In the face of extreme weather, resilient buildings are designed to maintain functionality or bounce back quickly in the aftermath. Strategies range from elevating crucial building systems to avoid floodwaters, to specifying materials that allow ground floors to flood, dry out, and return to service, says Robin Guenther, FAIA, a principal of Perkins+Will. Designing for events that may never happen and that vary by region add to this project type's complexity, she adds. "We need to take the science seriously and lead our clients, even when they are skeptical."

The net-zero energy David and Lucile Packard Foundation Headquarters in Los Altos, Calif., by EHDD

JEREMY BITTERMANN

> *To learn more about how these five project types can deepen your firm's portfolio, visit bit.ly/5bldgtypes.*

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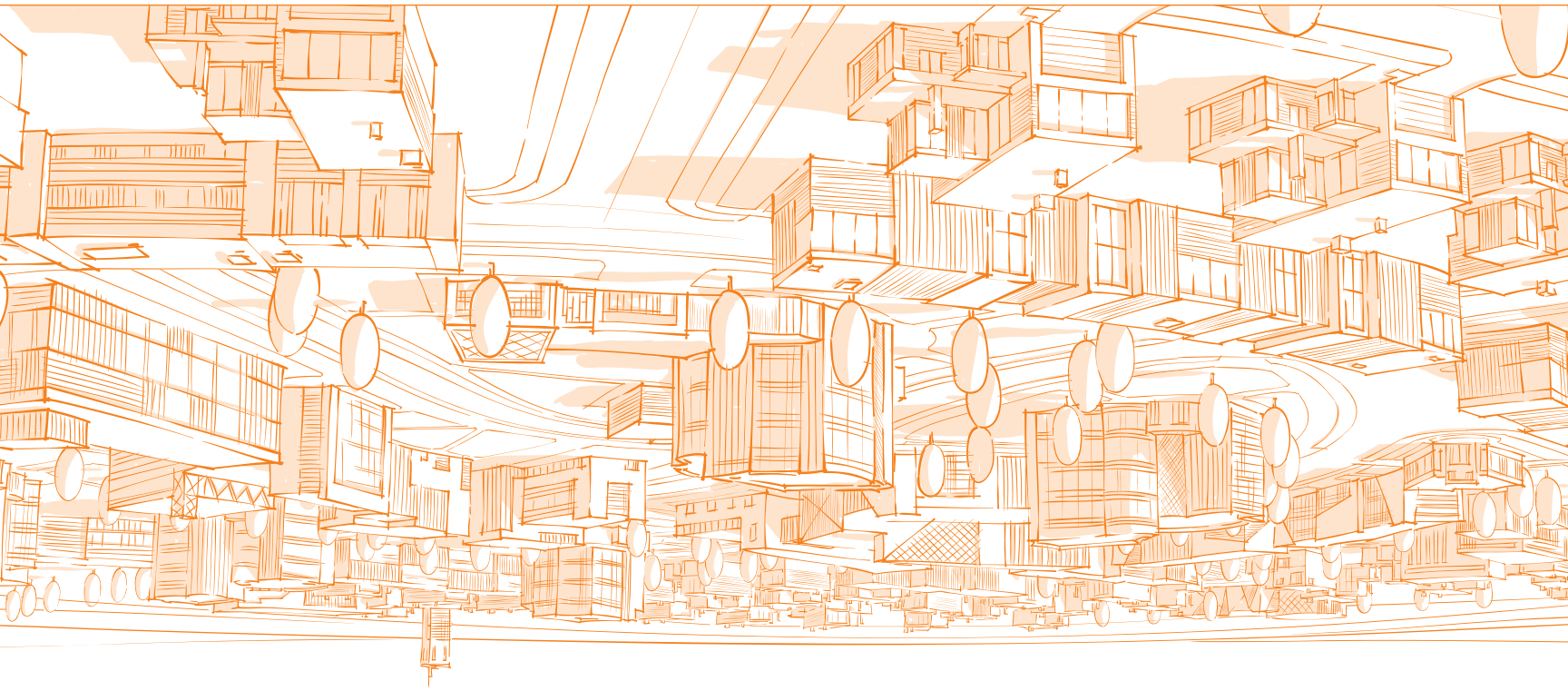

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SECURITY FEATURES IN REVOLVING DOORS

MOVING BEYOND EGRESS AND ENERGY EFFICIENCY

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LEARNING OBJECTIVES

After reading this article, you will be able to:

1. Understand the benefits of revolving doors.
2. Review revolving door components and configurations.
3. Examine the safety features available for revolving doors.
4. Describe how security revolving door systems operate and their various applications.

CONTINUING EDUCATION

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Written by: Paige Lozier

BENEFITS OF REVOLVING DOORS

Revolving doors not only provide a means of egress and entry, but can also increase the aesthetics, energy efficiency and security of a building. Revolving doors enable unique design options for the architect and building owner. Because they act as "always open" to pedestrians and "always closed" to the elements, they greatly reduce air infiltration in and out of the building, which results in measurable energy savings in addition to eliminating drafts, creating a more comfortable environment, reducing dirt and debris, and providing security.

Security is of utmost concern to many types of facilities such as state and U.S. government buildings, R&D laboratories, pharmaceutical companies, hospitals, financial institutions, office buildings and educational facilities. Typical building security measures usually require a security detail and several time consuming steps. Imagine a time that you've entered a federal building and had to go through security. First you enter off the street and are directed with crowd control stanchions to a guard station where you may show identification, run personal belongings through an X-ray security scanner, and then walk through a metal detector or possibly even a full body scanner. This type of system is slow, cumbersome, and allows for human error.

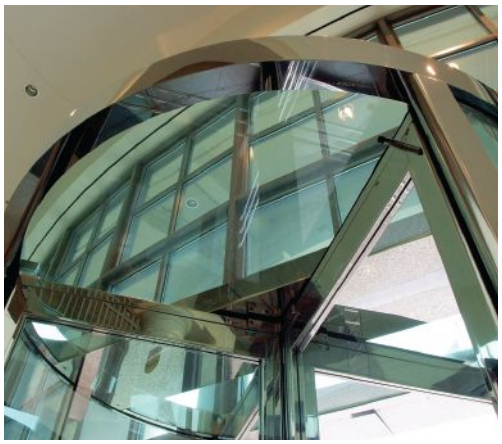
Controlled access security revolving doors are a more secure system that removes the security personnel component of the equation, provides several layers of security, as well as energy savings and effective high traffic management to boot.

HISTORY OF REVOLVING DOORS

For a brief history of the revolving door, let's look to Theophilus Van Kannel, a Philadelphian who was granted a U.S. patent on August 7, 1888 for what he called a "storm-door structure." The patent drawings show a three-partition revolving door that is described as having three radiating and equidistant wings and weather strips that ensure a snug fit. As Kannel described them, the advantages of this type of door over a hinged door were the prevention of wind, snow, rain or dust. It was noiseless and couldn't be blown open by wind. There was no possibility of collision; people could pass in and out at the same time; and it eliminated noise from the street. In 2007 Theophilus Van Kannel was inducted into the National Inventors Hall of Fame for this invention. Kannel's innovative invention almost 130 years ago is now commonplace in buildings throughout the world, but has been continually improved with far greater sensor and security technology in place today.

A two-wing, round drum, automatic revolving door can handle heavy pedestrian traffic up to 80 people per minute. It is ideal for healthcare, corporate headquarters, airports and retail applications. Photo courtesy of Horton Automatics

A three-wing, segmented drum, automatic revolving door system provides spacious compartments for an elegant, energy efficient entrance. With diameters up to 16 feet, this system is ideal for managing high traffic volumes including wheelchairs, walkers and stretchers. Photo courtesy of Horton Automatics



A four-wing, round drum, easy flow manual revolving door system is an excellent choice for energy efficiency and architectural appeal. Mechanical speed control and book-fold hardware for emergency egress are standard. Photo courtesy of Horton Automatics

REVOLVING DOOR COMPONENTS AND CONFIGURATIONS

Now let's discuss the different types of revolving door components and configurations. The components you must understand are the drum (the round enclosure), the throat openings (where people enter and exit), the wings (partitions between compartments), the center shaft (around which the wings rotate) and the motorized or mechanical speed control. The drum can either be round or segmented, with a round or segmented canopy, and either a throat- or center-connected configuration.

There are several types of revolving doors: manual, automatic, security and exit lane doors. Manual revolving doors can handle large volumes of traffic in both directions and are a low cost, energy efficient alternative to automatic revolving doors, which are also very energy efficient and offer easy, hands free operation. Automatic revolving doors have a series of active and passive sensors for door wing safety, to prevent entrapment and to detect obstructions. Security doors handle standard to high security applications, while exit lane doors are used in settings such as airports, stadiums and transportation facilities for security and to control one-way traffic.

Wing Design

For each type of revolving door there are different available configurations: two-, three- or four-wing. Two-wing revolving doors offer the largest compartment size, as there is no center shaft. The entire door, including the ceiling, rotates on a channel inside the canopy. Because of their large compartment size they are often used in healthcare facilities to accommodate wheelchairs, walkers, gurneys and carts.

Two-wing automatic doors easily accommodate large volumes of traffic in both directions and also offer the best airlock for energy efficient design. There is a superior airlock because in lieu of a single, center core there are two cores, one on each of the wings. These cores completely close the throat opening to outside elements and are desirable in cold climates to prevent ice and snow from entering the throat opening during non-operating hours. When the wings completely close the throat opening, this is the only revolving door that is not "always open and always closed" during part of its rotation. Due to increased mechanical components necessary for this configuration, including the rotating ceiling, the two-wing door is typically more expensive than comparable three-wing automatic alternatives.

The three-wing automatic revolving door is commonly used to provide fast and efficient traffic flow, and because the compartments are large, they provide more room for walking and can easily fit luggage and more than one passenger (i.e. parent and child) in the compartment. This type of revolving door is often used in hotels, retail stores and restaurants.

Four-wing manual designs move people through the door quickly, because four compartments accommodate up to four people. This is appropriate for applications such as conference centers, universities and libraries where many people are moving quickly through the building.

Drum Configurations

Configurations for the drum enclosure can be segmented or round. The advantages of segmented drums are that they allow for flat or insulated glass or solid panels. Because there is no curved glass they have easier installation and lower costs than round drums and allow for immediate glass replacement when needed; if the glass is broken, one segment is less expensive to replace. More glazing options are also available with custom finishes, as they allow for mixing panel types such as insulated glass at the exterior and flat glass at the interior.

Round systems are more expensive because curved glass costs more, but there are more architectural options. There are fewer extrusions and this type of system is the industry norm so meets most specifications. A segmented drum with a round canopy offers the best of both options; the system is less expensive with a more appealing canopy.

A revolving door is a free-standing vestibule, so the unit can be conveniently located either inside the building, outside the building, or centered between the interior and exterior. The drum enclosure can be center connected to the adjacent construction or throat connected at the entry's vertical rails. Adjacent construction should not bear down on the revolving door.

When designing and specifying it is important to consider whether you want a portion of the revolving door on the sidewalk and a portion inside (as with center connected) or the entirety of the revolving door inside the building or outside the building (throat connected). Locating the revolving door inside reduces interference

Because there is no curved glass, segmented drums have easier installation and lower costs than round drums and allow for immediate glass replacement when needed. Photo Courtesy of Horton Automatics

General safety features that are needed to meet building codes and standards include sensors such as a canopy mounted motion detector, a sensor to detect a person in the rotating path, entry point sensors, toe guard sensors, contact safety edges and emergency buttons. Photo courtesy of Horton Automatics

with pedestrian traffic on the sidewalk but takes up lobby space inside, while locating it on the exterior takes up sidewalk space but provides more lobby space, which may be important for retail and restaurant applications.

Other important design considerations are the diameter, position and finish of the revolving door. Typical diameters for revolving doors range from 6 feet to 16 feet. On four wing revolvers, two standard parking positions are available, plus "+" or "X." The "+" position has a smaller throat opening at one eighth of the circle and is more difficult to enter and exit, while the "X" position has a larger throat opening but takes up a quarter of the circle. Material finishes can be specified to match adjacent construction, while the wing and drum can be designed to match important sight lines. Customizations for these systems include special anodized and paint finishes, metal cladding, glass ceilings, lighting, signage and extended canopies.

SECURITY AND SAFETY FEATURES

Now that you have a solid understanding of the revolving door components and available configurations, let's move on to talk about security revolving door systems, as well as safety features that maximize the health, safety and welfare of building occupants.

On November 28, 1942 the Cocoanut Grove, a popular nightclub in Boston, Massachusetts, went up in flames killing 492 people, the deadliest nightclub fire in history. One of the main reasons cited for the large number of casualties was the single revolving door located at the entrance, which was rendered useless. As the mob of panicking patrons attempted to use the door as an escape it soon became jammed, trapping countless people between the door and the crowd pushing towards it. As a result, many people died from smoke inhalation, not being able to escape the burning nightclub.

This event led to a reform of safety standards and codes across the country; it is now illegal to have only one revolving door as a main entrance. The revolving door should be flanked by outward opening doors with panic bar openers and equivalent exiting capacity, and the revolving door wings should bookfold against themselves in emergency situations, so they become a double partition collapsing at 180 degrees, allowing people to pass on either side.

General Safety Features for Automatic Revolvers

Other general safety features that are needed to meet building codes and standards include sensors such as a canopy mounted motion detector, a sensor to detect a person in the rotating path, entry point sensors, toe guard sensors, contact safety edges and emergency buttons. Scanning sensors auto-rotate the door but slow or stop it when objects are within 8 to 12 inches of the door wings.

Another safety feature is a magnetic lock that prevents the door from breaking out unless initiated by human intervention. Electromagnets hold the wings in their locked position under normal conditions with 1000 pounds minimum force. Door wings will collapse into bookfold position for emergency egress after power is released from the magnetic lock. This is important for high wind and stack pressure conditions such as in sky scrapers.

A torque limiting control constantly monitors the motor current to detect any resistance and limit torque. If the door wings come in contact with an object during rotation, the control shuts down and stops. After an adjustable time delay, the door attempts to restart in slow speed. Once clear, it resumes normal operation. Torque limiting should be checked once the door is running at operating speed and the sensitivity adjusted so that the force exerted by the door is 15 to 25 pounds (66 to 110 newtons).

Note: Some doors contain logic that activates the "idle" mode when the safety edge or torque limiting feature is activated. Also, if the setting is too light (sensitive) it may cause nuisance tripping (momentary stops and restarts) on door start-ups or in cold weather conditions. Check with the installer to confirm how your door is intended to function.

Revolving doors have wall safety edges that stop the operator when pressure is applied. Unintentional bumping with luggage, etc. less than one quarter of a second will not stop the door. Dip switches located in the controls allow the choice between automatic or manual restart (push) in the event of a torque limiting or safety edge stop.

Power operated swing doors adjacent to the revolving door are recommended for safety reasons in situations where a pedestrian is significantly physically impaired and no assistance is readily available, or when a pedestrian is wary of a revolving door.

ANSI/BHMA A156.27 Code Compliance

The American national standard for Power and Manual Operated Revolving Pedestrian Doors is ANSI/BHMA A156.27. This standard establishes requirements for power operated revolving type doors, which rotate automatically

ANSI/BHMA A156.27 establishes requirements for power operated revolving type doors, which rotate automatically when approached by pedestrians and/or small vehicular traffic, and manual revolving type doors for pedestrians. Photo courtesy of Horton Automatics

when approached by pedestrians and/or small vehicular traffic, and manual revolving type doors for pedestrians. Included are definitions, general information, performance standards and provisions to reduce the chance of user injury and entrapment. This standard does not cover revolving doors for industrial or trained traffic nor does it attempt to assess any factors that exist with respect to custom installations.

The following are partial descriptions of requirements. Please see the complete standard for detailed requirements, methods and exceptions.

Egress Component Force Requirements

Each revolving door wing shall be capable of breakout when a force 130 pounds (570 newtons) is applied at a point 3 inches (75 millimeters) from the outer edge of the outer wing stile and 40 inches (1020 millimeters) above the floor. Exception: Two-wing doors with automatic center panels per 7.3 are excluded.

Automatic Door Signs

Automatic revolving doors shall be marked with a visible sign. The sign shall include the words "Automatic Door" and minimum 1 inch (25 millimeters) tall black letters placed at 50 inches +/- 12 inches (1270 millimeters +/- 305 millimeters) from the floor to the centerline of the sign. Consult the standard for additional signage requirements.

Starting Force

In the initial 1.5 seconds, the force required to prevent a stopped revolving door from rotating shall not exceed 50 pound-force (222 newtons) applied 1 inch (25 millimeters) from the outer edge of the outer wing stile. The force to prevent the door from revolving after the 1.5 second initial startup shall not exceed 40 pound-force (178 newtons).

Visit http://go.hw.net/AR815Course2 to read more and complete the quiz for credit.

QUIZ

1. Which of the following is a benefit of security revolving doors?
   a. Several layers of security
   b. Energy savings
   c. High traffic management
   c. All of the above

2. Which of the revolving door configurations offers the largest compartment size?
   a. Two-wing
   b. Three-wing
   c. Four-wing

3. True or False: Three-wing revolving doors are often used in hotels, retail stores and restaurants.

4. True or False: Round drums have easier installation and lower costs than segmented drums and allow for immediate glass replacement when needed.

5. True or False: Revolving door wings should bookfold against themselves in emergency situations for easy egress.

6. True or False: Per ANSI/BHMA A156.27, each revolving door wing shall be capable of breakout when a force 130 pounds (570 newtons) is applied at a point 3 inches (75 mm) from the outer edge of the outer wing stile and 40 inches (1020 mm) above the floor.

7. True or False: Light curtains and object detection prevent an object from being swept into the secure restricted area.

8. True or False: A two-way security revolving door turns one compartment at a time, allowing only one authorized person to enter from the secure area.

9. Which of the following is ideal for transporting pedestrians from secure to non-secure areas in applications such as airports?
   a. One-way revolving door
   b. Two-way revolving door

10. Which of the following is the unauthorized entry attempt via separate compartment while an authorized person is entering or exiting?
   a. Tailgating
   b. Piggybacking

SPONSOR INFORMATION

Horton AUTOMATICS The Automatic Choice

Horton Automatics, based in Corpus Christi, Texas, is a leading manufacturer of automatic entrances including sliding, swing and revolving doors as well as platform screen doors, industrial doors and service windows. The company serves the healthcare, commercial, transportation and security industries. Horton Automatics has been designing, manufacturing and selling automatic doors since 1960, when they developed the first automatic sliding door in America.

POST-FRAME CONSTRUCTION

IN LOW-RISE COMMERCIAL BUILDINGS

Presented by:

MORTON BUILDINGS

By Paige Lozier, in collaboration with Marissa Hovraluck

LEARNING OBJECTIVES

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

1. Describe the methods of construction employed in post-frame construction.
2. Review the importance of material and finish choice for post-frame construction.
3. Discuss the attributes of post-frame construction in terms of durability and energy efficiency and review applications in low-rise commercial buildings.
4. Describe how post-frame construction is code-accepted and code-compliant with applicable building regulations.

CONTINUING EDUCATION

CREDIT: 1 LU

COURSE NUMBER: ARaug2015.1

Use the learning objectives to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR815Course1 and complete the quiz for free as you read this article. If you are new to Hanley Wood University, create a free learner account; returning users log in as usual.

INTRODUCTION

The term "post-frame building system" refers to a building characterized by primary structural frames of wood posts as columns and trusses or rafters as roof framing. Roof framing is attached to the posts, either directly or indirectly through girders. Posts are embedded in the soil and supported on isolated footings, or are attached to the top of piers, concrete or masonry walls, or slabs-on-grade. This type of framing system outperforms other building types in any climate or soil condition and is an energy-efficient building method.

This article will discuss construction methods and materials, as well as performance measures for post-frame buildings and their application in low-rise commercial buildings. It discusses how a combination of quality materials, expert workmanship, energy efficiency and low maintenance in a post-frame building can optimize value.

METHODS OF CONSTRUCTION

The term "post-frame building system" refers to a building characterized by primary structural frames of wood posts as columns and trusses or rafters as roof framing. Roof framing is attached to the posts, either directly or indirectly through girders. Posts are embedded in the soil and supported on isolated footings, or are attached to the top of piers, concrete or masonry walls, or slabs-on-grade. Secondary framing members, purlins in the roof and girts in the walls, are attached to the primary framing members to provide lateral support and to transfer sheathing loads, both in-plane and out-of-plane, to the posts and roof framing.

This type of framing system outperforms other building types in any climate or soil condition. After hurricanes Katrina and Rita ravaged the southern U.S. coastal states, post-frame buildings stood tall amidst the rubble. The same is true of snowstorms in the North. Post-frame buildings are not only strong but they allow for flexibility in design and construction when compared to other building methods, as the choices for size, roof style, materials, ceiling systems, flooring, thermal insulation systems and interior wall configurations are virtually unlimited. Post-frame buildings feature wide open interior spaces thanks to their truss system, which allows for a virtually unlimited selection of interior layouts as well as exterior features.

Post-frame buildings can be constructed any time of year, as weather-related construction delays are rare. Once the construction process begins the amount of time it takes to get "under roof" for a post-frame building is approximately half of what is normally expected from other construction techniques. This allows building professionals to design buildings year-round without feeling the pressure of a season change. These attributes come as no surprise to those who engineer and build post-frame structures because when built correctly, their unique design and construction performs exceptionally well under tremendous weather extremes.

POST-FRAME FOUNDATION

The structure of a post frame building is what sets it apart from others, so it is important to explain how they are constructed from the ground up.

Based on the specific climate, ground conditions and building use of a project, there are several types of footings/foundations to choose from. A manufacturer's foundation and warranties must guarantee durability no matter what style is chosen. The foundation system of a post-frame building consists of columns that are buried in the ground, embedded in concrete, or anchored to a concrete foundation. Vertical loads from the roof are transferred to the column, and from the column to a concrete footing or foundation, and then to the soil. Buried or embedded posts can resist lateral loads.

Posts surface mounted on concrete foundations need to be designed utilizing roof diaphragms and shear resisting wall elements similar to traditional wood construction. Most metal roofing and siding manufacturers have design values for their products that can be used. Plywood and OSB substrates may also be used.

Concrete

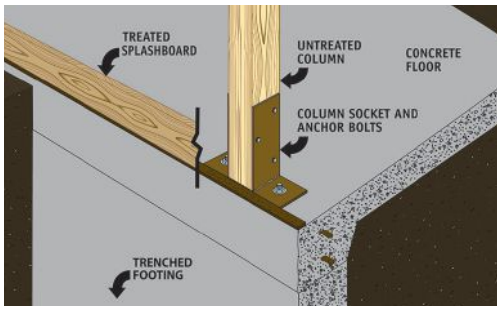
Field placed concrete or ready mix provide the best footings. This allows the concrete to conform to the column and fill the hole completely. Utilizing specialized digging equipment provides deeper holes for the footings and columns, creating a uniform cylindrical shaft. Digging a hole with shovels can result in shallower, funnel shaped holes that will be uneven. Pre-formed options, if used, shift and settle, creating an uneven surface for the column even if the hole was originally level. Industry standards and design specifications typically require the columns to be embedded in the ground a minimum of 4 feet.

Laminated Columns

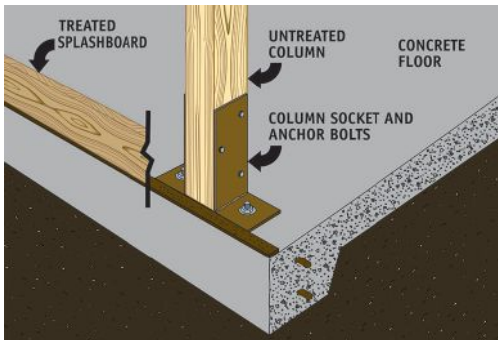
Nail laminated columns are the posts of choice. Typically 3-ply laminated lower columns that are hydraulically compressed during lamination and provide a stronger column than solid posts of the same dimension are chosen. Lower columns should be pressure preservative treated in accordance to AWPA treatment standards to prevent fungal decay and insect infestation.

Laminated columns provide superior treatment since this will allow 100% penetration of the sapwood, which cannot be obtained with square posts because they are treated with preservative on the outside edges only. It is preferred to treat only the lower portion of a column because a full length treated column would make it harder to get a straight wall, as treated lumber has a tendency to warp and twist as it dries out. Lamination also provides the ability to add column stiffeners and/or increase the dimensional size of lumber for high demand situations, like high wind areas, earthquakes and buildings taller than 16 feet.

There are several foundation options and different ways to achieve a solid foundation in post-frame construction. All begin with these three or four member laminated columns.



Column on Trenched Footing



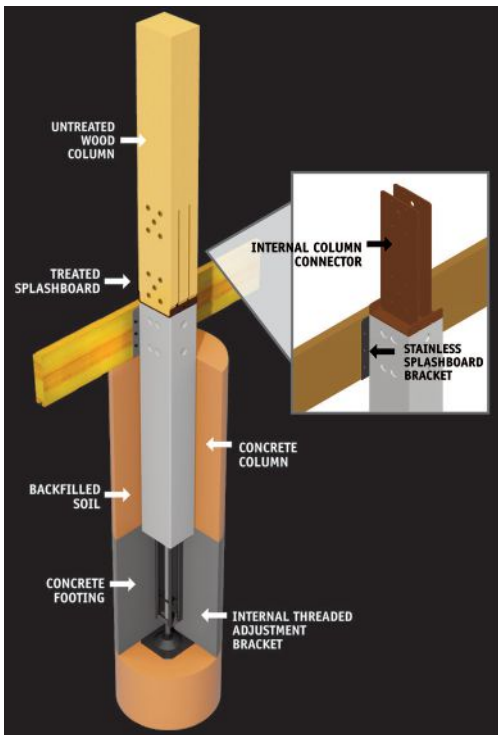
Column on Monolithic

Columns Mounted to Foundation

Columns can be mounted directly to the concrete foundation with a steel column socket and anchor bolts, using one of two techniques. A column on a formed wall with trenched footing below utilizes ready-mix concrete with reinforcement. Column sockets are anchored with plated concrete anchor bolts and the laminated column is bolted in the column socket. A column can also be mounted on a monolithic slab, which is a good solution in rocky, difficult-to-dig soils and works well with a poured concrete floor. As with the previous technique, column sockets are anchored to plated concrete anchor bolts and the laminated column is bolted in the column socket. A thickened edge meets heavy load requirements.

In-ground column foundations

Another economical foundation option that can be utilized where conditions permit is a system with pre-cast concrete columns buried in the ground. Providing superior strength with specially designed components and materials compared to laminated wood columns, the hybrid foundation can be used for a variety of building uses. The system consists of several components: a concrete column, an internal threaded adjustment bracket, stainless splash-board bracket, internal column connector and a wood upper column. Because the foundation system utilizes concrete in the ground, there is no need for treatment, providing an eco-friendly foundation option for the building.



Steel Bracket

Finally, pre-cast concrete foundation columns are attached to the concrete columns with a steel bracket, which is welded to re-bars in the concrete column that extend to the base of the column. 10,000 PSI super high strength concrete is usually specified, as well as galvanized steel uplift anchors.

Trusses

Trusses are another structural member that provide post-frame buildings' superior strength and longevity. Specially engineered trusses are densely webbed and attached to the support columns; while the trusses can be mounted on the outside column member, to the side of the column or in a support header, the best method is when they are centered in a column, positioned between column laminates. Extra deep truss heels eliminate the need for knee braces, leaving more usable space inside the building. Trusses should be made from premium-grade, such as MSR lumber which has been evaluated by mechanical stress-rating equipment for stiffness, which then determines the lumber's strength.

Trusses which sit in a saddle and are bolted and nailed provide double strength against wind shear. Finally, a predrilled, factory-cut continuous purlin system can add strength, rigidity and uniformity. There is the option of straight- or raised-chord trussing, the latter of which provides greater interior clearance and allows for the installation of taller end doors. Clear-span structures are available in a variety of widths. Some manufacturers offer custom clear-span widths up to 100 feet as well as double- and triple-wide trusses.

Steel Trusses

Another option in post-frame construction is a hybrid structure that allows for clear span buildings up to 150 feet when steel trusses are used. Hybrid technology combines the strength and spanning capabilities of steel along with the affordability, design flexibility and energy efficiency of post-frame construction and is a great option for a variety of building applications. These buildings feature pre-engineered steel trusses with an open-webbed design set on wood framing. The steel trusses allow for a wider building, while wood framing provides superior insulating properties and building strength. This hybrid technology also makes buildings possible that have greater door clearance, giving the ability to use bigger doors with shorter walls, and allowing for a lower profile building.

ENERGY EFFICIENCY AND INSULATION

While metal is a conductor of hot and cold, wood is an insulator. At its very core, the wood frame in post-frame construction creates a controllable environment. The design of a post-frame building should allow maximum insulation, air circulation and condensation control. Be sure to specify insulation choices that save on heating and cooling costs for the life of the building.

Where newer energy codes require higher levels of insulation, post-frame is a particularly good option because its walls and roof are relatively easy to insulate and wide blankets of insulation can be used. Wide column spacing allows for continuous insulation between structural elements, fewer interruptions in insulation material, and less chance of thermal leakage. In fact, insulation breaks occur only at the wood columns, which are spaced further apart than other structures. Where the insulation is interrupted, wooden structural members have natural insulating properties and conduct less heat than most structural steel or masonry components.

Air deflectors should be installed to move air up through the attic of the building and out through the peak to promote good ventilation throughout the building, protecting the insulation from condensation and the building from leaks. A fully ventilated attic allows for air flow and adequate room for blown-in insulation.

Finally, as part of the insulation system a vapor retarder should be secured over the insulation to keep it dry and reduce infiltration and heat loss. This creates a seal between the elements and the inside of the building. Nailers are then placed over the vapor barrier which allows interior walls to be attached. HVAC, electricity and plumbing can be run inside this barrier without compromising the seal.

Post-frame buildings feature an exceptionally large built-in wall cavity that is nearly 9 inches thick, six of which are insulation. Extra deep truss heels also allow for extra insulation and insulation descends below the top of the concrete floor. All of these factors lower heating and cooling costs throughout the year.

It's important to compare how insulating methods differ for steel buildings as opposed to post-frame and why post-frame can obtain a better R-value. Steel buildings offer several methods of installing insulation. In typical steel buildings, the insulation is draped over the roof purlins so that fiberglass blanket insulation is rolled out over and perpendicular to the outside of the structural frame. Then the metal covering sheets are fastened to the frame, holding the insulation in place, but this method compresses the insulation when the roofing is applied. This compression can result in a loss of nearly half of the thickness of the insulation, reducing the insulation's R-value, which is the standard measure of thermal resistance.

Insulation can also be installed between purlins. This allows for thicker insulation without compression at the structural members by applying it between purlins rather than perpendicular to them, resulting in better thermal efficiency. However, the problem of thermal bridging through the structural members in direct contact with the metal covering sheets still applies. While many steel-framed buildings feature 3 inch fiberglass ceiling insulation, which provides an R-9.5 rating, some post-frame insulation systems can obtain R-38 insulation on ceilings.

MATERIAL AND FINISH CHOICES

Post-frame is an energy-efficient building method and its primary material, wood, is a renewable resource that is widely available and sustainably harvested throughout North America. Wood is strong and innovations in engineered wood products allow it to be used for longer spans and taller structures than ever before.

As discussed, wood is a good insulator, which reduces heat transfer. The widely spaced, relatively thick wood side and end wall posts minimize the number of thermal breaks and minimize the thermal bridging effect in post-frame buildings. Condensation accumulation on the inside wall surfaces at thermal breaks is practically eliminated in post-frame buildings.

EXTERIOR MATERIALS

While the structural members of post-frame buildings are made of wood, the roofing and exterior siding can be clad in a variety of materials from asphalt, cedar shake, slate or tile roofs to stucco, brick, stone, fiber cement, wood or vinyl siding. As in other building types, materials can be combined to create architectural details such as wainscoting, board-and-batten siding, cupolas, dormers and porches that enhance the building's architecture and aesthetics. These exterior materials are easily adapted to post-frame construction and you will notice examples of each throughout the course. That being said, the roof and siding of post-frame buildings are often made of ribbed steel panels, which will be discussed in greater detail.

In order to get the strength needed to carry roof loads, flat sheets of steel are run through a roll-forming machine. Steel gauge is an important measurement and can vary depending on where the steel is purchased; typically "big box" retailers sell 30 gauge steel, while many contractors offer 29 gauge. The thickness of steel can vary, even within the same gauge of the product; for post-frame you should select a quality building that is constructed with a heavier (lower) gauge of steel. 26 gauge (thickness range of .0179 inches to .019 inches) commercial steel is ideal because it is a thicker, superior steel product. 26 gauge commercial steel is more flexible, minimizing cracking during the roll-forming process, but it is also heavier than 29 gauge steel (.0135 inches to .0142 inches) or 30 gauge steel (.0157 inches to .013 inches), making it better able to withstand the elements.

An arch-shaped rib configuration varies by manufacturer, offering a wide variety of profiles though-out the industry. Each panel type has its own structural and/or architectural design characteristics. Some manufacturers recommend fastening into the intermediate or flat ribs which allows water to run over the fastener and rib. This is not best practice and can be compared to putting holes in the bottom of a gutter. The best practice is to fasten in the high rib to prevent leaking.

QUIZ

1. True or False: In post-frame construction roof framing is attached to wood posts through girders.

2. Industry standards and design specifications typically require the columns to be embedded in the ground a minimum of _____.
   a. 5'
   b. 4'
   c. 6"
   d. 10'

3. True or False: 3-ply laminated lower columns that are hydraulically compressed during lamination provide a stronger column than solid posts of the same dimension.

4. Which is the best foundation option to use in rocky, difficult-to-dig soils?
   a. True
   b. False

5. True or False: 70% Fluoropolymer painted panels cannot chalk more than 5 Delta E's over a 10 year period.
   a. Column on trenched footing
   b. Column on monolithic slab
   c. Column anchored to buried monolithic concrete

6. True or False: Wooden structural members have poor insulating properties and conduct more heat than most structural steel or masonry components.

7. Which of the following can be used as exterior siding on a post-frame building?
   a. Brick
   b. Vinyl
   c. Stucco
   d. Stone
   e. Fiber Cement
   f. All of the above

8. What is the ideal gauge of steel for ribbed steel panels used in post-frame construction?
   a. 30 gauge
   b. 29 gauge
   c. 15 gauge
   d. 26 gauge

9. True or False: Because diaphragms and shear walls are used in the lateral design of a post-frame building the structure acts as "a box system" and can outperform many steel structures.

10. Post-frame buildings are wood structures and as such are classified as Type _____.
    a. VC or VB
    b. AC or HV
    c. VA or VB
    d. AV or BV

11. The ASABE is a professional and technical organization comprised of members who are dedicated to advancement of engineering applicable to agricultural, food, and biological systems.
    a. NFPA
    b. ICC
    c. AWA
    d. ASABE

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This article continues on http://go.hw.net/AR815Course1. Go online to read the rest of the article and complete the corresponding quiz for credit.

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Suspicious of Big Ideas

The internal logic of Pedro&Juana and the Chicago Architecture Biennial.

Ana Paula Ruiz Galindo and Mecky Reuss, who make up the Mexico City design firm Pedro&Juana, are obsessed with materiality. Take any one of their projects—from a couch named Frank, upholstered in jaundice-colored gunny fabric, to the tessellated façade of an annex to a colonial-era house in Yucatán—and you find a meditation on how seeing, and touching, is believing. "There is no such thing as honesty of the material," say Galindo and Reuss. "It is all about a continuous negotiation with textures, colors, space, smell, and sound."

We are thrilled to be working in Chicago, and of course we have been inspired and contaminated by it. We were assigned an interesting site with its own urban microclimate—Randolph Square, an interior public space on the north side of the ground floor of the Chicago Cultural Center, the main venue for the Chicago Architecture Biennial. It's a building with some history and a strange grandeur—and it's challenging to engage. During the course of the biennial, Randolph Square will continue to serve as the "living room of the city"—as it's known around town. The people that usually come and use the space will continue to do so, and they will be inside of our space without necessarily having to be visitors of the biennial.

We are suspicious of "big ideas," and we want to give the public the choice to find their own parti within what we are developing for Randolph Square. We can say this much right now: We are dealing with space, objects, and bodies, and how they relate to one another. We are playing with the idea of the object as it is perceived in space and how it is affected by color, texture, movement, and technology. It is important for all of these elements to relate to a space that is highly used and functional, and the biennial won't change anything about that (with the exception of some related programming). In a way, then, the integrity of the intervention is about allowing the design to come out on its own terms, not imposing a specific rule set from the beginning.

It's impossible to claim that any of our projects is a discrete investigation. Part of the way we work is within continuous disorder, one project feeding off of the other. We see it more as a perpetual investigation—one that mixes research with objects and vice versa. We do not like to think about a predominant conceptual idea. Rather, each of the objects that we design has a conceptual response to the context, to one another, and to us. **AIA**

As told to William Richards

Pedro&Juana is one of more than 60 official participants in the Chicago Architecture Biennial (Oct. 3, 2015–Jan. 3, 2016), sponsored in part by the AIA. Learn more at *chicagoarchitecturebiennial.org*.

The American Institute of Architects

I AM AIA

Obiekwe M. Okolo, Assoc. AIA
Member since 2014

"Music is my first love, and nothing connects me to it like architecture. In my first architecture class, we listened to a Miles Davis album and it clicked for me. Like music, architecture inspires when it unfolds in layers of meaning."

Join me.

aia.org/**join**

AIANow

What are the client/owner trends now?

By William Richards
Art Direction by Jelena Schulz

Top Three Reasons Clients Like Green Building

1. Rising energy costs (53 percent)
2. Corporate social responsibility (49 percent)
3. Long-term ROI (37 percent)

A Client Wish List

- Want architects to understand their unique needs and meet them
- Perceive architects to have the capacity to flesh out possibilities and think strategically
- Recognize the value add that architects bring from having clients in entirely different industries than their own
- Interested in a better integration between architect and contractor upstream
- Want architects to function as a partner, not a vendor
- Look to architects for new ideas, trends, best practices, and technological innovations
- Don't see architects doing enough to call attention to their value. (Nowhere was this perception stronger than among clients who themselves were architects.)

Mo' Money, Mo' Problems

- Eighty percent of owners expect future projects to be completed with added costs due to design mistakes made by the architect, 12 percent expect there will be no added costs, and 8 percent are unsure.
- Among owners who anticipate added costs, 40 percent say that 1 to 2 percent is acceptable, 38 percent say that 3 to 5 percent is acceptable, and 15 percent say that 6 to 10 percent is acceptable.

Satisfaction Spectrum

Eighty-six percent of owners report a high level of satisfaction with quality on their projects (regardless of owner size or project complexity), 63 percent are highly satisfied with cost, and 64 percent are highly satisfied with the schedule.

Clients' Top Two Metrics for Design Team Performance

1. Ability to develop documents that meet the owner's program requirements and prove that a project is constructible within budget
2. Ability to work with other team members to solve issues (rather than escalate them to the owner)

That Old BIM Magic

Clients who used Building Information Modeling (BIM) were 15 percent more satisfied with their architects during the procurement phase of the project, and 17 percent more satisfied during the construction phase, than clients who did not use BIM.

Causes of Uncertainty, According to Owners, In Order of Severity

- Unforeseen site or construction issues
- Design errors; design omissions (tie)
- Contractor-caused delays
- Owner-driven changes; accelerated schedule (tie)
- Construction coordination issues

Sources

—AIA Minnesota, *Architects in Commerce Research Initiative* (2012)
—AIA Economics and Market Research Client Survey (2014)
—McGraw-Hill/AIA Large Firm Roundtable SmartMarket Report (2014)

ILLUSTRATION: LAUREN NASSEF

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Change Orders

When clients ask for vanilla, can we give them strawberry instead?

ILLUSTRATION: MICHAEL GLENWOOD

Have you ever overheard a colleague say, wistfully, "Well, that was a fine project, but the client just didn't want me to put any architecture into it"? Or have you been tempted to express this frustration yourself? Faced with a similar situation at the beginning of a project, with an owner who appears at the very least indifferent to the insertion of Architecture (capitalization intentional), what range of choices does the architect have?

After all, as AIA members we have an obligation to fulfill, as defined in the AIA 2012 Code of Ethics & Professional Conduct, Educational Standard 1.2 Standards of Excellence: "Members should continually seek to raise the standards of aesthetic excellence, architecture education, research, training, and practice."

This is a clarion call to architectural arms, but are there other sections of the code that provide guidance with respect to the limits of what an architect can and should undertake when client design objectives may be unclear?

There are, in fact, and in considering these sections of the AIA code we can determine how our design course of action is likely to be perceived as a dose of good medicine.

The section "Canon III Obligations to the Client" includes a pertinent warning in Rule 3.101: "Members shall not materially alter the scope or objectives of a project without the client's consent."

What does it mean to "materially alter" a scope? An obvious test is whether a design feature or alteration results in an increase in project cost beyond the limits set by the client. And the architect must be at pains to understand whether budget limits mean spending every penny available or holding as prudently below those limits as possible.

Aside from the mandate to stay within budget, clients may have other reasons not to want Architecture inserted into their designs. Some of these include an institutional obligation for the building to not appear too expensive or for the organization to be perceived as profligate; a belief (as with some religious or cultural organizations) in humility of expression; a programmatic requirement for the contents of the building, and not the building itself, to be on display (as in art museums and high-end retail spaces); a reputation to maintain (as a hard-nosed developer, for instance); and an hourly owner–architect agreement, leading to the phrase "I'm not paying you to … "

Barring these directives, if architectural richness and depth can be added at an acceptable cost, don't we have an obligation to serve client and community?

And what about disclosure?

Even if you suspect that the client may not appreciate the Fibonacci series you've incorporated into the tile pattern in the corridor floor or the symmetry you borrowed from the south elevation of Palladio's Villa Barbaro, don't you have an obligation include the client in your thought process?

More aesthetic richness and design thinking go to the core of a project's vision than can be layered upon a design. But if you are unsure of whether you can explain an architectural feature or solution to the project stakeholders, it may be a sign that you should reconsider your design motives—or it may be a sign that you need a little help with that explanation.

In any case, don't underestimate the client, who may want to have good architecture (secretly, even passionately) but cannot quite articulate what this means. Your client may fear that good architecture translates into excessive cost—owing to the fact that sometimes architects indeed go over budget. But, in the pursuit of "aesthetic excellence … and practice," as the ethics code says, the operative phrase is "continually seek." No matter the budgetary restrictions, you have been hired for—among other things—your creative abilities. So get creative in that continual pursuit. AIA

Cornelius (Kin) DuBois, FAIA
Kin DuBois, FAIA, is a member of the AIA National Ethics Council.

AIAFeature

The New Client Landscape

Demographic trends point the way to a values-driven collaboration rather than an architect–client faceoff.

Ben Ikenson

ILLUSTRATION: MICHAEL KIRKHAM

When Mozilla contracted San Francisco–based MKThink to develop plans for the Internet software company's new 54,000-square-foot headquarters in Mountain View, Calif., the architects faced concerns from their client's staff about losing their existing workspace.

"Some [were] concerned about losing the office in downtown Mountain View," says Jonas Kellner, senior associate at MKThink. "Part of the desire for the client was to make the staff be part of the design process and engage them in that before we started construction. By the time the design was done, staff members felt ownership in the design."

The user-engagement strategy grew out of Mozilla's past work with MKThink, which has helped design seven facilities for the Silicon Valley company in the last three years.

It also represents a promising approach to doing business in a field where client trends are notoriously difficult to gauge, and where variability, from conception to completion, is a constant.

Ownership's Nuances

According to a 2014 McGraw-Hill Construction SmartMarket Report, commissioned by the AIA's Large Firm Round Table, only 7 percent of owners believe perfect construction documents are possible, as design errors and omissions are still considered highly impactful sources of uncertainty. The report, "Managing Uncertainty and Expectations in Building Design and Construction," ranked owner-related issues such as accelerated schedule, unclear project requirements, lack of direction and involvement, and program or design changes among the leading drivers of uncertainty on building projects. It also concluded that better communication and integration among project team members represent the most effective approach to reducing both the causes and the impacts of uncertainty.

"A client-focused design and delivery process requires the architectural design team to thoroughly understand and address the client's 'risk' factors as they relate to the project at hand," says Dale R. Dekker, AIA, a principal at Albuquerque, N.M.–based Dekker/Perrich/Sabatini.

"Budget risk, schedule risk, and design risk are all front and center in a client's mind when selecting an architect," Dekker says. "A design approach that documents and clearly articulates the cost and benefits of the myriad project decisions made during the programming, design, and construction of a project resonates well with clients. This approach has served our firm well over the years, as it establishes a confidence level with the client that he or she has made the right 'choice,' and it usually results in repeat work for years to come. It amazes me how many architects refer to a project as 'theirs,' which in my opinion totally negates the role of the client, who has the most at risk, usually money and reputation."

In fact, research suggests that clients have become distanced from architects thanks to the emergence of third-party owner representatives and architecture firms' increasing reliance on contractors.

Jean Leathers, president of Practice Clarity, a national consulting firm that helps architects build their businesses, finds that architects leave a lot out of initial conversations about the value they bring that may be hard to describe, but could mean losing a potential client.

"Architects are constantly selling themselves short when they talk about what they do," she says. "They point to buildings, landscapes, and exhibition models. They point to renderings and reports. But these are simply the tangible outcomes of their work. They rarely claim the highly valuable intangible benefits of working through the design process with an architect."

"For example, architects perform highly complex kinds of thinking to elicit ideas, vision, purpose, business goals, and personal aspirations from within their clients' heads," says Leathers. "They analyze organizational structure and influence organizational development. They recognize and work with political agendas within organizations; help clients obtain financing, funding, and tax credits. They assess how to get buy-in, and then guide processes to gain approvals. The intangible skills and services that architects provide contribute just as much as the tangible outcomes to an owner's success, such as more heads-in-beds for hoteliers, fewer re-admissions for hospitals, better ambiance for restaurants, and more memorable sporting events for fans. Architects would do well to claim the value they bring as competitive positioning against owners' representatives and contractors."

Michele Russo, senior research director for the AIA, encourages design professionals to capitalize on their abilities. "The time is really ripe for architects to realize their skill sets are not limited, to explore how to develop meaningful and productive relationships with clients, and to understand all the potential

AIA Feature

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possibilities that clients may themselves not even know exist," she says.

A co-principal at Chicago-based Space Architects + Planners and a member of AIA's Small Firm Round Table, Jean Dufresne, AIA, agrees. Like MKThink, his firm has utilized a similar method, on a smaller scale, to engage clients and offer a sense of ownership for clients in the design process.

"It's important to understand our client and make sure that the process of designing is pleasant and painless—and this applies to both commercial and residential work," says Dufresne, who points out that the term "client" sometimes extends to the actual client's kids, especially with flexible work environments where children are occasionally on-site.

"Depending on the ages of the kids, they sometimes get dragged to meetings, [and] we have started offering to the parents to meet with their kids," he says. "We take an hour or two and set up a meeting with the kids, one-on-one. It may sound silly, but then the kids feel like they had a say in the project; they have a sense of ownership and a greater respect for the property once it's all done."

"The best of all of this," Dufresne adds, "is that when the kid grows up, they will have dealt with an architect before, will have told their friends, and we have cultivated a potential future client."

"A client-focused design and delivery process requires the architectural design team to thoroughly understand and address the client's 'risk' factors as they relate to the project at hand."
—Dale R. Dekker, AIA

Numbers Rule

As for future clients (and future architects), the one evolving demographic that will influence the AEC industry sooner rather than later is how small Generation X is, in terms of sheer numbers of members, compared to the generations that came before and after. According to the 2012 McGraw-Hill Construction Industry Workforce Shortages SmartMarket Report, millennials—and their outlook—will soon dominate the workforce.

To better understand this demographic, the AIA partnered with McGraw-Hill Construction to conduct two studies that assessed the gaps between current thinking in the industry and that of the next generation on critical issues such as the use of technology and the importance of sustainability. According to Dufresne, these gaps are closing since, as clients, millennials are already playing a major—if sometimes challenging—role in the design process.

"They really want to be involved in company decisions and are looking to know everything about its operation," Dufresne says. "Maybe part of that stems from the oversharing that occurs via social media, or the ease at which things are custom-made for this generation, or how things are curated for them [such as] custom phone cases, custom t-shirts, one-of-a-kind bikes. They expect the same from the environment they live and work in. You can customize the data stream hitting your phone and social media platforms—why not your office space?"

Fortunately, social media is not exclusive to any demographic and represents a valuable tool for savvy architects to maintain and grow their client base. Kevin Toukoumidis, AIA, principal of another Chicago-based firm, dSPACE Studio, which focuses on residential and small commercial projects, has benefited from social media, having seen his eight-year-old company grow steadily, even during the economic downturn.

"I think a lot of that has to do with how we market ourselves to an increasingly tech-savvy population," Toukoumidis says. "As architects, we must be open to new ways of reaching clients. With my firm, we have attracted a lot of great tech-savvy clients who found us online, not through our company website but through other sites like Pinterest and Houzz."

There's always a strange balance firms must strike, though—related to their marketing efforts—between the "design ethos" of informed and engaged prospective clients and their own desires as professionals.

"All generations have required their own design ethos, and millennials are no different," explains Dekker Perrich Sabatini's Dekker. "[They are] open, transparent, social, plugged in, and determined not to do things the way the prior generation did. These are all design clues that work into all forms of the built environment—such as walkable neighborhoods, responsible design, mass transit, and mixed-use and social gathering places."

Describing a new era in which a distinct sense of place is paramount, Urban Land Institute senior resident fellow Ed McMahon cites Richard Florida's research in pointing out how the societal values of an era manifest spatially in the U.S., from the agrarian early nation to the industrial and consumer society. "The postindustrial era is about connecting people and ideas," said McMahon. "In today's world, capital is footloose and people can locate a business anywhere. So quality of place is becoming a deciding factor in where people decide to live, invest, vacation, or retire." AIA

AIAKnowledge

ILLUSTRATION: VIKTOR KOEN

Sustainability Becoming Quality

For 25 years, the Committee on the Environment has tried to integrate performance and design. Finally, they've made major headway.

Land use, water, energy, materials: For the last 25 years, the Committee on the Environment (COTE) has promoted sustainable measures in the design process. And now, after so much proselytizing, they're seeing progress at a rate commensurate with their efforts.

Rand Ekman, AIA, is the director of sustainability at CannonDesign in Chicago and current COTE chair. He's been involved with COTE both locally and nationally for the last 15 years, and sees it as a reliable barometer of what's possible now for the AEC industry and what could be possible just around the corner. Most of all, he sees it as reliably mission-focused.

"One of the things that is remarkable about COTE is the shared purpose and a shared mission," Ekman says. "A committee changes, people come and go, the chair changes, but the purpose and the mission remain pretty much the same."

COTE's most prominent program is the Top Ten, an annual batch of honors granted to projects that find what its members see as a sweet spot between design that pushes the envelope technologically, environmentally, and from an ecological whole-systems perspective, and great architectural design that would win in any standard awards program, according to Ekman.

"The fact that they're able to do that and meet our requirements is remarkable," he says.

More recently, COTE has introduced the Top Ten for Students and Top Ten Plus awards. The Student awards are a joint design competition with the Association of Collegiate Schools of Architecture that develops and recognizes sustainable student work. Top Ten Plus, however, is a step in a slightly different direction. While the Top Ten Awards predict performance, the Top Ten Plus award examines the actual operation performance and output of a project that was previously honored. A jury reviews submitted metrics and measures its sustainable impact; the third annual recipient is the Federal Center South Building 1202 in Seattle, Wash., a project that received LEED Gold certification and met impressive performance benchmarks.

"One of the things I think architects are very good at is telling stories about the work that they do," Ekman said. "We have a great ability to build narratives. What we haven't been particularly good at is actual metrics and actual performance that demonstrate the relevancy of the designs that we've delivered."

"Just like in school, we didn't want to admit it but we had report cards," added William Sturm, AIA, principal at Serena Sturm Architects in Chicago and a past COTE chair. "They were the only way we could determine what was being achieved and how we were achieving."

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A Future of Incorporation

The introduction of these new extensions of the COTE Top Ten commemorates the committee's 25th anniversary and the realization of one principal goal for its members in making building performance a commonly accepted criterion for design excellence. The AIA Institute Honor Awards, for example, now requires basic sustainability details as part of the submission process—an initiative backed strongly by William Leddy, FAIA, principal at Leddy Maytum Stacy Architects in San Francisco and COTE chair in 2013.

"What's been gratifying is to see the level of participation," Leddy says. "Since 2013, when this first started, 60 percent of the submissions included a sustainability narrative and metrics. By 2014 that had bumped to 81 percent, and by 2015 it was at 97 percent."

"What we've recently discovered," Ekman adds, "is more of a focus on sustainability and performance happening everywhere and no longer owned by COTE. We've changed the relationship from COTE being a specific committee with a topic, to being fully embedded and fully engaged across many areas of the profession. This feels like progress."

There's still a ways to go, however, to unite the entire profession. Until the majority of clients are willing to make short-term sustainable investments for long-term gains, or until building codes enforce energy efficiency or green building materials in more than just a few major cities, there will be a divide between those who require sustainable design to be part of the creative process and those who do not.

"There are still so many battles to be fought: net-zero buildings, resiliency, materials," said Andrea Love, AIA, director of building science at Boston's Payette and a member of the COTE Advisory Group, "and we don't even know what the next frontier beyond that will be."

For now, COTE will continue to work on integrating sustainability into both design and practice. In fact, Sturm noted that—if he had his way—the next step would be to drop that particular s-word from the architectural vernacular entirely.

"In my simple world," says Sturm, "sustainability becomes quality." AIA

Steve Cimino

Steve Cimino is the digital content manager at the AIA.

PHOTOGRAPHY: CARL BOWER

Take Note

Looking beneath the surface.

Last spring, a major collection of distinctly modern pieces by the American sculptor Steve Tobin was installed in one of the gardens at the U.S. Botanic Garden in Washington, D.C. The title of the exhibition—"Exposed"—imagines what we don't typically see when we look at a plant: the secret life of the roots. "Plant roots," according to the literature accompanying the exhibition, "are vital components of the Earth's ecosystem. Out of sight, their importance goes unnoticed."

The installation might just as easily have been a metaphor for the infrastructure of transportation, open spaces, utilities, and communications that makes contemporary life possible. We rely on these as surely as a plant relies on healthy roots. But too often we as a society seldom look beneath the surface to understand if the systems are working together to support a sustainable environment. Instead of regarding infrastructure holistically, investment is all too often piecemeal.

According to a recent publication "Rethinking Infrastructure," the McKinsey Global Institute estimates that between 2013 and 2030 the world needs to spend $57 trillion on infrastructure to fulfill global GDP projections. The authors of the report write that the challenge is not just the scale of the investment, but the difficulty of spending it well.

It is here where architects can make an impact. We believe that infrastructure is more than roads and bridges. We see infrastructure as a tightly integrated element of community that builds and ensures a high quality of life.

What do people experience as they move into and around our cities? Are there memorable moments that add color and texture to the daily commute? What about access to parks, streets, sidewalks, shop fronts, alleyways, and spaces between buildings? Are they inviting spaces? Do they facilitate interaction, socialization, and culture?

One thing is certain: The elements of the city ought to knit together to form a sense of place that supports a more healthy, productive, and democratic way of being.

As architects, we are, by both instinct and training, big picture thinkers. We see the intangibles. Like those who work the soil, our line of sight goes beyond the visible to what is typically unseen but nevertheless essential. This opens opportunities to lead. Through advocacy in the public arena and through our work, we have the skills to foster an integrated way of community building. Make no mistake: Our nation's future depends on investing in the strategic thinking of architects. AIA

Elizabeth Chu Richter, FAIA, 2015 AIA President

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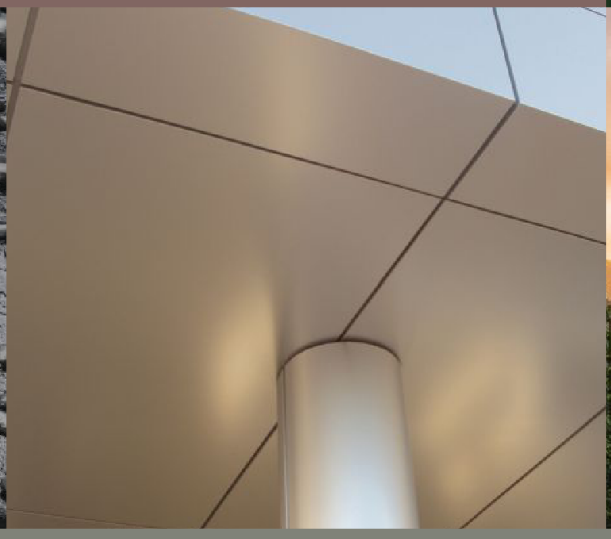

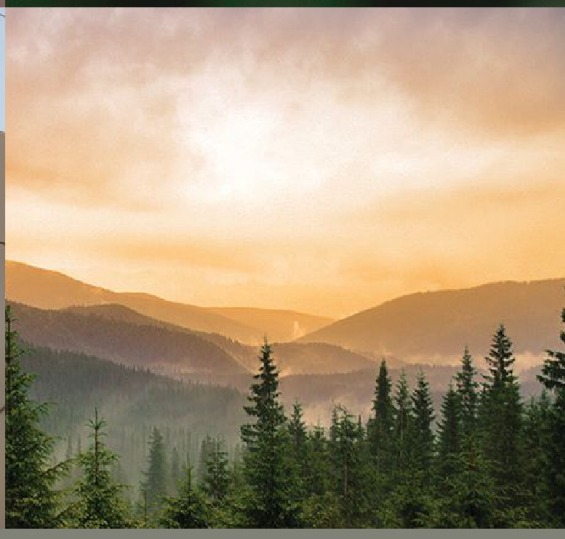

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“In the vestibule of the villa, Gray stencilled the words *Entrez lentement*—enter slowly—an instruction to leave your troubles behind and start to relax.”

Restoring Eileen Gray’s E-1027 by Anthony Flint

Architecture has its legends, and the one based in Roquebrune-Cap-Martin along the Côte d'Azur is a pretty good one: brilliant but unassuming female designer from Paris builds an elegant minimalist villa on the shores of the Mediterranean, and boorish male architect takes it over. Le Corbusier towers in history, and Eileen Gray fades away.

The restoration of Gray's Villa E-1027, which opened to the public in late June after decades of neglect, is part of a larger effort to put these two figures on more equal footing—and perhaps set the record straight. The new cultural heritage campus dubbed Cap Moderne, on a steep hillside between Monaco and the Italian border, which includes both Gray's villa and Le Corbusier's own seaside retreat, aspires to be a living museum that will direct a new lens on the creative energy that fueled 20th century Modernism.

The bisexual daughter of Irish aristocracy, Gray shunned marriage and forged her own way in Paris, designing furniture and objets d'art in the Roaring Twenties. Her lover, the architecture critic and bon-vivant Jean Badovici, asked her to find a spot in the South of France for a summer getaway. Coco Chanel would soon establish her own digs nearby at the luxurious La Pausa estate, but Gray hacked her way through lemon trees and banana palms to a site inaccessible by car. There, on the hillside just southeast of the Roquebrune-Cap-Martin train station, she conjured an all-white pastoral retreat bathed in sunlight, freshened by breezes, and outfitted with sleek yet practical furnishings of leisure.

Indeed, the design of E-1027 seemed to take shape around the furniture and the way its occupants would move in physical space. Gray created built-in cabinets and drawers for summer clothes, guest rooms and nooks that allowed retreat and privacy, little windows positioned to afford spectacular views, deck-chair style chaise lounges, and reading stands, dining tables, and tea and gramophone trolleys that extended and unfurled like something later featured in the Jetsons. The exterior, a rectangular box wedged into the hillside and supported by pillars, was punctuated by a simple cube with horizontal strips of dark shuttered windows.

Le Corbusier painting one of his murals at E-1027

E-1027—the name is based on where Gray and Badovici's initials fall in the alphabet ("E" standing for Eileen, "10" for the J in Jean, and so on)—was completed in 1929, when Gray was 51 years old. She schlepped building materials by wheelbarrow, building the place herself with help from a crew of local workers. It was an astonishing accomplishment. But the villa seemed doomed from the start. It was never the romantic destination the couple had first envisioned. She wanted to cozy up; he wanted to party. They split up, and Gray ended up building another house for herself in nearby Menton.

An Act of Vandalism

The real trouble started a few years later, when Badovici invited his friend Charles-Édouard Jeanneret to stay at E-1027 with his wife, Yvonne. Le Corbusier, as Jeanneret had rebranded himself, had just earned international fame with the Villa Savoye, and he decompressed from work by lounging around E-1027 in various states of undress. Eventually he decided the white walls needed improvement, and he painted eight racy murals of Picasso-like female figures, some intertwined in sexy repose. Photographs captured the architect, naked in the Riveria heat, with the offending paintbrush in hand.

Gray called it an act of vandalism. Badovici, put in a difficult spot, chastened Le Corbusier and told him he had worn out his welcome. The tension underlying the affair was electric. Here was a modernist summer home so superb Le Corbusier himself could have created it—but built by someone untrained in architecture, and a woman, no less. Gray had also angered Le Corbusier—not hard to do—by quibbling with his dictum that a home was a "machine for living in." A home, she argued, was actually a living organism.

As with Jane Jacobs and Robert Moses, the debate never actually took place in person. In letters, Le Corbusier innocently explained he was just livening things up. Gray, who never sought publicity for herself, mostly just moved on. When Word War II intervened, E-1027 was briefly occupied by wine-drinking Italian soldiers, who used the murals for target practice. Badovici, who owned the site, died

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in 1956. Le Corbusier longed to have the villa for himself and arranged for it to be sold to a wealthy Swiss widow, Marie-Louise Schelbert. But she turned it over to her doctor, a morphine addict named Peter Kaegi, who let the place fall apart. In a morbid twist, Kaegi was murdered there, in what police described as a sex tryst gone awry. After that, the villa was abandoned and occupied by squatters.

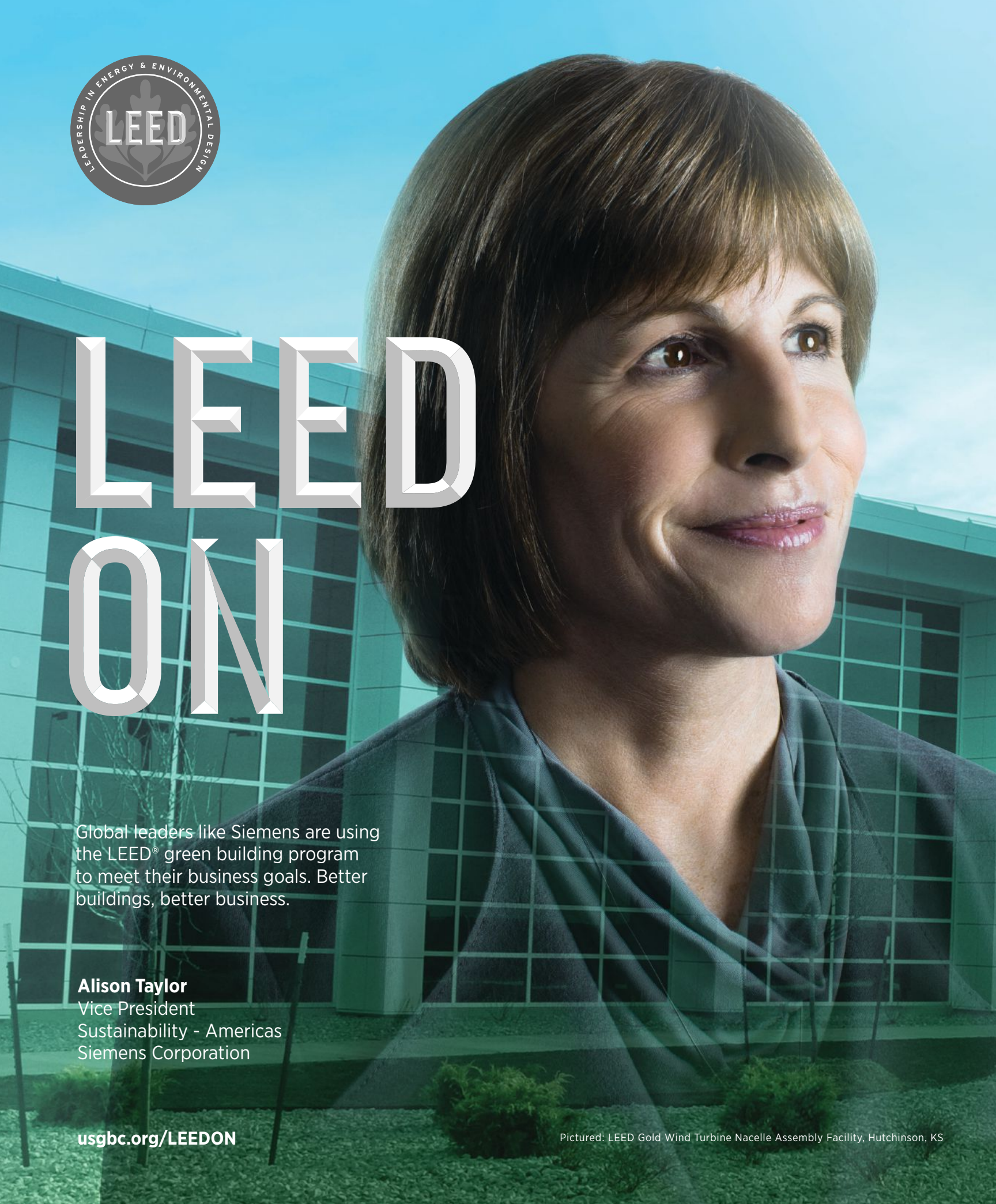
Le Corbusier, meanwhile, had returned to Roquebrune in the 1950s, when he was building the Unité d'Habitation in Marseille, and continued his own search of a summer getaway. He befriended Thomas Rebutato, a plumber from Nice who ran

> Here was a modernist summer home so superb Le Corbusier himself could have created it—but built by someone untrained in architecture, and a woman, no less.

L'Étoile de Mer, a restaurant adjacent to E-1027. Le Corbusier built five camping huts just to the west of L'Étoile de Mer, and struck a deal with Rebutato to erect his own private cabanon that would be attached to the restaurant on the other side. He finally had his own retreat, a tiny, super-efficient, 12-foot-by-12-foot structure based on the Modular, his design principles guiding how humans function in physical space. He loved the place so much he predicted—accurately—that he would end his days there. Fifty years ago, in August 1965, he died on his daily swim in the Mediterranean.

"Entrez Lentement"

It is the cabanon that was celebrated and preserved. It could be toured—with some effort, by appointment—as part of a pilgrimage of Le Corbusier's works.But now visitors to Roquebrune-Cap-Martin can finally appreciate E-1027. In the vestibule of the villa, Gray stenciled the words *Entrez lentement*—enter slowly—an instruction to leave your troubles behind and start to relax. To the left is a compact kitchen, and to the right is the main living area that includes a replica of Gray's Bibendum chair—enveloping tubes named after the Michelin Man—and the cushioned twin deck chairs, positioned to gaze out the accordion glass doors to the abundant flora and the sea. In one corner is the foldout dining table, easily moved outside to the deck; in the other a reading nook that doubles as an extra guest bedroom.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Living room alcove at E-1027, with restored bookcase and book tray

Gray designed the house to be experienced, much like one might move through a Japanese garden; a sculpted spiral staircase connects the two levels, which have a constant relationship with the outdoors. Quite possibly the world's finest hammock is stationed at a balcony at the western edge of the villa, with unfettered views to the beach crescents of Roquebrune-Cap-Martin and Monaco beyond. Gray was obsessed with light and air—but also privacy. The master bedroom and bathroom suite, tucked away on the first floor, encourages retreat.

In a deliberate violation of the clean, straight lines of Le Corbusier, there is a slight offset in the stacking of shelves and storage space, creating a sense of movement. Such unexpected details make a visitor want to stay—to open a bottle of Provencal rosé, sauté some sea urchins, and move in, just like Le Corbusier did.

Some restoration work remains, including on the spiral staircase and storage areas. But the place is in remarkably good shape, especially given that the

MANUEL BOUGOT

Project: **The Frick Art & Historical Center, Orientation Center, Pittsburgh, PA** *Architect:* **Schwartz/Silver Architects, Inc.**

The southern exterior of E-1027 that faces the Bay of Roquebrune

project itself was a somewhat tortured process, taking twists and turns over some 16 years. The Conservatoire du Littoral, a coastal conservancy agency that acquired the cabanon in 1975 from the Fondation Le Corbusier, took control of E-1027 in 1999, in coordination with the town. The mayor of Roquebrune-Cap-Martin and a succession of architects worked on the restoration. But the French bureaucracy governing historic monuments, as well as hand-wringing over things like authentic light switches and skylight parts, made for sluggish progress.

Enter Michael Likierman, a British businessman who came to France in 1972 to launch the U.K.-based Habitat furniture company chain, and who had already embarked on another restoration project: the house and gardens of Serre de La Madone, in neighboring Menton. Likierman became friends with Robert Rebutato, the son of the owner of L'Etoile de Mer, who fondly remembers Le Corbusier as a kindly uncle. Together, Likierman and Rebutato looked to establish a coherent campus linking all the notable buildings together—Gray's masterpiece, L'Etoile de Mer (essentially preserved as it was in the 1950s), the five camping cubes, and Le Corbusier's cabanon.

The project got an unexpected boost thanks to "The Price of Desire," a drama based on the sordid tale of E-1027 that debuted earlier this year at the Dublin Film Festival. Supported by Julian Lennon, who took photographs of the production, and featuring Alanis Morisette as Gray's lesbian lover from Paris, the film was shot on site and helped speed along the restoration work, ensuring that the villa was presentable for the cameras.

The Cap Moderne association has powerful benefactors, led by Prince Albert of Monaco, chairman of the board of trustees, and of course Likierman, the *force majeur* behind ambitious plans such as transforming a warehouse building at the train station into a reception and visitor center and exhibition space. The association also hopes to purchase the vacant Villa Giori, next door to E-1027, to turn it into what Likierman calls a "laboratory of living architecture" for researchers. The total budget is over $5 million.

Eileen Gray's Revenge

Cap Moderne, thanks to the way the tours are sequenced, may help to retell history. Visitors start with E-1027, proceed to L'Étoile de Mer and the

camping huts, and only then do they explore Le Corbusier's cabanon. Which could lead to some scandalous thinking: How much was he actually inspired by Eileen Gray? The simple dining table, the compact kitchen, the acutely positioned fenestration—suddenly the cabanon looks more derivative and less like a unique creation. Nearly a century later, this is Eileen Gray's revenge.

That is probably taking things too far. Le Corbusier had developed most of his comprehensive theories years before he ever laid eyes on E-1027—although he only first codified his Modular concept after World War II. Yet the public opening of E-1027 coincides with a new rash of criticism of France's favorite son. A recent exhibit at the Pompidou Centre was faulted for omitting the architect's time in Nazi-controlled Vichy during World War II, which was detailed in two recent books that raise troubling questions about the extent of his fascist sympathies. For those who argue that Le Corbusier is responsible for the destruction of cities, and the proliferation of blank walls and soulless towers, there is no little glee for this latest attack. He was a swaggering figure, not always particularly nice to be around, a serial philanderer, and somewhat parasitic in arranging his personal affairs. His behavior at E-1027 has been likened to a dog marking its territory.

For his part, Likierman doesn't buy the notion that Cap Moderne is any kind of revisionist comeuppance. His goal for visitors is plain: "That they have seen the work of two architectural geniuses in a magical setting," he says. "And that architecture is all about human beings and their interaction."

In Roquebrune-Cap-Martin, Le Corbusier is well remembered, and his name is plastered all over the resort town. The path leading to Cap Moderne from the Menton side is called Promenade Le Corbusier; he is the star attraction. But now the untrained architect gets first billing; the architect who influenced so much of the 20th century landscape is nudged back into context.

Up on the switchbacks on the Monaco side, the white box of E-1027 is plainly visible, while L'Étoile de Mer and the cabanon are much harder to pick out. For those who once asked, who built that—and wrongly assumed it was Le Corbusier—they now can discover the answer.

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“Hadid was not concerned about the mechanics of architecture. Malevich was a mystic, and Hadid likewise wanted to create a sense of wonder.”

Zaha Hadid at the Hermitage by Joseph Giovannini

From the time she was a student at the Architectural Association School of Architecture (AA) in London, Zaha Hadid, HON. FAIA, was famously influenced by the Russian Suprematists of St. Petersburg. So when her career retrospective opened in late June at the State Hermitage Museum, in the colonnaded Nicholas Hall of the Winter Palace, it was a spiritual homecoming. The movement's founder, the painter Kazimir Malevich, had taught near the Hermitage, and to make the historic connection perfectly clear, curator Ksenia Malich opened the show by hanging Malevich's iconic "Black Square," from the museum's own collection, opposite the entry. It was the Big Bang for Hadid as well as for modern art, the *ne plus ultra* of pure abstraction.

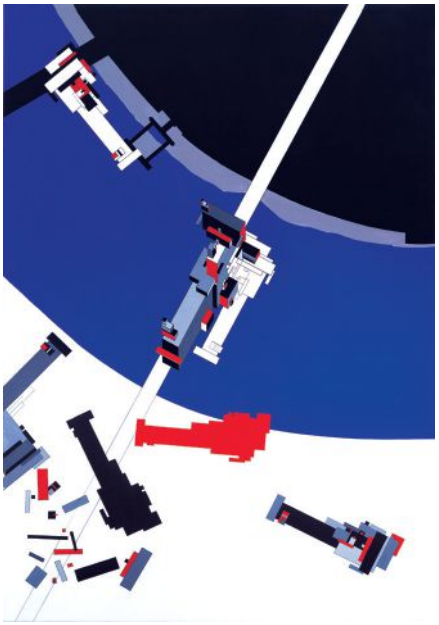
Early on in her career, Hadid resolved to develop the ideas of a movement that was derailed after political resistance to it grew in post-Revolutionary Russia. Malevich was never able to consummate his own theories by building real structures. But through her projects, Hadid brought the implications of the Black Square, the Red Square, and all the other four-dimensional geometries floating in the white infinities of Malevich's canvases into reality, in a way the master himself could not have anticipated. In project after project, taking great evolutionary leaps, she transformed his "Suprematism of feeling" into designs of keen emotional intensity.

But Hadid's work did not just extrapolate from canonical Suprematism or other influences; her own artistic and architectural inventiveness took those seminal influences into highly original, purely Hadidian territory. The range of invention in this 35-year retrospective, from the architect's fragmented early visions to the topologically smooth, spatially fluid designs of her more recent work, is paradigms removed from the Black Square posted at the entry.

Hadid, Pre-Computer

"Zaha Hadid at the State Hermitage" starts with a vividly painted tableau of her award-winning AA thesis from 1976–1977, "Malevich's Tektonik," in which she programs a tekton of jogged orthogonal masses by the artist into a habitable bridge over the Thames. The retrospective, which features more than 300 objects, ends with digital models of Hadid's hypnotically curved structures, including the swooping Heydar Aliyev Center in Baku, Azerbaijan; a desert village of polyhedral pavilions for Aramco in Saudi Arabia; and the Magazine, a restaurant wafting like a stingray in London's Hyde Park.

In a reaction to the often crushing regularities of industrial Modernism and the leveling impact of normative standards, Hadid first escaped Euclidean forms early in her career with impure, illegitimate geometries, and then with increasingly liquid shapes and spaces, some stretched like rubber. The exhibit reveals how she worked with surprising versatility at all scales in all building types, from her vast urban plan for Singapore to product design: shoes, rings, benches, and even a car.



"Malevich's Tektonik," Hadid's AA thesis from 1976–77

In the ceremonial Nicholas Hall, haunted with ghosts of czars past, Hadid was not permitted to exhibit on the sacrosanct palace walls. So she built the show into the room on temporary walls configured in a dynamic pattern of crossing Xs: dozens of models, drawings, paintings, and reliefs are ganged on either side of each wall. The double-X configuration injects Hadid's concept of fluid, interlacing space into this symmetrical, axial, classical room. She creates a dispersive field of display typical of the non-hierarchical, democratic spaces of her architecture.

In the conceptual design phase, Hadid researches her projects exhaustively in a range of techniques and materials. The exhibition illustrates how she tests designs in multiple media, as if each were a separate lens offering a different way of seeing. Hung gallery-style on the walls are wispy calligraphic sketches, organizational diagrams, hard-line X-ray drawings, working drawings, acrylic tableaux, paper wall reliefs, and models in foam core, Plexiglas, and digital print.

In the east half of the exhibit, visitors immediately enter an allée of paintings done during one of the intensive phases of Hadid's research, from the late 1970s through the late 1980s. In acrylic tableaux, she paints entire cities that seem warped in the distortional throes of Einsteinian space, and she depicts buildings

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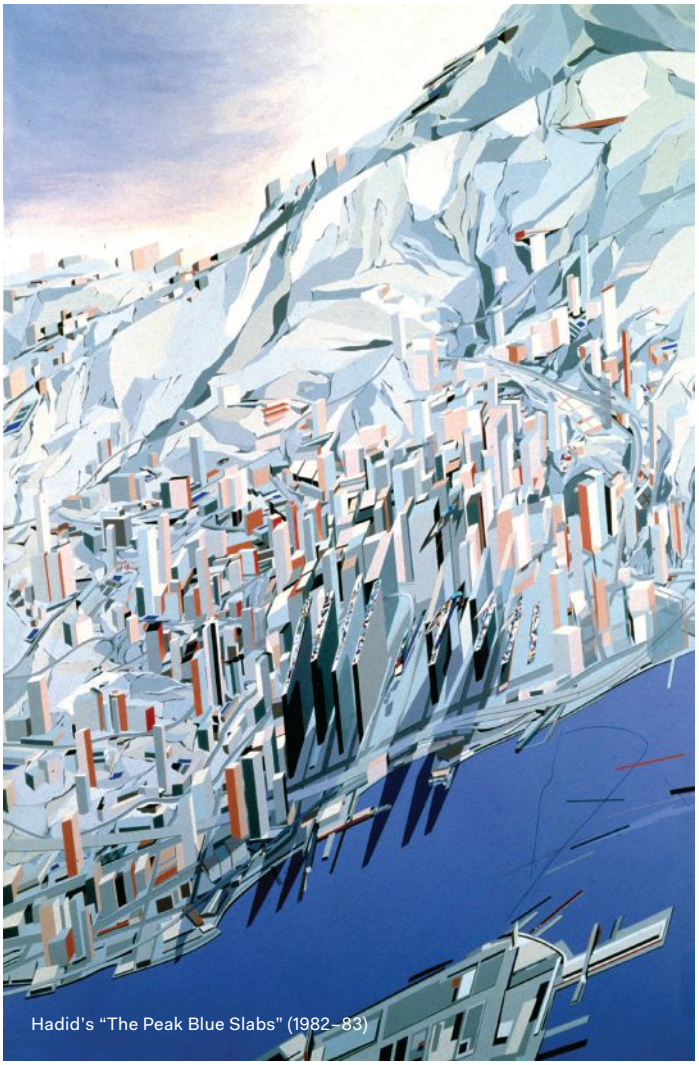
in simultaneous views from all sides, as though in a time-lapse sequence, frame by frame. Colors are vivid, provoking strong emotional responses, as in a Matisse painting, but yoked here to explosive forms that seem to project out to the viewer. She depicts cities as fields of energy whose push and pull of forces charge and shape the buildings she plants in their warped planes. Gravity is no longer the force keeping buildings in vertical obedience.

When Hadid first painted these omnidirectional tableaux, with hieroglyphic markings that were actually abstractions of plans and sections, no one quite understood them. They were not the usual explanatory architectural renderings, but pieces and views of a building that viewers knitted together in their minds. Mystification was part of the



Hadid's "The Peak Blue Slabs" (1982–83)

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An installation of Hadid's skyscrapers at the Hermitage

experience, and unlike the Russian Constructivists, often confused with Suprematists, Hadid was not concerned about the mechanics of architecture, about showing how buildings were fastened. Malevich was a mystic, and Hadid likewise wanted to create a sense of wonder. No need to show bolts. Technology was a means rather than an end.

Indisputably, the computer changed Hadid's practice, although her early projects were so complex that they appear to have been designed digitally. In her case, the computer caught up with her vision, and when it did, she harnessed its power to drive her vision even further.

The show uses a visible divide to mark the firm's gradual transition, in the late 1990s, into a largely digital practice. In the hall's west end, there are few if any freehand drawings, sketches, or hand-painted tableaux. The analog design media featured in the east hall all but disappear. The transition is unexpected, even saddening, for an architect who used those methods brilliantly as tools of exploration. Digital printed models supersede hand-built ones, which, of course, were incapable of capturing the complexities of compound curves characteristic of the new generation of designs. Still, the digital work clearly grows out of the firm's older vision, possibly because that vision originally evolved without the mechanical drafting

ANDREY TEREBENIN

tools that surreptitiously imposed the tyranny of the right angle on most drafting boards.

An Unexpected Note

"Zaha Hadid at the State Hermitage" is a show of seminal works and an accelerating sequence of architectural triumphs: the dynamically shaped Phaeno Science Center in Wolfsburg, Germany (2005); the urbanistically sensitive MAXXI in Rome (2009); the acrobatic Aquatics Center for the London Olympics (2011); the bread-loaf office towers of Galaxy Soho Beijing (2012); the voluminous, magisterial public spaces of the Dongdaemun Design Plaza in Seoul, South Korea (2013); and the Jockey Club Innovation Tower at the Hong Kong Polytechnic University (2014), which lists like a sailboat.

The one segment of the exhibit that seems out of character is a zone of about 50 skyscraper models, grouped together like a gridded city of point towers. Whereas all of Hadid's previous projects, even her very recent designs, are typified by asymmetry, distortion, incompletion, porosity, and dynamism, the towers display the botanical symmetries of flowers, which have recently become the office's morphological touchstone and inspiration. It is hard to reconcile the ideology behind the towers, which clearly express structure, rationality, and even efficiency, with Hadid's more poetic work that embraces the inexplicable. Even the architect's current low-rise and mid-rise institutional and corporate projects seem more in line with her older work, extending those early concepts into the digital landscape. Perhaps the demand for skyscrapers to be hyper-efficient inevitably means reducing their designs to a series of multiplication tables, which encourage the extruded stacking and serial repetition that Hadid had always avoided as a matter of creative principle.

This is Hadid's second visit at the Hermitage. In 2004, she won the Pritzker Prize on a stage built by Catherine the Great, another prepossessing woman who prevailed in a man's world. In the dense context of St. Petersburg, in the shadow of Catherine and Malevich, the current exhibition expands our conception of Hadid's career, charging her work with an intense historical dimension.

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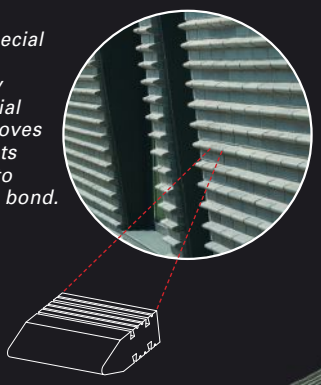

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Tozzer Anthropology Building
Cambridge, Mass.
Kennedy & Violich Architecture

TEXT BY IAN VOLNER
PHOTOS BY JOHN HORNER

Harvard has a brick problem.

As early as 1890, when the celebrated firm of McKim, Mead & White was commissioned to design the Johnston Gate on the western perimeter of Harvard Yard, university administrators stipulated that the designers use a particular ruddy shade of brick to match the 18th-century buildings beyond. The material shortly assumed the name "Harvard brick," and it has been the official façade treatment of America's oldest institution of higher learning ever since.

For designers, this condition can be a bit limiting, to say the least. "It would be nice to do something not in brick," says Frano Violich, FAIA, who, together with wife Sheila Kennedy, FAIA, heads up Boston-based Kennedy & Violich Architecture (KVA). Last fall, the duo completed work on the latest addition to the sprawling Cambridge, Mass., campus. The new Tozzer Anthropology Building on Divinity Avenue is a classic academic pavilion, but it attempts to tinker with the well-worn formula while remaining within the confines of a tight $16 million budget—and, of course, a very familiar wrapping.

The pitfalls of Harvard's brick-o-mania are borne out by the history of the Tozzer site, enfolded on three sides by (and connected via a slender passageway to) the massive Peabody and Harvard Museum complex. KVA's new project incorporates the steel floor plates and fire stairs of the now-dismantled Tozzer Library, built in 1974 by local office Johnson Hotvedt and Associates. This predecessor building, also clad in brick, was a reasonably accomplished exercise in Late Modernism—"I kind of liked it," Kennedy admits—that unfortunately suffered from a couple key defects: It incorporated a menacingly dark and dingy underpass on its southern side, and it developed an internal mold problem that finally rendered it hazardous to occupants. "The insulation space between the brick and the interior wall was this thick," Violich says, pinching thumb and forefinger to an insufficient sandwich-width. It's hard to believe that a school with Harvard's resources would ever have sanctioned such a building; and yet Cambridge abounds with similar mediocrities, suggesting that the university has been prepared to tolerate almost any transgression of taste or quality, provided that it's red.

Making hay with baked clay isn't easy—but fortunately for Harvard, KVA came to the commission with a ready-made background in material innovation. Inside their studio at a former bottling plant in the still-industrial Roxbury neighborhood, machines buzz and whirr as associates fabricate mock-ups and finished products for MATx, the firm's spin-off research lab. "Originally we were only interested in modeling," explains Kennedy, "but a lot of our colleagues and clients encouraged us to get into fabrication." The firm is currently producing a line of custom furniture for the Boston offices of a German consulting firm, hewing plain plywood slabs into carefully contoured and textured tables and chairs. In their work for other institutional clients—as with their 2012 University of Pennsylvania law school building in Philadelphia, and the upcoming Wegmans Hall for the University of Rochester in upstate New York—KVA has confronted the problems of brick-bound buildings head on, and Tozzer shows what they can do with even the most modest of means.

Before considering the envelope, the designers took care to fashion an interior that would finally give Harvard's anthropologists a space of which they could be proud. "They've been an important department going back 100 years," Violich says, "but they'd never really had a home before." Anthropology's three sub-departments had been scattered in various annexes around the Peabody, the Vanserg building, and in an imposing Minoru Yamasaki tower nearby. With the digitization of libraries advancing at a brisk pace, the university saw the opportunity to put fewer books and more people into the new Tozzer, placing the social anthropology department in the new facility, and thus giving it a closer connection to the archaeology department in the Peabody next door. The lowermost floors still house reading rooms and archival storage, including a sophisticated mechanical stack system in the basement, but the majority of the building is now given over to offices and workspaces for faculty and graduate students.

Most significantly, the core of the building now boasts a light-filled social space topped by a ceiling system that shows KVA's technical finesse in full swing: Beneath a broad glass skylight, a sloped and jagged wall is decked in irregular wooden panels—interrupted at intervals by lighting fixtures and acoustical panels made from a novel cement-and-wood matrix—that impart a warm, glowing atmosphere to the gallery that rings the void on the fourth floor and the lounge in the center of the atrium on the floor below. During last winter's record-breaking blizzards, the thick snow pack atop the atrium glass infused the space with an eerie blue radiance. One faculty member said it was like living in an igloo.

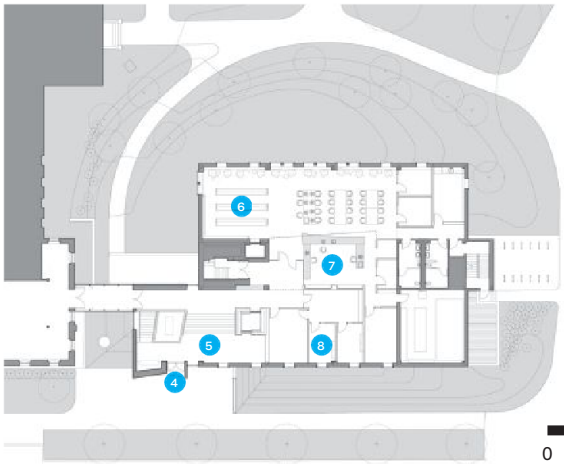
But for the exterior, the architects couldn't really hope for any such evocative accidents, and instead tried to put a subtle spin on the Harvard learning-box typology. The skin of the new anthropology building isn't just a clipped-on veneer; it was mortared into place the old-fashioned way by the construction team.

Third-Floor Plan

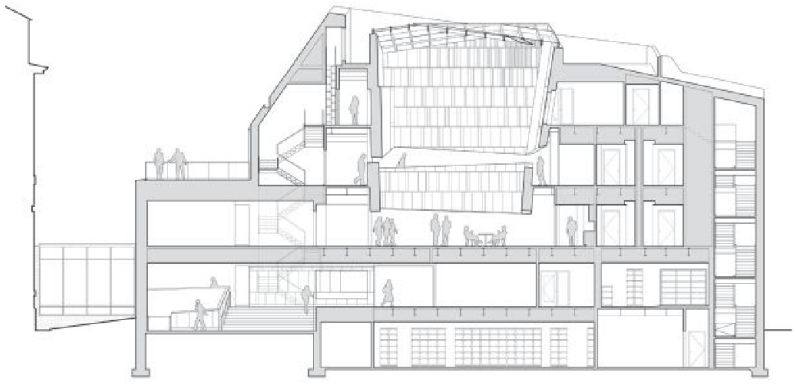
Fourth-Floor Plan

First-Floor Plan

Second-Floor Plan



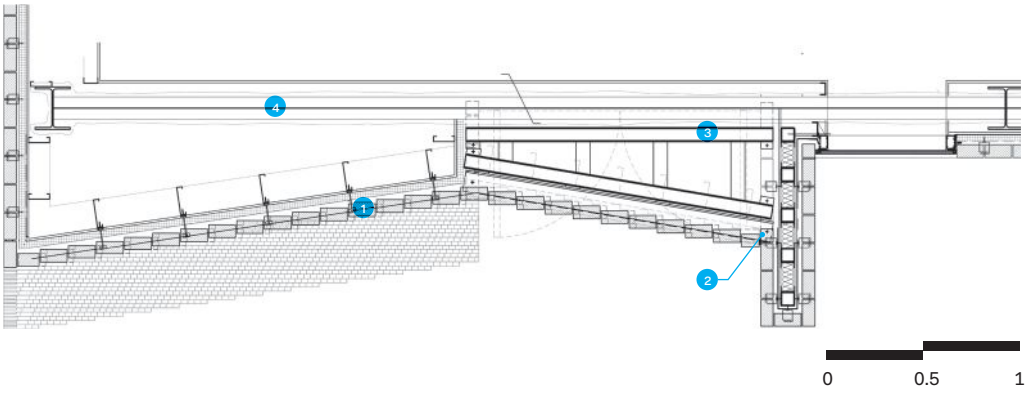
Section A–A1



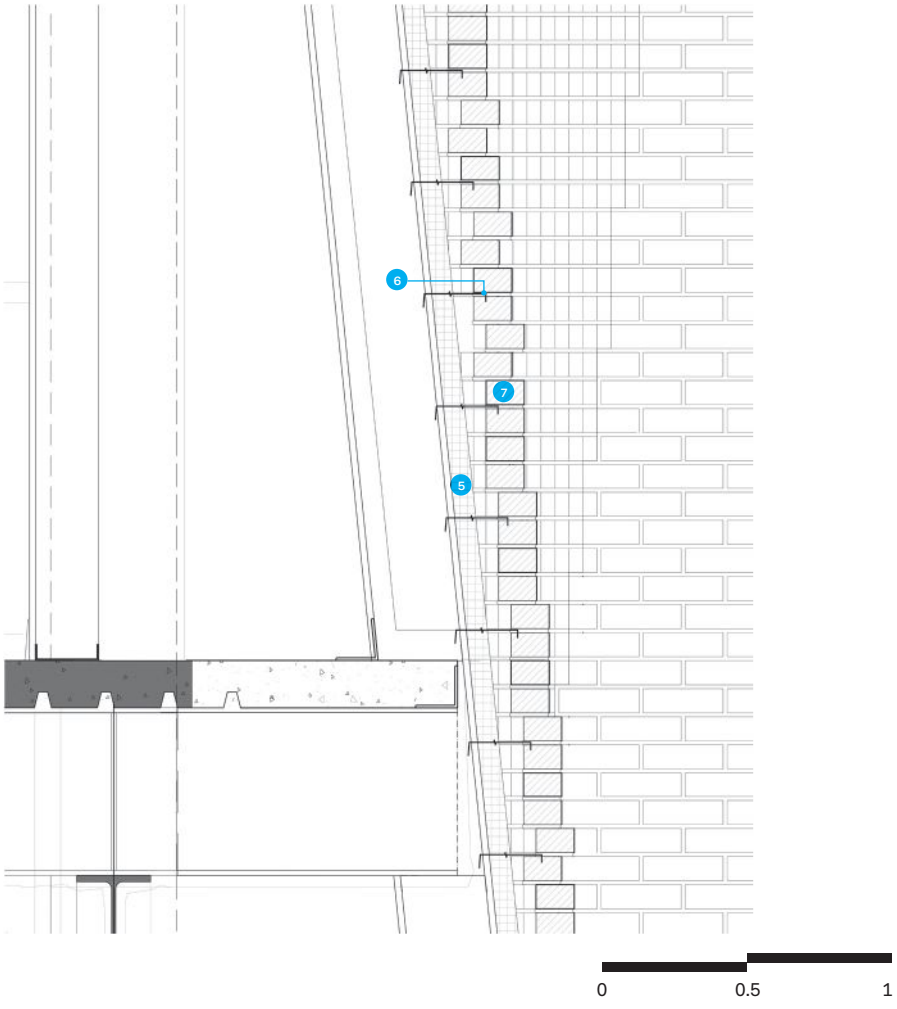
1. West entrance
2. High-density mobile shelving
3. Study room
4. East entrance
5. Lobby
6. Library
7. Circulation desk
8. Office
9. Classroom
10. Lounge
11. Gallery
12. Atrium

Previous Spread: Copper-and-brick-clad east façade

Plan Detail of Entrance at Ceiling Support



Section Detail Through East Entrance Wall



Opposite, Top: View from north of main entrance, with its complex brickwork

Opposite, Bottom: Second-floor lobby, just inside entrance shown above

1. Brick course
2. Control joint
3. Steel tube lintel frame
4. Flange with spray-on fireproofing
5. 2"-thick-rigid insulation with contact-adhered water and vapor barrier
6. Engineered tie-back anchors
7. Veneer brick

The signature moment, the place where KVA was able to introduce real structural drama, is in the main entrance: The east face of the foyer sports a broad, two-story fin of brick, projecting at an acute angle from the building with a crease that extends from the corner of the door. The courses on one side of the fold recede as they go up, turning the wall into a self-supporting corbel; on the other, the courses march back out again in staggered diagonal rows. The intent, Kennedy says, is to "express the depth of the wall," giving the building skin a certain presence and specificity while lending a hierarchical significance to the entryway. It's a simple enough gesture that belies a complicated geometric and engineering investigation, and the builders were sufficiently wary to insist on creating a freestanding version before they'd set to work on the real thing. "They said, 'We get that you can design it,'" Violich says. "'But we're not sure we can build it.'"

Yet build it they did, and to good effect. KVA's Tozzer is an especially fine meditation on the idea of the background building—the architectural team player, always getting along with its neighbors—on a campus that abounds in half-hearted contextual duds dolled up in crimson costumes. The only misfortune is that the architects had to be kept on such a short leash. (Even the building's copper roof, the one real break with the prevailing material palette of Divinity Avenue, elicited raised eyebrows.) Indeed, it would have been nice if KVA had done some "not in brick," as Violich says—the firm that produced the net-zero Soft House in Hamburg, Germany, using PV ribbons instead of solar arrays seems somewhat overmatched to the simplicities and strictures of the Tozzer brief. But if anyone can find a play on a well-trod material, it's this team, and their corbelled approach to textured masonry makes Tozzer more than merely contextual—it makes it a piece of architecture.

Central atrium from fourth-floor gallery, lined with faculty offices

View from southwest, with Peabody Museum of Archaeology and Ethnology and Harvard Art Museum complex (at right)

Project Credits

Project: Tozzer Anthropology Building, Cambridge, Mass.
Client: Harvard University
Architect: Kennedy & Violich Architecture, Boston · Frano Violich, FAIA (managing principal); Sheila Kennedy, FAIA (principal consulting on design); Gregory Burchard, AIA (project architect); J. Seth Hoffman (project manager); Justin Hui, Jungmin Nam, Charles Garcia, AIA, Daniel Sullivan, Alda Black, Alex Shelly (project team)
M/E Engineer and Envelope Consultant: BuroHappold Consulting Engineers
Structural Engineer: LeMessurier Consultants
Civil Engineer: Green International Affiliates
Construction Manager: Bond Brothers
General Contractor: Consigli Construction
Landscape Architect: Richard Burck Associates
Lighting Designer: Tillotson Design Associates
Code Consultant: Jensen Hughes
Acoustic Consultant: Cavanaugh Tocci Associates
Size: 35,000 square feet
Cost: $16 million

CHS Field
St. Paul, Minn.
Snow Kreilich Architects with AECOM and Ryan Companies

TEXT BY THOMAS FISHER, ASSOC. AIA
PHOTOS BY PAUL CROSBY

When the real estate analysis firm RealtyTrac ranked the Lowertown neighborhood of St. Paul, Minn., as the "hippest zip code in America," it surprised everyone but those living there, who have watched the former warehouse district become a flourishing arts community—a transformation capped by the recent completion of CHS Field, home to the minor league St. Paul Saints. Designed by Minneapolis-based Snow Kreilich Architects, with AECOM as the sports architect and Ryan Cos. as the architect-of-record and contractor, the 7,000-seat, 13-acre ballpark has become an irreverent baseball-watching venue. (The Saints, partly owned by actor Bill Murray, set a world record during a recent game with a 6,261-person pillow fight.)

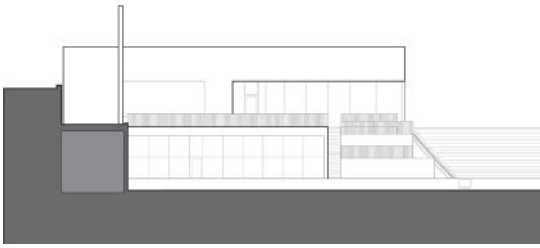
The new park provides a perfect place for such hijinks. "We nestled the ballpark into the site," says design principal Matthew Kreilich, AIA, "and opened it up to the city," with the main concourse visually connected to the street. Low, flat-roofed structures clad in dark masonry contain ticketing and concession areas with a steel-framed, wood-ceilinged, clubhouse-and-suites level that appears to float above. "The western red cedar ceiling glows at night and turns the surrounding heavy timber warehouses inside out," Kreilich adds. "Rather than mimic those buildings, we made them part of the experience."

That experience recalls baseball's 19th century origins as an urban game played in open fields and public parks. "We wanted to transform Lowertown," says Ryan Cos. senior director Mike Ryan, AIA, "and make it a neighborhood park," treating the playing field as one of several public open spaces along Fifth Street in downtown St. Paul, with the plaza in front of the ballpark serving as an extension of the open-air farmer's market across the street. Restrooms, for example, open to both the concourse and the street, serving marketgoers and baseball fans.

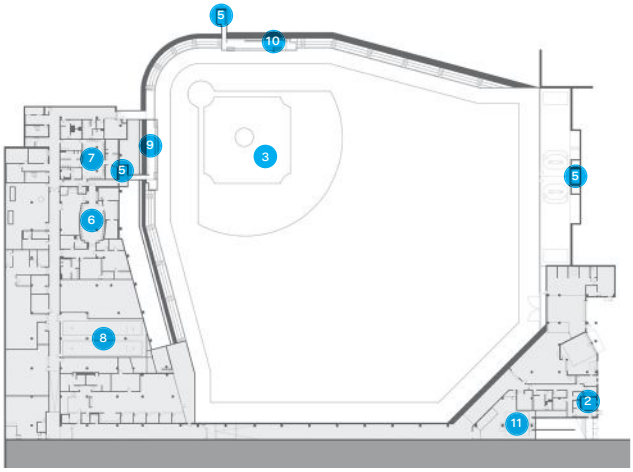
The stadium is one of the greenest ballparks in America. "We reused 99 percent of the Gillette plant that stood on the site," Ryan says, "recycling its concrete and reusing the floor of the factory for the service areas and offices." A large tank collects runoff from the adjacent garage roof for watering the grass, and solar panels occupy an earthen berm and the roof of a left field picnic pavilion. The stadium-wrapping concourse also connects the downtown to the regional bike trail system, and the adjacent city-owned dog park enables dog owners to watch games for free.

Neither Snow Kreilich nor Ryan Cos. had designed a ballpark before, and the city's willingness to commission a design/build team to think in creative new ways about the baseball experience shows why St. Paul—and the Saints—have become so hip.

Section A–A1



Service-Level Plan



Previous Spread: Fourth Street entrance with sunken seating and field below

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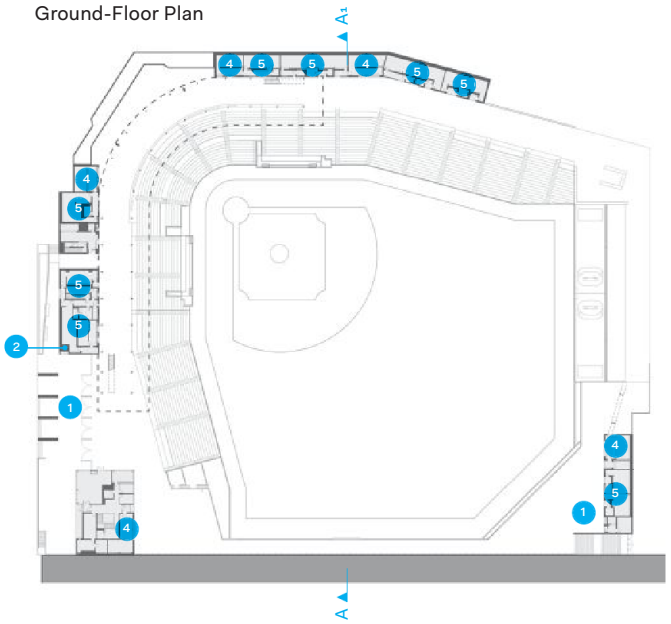
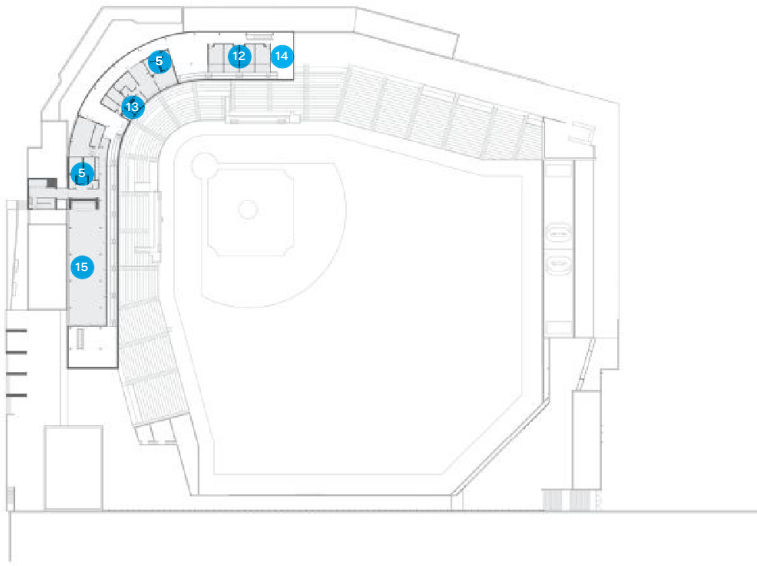
Ground-Floor Plan



Club-Level Plan



1. Entry plaza
2. Ticketing
3. Field
4. Concessions
5. Restrooms
6. Saints locker room
7. Visitor locker room
8. Batting tunnel
9. Saints dugout
10. Visitor dugout
11. Rainwater harvesting
12. Suites
13. TV and radio
14. Organist
15. Club

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30
ANTONIO
13
HOME OF

Open-air terraces with western red cedar ceilings overlook field sustained with harvested rainwater

Project Credits

Project: CHS Field, St. Paul, Minn.
Client: City of St. Paul, the St. Paul Saints
Architect: Snow Kreilich Architects, Minneapolis · Julie Snow, FAIA, Matthew Kreilich, AIA (design principals); Andrew Dull, ASSOC. AIA (project lead designer); Tyson McElvain, AIA (project architect/project manager); Cameron Bence, ASSOC. AIA, Michael Heller, ASSOC. AIA, Kai Salmela, ASSOC. AIA, Matt Rain, Jim Larson, AIA (project team)
Architect-of-Record: Ryan Cos., Minneapolis · Mike Ryan, AIA (principal-in-charge); Logan Gerken, AIA (project lead designer/project manager); Eric Morin, AIA (project architect); Ayman Arafa, Sebastian Marquez, Tony Solberg, AIA
Interior Designer: Snow Kreilich Architects
Mechanical Engineer: Schadegg Mechanical
Structural Engineer: Ericksen Roed & Associates
Electical Engineer: Hunt Electric
Civil Engineer, Landscape Architect-of-Record, Construction Management, General Contractor, and Concrete Work: Ryan Cos.
Stormwater Design: Solution Blue
Energy Modeling: The Weidt Group
Landscape Design Architect: Bob Close Studio
Lighting Designer: Henderson Engineers
Face Brick: Custom Block by Amcon Block and Precast
Cabinetry: Artifex Millwork
Window Systems: Empirehouse
Architectural Metal Panels and Wood Ceilings: MG McGrath
Size: 63,414 square feet (enclosed); 347,000 square feet (total); 13-acre site
Cost: $63 million

Upper-level club

Paul and Henri Carnal Hall at Institut Le Rosey
Rolle, Switzerland
Bernard Tschumi Architects

TEXT BY CLAY RISEN
PHOTOS BY CHRISTIAN RICHTERS

For 135 years, the Institut Le Rosey in Rolle, Switzerland, has educated children from the upper echelons of the global elite. Gulf sheiks, Hollywood superstars, Metternichs, and Rothschilds have all sent their offspring to the boarding school, whose low-slung academic buildings nestle into a gently sloping hillside, a world exclusive from Geneva and Lausanne despite being just a half hour's drive away from each.

Le Rosey is among the last places one may expect to find the work of Bernard Tschumi, FAIA, the Swiss-born architect known for his dense, theoretical work and striking, deconstructivist designs. But Tschumi, who won a competition to design the school's new performance venue and cultural center in 2010, did not disappoint. The $52.5 million Carnal Hall, named for the school's founder and his son, is a stainless-steel dome that sits at the edge of campus like the class rebel and looks back at the field of staid Second Empire–style buildings with a chuckle. Even the design is a pun, Tschumi says: The 302-foot-diameter roof is shaped like a rosette, appropriate for a place called Le Rosey.

Every school needs a few hell-raisers, and Carnal Hall has its role in the campus. "The dome acts as a hinge at the end of a sequence of old buildings," Tschumi says. "It's a dialogue between two eras."

While other designers proposed separating the project's multifaceted program—concert hall, a black box theater, rehearsal rooms, a library, and a café—into different buildings, Tschumi united them. Placing the shoebox-shaped concert hall at the center of the circular floor plan, he stacked the other features along its sides and topped everything with the dome.

Perhaps even more unexpected than the building's shape are its modest materials: The structure is primarily poured-in-place concrete paneled with clear-finish OSB. Even the 900-seat concert hall, which can accommodate a full-size 120-piece orchestra, is lined with OSB panels.

"I felt a little bored with the clichés of wooden concert halls," Tschumi says. "I thought, wouldn't it be great if we used compressed wood? And we found, working with [the engineering consultant] Arup, that OSB can be incredibly dense and therefore has a mass that is very good for acoustics." He also had to contend with a railway line running 300 feet from the building. To protect the concert hall from vibrations, the team structurally isolated it from the rest of the building, placing it atop massive springs, nearly 7 feet tall.

Accommodating a large number of musicians in the relatively small hall posed another challenge. A full-size orchestra normally plays before 2,000 seats or more; any fewer and the sound can be overwhelming. "It's a bit like putting a 12-cylinder motor into a small car," says Alban Bassuet, a former associate principal at Arup who led the firm's acoustic team on the project.

The solution was to arrange hundreds of OSB-engineered joists, ranging in depth from 2 inches to 2.4 inches, on the OSB-panel walls to form what Bassuet calls "corners" that catch the acoustic energy and scatter it back over the audience. The result is a clear, immersive sound that blankets the room without overwhelming it. "Many folks have said the room is crystalline," he says.

The last significant technological difficulty stemmed from Switzerland's strict Environmental Protection Act and, in particular, the virtual prohibition of mechanical cooling in commercial and institutional buildings. But an unventilated concert venue, even in the country's temperate mountain range, is unthinkable. Tschumi and Arup turned to the stack effect, devising a largely passive system that uses fans to draw in cool air through the sublevel space that houses the massive noise-isolating springs, and pushes hot air out through slots near the top of the dome above the concert hall. The approach also produces little noise or vibration—perfect for a music venue.

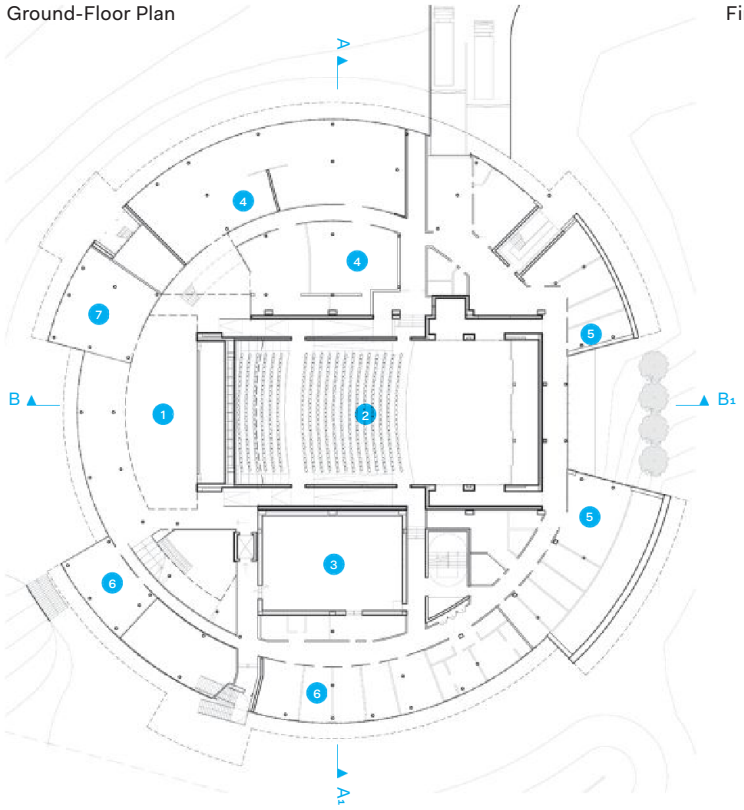
Sustainability, however, was never Tschumi's main objective. "I would not say it was the driver, but rather the result of taking advantage of certain constraints," he says. "I'm not a sustainability nut." What drove the project were the school's relatively small capital budget, and the opportunity those constraints provided to explore new materials and forms.

The results speak for themselves. The OSB panels comprise recycled wood and nontoxic adhesives; the dome is punctured by strategically placed cutouts to let in daylight; and many windows are operable, taking advantage of the cool breezes from the lake to the south and the mountains to the north. Though Arup did not conduct a formal energy analysis, the firm insists the project is exceedingly stingy. "Most of the building uses few or any mechanical systems, which by definition make them very energy efficient," says principal and project leader Ray Quinn.

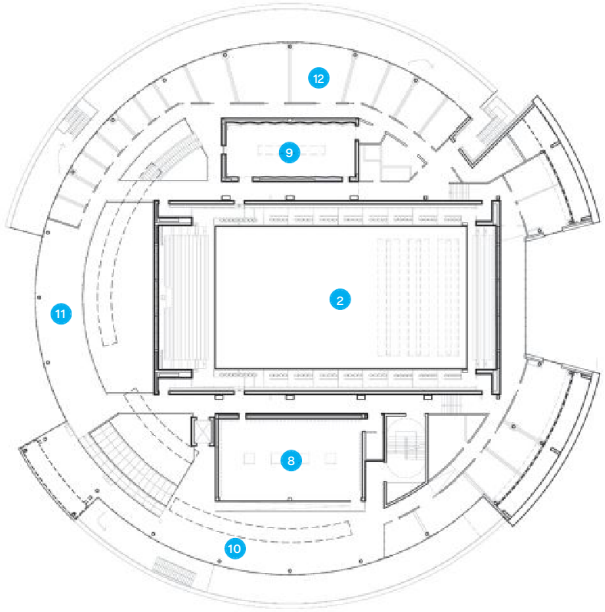
Designing a cutting-edge building is one thing; getting a tradition-minded faculty and student body to accept it is another. But Le Rosey director Philippe Gudin says the school community took to the seemingly aggressive design. "The students and teachers were a bit worried, a bit scared," he confesses. "But after a week, the students adopted the building. Now it is really the center of campus."

And thanks to a series of public concerts at Carnal Hall, the school is shedding some of its exclusivity. "Le Rosey was set apart from the area, but now it has become part of the cultural life," Gudin says. "People arrive early and stay late, talk with students, and have a drink. It makes for a small village, here at the school."

Ground-Floor Plan



First-Floor Plan



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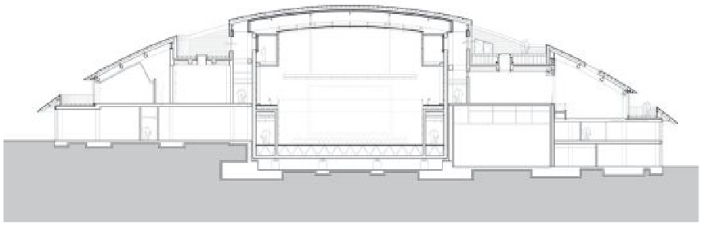
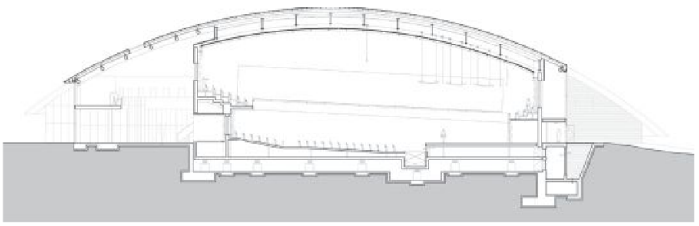


Section B–B₁



1. Foyer
2. Concert hall
3. Black box theater
4. Art studios
5. Back-of-house (concert hall)
6. Offices
7. Cafeteria
8. Library
9. Rehearsal room
10. Learning center
11. Lounge
12. Practice rooms

0 20 40

Previous Spread: View of venue from south and entry terrace (on the left)

Exterior and interior glass curtainwalls activate circulation spaces

This Page: Cutouts in dome allow in daylight

Opposite: Detail of OSB panels and engineered joists in concert hall

OSB finishes in the 900-seat main concert hall

Project Credits

Project: Paul and Henri Carnal Hall
Client: Institut Le Rosey
Architect: Bernard Tschumi Architects · Bernard Tschumi, FAIA (principal); Kate Scott, Joel Rutten, Christopher Lee, Jocelyn Froimovich, Bart-Jan Polman, Jerome Haferd, Paul-Arthur Heller, Clinton Peterson, Emmanuel Desmazières, Nianlai Zhong, Olga Jitariouk, Colin Spoelman, Kim Starr, Grégoire Giot, Dustin Brugmann, Taylor Burgess, Sheena Garcia, Sung Yu, Pierre-Yves Kuhn, Alison McIlvride, Jessica Myers, W.Y. Frank Chen, Athanasios Manis, Ciro Miguel, John Eastridge, V. Mitch McEwen, Alexa Tsien-Shiang (project team)
Local Architect: Fehlmann Architectes · Serge Fehlmann, Nicolas Engel, Christophe Faini, Julio Rodriguez, Julien Camandona, Jean-Jacques le Mao, Victor Goncalves
Interior Designer: Bernard Tschumi Architects
Mechanical Engineer: Arup (design); Sorane (execution)
Structural Engineer: Arup (design); Alberti Ingénieurs (execution)
Electrical Engineer: Arup (design); Scherler (execution)
Civil Engineer: Bureau d'études D. Belotti (site surveyor); Impact-Concept (ground engineer)
Geotechnical Engineer: Karakas & Français
Landscape Architect: Mathis
Lighting Designer: Arup
Acoustics: Arup (design); D'Silence Acoustique (execution)
Audiovisual and Theater: Arup
Façade: Arup (design); Biff (execution)
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Cost: $52.5 million

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Residential:
Blackbird House
Aspen, Colo.
Will Bruder Architects

TEXT BY DAVID HILL
PHOTOS BY BILL TIMMERMAN

Aspen has no shortage of spectacular single-family homes, many designed by some of the world's leading architects. If you know where to find them, you can spot houses by John Lautner, Robert A.M. Stern, FAIA, Antoine Predock, FAIA, Renzo Piano, HON. FAIA, and Bohlin Cywinski Jackson.

Time to add Will Bruder, FAIA, to that list. The Phoenix-based architect recently completed Blackbird House, a dramatic 5,829-square-foot structure clad in shou-sugi-ban cypress. Unlike many of the Aspen area's high-end houses, it's set right in town, on a quiet cul-de-sac just three blocks from the main ski lift. What's more, Bruder designed and built Blackbird as a multimillion-dollar spec house, complete with furniture, flatware, linens—even art on the walls. The house sold in just four days to a New York family looking for a second home.

Bruder conceived the house with friend and business partner Frederic Horne, who sensed that Aspen was ready for a modern "urban mountain retreat" in the town's urban core. They found a 0.21-acre property in a neighborhood of relatively modest single-family homes and apartments. Bruder then faced designing a house that would conform to Aspen's form-based zoning code, which includes design standards to preserve the town's established scale and character, and he was game for the challenge. "I'm a devout modernist," Bruder says, "but I thoroughly believe that cities are made better by form-based zoning."

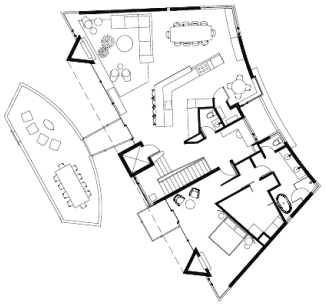
Aspen's design standards do not prescribe any particular architectural style, but they are quite specific when it comes to elements such as building orientation, volume, fence height, and the like. Blackbird is a far cry from Aspen's historic cabins or ornate Victorians, but its size and scale fit the neighborhood."It's very modest and quiet," Bruder says.

Indeed, the burnt-wood exterior allows the house to almost disappear when viewed from the street, particularly at dusk. "It's a dance between the positive and the void," Bruder says. A copper butterfly roof gives the house a birdlike quality (it's no wonder Bruder's wife came up with the "Blackbird" moniker).

Inside, Bruder and his team used rustic yet luxurious materials, such as white rift-sawn oak for doors and cabinets, walnut planks for floors, and textured gray stone for the master-bedroom fireplace. There are five bedroom suites and three levels. Large windows take advantage of stunning mountain views.

Bruder calls Blackbird House "a place-appropriate, sophisticated, rustic, comfortable house," and he and Horne are already looking for another lot to build a second high-end spec house."There's clearly a market in Aspen for this kind of venture," Bruder says.

Second-Floor Plan



Ground-Floor Plan

Basement-Level Plan

Previous Page: A view from the west showing the ground-floor patio and lower-height guest wing (at left).

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The house is clad in shou-sugi-ban, or burnt cedar boards. Natural cedar lines the deep soffits at the front of the house, which were designed to meet regulations dictated by Aspen's form-based codes.

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Inside, plaster work on the stairwell wall catches and reflects light into the second-floor hallways. The art on the wall was selected by Bruder as part of a complete interior design for the spec project.

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Top: The second-floor master suite features a sloping ceiling, which is the result of a butterfly roof, the "wings" of which give the house its name. *Bottom:* Much of the second floor is open-plan, featuring a living area, dining area (seen beyond), and kitchen.

Project Credits

Project: Blackbird House, Aspen, Colo.
Client: Frederic Horne
Architect: Will Bruder Architects, Phoenix · Will Bruder, FAIA (principal and design lead); Kent McClure, Jacqueline Twardowski, Craig Chapple, Marjorie Whitton (project team)
Structural Engineer: Rudow + Berry
Mechanical Engineer: Otterbein Engineering
Interior Designer: Will Bruder Architects
Landscape Architect: BlueGreen
General Contractor: Koru
Size: 5,829 square feet
Cost: Withheld

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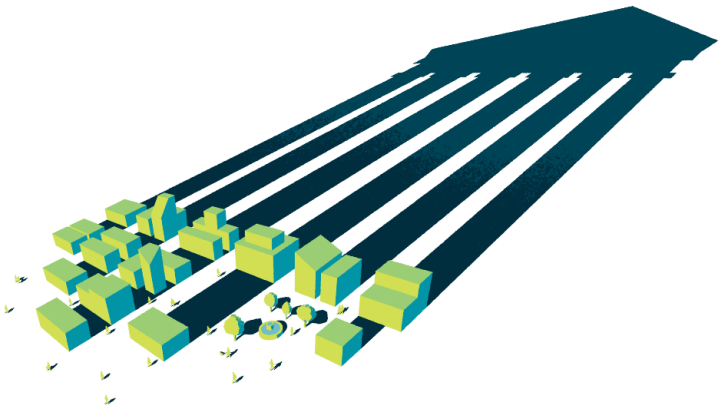

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Editorial: An Early Encounter with Tomorrow

I stole the title for this editorial from architectural historian Arnold Lewis' excellent *An Early Encounter with Tomorrow: Europeans, Chicago's Loop, and the World's Columbian Exposition* (University of Illinois Press, 1997), which documents the shock of exposure to a metropolis that emerged seemingly overnight, and in the middle of nowhere. Chicago had 4,000 residents at the time of its incorporation in 1837 and a population of 1 million when the fair opened in 1893. What the city presented to wide-eyed visitors from the Old World was a vast alien landscape of railyards and stockyards, department stores and skyscrapers—a surreal commingling of brute force and technological sophistication.

More than a century later, I find myself similarly astounded by the urban explosion in East Asia. In July, *The New York Times* and other outlets reported that the Chinese capital of Beijing is going to absorb its two neighboring provinces, Tianjin and Hebei, into a megalopolis called Jing-Jin-Ji ("Jing" for Beijing, "Jin" for Tianjin, and "Ji" for Hebei). Administratively, it would be similar to the District of Columbia annexing Maryland and Virginia. Statistically, however, there's no comparison. The commingled urban area of 83,400 square miles will be bigger than the state of Kansas, its population of 100 to 130 million potentially greater than Japan's, and its annual economic output of nearly $1 trillion larger than the Netherlands'.

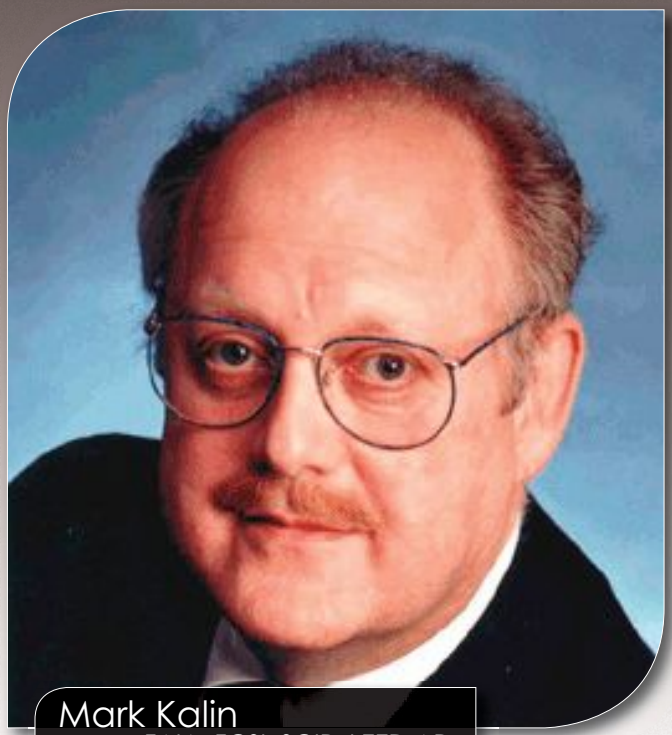
I haven't visited any of the region's great cities: Tokyo, Seoul, Manila, and the like. My impressions are all second hand. Maybe that's why I find it hard to fathom a city as enormous as Jing-Jin-Ji will be. The only analogs in my own experience are science fiction dystopias: Fritz Lang's *Metropolis*, Mega-City One from the *Judge Dredd* comics, the Los Angeles of Ridley Scott's *Blade Runner*. Is the expanded Beijing fated to follow these imaginary precedents and become an urban hell on Earth, dense, dirty, and dangerous?

Of course, by all accounts Beijing is already overcrowded and polluted (though the crime rate is lower than in most Chinese cities). Since Chairman Mao proclaimed the People's Republic in 1949, it's been policy to concentrate development in the city center. No longer. Apparently, livability is the Politburo's new watchword. While the plans for Jing-Jin-Ji remain something of a mystery, officials speak of capping the population of the city center at 23 million (it's currently around 22 million), relocating the municipal government and other services to the perimeter, consolidating manufacturing, and building new infrastructure such as high-speed rail—all in short order. Eat your heart out, Robert Moses.

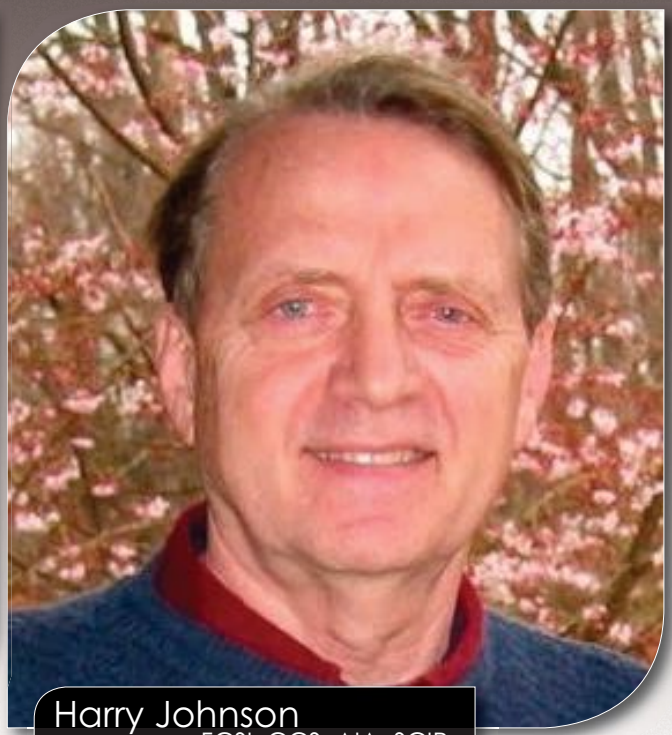
The changes are essential for China to thrive. The nation's one-child policy has stalled overall population growth, but by 2025 some 250 million Chinese will have migrated from the countryside to cities and begun to join the middle class. The number of major urban agglomerations will have risen from three in 2000 to 13 in 2020. The social and environmental implications are staggering, and it's in our own best interests to pay heed. Just as 19th century European architects adopted the steel frame and other innovations from their Chicago contemporaries, what we witness in cities like Jing-Jin-Ji could inform the future of architecture and urbanism in the United States.

STEPHEN VOSS

Meet two of America's best spec writers.



Mark Kalin
FAIA, FCSI, SCIP, LEED AP



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