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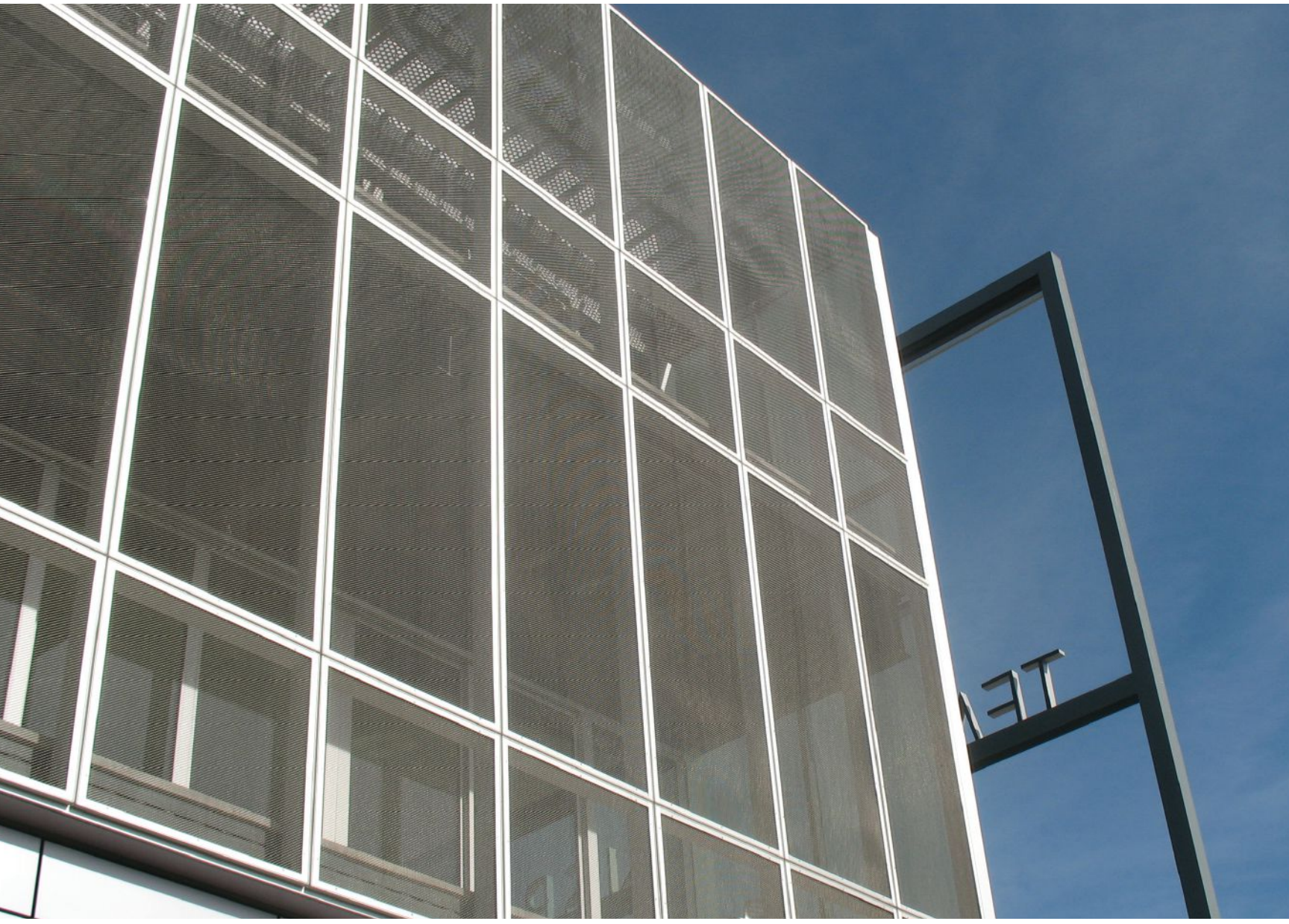

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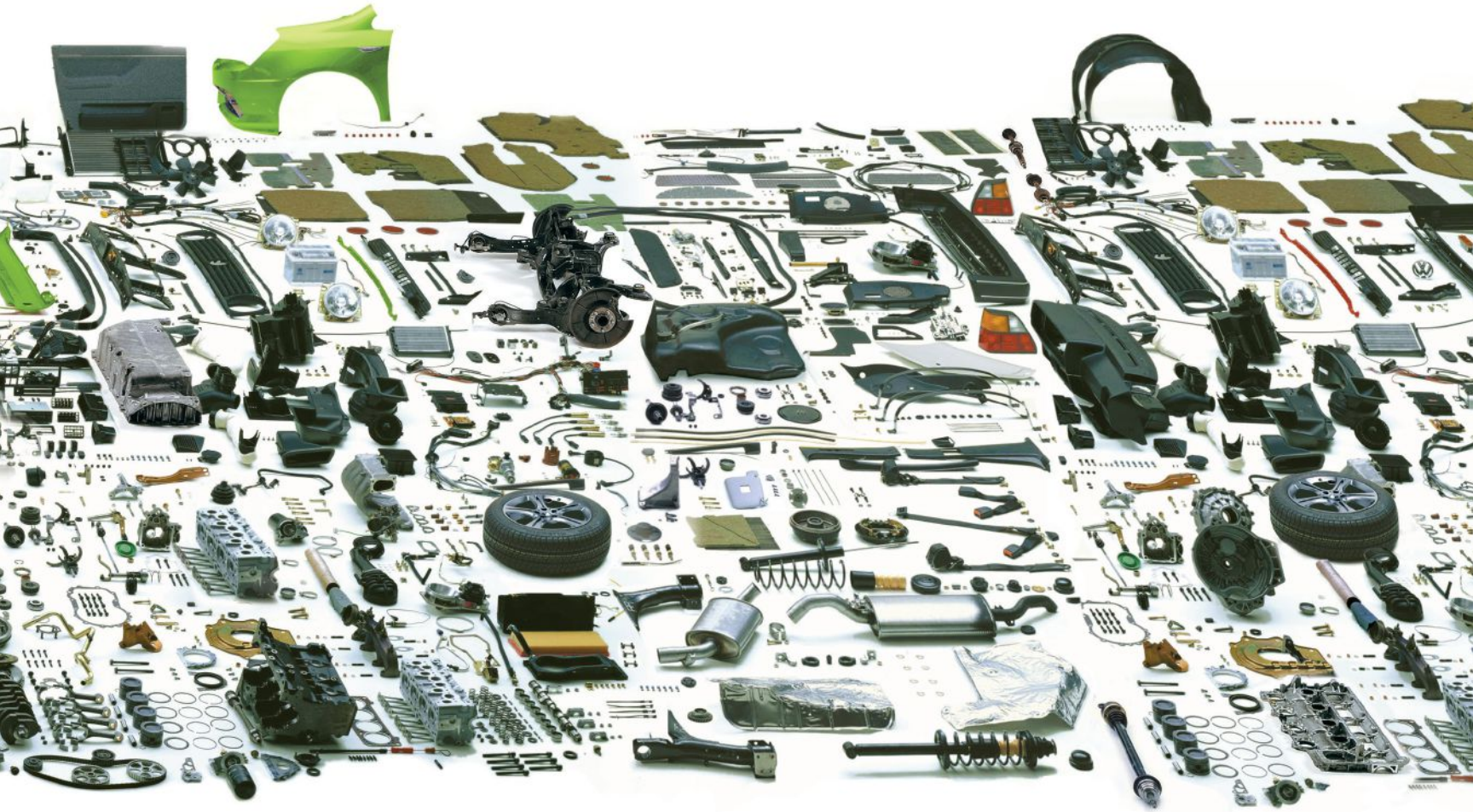

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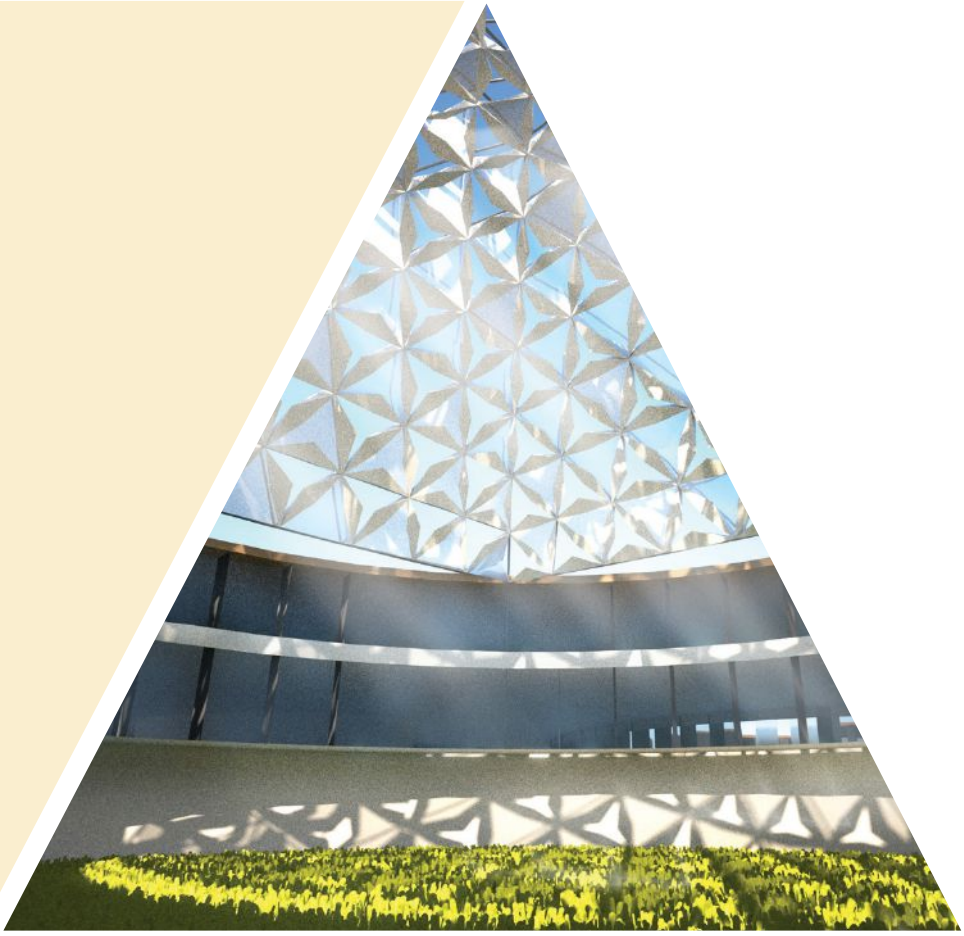

The Future of Shade calls on architects, designers and students to imagine new possibilities as they explore the integral role of fabric in shade and building design.

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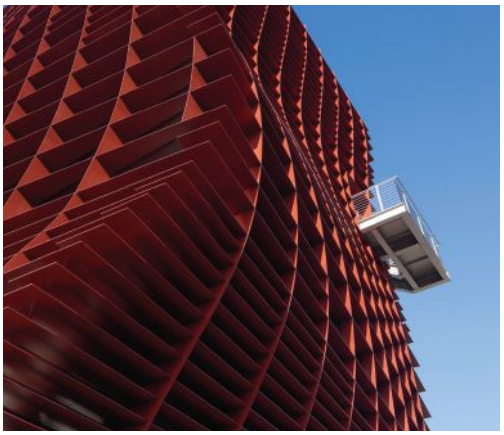
Volume 106, number 8. August 2017.
On the cover: The Chrysalis, in Columbia, Md., by Marc Fornes/ TheVeryMany and Living Design Lab. Photo by Jeffrey Totaro.



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A Magnetic Elevator for Future Buildings

German conglomerate ThyssenKrupp has debuted its 807-foot-tall test tower, designed by architects Werner Sobek and Helmut Jahn, FAIA, in Rottweil, Germany, which houses the company's new cable-free, magnet-based elevator design, Multi. Initially revealed in 2014, the concept is now being tested in three of the building's 12 elevator shafts. The manufacturer says the technology has the potential to reduce elevator cabin weight by half and could increase available space in buildings by 25 percent. The East Side Tower in Berlin—a project by OVG Real Estate, currently in its early stages—is set to be the first building to utilize Multi. —SELIN ASHABOGLU

> *For more technology news, visit bit.ly/ARtechnews.*

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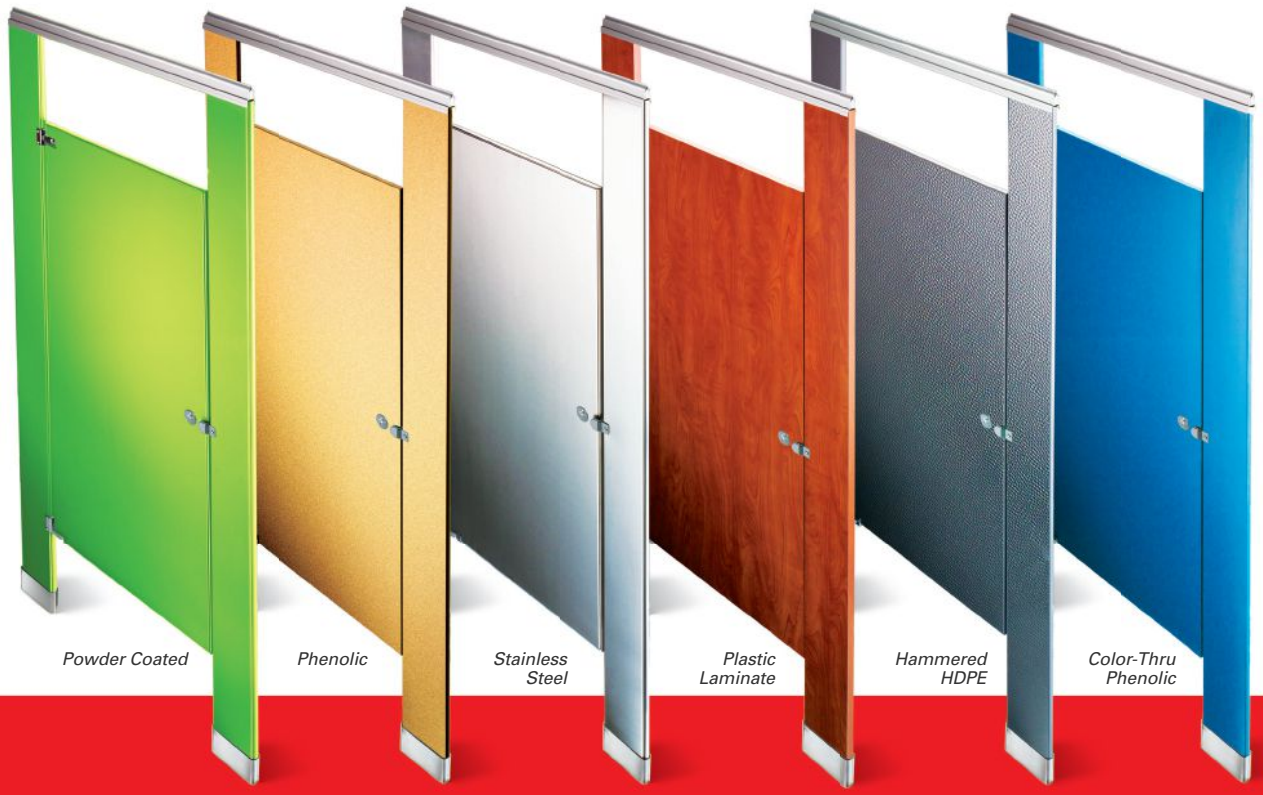

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In June, the AIA announced the 11 winners of its 2017 Small Project Awards Program, now in its 14th year. The program is intended "to raise public awareness of the value and design excellence that architects bring to projects, no matter the limits of size and scope," according to a press release. This year's winners include Mell Lawrence Architects' steel-and-concrete restroom pair, Lady Bird Loo (above), in Austin, Texas, and Architecture Building Culture's Laura's Place, a transitional housing center for mothers and pregnant women in Portland, Ore. —KATHARINE KEANE

> *See all the winners of the 2017 Small Project Awards Program at bit.ly/SmallProjects2017.*

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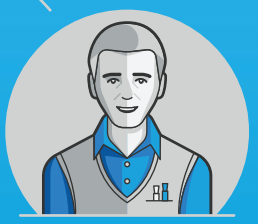

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Totally Rad

Best known for his role in the creation of the Memphis Group—a furniture and product design collective in Milan whose daring shapes and colors arguably defined the '80s aesthetic—Italian architect and designer Ettore Sottsass is the subject of a new Met Breuer exhibition, "Ettore Sottsass: Design Radical," on view through Oct. 8. The exhibition displays a variety of Sottsass' pieces including architectural drawings, machines, jewelry, textiles, photography, and furniture, such as his 1972 Synthesis 45 office furniture system side chair (above). The show also incorporates ancient and coeval objects that inspired his pieces. —SELIN ASHABOGLU

> *Read more about the "Ettore Sottsass: Design Radical" exhibition at bit.ly/EttoreSottsassMet.*

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P/A Awards

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Program: 1.12 million square feet of Class A commercial office space in two buildings, with underground parking for 500 cars, and street-related retail. The buildings are to minimize the barrier effects of a rail corridor and expressway, to give a strong "gateway" definition, and provide a comfortable pedestrian environment.
Solution: Each façade is layered to create a special character relating to its streets and settings. The design is conceived as a guide for future adjacent development; one wing of the easternmost building is clad in black granite and gray glass, while the other is a light green curtain wall, curved as a gesture toward the SkyDome nearby. The western building is skewed in plan to create a welcoming space for the downtown entry point. One wing is clad in a glass "sail," while the other is in flush granite and glass.

By articulating the office wings in this manner, the architects sought to provide the conventional mid-rise box with more elegant proportions and enhanced interior experiences. It is also their intention to create an "authentic," high quality, contemporary building that relates in a positive way to the neighboring SkyDome, CN Tower, and office buildings.

Architects: *Ellerbe Becket, New York, design consultant architect; Dunlop Farrow, Toronto, architect of record. For Ellerbe Becket: Peter Pran, design principal, Carlos Zapata, associate design director; Jill Lerner, Greg Powe, project directors; Lyn Rice, Mark*

MODEL FROM THE WEST

1 LOBBY
2 VOTING
3 MAIL
4 RAMP DOWN
5 OFFICE
6 OPEN TO BELOW
7 CONFERENCE
8 KITCHEN
9 CAFETERIA
10 WINTER GARDEN/CAFETERIA

OFFICE FLOOR PLAN

SECOND FLOOR PLAN

GROUND FLOOR PLAN

N 100'/30m

...project architects; Eduardo ...Rhea Wilthew, Curtis Wag... ...project designers; Paul Davis, Jeff ...Tom Klose, Deborah Stiefel, ...Caros, Architecture Engineers; Timothy Arnold, Vatche ...Berj Malikian, Frank Yu, ...Mrs. John Kelly, Timothy ...and Melissa Koff, project ...Dunlop Farrow: Peter War... ...project director and partner, Doug ...project manager and partner, ...Morgan, associate partner, Alan ...associate partner; Christian ...Robert Cheng, Nada Bajie, and ...Rinkakis, project team).
...CN Real Estate, Michael Whe... ...Senior Director of Development.

Consultants: *M.S. Yolles + Partners, structural; Smith + Andersen, mechanical; Mulvey + Banani International, electrical; Ferris McCluskey Quinn & Associates, landscape; IBI Group, planning; B-A Consulting Group, traffic; K.J.A. Consultants, elevators; Rowen, Williams, Davies & Irwin, environmental engineering; PCL Constructors Eastern, construction management.*
Modelmakers: *Ellerbe Becket: Lyn Rice, Eduardo Calma, Curtis Wagner, Maria Wilthew, Frank Yu, Berj Malikian; Richard Tenguerian Models.*
Model photographer: *Dan Cornish.*
Renderers: *Carlos Zapata, Eduardo Calma, Curtis Wagner.*

Progressive Architecture 1:91
100

Groundbreaker Peter Pran Dies

Following decades at some of the biggest U.S. firms, Norwegian-born architect Peter Pran, FAIA, died on July 5 at 81. At Ellerbe Becket (since acquired by AECOM) and then NBBJ, Pran developed a reputation for championing innovation in large practices, and his work was recognized repeatedly in the Progressive Architecture Awards (e.g., above). Kenneth Frampton, AIA, once described him as "an architect for a new age, where neither the individual practice nor the corporate firm will remain the same and where the hybrid alternative will begin to have a greater chance of achieving work of quality." —SARA JOHNSON

NATALIE SAVINO

> *Read a full obituary for Peter Pran at bit.ly/PeterPranObit.*

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Best Practices: How Compliance Can Protect Your Firm

TEXT BY KATHARINE KEANE

Though many firms today have legal counsels to ensure designers are acting within the letter of the law, blind spots regarding varying ethical standards can still land an architect in hot water. Below, business experts and design leaders discuss the benefits of establishing a compliance program.

Risks and Regulations

When a designer from international firm CannonDesign became embroiled in a legal conflict due to a relationship with a developer on a federal contracting project in 2011, it became evident that, to protect and educate their staff and brand, the firm should create a compliance division. Tasked with establishing ethical standards and oversight of the company's portfolio, former FBI agent Paul Moskal joined as CannonDesign's compliance director in 2014.

To determine "what factors put the firm or its employees, clients, or partners at risk," Moskal first completed a risk analysis. While a firm's risk exposure will vary based on where projects are located, local ordinances, and myriad other factors, identifying the key risks enables a compliance officer to create a personalized plan for the firm, and a road map for employees to follow.

Establishing a Code of Conduct

One of the best ways to avoid potential pitfalls and to establish company-wide protocols for legal and ethical standards is to create a code of conduct. This can detail everything from gift giving and receiving, to privacy and confidentiality, to conflicts of interest. While Louisville, Ky., firm Luckett & Farley has yet to make the leap to creating a full compliance program, it is currently developing a code to protect both its clients and its employee owners. "We can't expect [our designers] to understand all the issues with ethics and compliance," says president and CEO Aric Andrew, AIA. "So the first step is to get the information in front of them and then [once] they understand what the issues are, [they can] hold each other accountable."

For CannonDesign, their code of conduct has not only clarified the firm's cultural, moral, and ethical expectations, but has also helped them earn and select work. "By inculcating the compliance program, honesty, and integrity into all of our business decisions, we actually bring value to our partners and clients," Moskal says. "And we've been solicited by clients to work for them, as a consequence." Matthew Dates, senior structural engineer and vice president in CannonDesign's Buffalo, N.Y., office, agrees. "Our compliance training has given our people a new sense of awareness when it comes to client engagement and pursuing work," he says.

Potential Consequences

The range of penalties for violating compliance protocols—whether local, federal, or international—is almost as vast as the number of regulations that a firm must observe. In extreme cases, a firm could be suspended or disbarred from federal work, or if an employee is deemed personally liable, it could mean jail time. "If you have information that is confidential, it can put you and your firm at risk, long-term," Dates says. "You want to be sure everyone pursuing a new project is on a level playing field."

The most common consequence today is for a company to lose face due to an oversight—regardless of intention. With the 24/7 news cycle and the proliferation of social media, "even well-intentioned mistakes can now end up as a headline in tomorrow's newspaper," Moskal says. As such, it falls to a compliance officer to ensure employees receive the appropriate training and guidance to avoid possibly career-altering consequences. "[In the legal world] ignorance isn't a defense to the law," Moskal says, and "it's the same in the AE world—not knowing the rules doesn't excuse your actions."

> "By inculcating the compliance program, honesty, and integrity into all of our business decisions, we actually bring value to our partners and clients."
>
> —Paul Moskal, compliance director, CannonDesign

> *To learn more about how compliance can help your firm, visit bit.ly/ARCompliance.*

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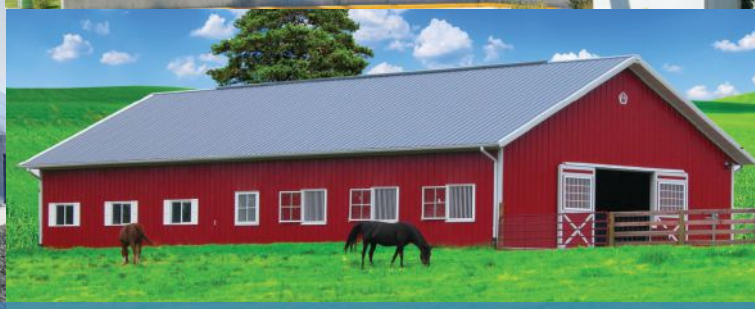

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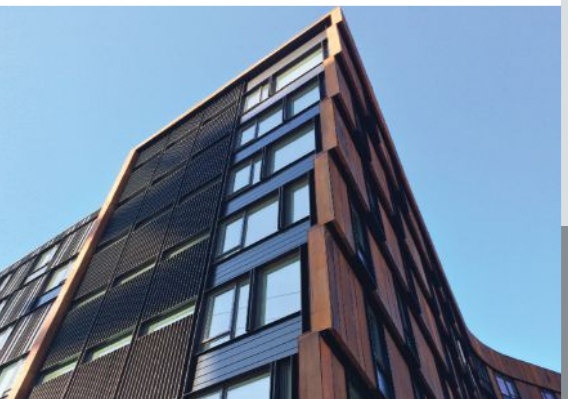

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Detail: Château d'Hardelot Theater Curved Panels

TEXT BY TIMOTHY A. SCHULER

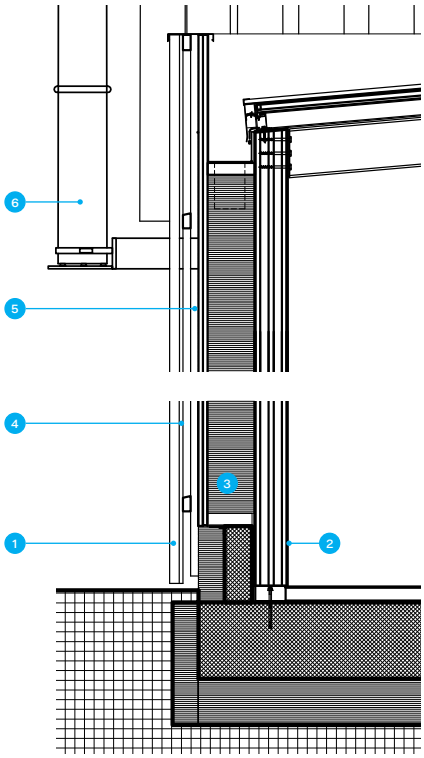
Initially designed from the inside out and without a predetermined site, Andrew Todd's Elizabethan theater at France's Château d'Hardelot emerged from what he calls a "very peculiar process." Proposed as part of a design competition hosted in 2013 by the local government in the northern region of Pas-de-Calais—just across the English Channel from the U.K.—the theater needed to be discreet to avoid competing with the 13th-century castle that occupies much of the historic area.

For their submission—which ultimately won the competition and contract—the theater-design specialists at the Paris-based Studio Andrew Todd first conceived of a three-story, cylindrical auditorium constructed almost entirely of wood, including a structure of curved cross-laminated timber (CLT) panels. From there, Todd's team honed the details. "We started drawing detailed sections, showing sight lines to get the balcony heights as low as possible, to get a rhythm of the columns that would follow a rhythm of the seats," he says. "Once we'd gotten a handle on the core relations, we expanded outwards."

Completed in June 2016, the structure became France's first permanent Shakespearean theater and one of the first buildings in the world to be made entirely of curved CLT panels. Other than the concrete floor slab and a few steel stage elements, nearly 100 percent of the building is timber, a material Todd believes "presents numerous benefits in our faltering attempts to live in balance with our world."

All of the building's concentric layers, from the innermost circular auditorium to the exterior walls, are formed by the curved timber panels. A typical wall section is a 4-inch-deep curved spruce CLT panel, a vapor barrier, 6 inches of Rockwool insulation inside a pine-wood frame—also with a vapor barrier on the inner face and plywood on the outer—as well as a Phaltex band that serves as an acoustic barrier. On the outside is a rainscreen and then larch battens, twisted 45 degrees, giving the timber walls a monolithic feel. Vertical bamboo posts, nearly 40 feet tall, have steel footings and clip to a cantilevered galvanized steel ring, to which the radial horizontal members also attach.

The raw approach was akin to Brutalism, Todd says, "but instead of concrete we were doing it in wood."



1. 40mm-square untreated larch battens
2. 109mm five-layer, vacuum-pressed CTL panel
3. 149mm Rockwool insulation in pine box frame
4. Rainscreen membrane
5. 2mm × 15mm CTB-X plywood form
6. 12m bamboo culm

MARTIN ARGYROGLO

> *To learn more about the planning and construction of the Château d'Harledot theater, visit bit.ly/ARChateau.*

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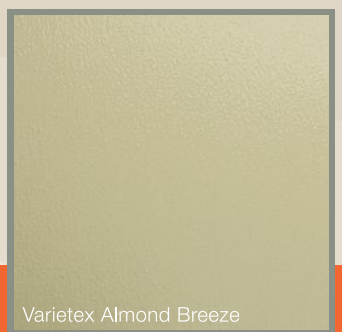

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Next Progressives: FreelandBuck

EDITED BY KATHARINE KEANE

Location:
Los Angeles and New York

Year founded:
2010

Firm leadership:
Brennan Buck and David Freeland, AIA

Education:
Buck: B.S. Landscape Architecture Cornell University, M.Arch. University of California, Los Angeles (UCLA); *Freeland:* B.Arch. University of Virginia, M.Arch. UCLA

Experience:
Buck: Neil M. Denari Architects, Johnston Marklee, Walker Macy; *Freeland*: Michael Maltzan Architecture, AGPS Architecture, Resolution: 4 Architecture, Eisenman Architects

Firm size:
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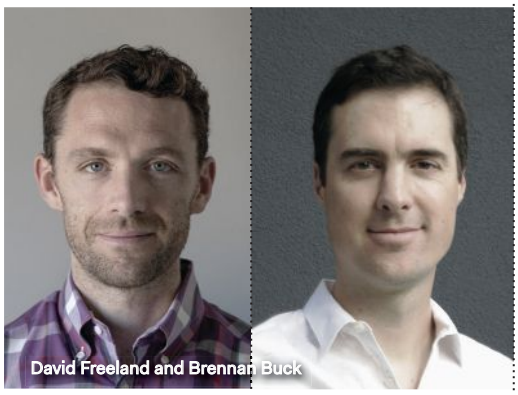

David Freeland and Brennan Buck

Mission:
We make buildings, spaces, and objects with layers—layers of meaning, illusion, and visual effect that enable people to engage with them in multiple ways. We tend to work toward this through visual ambiguity using open-ended, incomplete, or informal arrangements, images, and complexity. We try to pull together the visual detritus around us such as graphics, drawing, patterns, painting, sculpture, visual tricks, and illusions, and translate them at an architectural scale. With each project, we hope to assemble a tiny portion of a more stimulating, aesthetically engaging, and challenging world at the scale of the building.

Memorable learning experience:
By our last year as grad students at UCLA, we had seen a lot of materials cut on the school's new CNC mill—acrylic, plywood, MDF, etc. These materials all tracked the contours and undulating surfaces being cut into them without added variety or material character. Driving by a freshly felled street tree in Westwood, we loaded a few logs and stumps into the back of the car and put them on the mill. The intersection of digital contours and the natural grain of the wood yielded something much less predictable at first glance—a lesson that has stuck with us 10 years later.

Favorite project:
Parallax Gap installation at the Renwick Gallery in Washington, D.C. (open until February 2018). This is the culmination of a series of projects that attempts to build drawings. Of course, drawings are always a part of the process of building, but at the Renwick, the installation is a three-dimensional physical drawing, with elements like linework and hatching constructed as objects in the space.

Design tool of choice:
All of them. We've never believed design software could do everything or that the pencil sketch is the only direct, intuitive way of designing. Hand sketches, physical models, digital modelers, and algorithms are all useful and we employ each of them.

Design aggravation:
Expressed floor slabs that reveal everything about a building's interior. We'd rather live among buildings that are a little more mysterious.

Architectural hero:
Walter Netsch. Looking over his career, Netsch was more concerned with spatial complexity than beauty. While many of his projects are massive concrete structures that are not popular today and have proven functionally difficult, we frequently think about the moments of spatial complexity that he achieved and the layered geometric processes he used.

Special item in your studio:
Baratza Encore Conical Burr coffee grinder

LEFT: JONATHAN FREELAND; RIGHT: COURTESY FREELANDBUCK

>*To learn more about the firm's projects and inspiration, visit bit.ly/ARFreelandBuck.*

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Next Progressives:
FreelandBuck

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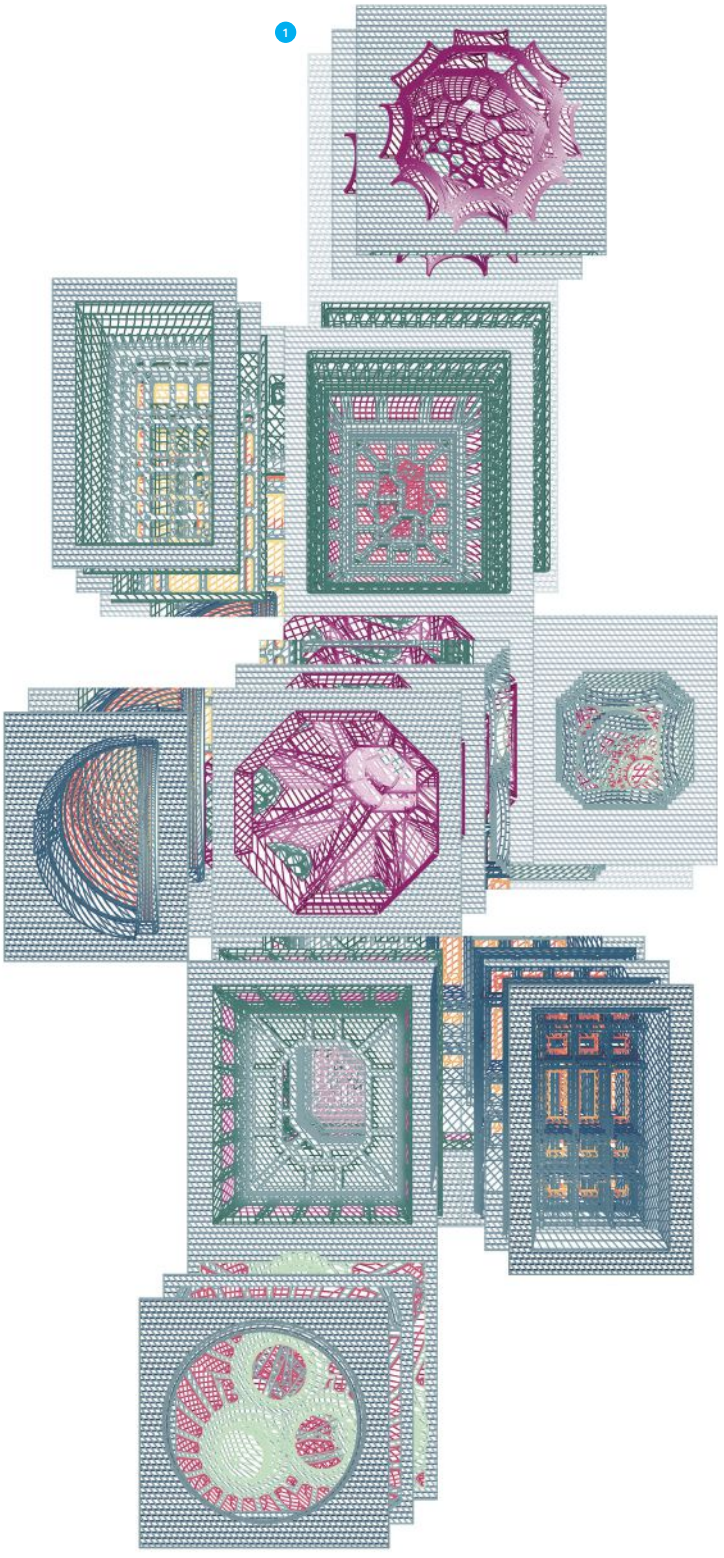

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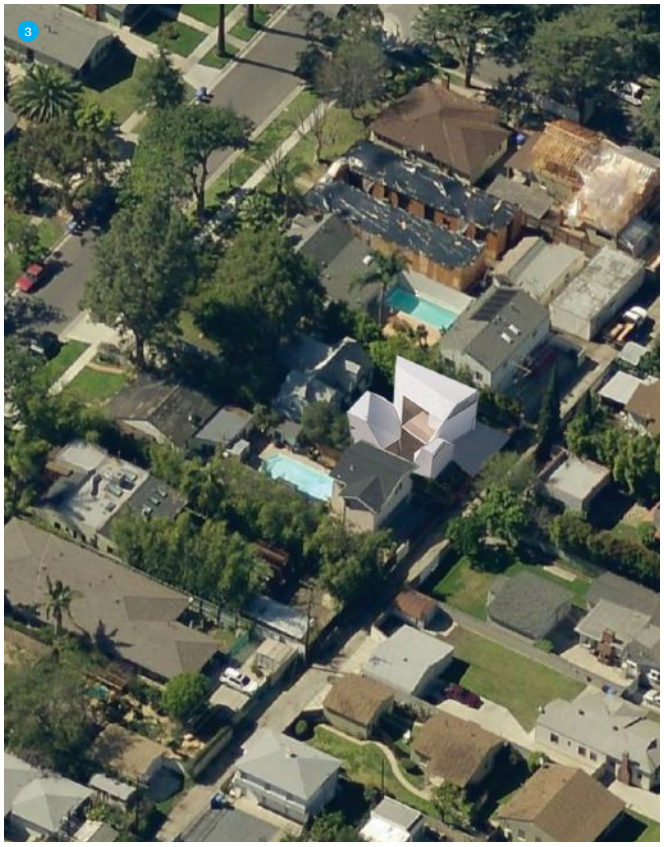
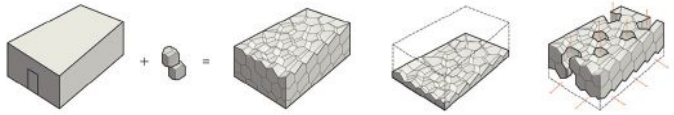
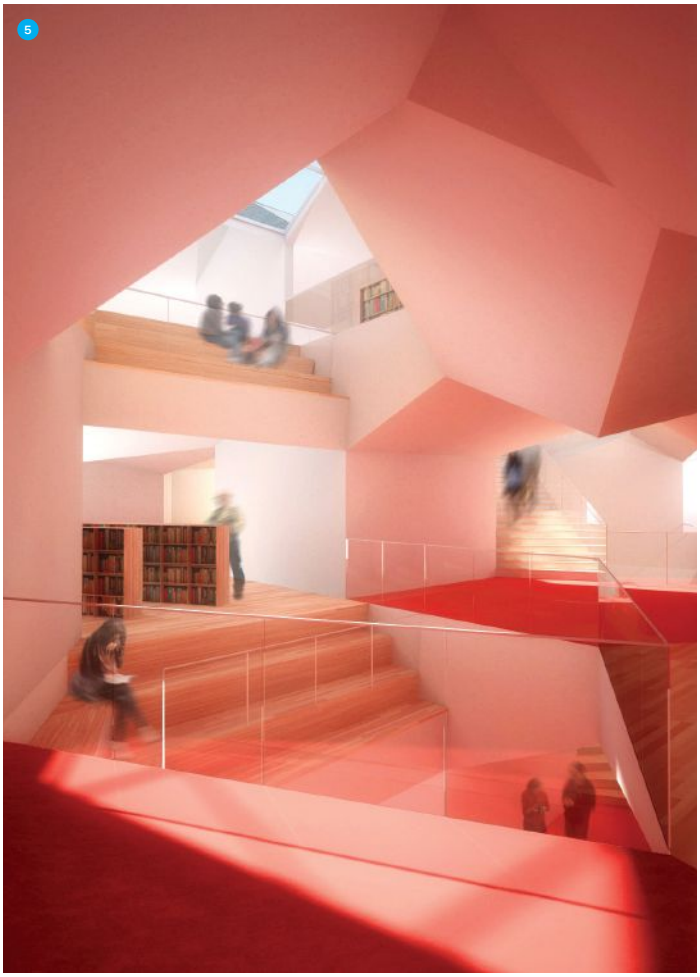
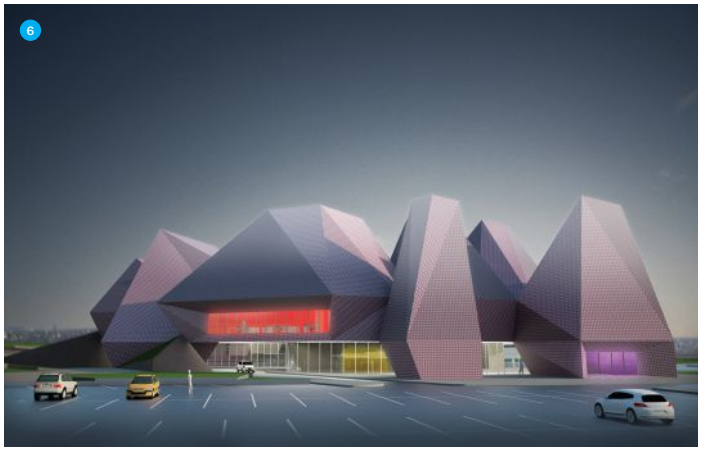


ALL EXCEPT 4: COURTESY FREELANDBUCK







1. David Freeland and Brennan Buck were inspired by trompe l'oeil ceilings when creating "Parallax Gap," a 2,500-square-foot installation suspended from the ceiling of Washington, D.C.'s Renwick Gallery that depicts a composite of sketches of historic ceilings. **2.** This 2016 design competition submission proposes an interactive temporary structure through which to view the Flatiron Building in New York. A "collection of fractured, varied" images of Daniel Burnham's iconic structure are printed onto the form. **3.** Due to the limited views surrounding the site of this 1,500-square-foot residence, Freeland and Buck opted to reorganize the structure's volumes to create a central courtyard, encouraging the inhabitants to look inward at their outdoor living space. **4.** FreelandBuck describes the geometric ceiling canopy over this Kuwait City restaurant as "vaguely arboreal," using rotated orientations rather than a traditional grid pattern to divide the space into smaller interior volumes. **5.** For the design competition for the Daegu Gosan Library in South Korea, the duo proposed a "nested cellular" geometric structure made of five-sided volumes. **6.** In this proposal for the Istanbul Disaster Prevention and Information Center, which houses various disaster simulation galleries, Freeland and Buck conceptualize an irregular form created from a core of smaller, independent "boulder" rooms.

Products: Outdoor Sectionals

TEXT BY SELIN ASHABOGLU

Riad Sectional Sofa, Oasiq

Midcentury designers such as Mathieu Matégot inspired the shape of this collection of six seating modules. A slim teak trim is set along the top of each module's perforated, powdercoated aluminum backrest. The two left- and right-arm single-corner modules measure 41.8" wide by 35.7" deep, while the central corner module measures 35.7" square; the left and right lounge sections measure 72.37" by 38.6" (shown), and the two-seater center module measures 64.6" wide by 35" deep. The sectional's cushions are available in three weather-resistant fabrics: canvas natural, sooty, and panamone green. The aluminum frame comes in white, anthracite, and pastel-green powdercoated finishes. *oasiq.us*

Pure Sofa Collection, Janus et Cie

Romanian designer Andrei Munteanu created this Indonesian teak–framed sectional made up of three independent parts—a right-arm two-seater, a left-arm two-seater (shown), and a corner module—which can be configured in a variety of ways. Each two-seater module measures 75.6" wide by 38.2" deep, and the corner module measures 38.2" square. Cushions are available in two styles—tailored or casual—and are stuffed with dry foam, polyurethane foam, or water-repellent filling. Available in 27 fabric colorways including canvas, ciel, and leaf. *janusetcie.com*

Saler Teak Sectional Sofa, Gandia Blasco

This contemporary sectional can be arranged into a host of configurations due to its four versatile parts: a single-seater, a corner lounge sofa, a corner two-seater, and a center two-seater. An anodized aluminum frame is clad in teak wood planks to provide a warm contrast between the two materials. The corner lounge sofa, corner two-seater, and center two-seater measure 71" wide by 35" deep; the single-seater measures 35" square. The sofa is topped with cushions filled with polyurethane foam that come in removable, water-repellent fabric covers that are offered in more than 90 colors. The aluminum frame is available in seven finishes, including silver, bronze, and anthracite. *gandiablasco.com*

> *To discover more outdoor furnishings, visit bit.ly/OutdoorSectionals.*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CONSERVATORIES AS ADAPTABLE ENVIRONMENTS

Presented by:

CONSERVATORY CRAFTSMEN

LEARNING OBJECTIVES

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

1. Examine the history and uses of glass conservatories .
2. Outline the functional and environmental benefits of conservatories.
3. Identify key elements of conservatory design and construction.
4. Discuss how automation enables comfort, convenience, and energy efficiency.

CONTINUING EDUCATION

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By Aphrodite Knoop

HISTORY AND USES OF GLASS CONSERVATORIES

From modest greenhouses to soaring glass structures, conservatories inspire and connect us to the natural world, even in the harshest of climates. Conservatories are such a unique and distinct part of a home that many conservatory owners speak of them as if they have identity and soul.

In the past, a conservatory was a loosely built shed-like structure attached to a house for growing plants. People would often set aside space in these structures for relaxing and socializing. Today, the boundaries among conservatory, greenhouse, orangery, and sunroom are blurred. So, what exactly is a conservatory? By definition, it is a structure with more than 50 percent of its wall surfaces made of glass. Conservatories often are attached to buildings (whether residential or commercial) and have ceilings composed entirely of glass. They can be divided into sub-categories and almost all depend on the overall pattern of the roof such as gable, lean-to, peaked roof, and lantern style.

History of glass conservatories

Although the history of conservatories can be traced back to the Roman Empire, the glass conservatory as we know it today came into vogue in England during the 19th century. During the early and mid 1800s, there was a tax on glass in England, where wood was used to fire glass kilns. The English needed the wood for the boat building industry and therefore homes were taxed based on the number of windows.

When manufacturers switched from wood to coal for kilns, the demand for wood decreased and thus glass became more available and affordable for use in construction. Then came the 18-acre Crystal Palace, built for the Great Exhibition of 1851, which captivated the world and ignited a love of the sun-drenched, sparkling glass structures.

This obsession with glass conservatories was forgotten during the economic crash of the 1920s, during which time conservatory space was deemed a needless luxury. As homes were being made more comfortable with central

heating, the less advanced materials that were available for conservatories in that period made the rooms uncomfortable for much of the year.

Although conservatory construction waned with the advent of WWII, the 1950s and 1960s brought a minor resurgence in the form of simple sunroom additions. By the 1970s, conservatory construction flourished again as architects began recreating the grand styling of the 19th century Victorian structures, taking advantage of insulated glass and modern framing materials.

Recent decades have brought a boom in conservatory construction around the world. The latest incarnation of the conservatory is versatile in both function and design. Unlike its predecessors, a modern, well-built conservatory can be used in all seasons, as it remains cool on the hottest days and warm in the coldest of winters. Features including automation, improved technology including heating and cooling systems, and solar glass help regulate moisture, temperature, and sunlight.

Myths versus reality

Despite the benefits of the conservatory, many builders hang onto misconceptions about practicality and affordability. The most common fears are of leaky roofs, overheating, extreme cold, draftiness, and condensation. Builders and owners also worry that conservatory spaces may cost far more than regular additions.

However, if you partner with a reputable conservatory builder to design the space and specify the proper materials for a function and location, the resulting conservatory will be durable, comfortable, and energy efficient.

For example, more than a dozen conservatory projects went through Hurricane Sandy without leaks or other damage. On one house with a conservatory addition, the new windows on the main house blew in. Yet the 40-foot high conservatory, which was well-engineered and had safety-treated glass, took the brunt of 100 mph winds and stood firm. Safety-treated glass is ideal for such roofs—particularly in storm-prone areas—because it will not break from hail.

That's not to say that conservatories will not ever leak or break. Like any other type of construction, the success of the project depends on the skill and experience of the conservatory contractor and on proper attention to detail and specification of the appropriate materials.

Residential and commercial applications

Conservatories, whether used in residential or commercial applications, can vary greatly in scale, scope, and variety.

Even in residential uses, conservatories are now so much more than small backyard structures made up of discarded wood storm windows. They can be unique architectural and high-tech showpieces that accommodate and enhance modern lifestyle and activities including horticultural greenhouses, lounge areas, pool houses, breakfast nooks, and other functions.

With technological advancements that enhance comfort and convenience as they lower costs, these structures are attractive alternatives in the home renovation market.

Much like their residential counterparts, commercial conservatories showcase a broad array of design and functionality. They can be vast, covering dozens of acres with glass.

In the United States alone, there are more than 21 million acres of tomatoes, peppers, and herbs growing under greenhouses for sale at markets around the country. Commercial greenhouses now produce more than plants and flowers. They are also used to farm shrimp, oysters, fish, and even gourmet algae.

Then there is the more recent trend of using conservatory construction for event centers. The large community conservatories built in the last century for the public have morphed into structures that provide the controlled environments needed for all-season community and family events. Even so, public horticultural conservatories continue to attract public functions because people still enjoy the atmosphere and aesthetics of a traditional conservatory.

Because conservatories have always lent themselves to social gathering functions, they are a natural fit for theme parks where the public has access to outside views and daylight, but is sheltered from the elements. Climate controlled glass are now home to zoological parks, water rides, carnivals, and other types of theme parks, where the season and time don't have to curtail activities.

Originally, conservatories were meant for growing tropical plants in a temperate climate. Today, universities and government agencies are commonly using greenhouses as research facilities for ongoing research and ecological testing. Controlled environment testing allows researchers to save endangered plant species, study plant interactions, and develop new hybrids for the changing environment.

Conservatories are also popular with retailers and property managers who look to natural light to boost customers' moods and put them into a buying mood. The relative uniqueness of a store under glass also makes branding and name-recognition easier.

FUNCTIONAL AND ENVIRONMENTAL BENEFITS OF CONSERVATORIES

The design of conservatory structures is as unlimited as the imagination. Conservatories can be whimsical, grand and soaring, contemporary, classical, minimalist, or ornate. These structures, which originally were only places for growing plants, have evolved into truly singular spaces in which to live, work, learn, and play. Conservatories and greenhouses can be as custom as any other addition. Specialty mullions and muntins, hand woodworked details, choices in framing materials, and stained glass, and other elements help make each "crystal palace" one of a kind.

The structure to which a conservatory will be added (as applicable), the surrounding topography and climate, the intended purpose of the conservatory, and the needs and personality of the owner all play an important role in shaping the design to create a signature piece.

Architects and building owners appreciate glass both for its beauty and versatility and for its positive environmental impact. Technological advancements in glass manufacturing have also made glass more appealing to the construction and development industries. Among the advancements that make glass a good construction material are its high compressive strength and resistance to corrosion.

Glass is transparent, reflects light, makes spaces feel open and expansive, and allows views while drawing natural light indoors. However, glass is more than a glazing material; it is also a structural material. It can be used for floors, facades, roofs, and even framing.

Glass roofing in conservatories lifts the spirits and brings natural light into our lives. It adds drama to a space and helps set conservatory architecture apart from the mundane.

Structural elements

A conservatory glass structure has two key components: the glass itself and the structure holding the glass, with the glass roof being the dominant element.

In a conservatory, the roof carries the huge weight load of its glass. It must be engineered properly and may need supplemental structural support.

A conservatory roof differs from a typical roof structure in its relationship to water and load. A good design prevents leaking, so architects benefit from working with a conservatory contractor who understands the unique issues of conservatory roof design, including water movement, optimal pitch, and local code issues. When working with a conservatory contractor, architects have engineering and code/liability support and can feel confident when presenting to a client.

Smaller residential structures are typically made of wood because wood has excellent thermal properties. Sapele mahogany is a standout material because of its tremendous strength and moisture resistant qualities that far surpass other woods.

Sapele mahogany belongs to a family of hardwoods grown sustainably. A knowledgeable conservatory contractor will opt for only high quality hardwoods for strength and durability and specify stainless steel hardware to avoid rusting of components.

Metal is also used for the structural framing. Ideally, it should be a powder-coated aluminum. Powder coating is a paint method that allows the aluminum to be matched to any color. Aluminum today is the architect's choice of framing because it is thermally broken and can meet stringent energy codes. The thermal break (or thermal barrier) provided by the aluminum framing has low thermal conductivity so that the enclosed space stays cool in summer and warm in winter without condensation and moisture problems.

Steel can also be used in conservatory construction. However, it is typically used only as a sub structure which, like aluminum, is powder coated.

Glass is the highlight material of the conservatory. Glass can be solar collecting, decorative, lit to a rainbow of colors, and

light diffusing—which is important in many environments. It should be custom fabricated for each conservatory project to meet the needs of the environment it encloses and defines.

Modern glass design and fabrication processes provide us with ample opportunities to use energy and create bright spaces filled with natural sunlight and abundant plant life, without negatively affecting the environment.

Energy and environmental benefits

A conservatory or greenhouse is where lifestyle meets practicality and sustainability. Climate change is threatening the world's natural resources. As a result, people are becoming more aware of their carbon footprint: how much energy they consume, the environmental factors involved in growing their food, and how to incorporate sustainable practices into everyday life. As a result, the building industry strives to optimize energy efficiency to meet market demands and global challenges. Conservatory construction techniques can be effective tools in meeting the needs of a more aware global consumer.

The primary goals of green building are to reduce the use of non-renewable resources, promote products that can be reused and recycled, and improve building performance and efficiency. Glass meets the criteria in that it has minimal environmental impact and is 100 percent recyclable.

Glass walls, when designed with energy in mind, can greatly improve a building's energy efficiency. Insulated glass is particularly energy efficient and has a special low-emissive (Low-E) coating to allow sunlight to pass through but reflect excess heat. Installing skylights, windows, and doors with this premium material is more expensive upfront, but its natural ability to keep the space cool when it is hot outside cuts electrical costs considerably as well as improving customer satisfaction.

In addition to energy benefits, conservatories also enhance comfort as well as emotional and physical well-being. As outlined in the *Whole Building Design Guide*, these benefits arise from access to natural daylight and views, ventilation, acoustic and thermal comfort, which we achieve with properly specified glass.

KEY ELEMENTS OF CONSERVATORY DESIGN AND CONSTRUCTION

When it comes to extending living space and enjoyment while maintaining a low carbon footprint, greenhouses and conservatories are good options. Conservatories can be built at the same price point as any other home addition, but can yield a greater return on investment because of the unique and attractive approach to the additional functional space.

In addition to the financial benefits, there are even greater quality-of-life benefits. For example, conservatories help us enjoy watching snow or rain as we sit sheltered on a cozy sofa, see a summer sunset free of bugs, luxuriate in starlight as we lay in bed, and grow organic fruits and vegetables all year round.

Architects and homeowners appreciate conservatories because of the tremendous design flexibility. Conservatories are crafted exactly to specification to accommodate an owner's specific needs. One structure may be built entirely of glass, another of stone knee walls and custom woodwork, and yet another of soaring arched windows accented with stained glass.

This unique undertaking begins with the architect getting to know the client's needs, including how the client intends to use and maintain the conservatory. What will happen inside that space? What is the surrounding environment like? Will the space be used for houseplants, people, or both? The start of the project, when architects address these questions, is also the best time to begin the dialogue with the selected conservatory builder.

QUIZ

1. Which of the following is the defining characteristic of a conservatory structure?
   a. The roof is made of steel and glass
   b. More than 50 percent of its wall surfaces are glass
   c. More than 50 percent of the roof is glass
   d. The glass is always supported by steel

2. True or False: English orangeries were the first glass conservatories in history.

3. Builders were wary of building glass conservatories for which of the following reasons?
   a. Difficulty of glass installation
   b. Lack of variety in roof shapes
   c. Fear of leaks
   d. Difficulty of permitting

4. Glass conservatories offer owners which of the following?
   a. Energy efficiency
   b. Comfort through automation
   c. Unique living spaces
   d. All of the above

5. How does automation technology support energy efficiency?
   a. By providing webcams with security monitoring
   b. By monitoring environmental changes and adjusting thermal and lighting systems
   c. By alerting owners to make changes to conservatory systems
   d. By activating HVAC systems at specific times during the day

6. Which of the following are uses for conservatories?
   a. Hosting of public events
   b. Cultivation of tropical plants
   c. Farming of edible algae
   d. All of the above

7. True or False: Glass conservatories can withstand hurricane-force winds.

8. Which of the following is not true of conservatories?
   a. Roof shapes can be any pitch or design
   b. Both plants and humans can thrive in the conservatory space
   c. Leaking and moisture issues are inevitable
   d. Can incorporate sustainably grown hardwoods

9. What is the role of finials and cresting?
   a. Keep pigeon droppings of the roof
   b. Add decorative flair to the roof line
   c. Break up the glass surface to reduce sun exposure
   d. Provide grounding for lightning protection

10. When properly designed, glass provides which of the following?
   a. Incremental cooling
   b. Plant partitioning system
   c. Acoustic transmission
   d. Energy efficiency

This article continues on http://go.hw.net/AR082017-1. Go online to read the rest of the article and complete the corresponding quiz for credit.

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INTEGRATED AIR & WATER BARRIER SYSTEM

Integrated air and water barrier system application

LEARNING OBJECTIVES

- Understand the purpose of air and water barriers, as well as their makeup in building enclosures.
- Become familiarized with the various types of air and water barrier systems and assemblies, and their comparative advantages.
- Understand the codes and standards that govern air and water barriers.
- Differentiate between traditional and integrated air and water barrier systems.
- Learn installation best practices related to integrated air and water barrier systems.

CONTINUING EDUCATION

CREDIT: 1 LU

COURSE NUMBER: AR072017-4

Use the learning objectives above to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR072017-4 and complete the quiz for free as you read this article. If you are new to Hanley Wood University, create a free learner account; returning users log in as usual.

By Matthew Sisul

INTRODUCTION

This course provides guidance for architects, specifiers, waterproofing contractors, and other professionals considering use and advantages in the selection or specification of air and water barriers for the design and installation of integrated structural panel and air and water barrier systems. Topics covered include an introduction to air and water barriers, structural panels, code requirements when designing for energy code compliance, and common design and installation practices and techniques.

This course should serve as a refresher for architects and builders on the subject of building enclosures, and their component parts, with special focus on air and water barriers. The practicing architect or builder often has end-to-end responsibility for a project from conception to execution. There is generally a wide variety of building products available for construction, although the selection of the materials that comprise the exterior may be constrained by the local environment and climate, the building's function, the budget, and the vision of the architect, builder, or owner. With the aid of this lesson, architects and builders will be armed with increased knowledge regarding enclosures and their component parts, the various options available, the relative advantages of integrated air and water barrier systems, and key considerations and guidance for specifying integrated air and water barrier systems for code conformance.

PART 1: INTRODUCTION TO BUILDING ENVELOPE AND BARRIERS

Building Trends

Modern advances in construction techniques, design, and materials has led to an explosion of options for architects, engineers, and builders when it comes to building construction. However, framed construction remains the most popular building methodology for single-family residential homes, as well as multi-family and commercial buildings of up to five stories, in North America. Continued popularity does not mean framed construction has not advanced along with building practice in general. Over the years, framed construction has undergone many changes, from construction methods, to materials available, to the manner in which

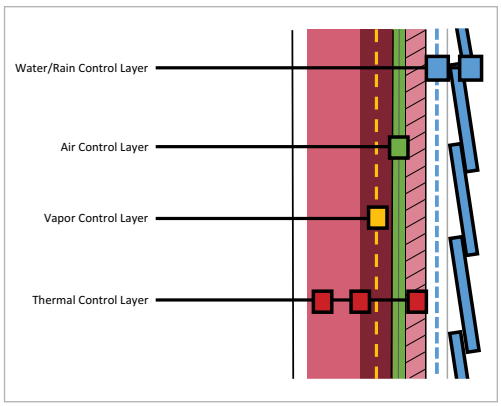
the building envelope is conceived. For the practicing architect, engineer, or builder, staying current with trends in framed construction is critical for executing the best possible project. In this section, we will cover the state of the art when it comes to building envelopes in framed construction.

For the purposes of this article, the construction practice is limited to wood platform frame construction utilizing dimensional lumber, with plywood or OSB sheathing covering the exterior.

The Enclosure

The goal of any building is to protect the occupants on the interior and allow them to function within the space as intended. Traditionally, this goal was met by a building system that simultaneously provided the structure and the means to protect the interior from exterior elements like weather and temperature. Advances in practice, materials, and technology have allowed designers to deconstruct these functions and assign them to specialized elements. Together, these elements comprise the building enclosure. The enclosure is comprised of the structure, the control layers, and cladding. The elements cannot function without the support of the others. Deficiencies in one or more element may negatively impact other elements and ultimately lead to building failure. For this reason, it is critical that architects, engineers, and builders understand the requirements of various elements, design and install each properly, and understand the interplay between elements. The structure supports the building and holds the control layers and cladding in place. The control layers protect the structure against weather, including air, water, water vapor, temperature, and when cladding is not present, radiation. Cladding is the outermost layer, protecting the control layers from radiation, impact, and general wear and tear. Generally, the elements are arranged with cladding at the exterior, the structure on the interior, and the control layers in between. There are exceptions to this arrangement, particularly when a single material functions as two or more control layers.

In wood frame construction, dimensional lumber and plywood or oriented strand board (OSB) sheathing acts as the structure, house wrap and insulation are the control layers, and the cladding may be vinyl siding, wood shingles or shakes, brick veneer, or many other common materials. The selection of structure and cladding by the architect, engineer, or builder is commonly a mixture of design intent and cost considerations. The selected materials reflect the type of building, the desired aesthetic, and cost. These factors place constraints on whoever is selecting material for structure and cladding. Less understood or clearly delineated are the factors that must be considered during selection of the control layers and the relative trade-offs between the needs of the designer, the contractor, and the building owner or occupant. Nominally, the architect is responsible for designing the control layers, but input from the engineer, contractor, and owner/occupant is critical to ensure the right systems are selected. In order to understand the trade-offs associated with the design of the control layers, we need to take a closer look at the different elements that comprise the control layers, particularly in wood frame construction.



Configuration of Control Layers

Elements of control layers

Control layers protect the structure from the environment, including air, water, vapor, temperature, and at times, radiation. Protection from environmental conditions is a matter of both comfort and protection of the structure. The five common components of the control layers are:

- Air Barrier;
- Water Barrier;
- Vapor Barrier;
- Insulation; and
- Radiant Barrier.

Each control layer protects the structure from a different environmental condition—as their names suggest, air barriers prevent passage of air, water barriers keep out water, vapor barriers prevent penetration of water vapor, insulation protects from heat gain and loss, and radiant barriers reflect radiant heat. The control of environmental conditions is important to the architect, engineer, and builder for many reasons. First, as stated previously, the control layers protect the structure and help ensure the building stands for a long time. Water infiltrating the structure over time can cause a number of structural problems. Steel structures can start to rust due to excessive contact with water and air. Reinforced concrete may spall or break out due to excessive contact with water, especially in areas where cracking, even hairline cracking, is present. Wood in contact with water could lead to rot. Water and air may enter the building through the same openings or gaps, but water may also enter the building in the form of water vapor. As such, considerations must also be made for the control of water vapor. Temperature plays a role in the passage of air, water, and water vapor, as temperature differentials between the interior and exterior of a building can promote condensation.

Environmental conditions affect the comfort of the building occupants. A space can be unusable to its occupants if there is excessive heat, cold, or humidity. Adequately functioning control layers can support building comfort, though a building's comfort is controlled primarily by the heating, air conditioning, and ventilation system (HVAC). HVAC are electrical and mechanical means for controlling comfort, and properly installed control layers work with the HVAC.

The relationship between control layers and HVAC is evolving. Prior to the common use of HVAC, proper control layers and passive designs were necessary to ensure comfort. HVACs allowed comfort to be controlled through the application of energy, and reliance on control layers diminished, leading to excessive energy use in buildings. Buildings were built with tight seals to prevent air and moisture intrusion but with limited insulation, leading to operation of HVAC all year. Alternatively, gaps or incomplete control layers allow heat and cold to escape, leading to increased HVAC usage.

In modern construction, where energy efficiency is promoted to reduce a building's cost, HVAC remains necessary and must work in harmony with the control layers. A properly sealed building may allow in little outside air, but the air inside would become stale over time or develop an unpleasant odor without an HVAC generating air exchange. The HVAC brings in outside air, first conditioning it, so that it does not carry excessive moisture, heat or cold, depending on application.

Types of control layers

Air Barrier

The air barrier helps to prevent air infiltration and improve a home's energy efficiency—a home with a more effective air barrier is referred to as a tighter home. An air barrier is a system that is comprised of several different elements working in concert to ensure tightness. Its purpose is to prevent or minimize the flow of air into and out of the house, which are referred to as infiltration and exfiltration, respectively. Air flows through gaps in windows, doors, openings for systems like MEP, rips and tears, joints, transitions, and penetrations resulting from nails or other fasteners. Air movement is caused by differential pressure, high pressure on the outside due to wind coming up against lower pressure on the inside, and air's natural tendency to move from areas of high pressure to low pressure. The differential pressure may be caused by wind striking the surface; suction on the roof; stack effect, which is the phenomenon of hot air rising up a structure exiting from the roof, while simultaneously drawing cooler air in at the base; or mechanical pressure induced by HVAC. It is critical that an air barrier properly resist all forms of infiltration continuity in the barrier. Continuity is achieved by binding together the various elements of the air barrier system. The elements of the air barrier system are described below.

- Air barrier materials: the primary material of the air barrier is the principle source of resistance to the passage of air.
- Air barrier accessory: these are materials that maintain air tightness between elements of the air barrier system; they bind the elements together or line the boundaries. Special tapes or paints are used as accessories.
- Air barrier components: these are pre-manufactured elements of the buildings like windows, doors, and service elements, that are sealed and joined with air barrier materials by air barrier accessories.
- Air barrier assemblies: combinations of air barrier materials and accessories designed to act as continuous air barriers, often assembled on site or pre-assembled prior to shipping.
- Air barrier systems: the fully constituted environmental barrier that protects the structure comprised of air barrier assemblies and components stitched together by accessories.

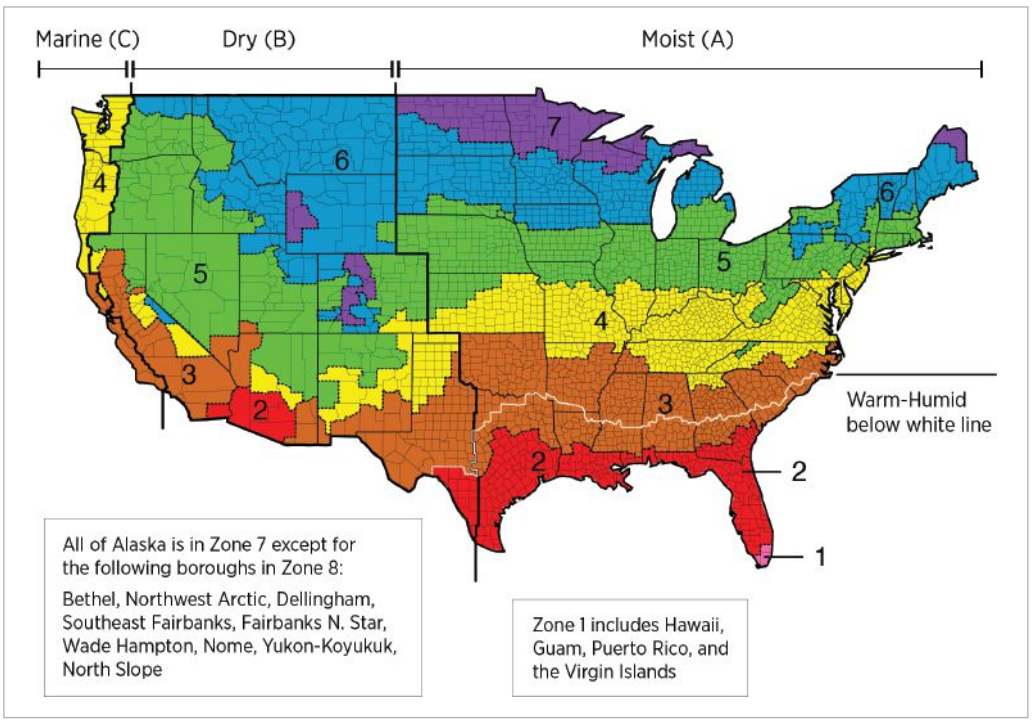
Water Barrier

The primary purpose of the water barrier is to prevent water from entering the structure, helping to mitigate moisture damage. Water barriers may be wraps mechanically fastened to the structure or membranes applied as a fluid, a cellular plastic, self-adhered membrane, building paper, or other material designed to resist water in its liquid form. They are used with flashing and supporting materials to route water away from exterior sheathing. Water barriers are designed primarily to keep out bulk liquid water, which comes into contact with the building as falling rain, wind borne rain, snow and ice, and other direct forms of water. Water barriers are not necessarily designed to be air or vapor barriers, though, in many cases, the same product may take on multiple roles. In most cases, the water barrier does not act as a vapor barrier, but rather is designed to allow water to pass through the barrier as a vapor in order to facilitate drying of the building interior.

Illustration of vapor permeability

Vapor Barrier

A vapor barrier protects the structure from the transmission of water in vapor form. It is different from an air barrier, as an air barrier limits bulk airflow while the vapor barrier controls water vapor. Water vapor moves through a barrier at the microscopic level, through the pores in the material, driven by pressure differentials where wet warm moisture seeks cooler, dryer places. The transmission of vapor is limited by the material's permeability. Vapor barriers come in varying levels of



Climate zones

permeability, each designed for a specific purpose. The International Building Code (IBC) and International Residential Code (IRC) refer to vapor barriers as vapor retarders, and vapor retarders come in three classes, defined by their level of permeability. Permeability is measured in the US as a unit of "perms" which is defined as the passage of 1 grain/square-foot•hour•inch of mercury, which is a unit measured in mass per unit area at a set pressure. The three vapor barriers, or vapor retarders, are:

- The Class I vapor retarder, which is considered impermeable and has a permeance of 0.1 perm or less;
- The Class II vapor retarder, which is considered semi-impermeable and has a permeance of 0.1 perm to 1.0 perm; and
- The Class III vapor retarder, which is considered semi-permeable and has a permeance of 1.0 perm to 10 perm.

According to the IBC and IRC, materials with 5.0 perms or greater are considered permeable. The class of vapor retarder is important for the designer because IRC and IBC code dictate where and when to use vapor retarders based on the local climate zone of the building. Class I and II vapor barriers should be placed on the inside of frame walls (and thus on the inside of insulation) in climate zones 5, 6, 7, 8 and marine 4. Class III vapor retarders can be used in those locations provided certain conditions be met. There is debate in the industry as to the proper location of the vapor retarder. Many believe the vapor retarder should always go on the inside face of the insulation and outside of the structure in order to prevent condensation from collecting on the structure. Others maintain that such a configuration is only necessary in the zones highlighted by IBC and IRC, and that in warm climates the configuration should be reversed. Like water barriers, vapor barriers are typically mechanically fastened sheet material, self-adhered membranes, fluid applied materials, insulating board stock, or medium-density spray polyurethane foam.

Visit http://go.hw.net/AR072017-4 to read more and complete the quiz for credit.

QUIZ

1. The IBC requirement for location of vapor retarder in the building envelope in northern climates (zones 5, 6, 7, 8, and marine 4) is:
   a. Cladding, Thermal/Air/Water Controls, Vapor Control, Frame Wall
   b. Cladding, Thermal/Air/Water Controls, Frame Wall, Vapor Control
   c. Cladding, Vapor Control, Thermal/Air/Water Controls, Frame Wall
   d. Cladding, Vapor Control, Frame Wall, Thermal/Air/Water Controls

2. According to the IECC climate zone map, Los Angeles, CA is located in which climate zone?
   a. Zone 2
   b. Zone 3
   c. Zone 4
   d. Zone 5

3. How might a vapor barrier differ from an air barrier:
   a. Air barriers do not allow air to pass through while vapor barriers are water proof
   b. They are the same thing
   c. Air barriers resist air movement across the surface but allow the building envelope to breathe and dry
   d. Vapor barriers are both water tight and air tight.
   e. c and d

4. Which of the following may be the cause of differential pressure on a building
   a. Exterior wind striking the wall surface
   b. The "stack effect"
   c. Mechanical pressure induced by the HVAC
   d. All of the above

5. Which of the following is a typical challenge associated with the use of house wrap as air and water barriers
   a. Material may tear during installation
   b. Only one product available on the market
   c. Contractors are unfamiliar with the product
   d. All of the above

6. Integrated air and water barrier systems typically use what material as a substrate:
   a. Steel panels
   b. Cold formed steel track and stud
   c. OSB or plywood
   d. None of the above

7. What are some advantages of integrated air and water barrier systems over house wrap?
   a. Ease of installation—faster install by laborers
   b. Less frequent blow out of air and water barrier
   c. Ease of flashing of windows, doors, and other penetrations.
   d. All of the above

8. The IECC requires residential air barriers to perform at which of the following:
   a. 3 ACH for climate zones 1 & 2; 5 ACH for climate zones 3 through 8
   b. 5 ACH for all climate zones
   c. 5 ACH for climate zones 1 & 2; 3 ACH for climate zones 3 through 8
   d. .4 cfm/ft² at 1.57 psf

9. What amount of spacing should be maintained between panels?
   a. 0 inch
   b. 1/8" inch
   c. 1/4" inch
   d. 1/2" inch

10. What should the installer do if the overlay is damaged during installation
   a. Replace the panel
   b. Cut the affected area and affix a new panel
   c. Cover the damaged area with seam tape
   d. Contact the manufacturer for support

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Presented by:

BUILD WITH STRENGTH

CONCRETE'S CONTRIBUTION TO LEED V4

LEARNING OBJECTIVES

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

1. Recognize how concrete can be used to achieve LEED v4 project goals.
2. Recognize the significant overhaul of the Material and Resources credit category towards disclosure and optimization.
3. Describe the concrete innovations that are available to reduce environmental impacts.
4. Understand the role of environmental product declarations and life cycle assessment in achieving project goals.

CONTINUING EDUCATION

AIA CREDIT: 1 LU/HSW
AIA COURSE NUMBER: AR082017-3

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One World Trade Center, New York, NY
One World Trade Center achieved LEED Gold Core and Shell certification using several advanced energy- and water-saving technologies. In addition, the building used high strength "green concrete" produced from waste fly ash collected from coal plants. 34 percent of construction materials were sourced locally, and over 87 percent of construction waste was diverted from landfills.

By: Lionel Lemay, PE, SE, LEED AP. Executive Vice President, Structures and Sustainability, National Ready Mixed Concrete Association
Tien Peng, Associate AIA, LEED AP+, PMP. Vice President, Sustainability, Codes and Standards, National Ready Mixed Concrete Association

INTRODUCTION

Because of concrete's versatility there are many applications where concrete can be used in a building project, from foundation and superstructure to sidewalks and parking lots. That means concrete can contribute to every credit category in LEED v4. The following are suggestions for earning LEED v4 points through the use of ready mixed concrete products. The paragraph headings below correspond to the credit in LEED v4 Building Design and Construction (BD+C): New Construction (NC). Other LEED v4 rating systems for Core and Shell, Health Care and Schools, among others, have similar credits available but may vary slightly in the points available for each credit.

INTEGRATIVE PROCESS (IP)

This new integrative process credit category involves the building owner, design team, contractors and product manufacturers during the pre-design phase and throughout the design phases to identify synergies across design disciplines for energy and water related systems. For energy related systems, the team performs a preliminary energy analysis that takes into account site shading, hardscape, building massing and orientation, insulation (and thermal mass), glazing, thermal comfort, plug and process loads. For water related systems, the design team works together to perform a preliminary budget to explore ways to reduce water in the building. Although concrete does not contribute to this credit

directly, informed design professionals can participate by understanding concrete's contribution to energy efficiency and water efficiency and offer concrete solutions early in the design phase. This new credit is worth 1 point.

LOCATION & TRANSPORTATION (LT)

In this new LT credit category, LEED v4 separated out location based strategies from Sustainable Sites.

High Priority Sites

The intent here is to encourage project location in areas with development constraints with three available options. Option 1 is to locate the project on an infill location in a historic district (1 point). Option 2 is to locate the project on a government designated priority site (1 point). Option 3 is to locate on a soil or groundwater contamination site and perform remediation to the satisfaction of that appropriate authority (2 points). Cementitious materials can be used to solidify and stabilize contaminated soils and reduce leaching concentrations to below regulatory levels. Although not typical, ready mixed concrete trucks and plants have been used to mix and deliver cementitious slurries for solidification and stabilization projects.

Surrounding Density and Diverse Uses

This credit encourages development in areas with existing infrastructure in order to promote land conservation, farmland protection, walkability and transportation efficiency. There are two options to meeting the credit. Concrete contributes to Option 1 of this credit since high density often means multi-story construction. Option 1, Surrounding Density, is to locate on a site with a minimum surrounding existing density (floor area to land area ratio) within a 1/4-mile (400 m) radius of the project boundary. Concrete's strength, economy and versatility make it ideal for multi-story residential and commercial construction in urban settings. Features such as long spans, low floor-to-floor heights and energy efficiency contribute to environmental performance. This option is worth 2–3 points.

Access to Quality Transit

The intent of this credit is to encourage development in locations with several public transportation options with the purpose of reducing greenhouse gas emissions, air pollution, and other environmental and public health harms associated with automobile use. There are several specific requirements for locating the project near rideshare locations, bus stops and train stations. The public transportation options can be existing or built within 24 months of project completion. Since most public transportation facilities, including bus stops and train stations, are concrete intensive, concrete can contribute to this credit, which is worth up to 5 points depending on the frequency of scheduled public transportation stops.

SUSTAINABLE SITES (SS)

Site Development: Protect or Restore Habitat

The intent of this credit is to conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity. This credit is achieved by limiting the amount of developed space on a site to specified minimums. Concrete can contribute to this credit since concrete excels in multi-story applications. Another potential strategy for increasing density is to locate parking areas within the building footprint to limit site disturbance. A parking garage, typically built with concrete, located within a building helps maintain existing natural areas that would otherwise be consumed by surface parking. Also, using a pervious concrete parking area to store and treat rainwater, thereby eliminating or minimizing land required for detention ponds, helps protect and restore habitat. This credit is worth 2 points.

Open Space

For this credit, the project must have a specific amount of exterior open space accessible to building occupants. The concept is to encourage interactions with the environment, social interactions and physical activities. For projects with a density of 1.5 floor-area to land-area ratio, vegetated roofs which are often supported on concrete structures, can be used toward the minimum vegetation requirement. Parking garages, typically built using concrete, on the lower floors of a building can be used to help reduce the developed footprint on a site. Pervious concrete parking areas can eliminate or reduce land required for detention ponds and can help maximize open space. This credit is worth 1 point.

Rainwater Management

The intent of this credit is to reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site using low-impact development. The number of points available is dependent on the site density and percentage of rainfall managed on site. Using pervious concrete pavements can improve the rate, quantity and quality of stormwater runoff because it increases infiltration. Vegetated roofs are another strategy to achieve this credit. Reinforced concrete is often used as the structural system to support the heavy loads of vegetated roofs, which can reduce stormwater runoff. This credit is worth up to 3 points.

Heat Island Reduction

This credit's intent is to minimize effects on microclimates and human and wildlife habitats by reducing heat islands. The requirements include 2 options. Option 1 encourages the use of site shading and reflective pavements and roofing materials or vegetative roofs. Option 2 encourages underground or shaded parking areas. For reflective pavements, the requirement is to use paving materials with a three-year aged solar reflectance (SR) value of at least 0.28, or an initial SR of at least 0.33. The requirement for SR can usually be met by using concrete rather than asphalt for hardscape areas, including sidewalks, parking lots, drives and other impervious surfaces. Solar reflectance is the ratio of the amount of solar radiation reflected from a material to the amount that shines on the material. Generally, light-colored surfaces have a high SR. Conventional grey concrete generally has an initial SR of greater than 0.35. Concretes made with white cements can have SR greater than 0.70. As a comparison, new asphalt generally has an SR of approximately 0.05. Solar reflectance is measured using ASTM Standards E903 or E892. This option of the credit is worth 2 points.

Option 2 is achieved by placing a minimum of 75% of parking spaces under cover. Any roof used to shade or cover parking must (1) have a three-year aged Solar Reflectance Index (SRI) of at least 32 or initial SRI of at least 39, (2) be a vegetated roof, or (3) be covered by energy generation systems, such as solar thermal collectors, photovoltaics and wind turbines. Concrete can generally contribute to this option since the material of choice for parking structures is concrete. This option is worth 1 point.

Hopkins Parking Structure, San Diego, CA
Hopkins Parking Structure at the University of California San Diego campus uses photovoltaic cells for parking lot canopies and high albedo concrete in the driving lanes to help reduce the urban heat island effect. Photo: University of California San Diego

WATER EFFICIENCY (WE)

Outdoor Water Use Reduction

This credit requires the reduction of outdoor water consumption through the use of landscape that does not require permanent irrigation or through the use of alternative water sources. Option 1 offers 2 points if the landscape does not require a permanent irrigation system beyond a maximum two-year landscape establishment period. Option 2 offers 1 point for 50% reduction from peak watering months and 2 points for 100% reduction from peak watering months. Up to 30% of the reductions can be achieved using any combination of efficiency, alternative water sources and smart scheduling technologies. Alternative water sources include reclaimed wastewater, captured rainwater and stormwater, among other sources. Cisterns for capturing and storing alternative water are often built using concrete. Pervious concrete systems and other concrete stormwater management systems, such as culverts and pipes, can be used to capture stormwater for collection into cisterns for irrigation purposes.

WE Credit: Indoor Water Use Reduction

For this credit, the intent is to reduce indoor water use by using low flow fixtures and using alternative water sources. One to 6 points are awarded for 25% to 50% reduction below specified baselines. Again, concrete cisterns could be used to collect and treat alternative water sources such as reclaimed wastewater, captured rainwater and stormwater.

ENERGY AND ATMOSPHERE (EA)

Minimum Energy Performance

For a project to be LEED v4 certified it must reduce the environmental and economic harms of excessive energy use by achieving a minimum level of energy efficiency. There are several options for achieving this credit, but the most frequently used option is to demonstrate 5% improvement over a baseline building using the ANSI/ASHRAE/IESNA Standard 90.1. Energy performance must be measured by a whole building simulation using the Building Performance Rating Method in Appendix G of the standard. Many consulting firms have the capability of modeling a building to determine energy savings using a computer-based program such as DOE2. When concrete is considered, it is important to use a program like DOE2 that calculates annual energy use on an hourly basis since building components constructed of concrete generally exhibit a property known as thermal mass which can only be accounted for in sophisticated energy analysis software.

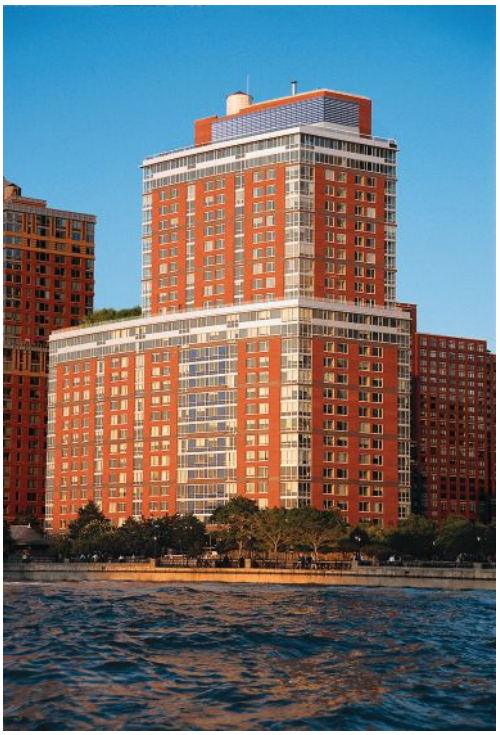
Buildings constructed of cast-in-place concrete frame, tilt-up concrete or insulating concrete forms (ICF) possess thermal mass which helps moderate indoor temperature extremes and reduce peak heating and cooling loads. In many climates, these buildings have lower energy consumption than non-massive buildings with walls of similar insulation. In addition, heating, ventilating and air-conditioning needs can be met with smaller capacity equipment.

Optimize Energy Performance

This credit is awarded if energy cost savings beyond the prerequisite can be demonstrated compared to a baseline building that meets the requirements of ANSI/ASHRAE/IESNA Standard 90.1. Concrete building systems, used in conjunction with other energy saving measures, will most likely help improve energy performance and thus contribute to points under this credit. The number of points awarded depends on the demonstrated energy savings for the building. One to 18 points are awarded for 6% to 50% energy cost savings.

MATERIALS AND RESOURCES (MR)

In the past versions of LEED, the focus of material impacts has been on single attributes such as recycled content, rapid renewability or regional materials. While these attributes are important, they only tell part of the story. A product could perform well in one attribute but poorly in another. The new LEED v4 MR credits attempt to take a holistic look at materials by adopting life cycle assessment (LCA) and product disclosure and optimization.



The Solaire, New York, NY
The $120-million Solaire in lower Manhattan's Battery Park City stands 27 stories tall with 293 rental units. A reinforced concrete structural system was chosen in large part because its thermal mass moderates daily temperature swings and reduces energy needed for heating and cooling. Among its many environmental benefits, the building is designed to consume 35 percent less energy, a savings that is potentially worth 14 points toward the LEED Energy and Atmosphere credit. Design Architect: Cesar Pelli & Associates Architects. Photo: www.concretethinker.com

Building Life Cycle Impact Reduction

Life cycle assessment, or LCA, is the investigation and evaluation of the environmental impacts of a product, process or service. LCA evaluates all stages of a product's life to determine its environmental life cycle impacts. LCA is the most comprehensive approach to determining environmental impacts of a building. A new credit in LEED v4 called Building Life Cycle Impact Reduction rewards project teams if the building has lower life cycle impacts than a baseline building.

This credit offers several options for reducing the impact of buildings, mostly centered around existing building adaptation and reuse. However, for new buildings, Option 4 of the credit encourages the use of LCA to demonstrate lower environmental impacts of the proposed building over a baseline building. The project is awarded 3 points for conducting a whole-building life cycle assessment of the project's structure that demonstrates a

minimum of 10% reduction, compared with a reference building, in at least three of following six impact categories:

- Global Warming Potential (Required)
- Reduce Ozone Depletion
- Land /Water Acidification
- Eutrophication
- Tropospheric Ozone
- Non Renewable Energy

No impact category assessed as part of the life cycle assessment may increase by more than 5% compared with the reference building. Design teams can design the reference building using conventional concrete mixes and design the proposed building using concrete mixes with high volumes of fly ash and slag to lower the overall impacts of the building structure. They can use specially designed life cycle assessment software such as the Athena Impact Estimator (www.athenasmi.org) to demonstrate the proposed buildings meet the criteria for this credit. The concrete industry, through the National Ready Mixed Concrete Association (www.nrmca.org/sustainability) has populated the Athena software with hundreds of concrete mixes along with their environmental profiles to facilitate meeting the LCA credit.

Building Product Disclosure and Optimization

There are three Building Product Disclosure and Optimization credits and each offers 2 points:

The first point (Option 1), Disclosure, requires the project use 20 permanently installed products that disclose impacts using EPDs, CSRs and/or HPDs. In LEED v4, a "product" is defined by the distinct function it serves. That means concrete has the advantage of contributing significantly because of concrete's wide range of applications or functions. For example, footings, foundation walls, shear walls, bearing walls, columns, beams, slabs, sidewalks and parking areas, each with a unique mix design, would all be considered different products in LEED v4 and therefore contribute significantly to the 20 required products.

The second point (Option 2), Optimization, requires a certain minimum value of building products to demonstrate they are performing better than industry baselines for environmental, social and health impacts.

QUIZ

1. The two new categories added to LEED v4 are:
   a. Integrative Process, Location and Transportation
   b. Global Warming, Integrative Process
   c. Smog Formation, Global Warming Potential
   d. Aesthetics, Technology

2. Conventional grey concrete generally has an initial SR of _____.
   a. > 0.70
   b. > 0.35
   c. < 0.28
   d. 0.05

3. To demonstrate products have been extracted or sourced in a responsible manner in the Building Product Disclosure and Optimization credit, a concrete manufacturer can disclose through:
   a. Health Product Declarations (HPD)
   b. Recycled Content Reports
   c. Corporate Sustainability Reports (CSR)
   d. Life Cycle Assessments (LCA)

4. True or False: Concrete's strength, economy and versatility make it ideal for optimizing density in urban settings contributing to the Location and Transportation category.

5. One way to achieve credit for the Building Life Cycle Impact Reduction is to:
   a. Build in winter months
   b. Reduce the total energy consumption by 50%
   c. Provide 20 environmental product declarations
   d. Use concrete mixes with high volumes of fly ash and slag

6. Which impacts are NOT reported in Environmental Product Declarations?
   a. Urban heat island effect
   b. Ecologically responsible land use
   c. Health hazards and risks
   d. All of the above

7. True or False: Concrete mix designs such as shear walls, bearing walls, columns, and slabs would all be considered as ONE product in achieving Building Product Disclosure and Optimization credits.

8. Concrete can contribute directly or indirectly to _____ points in LEED v4:
   a. 16
   b. 34
   c. 54
   d. 74

9. Concrete building systems such as cast-in-place concrete frame, tilt-up and insulating concrete forms possess _____ which helps moderate indoor temperature extremes and reduce peak heating and cooling loads.
   a. added value
   b. steel reinforcing
   c. thermal mass
   d. superior quality

10: True or False: Exposed concrete is both an excellent structure and finish material, eliminating the need for additional material to be applied on the interior.

The second option limits the contribution of structure and enclosure to 30% of the qualifying products on a cost basis. However, the value of products manufactured and extracted within 100 miles (160 km) of the project site is doubled, meaning concrete can contribute significantly to this option since concrete is almost always manufactured and extracted locally.

This article continues on http://go.hw.net/AR082017-3. Go online to read the rest of the article and complete the corresponding quiz for credit.

SPONSOR INFORMATION

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After a devastating fire, Colonial Inn is rebuilding with ICFs.

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DESIGNING THE MODERN GROCERY STORE

IT'S ALL ABOUT THE EXPERIENCE

Presented by:

Wilsonart®

An innovative and forward-thinking designer convinced her conservative client to take some chances with fresh, whimsical, colorful designs and materials set in an urban contemporary style. Photo by John Linden.

LEARNING OBJECTIVES

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

1. Identify the factors driving transformation of grocery retailers, from the local corner store to large supermarket chains.
2. Define the concept and design of a shopping experience, and using sights, colors and sounds to stir emotions.
3. Describe how destination centers in grocery stores drive sales, features that are proving successful.
4. Discuss the future of grocery store design and function, as well as design techniques and materials that support trend fluidity.

CONTINUING EDUCATION

AIA CREDIT: 1 LU
IDCEC CREDIT: 1 CE HOUR

AIA COURSE NUMBER: AR082017-2

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Use the learning objectives above to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit **http://go.hw.net/AR082017-2** 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.

Competition drives innovation, and grocery stores and supermarkets are in the midst of great evolution. The familiar brick-and-mortar stores long at the center of consumer life are being spurred to change by intense online competition and the shifting shopping habits of Millennials and their successors, Generation Z. No longer are variety, price and ease of shopping enough to ensure a steady and growing clientele. Today's food consumer can get all that online. What a physical store can offer is an experience. That includes lively visual merchandising, in-store sampling, destination centers inside grocery stores, a combination of online and in-store shopping and even in-store entertainment, dubbed retailtainment. What neighborhood farmer's markets discovered already—that the experience of buying fresh food and the delights that live entertainment draws in the customers—brick-and-mortar stores are increasingly including in their stores.

When interior designer Katrina Nable-Villa first saw the abandoned 30,000 sq. ft. grocery store in Santa Clarita, California, that she was tasked to transform, she knew a safe, staid, somber approach would not suffice. Rather, Nable-Villa wanted an innovative approach to the grocery store design based on her perspective as a progressive designer eager to try out new strategies and materials, and as an astute observer of the changing retail landscape.

As Nable-Villa believes: Design must be fresh and evolving.

Indeed, when you look up in the refurbished Island Pacific Supermarket store Nable-Villa designed, amid the bustle of the primarily Filipino and Asian population the chain caters to, you see that she did indeed innovate. From the elevated full-size cow statue indicating the dairy department, to a row of colorful chairs along a solid surface soffit indicating a sit-down eating area, to the giant ice cream cone and solid surface cityscape soffit indicating the frozen foods department, you see signs of the designer's touch that brighten and energize the shopping environment.

Unlike sterile click and buy online shopping, a brick-and-mortar grocery store can offer a lively, engaging shopping experience with sights, sounds, aromas, and engagement to turn shopping from a chore to a delight. Photo by John Linden.

COMPETITION DRIVES INNOVATION

Innovation in supermarket design is increasingly necessary because grocery supermarkets and retail stores are in a crisis of identity of sorts, facing intense competitive pressures from online retailers and the changing buying and eating habits of Millennials and their successors, Generation Z.

The shifting shopping habits have been heavily reported in the media. A U.S. News and World Report headline asks: "As Online Sales Boom, Is Brick and Mortar on the Way Out?"

The report states that UPS delivers up to 30 million packages a day in the peak holiday season, and FedEx's usual 12 million shipments a day goes up to 25 million at times. The growing number of delivery trucks on city, suburban and rural streets is striking to observe.

The plethora of online grocery shopping options worldwide is stunning. In the Netherlands, a company called Picnic offers free deliveries made by "runners" driving small electric delivery vans. In San Francisco and other U.S. cities, Instacart offers customers the opportunity to order through an app and promises grocery delivery in under an hour from local stores such as Whole Foods Market, Costco and Target.

According to Nielsen on "The Grocery Shopping Experience Around the World":

- One-quarter of online respondents say they order grocery products online, and more than half (55%) are willing to do so in the future.
- Growth of online grocery shopping is driven in part by the maturation of the digital natives—Millennials and Generation Z.
- Willingness to use digital retailing options in the future is highest in Asia-Pacific, Africa/Middle East and Latin America regions.
- E-commerce is well suited for stock-up and specialty-needs retailing because it can offer deeper product selections than may be available in brick-and-mortar stores.
- Use of online or mobile coupons and mobile shopping lists are the most cited forms of in-store digital engagement in use today.
- For in-store retailing, large stores have a sales volume advantage, but smaller formats are growing more rapidly.

For neighborhood and niche grocery stores, competition comes not only from online sales but also from warehouse stores and even the granddaddy of online merchants, Amazon. Bloomberg News reports that Amazon is creating a new fusion of digital shopping and brick-and-mortar stores called Amazon Go. A teaser YouTube video showing the future phenomenon displays the slogan: "No lines. No checkout." The video has been viewed 9 million times.

HISTORY OF GROCERY SHOPPING

Before studying current and future grocery store strategies, it helps to understand what got us here. While shopping is a central activity of the American individual and family, it's a relatively new activity in the scope of human existence. A century ago, most Americans lived on farms, and grew their own meat and produce. Saturday trips into town for coffee and sugar and other items rounded out the pantry. The shopper would ask for items across the counter, or hand the clerk a list.

The first self-service grocery store, Piggly-Wiggly, was opened in 1916 in Memphis, Tennessee, by

Fast food service and even fancy restaurants are part of the modern supermarket experience. Photo by John Linden.

entrepreneur Clarence Saunders. This allowed the store to operate with fewer clerks, and thus began the art of packaging and visual merchandising to entice the shopper toward more impulsive purchases.

Early supermarkets eventually evolved into chains. This spurred the growth of specialty grocery shops that catered to qualities of food not found in standard stores, or to ethnic foods not easily found in chains. In fact, the homogeny of items found in Sam's Club or Costco has created extra incentives for ethnic markets, such as the one Nable-Villa designs, which caters to a primarily Filipino clientele, to evolve with the times.

Catering to Millennials and Generation Z is also part of the challenge. Rather than shopping once a week with a shopping list, they are more likely to shop daily or every few days, making spur of the moment purchases, and are likely to purchase ready-made meals or dine out. Successful grocery stores are increasingly catering to those buying habits.

HOW MODERN GROCERY STORES COMPETE

Today, standard, old school brick-and-mortar grocery stores must ask themselves: What do we bring to a buyer that an online merchant cannot? How are we different?

The difference is, in a phrase: The Shopping Experience.

While online merchants can offer important benefits—ease of buying, a vast selection and value—they cannot appeal to the whole person.

What does online shopping sound like? Not like live musicians serenading evening shoppers, or children playing in an in-store playground, or meat grilling at in-store buffets. What does online shopping smell like? Not like the aroma of freshly baking pastries or the grilling of fish or meats. What does online shopping taste like? Not like delectable free samples handed out with a smile along grocery store aisles.

And perhaps most importantly, online shopping does not offer contact with one's community. The solitary act of browsing a flat screen and clicking on "Add to Cart" is no match for a lively, engaging, sensory-rich, live retail shopping experience.

The strategies of successful grocery and supermarkets include compelling interior design that engages the emotions, visual merchandising to spur purchases, destination areas and restaurants within grocery stores, music and other "retailtainment," and a plethora of free samples and other engagements with store staff and fellow shoppers.

Grocery stores must be able to compete with online shopping and consumers' changing shopping habits. Photo by John Linden.

DESIGNING A SHOPPING EXPERIENCE

To compete with online shopping and changing shopping habits, grocery stores such as the Island Pacific Supermarket chain must step up their game.

Nable-Villa's history with Island Pacific Supermarket began in 2008 when founder and CEO Jefferson Lim brought her in to design one of his stores (she is now on her 25th store design for him). At the time, Lim proposed to draw inspiration from a successful competitor. She advised against it and suggested going in a different direction. Still keeping the client's vision in mind, Nable-Villa specified a familiar island theme that fit with the store name, and the Filipino island culture it represents.

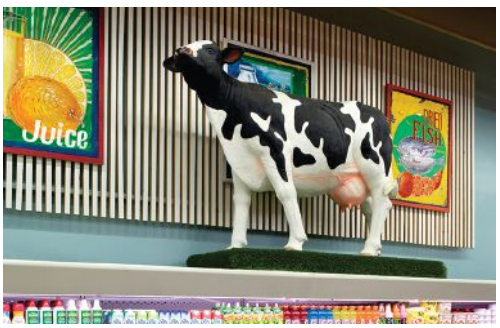
Eventually, Nable-Villa convinced her client to go a little out of the box when she suggested suspending a wooden fishing boat above the ceiling to indicate the fish department. Jeff was hesitant, but the designer said: "Let's just try it. If you don't like it, we'll change it."

She tried it. He liked it.

Since then, Nable-Villa has used a number of unique three-dimensional objects suspended below the ceiling or attached to the soffits. This strategy is a perfect anecdote to the flat world of online shopping.

Some of her more creative designs include:

Cow Statue: A less creative designer might have painted "Milk and Dairy" on the soffit. But Nable-Villa's version, as mentioned earlier, is much more fun: a full-sized but lightweight cow statue lofting above the aisles. The statue not only brings a whimsical attitude to the store, but also reminds shoppers where the food came from. This is in line with a movement in younger generations toward "real" foods and away from processed foods.



A full-size cow statue has become a signature design feature as each new market in the chain opens. Each cow is known as Matilda. Photo by John Linden.

"I've always wanted to use something that big and dramatic," Nable-Villa said of the cow statue she started including in her Island Pacific Supermarket designs years ago. "It creates such an impact to see a life-size cow in a supermarket. So catchy isn't it? I actually named her Matilda, our market muse. So now, 11 stores later, everyone's calling her Matilda too. She's become quite the attraction, actually. People come up to her and take pictures."

Why simply spell out the word "produce" when you can do it with leafy materials? Photo by John Linden.

Leafy Produce Sign: Above the produce section in the Rancho Cucamonga store, the designer didn't settle for the word "produce" painted on the sign. Rather, she opted to outline the letters with materials evocative of leafy greens.

Racks of Faux Produce on Soffit: The three-dimensional produce display on the soffit evokes the senses of shoppers on more levels than simple words.

VISUAL MERCHANDISING 101

What Nable-Villa has done in the Island Pacific Supermarkets is a form of visual merchandising. According to Progressive Grocer: "Visual Merchandising (VM) is an indispensable retail discipline, consisting of a series of practical selling tools that are used to influence what and how much consumers buy. Successful retailers—supermarkets in particular—can employ effective and integrated VM practices as part of the retail experience and overall brand delivery, to successfully maximize sales and profits in-store—essentially, it's a silent selling service of sales-driving levers and tools."

This article continues on http://go.hw.net/AR082017-2. Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. According to a Nielsen survey, how many online respondents say they order grocery products online?
   a. 2%
   b. 5%
   c. 10%
   d. 25%

2. What is the name of the new brick-and-mortar grocery stores that Amazon is planning to open?
   a. Amazon Go
   b. Amazon Grab and Go
   c. Amazon No Checkout.
   d. Going Amazon

3. What is the term mentioned in the course that describes lively visual merchandising, in-store sampling, destination centers inside grocery stores, and in-store entertainment?
   a. Grocery Grabbers
   b. Shopping Palooza
   c. Retailtainment
   d. Viral Shopping

4. An innovative designer encouraged the owner of an ethnic supermarket chain toward a unique and fresh store design. What is the name of that chain?
   a. Smart and Tidy
   b. Pacific Foods Market
   c. Island Pacific Supermarket
   d. Pacific Rim Delicacies

5. Designer Katrina Nable-Villa suggested a bold feature in a chain of supermarkets and told her reticent client: "If you don't like it, we can go back." What was that feature?
   a. Mirrored walls
   b. Fishing boat suspended from ceiling
   c. Rotating fish tanks
   d. Elevated live music platform

6. What design technique did Nable-Villa use to indicate the store's dairy department?
   a. Full-size cow statue
   b. Free milk samples
   c. Giant ice cream maker
   d. Laying hens for sale

7. Before she specified colorful laminate materials in the soffits of her newly designed stores, where had Nable-Villa used that material previously?
   a. Exterior signage
   b. Check out counters
   c. Cabinets in store kitchens
   d. She had never used it before

8. Which destination is found in grocery stores?
   a. Coffee bars
   b. Higher inertia force compared with concrete or steel
   c. Containment of transfer loads induced by seismic activity
   d. Fewer redundant load paths

9. True or false: Meal kits with all the ingredients for a home cooked meal are a growing trend for online companies. Thus far, no major grocery chains have offered a similar kit for sale inside stores.

10. Sustainability is a big concern for Millennials and Generation Z. According to a Nielsen global online study, what percentage of them are willing to pay more for products and services that come from companies who are committed to positive social and environmental impact?
    a. Less than 10%
    b. 25%
    c. 50%
    d. More than 70%

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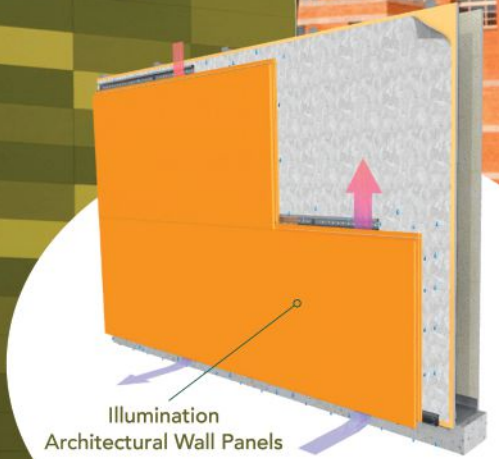

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AIA Architect

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PHOTOGRAPHY: TODD WINTERS

This Is Your Brain on Design

Turning high building performance into high human performance.

As research director of Perkins+Will's Human Experience Lab, Eve Edelstein, ASSOC. AIA, has the unique opportunity to both study how the brain responds to architectural stimuli and then to apply those learnings to design choices. Edelstein's background ranges from neuroscience and clinical neurophysiology to architecture—the one constant being a focus on evidence-based strategies and tools that inform and improve health and well-being. From a keynote address at the AIA Conference on Architecture 2017 to groundbreaking work with light and color, she's subtly and explicitly influencing the future of design.

As told to Steve Cimino

One of the things I've been most grateful for is training in anthropology, which actually inspired me to take a neuroarchitecture class. Then it turned out that Marian Diamond—one of the best teachers at Berkeley—was teaching the graduate neuroscience course and sent me down that particular path. I realized that I didn't just want to observe, as you'd do in anthropology. I wanted not only to ask but also to measure. I moved toward the cellular and then realized that the nexus between the cellular sciences and architecture is the clinical sciences. The pragmatic process of understanding that people are messy—they don't always do the right thing, they can't always tell you why, and their responses to the built environment are not predictable—is in the clinical realm.

There has been, historically, a divide between building performance and human performance. I would argue that there's no reason why they have to be divided. What we need to do is combine the information and produce best practices that serve both. We need to ask questions like, "Why do men and women differ when it comes to, say, thermal comfort? How can we design for individual comfort that, at the same time, doesn't increase energy load? How can we look at high building performance and relate it to high human performance?"

All day I'm being asked questions: "How do we design for healthcare environments? What can be done for people with prevalent disabilities like Alzheimer's and autism? How do I create healthy cities? How do we design creative places for our tech workers, let alone for our artistic workers?" There is no part of the brain I'm not being asked to consider. The way I approach it is project by project, topic by topic, measurement by measurement. Then I let the priorities of the designers and the users drive our strategic initiatives.

We can't pretend that this is simple, or that someone can say, "Here's a checklist, move forward." It is as complex as people are. We can—we have to—learn to communicate to our teams and to our users, and then make our knowledge fit a real process. We have to make research real. AIA

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AIANow

By Steve Cimino
Art Direction by Jelena Schulz

ILLUSTRATION: LAUREN NASSEF

Shiver Me Timbers

In March 2017, a piece of bipartisan legislation was reintroduced in both the U.S. Senate and House of Representatives: the Timber Innovation Act. Its stated goal is "to find new and innovative uses for wood as a building material," focusing on buildings more than 85 feet in height. As architects consider new applications for this renewable resource, where are wood's frontiers—present and past?

1. Skyscrapers: Architects and designers are reconsidering wood as a material worthy of large buildings; last year, construction began on two 50-meter-tall wooden office towers in Bordeaux, France.

2. Airplanes: Up until about World War II, all planes were made of wood, including Howard Hughes' massive, pioneering, and controversial Spruce Goose.

3. Bridges: Wooden bridges have been designed for thousands of years; the Holzbrücke Rapperswil-Hurden in Switzerland is a pedestrian bridge located near timber piles that date to 1523 B.C.

4. Bikes: Two hundred years after the first wooden bikes were produced, present-day bike shops in Portland, Ore., and Denver use CAD and machining to meticulously engineer hardwood bikes.

5. Robots: As technology evolves, scientists are factoring sustainability into robotics and swapping out aluminum robot arms and legs with bamboo.

AIAFeature

Ahead of Their Time

The recipients of the 2017 Latrobe Prize will help ensure that the buildings of today are adaptable enough to become the buildings of the future.

By Kim O'Connell

PHOTOGRAPHY: PORTER GIFFORD

The core of Michelle Laboy, Peter Wiederspahn, and David Fannon's 2017 Latrobe Prize–winning project, "Future-Use Architecture," is the potential of a structure to adapt to seen or unforeseen circumstances.

If architects had a crystal ball, their work would be so much easier. They would know when and how a catastrophic natural disaster might befall a city, or exactly which systems in a building could fail in 20 years. Barring this kind of clairvoyance, how can architects design buildings and cities that can adapt to a future that's difficult to foresee? What are the most important elements? And does adaptability make those buildings too generic and formless? These are just a few of the questions that the recently announced recipients of the 2017 Latrobe Prize are hoping to answer.

Since 2001, the AIA's College of Fellows has awarded the Latrobe Prize every two years to acknowledge and support work that is shaping the future of architecture in ambitious ways. Named for neoclassicist Benjamin Henry Latrobe, the juried prize includes a $100,000 grant to support significant architectural research on a proposed topic. Entrants are tasked with addressing a critical issue in the built environment and providing a solution with widespread applicability. Past selected proposals have involved resilience strategies for arid cities, a study of Upper New York Bay, and neuroscience research for architecture.

This year's recipient is a faculty team from Northeastern University's School of Architecture—Peter Wiederspahn, AIA, associate professor of architecture and principal of Wiederspahn Architecture; Michelle Laboy, assistant professor of architecture and co-founder of FieLDworkshop; and David Fannon, AIA, assistant professor of architecture and civil and environmental engineering.

Their proposal, "Future-Use Architecture," will allow the team to investigate the attributes that contribute to building adaptability in a variety of cultures, contexts, and climates, including such things as materials, configuration, massing, and social significance. "We are honored to win this prestigious prize," says Fannon, speaking for the group. "It recognizes the work we have done and it provides the resources to make that work deeper, richer, and accessible to a broader audience."

While the concept of "adaptive reuse" has always been prominent in the realm of historic preservation—wherein an old building is given new life for economic, architectural, and community-building reasons—now the stakes seem even higher. What if a school needs to one day become a shelter? What if a library needs to become a residence? Future-use architecture is based on the notion that the realities of population growth and climate change—no matter how much they are debated—require that building usage must be more flexible than fixed going forward. But accomplishing this—while protecting what makes buildings special, beautiful, and imbued with the essence of their time—is no easy feat. The first step, for the team from Northeastern University, is a fact-finding mission.

Building Blocks

As an urban university in the dense waterfront city of Boston, Northeastern is in a prime position to examine issues of climate-change preparation, sea-level rise, urban infill, and adaptive reuse. It is, in fact, the home of the Northeastern Resilient Cities Laboratory, a think tank that draws together faculty and researchers from several academic disciplines to examine how to make cities more resilient—that is, able to withstand potentially catastrophic change from natural and manmade disasters. Recent projects undertaken by its researchers include the development of an interactive simulation model for climate adaptation in northwest Germany and an online tool to compare multiple dimensions of resilience and sustainability in buildings. Wiederspahn, Laboy, and Fannon are also members of the lab and will contribute their research to its growing body of knowledge.

AIA Feature

CONTINUED

Their work began with students. "We've been using the concept of future-use architecture in the capstone studio in the architecture school for many years," Fannon says. "It helps us to frame a set of issues for students, so that instead of just thinking about a building that provides certain spaces, students think more deeply about the long-term effect of the spaces we make—getting past 'program' to think more about 'use.'"

In class, students use scenario planning to anticipate how future events, the passage of time, and technological advancement might affect building systems, which leads to some creative solutions, according to Fannon. One student project envisioned a scenario that was set 1,000 years in the future, in which buildings could be adapted to become a means of escape from planet Earth.

"These projects may be extreme, but they tell you how the world works by exaggerating the nuance," Fannon says. "If there is an ability for architecture to change the world we're living in, we feel there's an obligation to have those changes be positive, and future-use is a way architecture can do that. A building embodies its culture, so long-lasting buildings can contribute to creating public space and a civic realm by having many useful lives over time."

Getting the Latrobe Prize will allow the team to move from a method of inquiry that is speculative and educationally focused to one that is more scholarly and grounded in practice. The first step for the team is to do a far-ranging search for buildings, regardless of region or building type, that have had adaptability built into the design and then determine how that was accomplished. To that end, the team hopes to receive suggestions for future-use buildings to include. This final list will eventually get pared down to a core group of buildings for which the team will develop case studies chronicling their adaptability for future scenarios.

"We're doing a broad hunt for buildings that have successfully led multiple lives," Fannon says. "We want to know what made people decide to reuse them, and how. I am also equally interested in the buildings that don't get reused."

One example of the type of building that the architects will study is the two-story, 19,000-square-foot Lovejoy Building in Portland, Ore. Now the headquarters for Opsis Architecture, this building was completed in 1910 as the stables for the Marshall-Wells Fire Co.; it later became a machine shop and had other uses throughout the 20th century. Opsis renovated the historic building to create ground-floor lease space and second-floor offices for the firm, the latest example in a string of adaptive reuse projects and renovations that has turned a former warehouse district in Portland into a thriving destination with eateries, galleries, and shopping.

The completely sustainable renovation—in which some desks were even made from old doors—earned the project LEED Gold certification, but the most interesting part might be what hasn't yet been built. Recognizing the potential for the city to keep changing, the architects strengthened the building as part of its renovation so that two stories of residences could be built over the existing building at some point in the future.

Designing for potentially unrealized future uses raises the important question of how we value future-use architecture. It's easy to determine the costs to design and build a structure, but what is the value to a community of not having a building go offline in a hurricane 10 years from now? How much time and money is worth investing in a structure when the outcome is so uncertain? At Lovejoy, the architects were also the clients, and especially community-minded ones at that. But it remains to be seen how well architects will be able to get clients and building owners on board with future-use design.

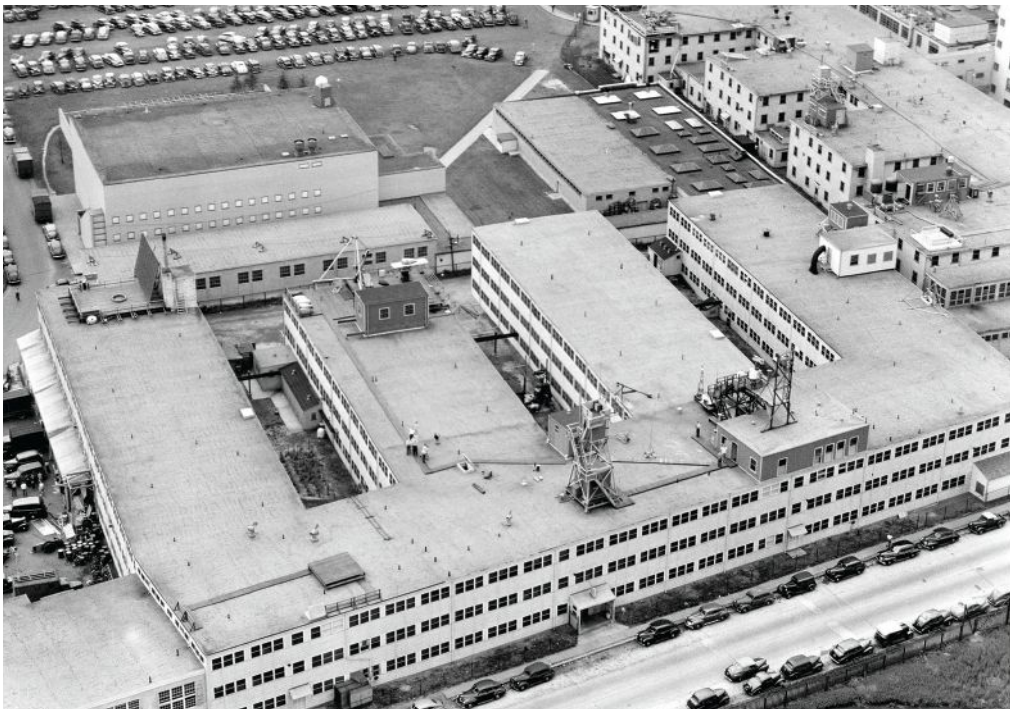
Another challenge is how to do adaptable, future-use architecture without making buildings generic, nondescript boxes. There is a special kind of beauty to a purpose-built place. And who would fault a Zaha Hadid or Frank Gehry, FAIA, for not imagining future scenarios for their buildings, which are dazzlingly iconic in the here and now? The Northeastern team understands this dilemma.

"Maybe some buildings are so program-driven that that's all they can be," Fannon says, "but some will be as flexible as possible. I have a sneaking suspicion that the kinds of things that make buildings adaptable are some of the same things that make them specific. Mill buildings come to mind; they tend to have great natural light, high floor loadings, and so on, which turns out to be useful for other uses, too. I hope the principles we identify will make even better celebrations of the way buildings are used."

Project Outcomes

In considering their choice, the Latrobe Prize's eight-member jury, which included architects in public and private practice, was impressed

This prestigious prize recognizes the work we have done, and it provides the resources to make that work deeper, richer, and accessible to a broader audience.
—David Fannon



PHOTOGRAPHY: COURTESY OF THE MIT MUSEUM

The form and space of Building 20 (the Radiation Laboratory) at the Massachusetts Institute of Technology was planned as a temporary wartime research facility. Its flexible organization, lightweight structure, and inexpensive materials lasted longer than anticipated and allowed many modifications for changing research uses. The building was demolished in 1998 because it did not meet modern service and safety requirements for research and educational facilities.

PHOTOGRAPHY: GETTY IMAGES

On the same site, the Stata Center replaced the Radiation Laboratory in 2004. Designed by Gehry Partners, the complex form, intricate architectural order, and advanced building systems seek to foster collaboration and innovation, but the long-term serviceability and adaptability to future uses remain to be seen.

with the holistic quality of the awarded proposal, its cogent framework, and its potential for advancing knowledge, according to jury chair Katherine Schwennsen, FAIA, director of Clemson University's School of Architecture.

"The proposed outcomes will include interactive products of immediate use to practice, while also advancing architectural education and our collective understanding of the characteristics of buildings with 'long-life, loose-fit,'" she says. "This high-functioning team convinced us that they will consolidate empirical evidence and articulate it and disseminate it in ways that are compelling and useful. How do we best design buildings and cities for unknown future uses? How much does it cost to design for future-use, and what might be the return on investment? How do we help initiate more informed development practices and regulatory frameworks for adaptive reuse and regeneration? The winning Latrobe Prize proposal will help us answer some of these complex and critical questions."

Once their research is complete, the plan is to produce a website that will make the information available as a general clearinghouse. The team will also create course modules for use in their own studios or by other universities, as well as through AIAU or AIA chapters. The team is particularly interested in public outreach and hopes to mount a traveling public exhibition on future-use architecture.

"This is a great question for the public to consider: How long do buildings live, and why?" Fannon says. "We want to get the public engaged." A natural follow-up to an exhibition would be a book or monograph that memorializes the work to date, with the understanding that, by its nature, considering what the future looks like is a moving target.

No matter the outcome, Fannon and his colleagues want to ensure that architects are at the forefront of the discussion about future-use architecture. "The concept of future-use incorporates a lot of architecture's contribution to resilience," he says. "I hope the work we do will capture not just the technical component, but also the social and humanistic design elements that make buildings worthy of preserving. We hope to advance that conversation beyond just a limited one of technical solutions or a deference to other fields' definition of resilience. It's a step for architecture claiming its own leadership position." AIA

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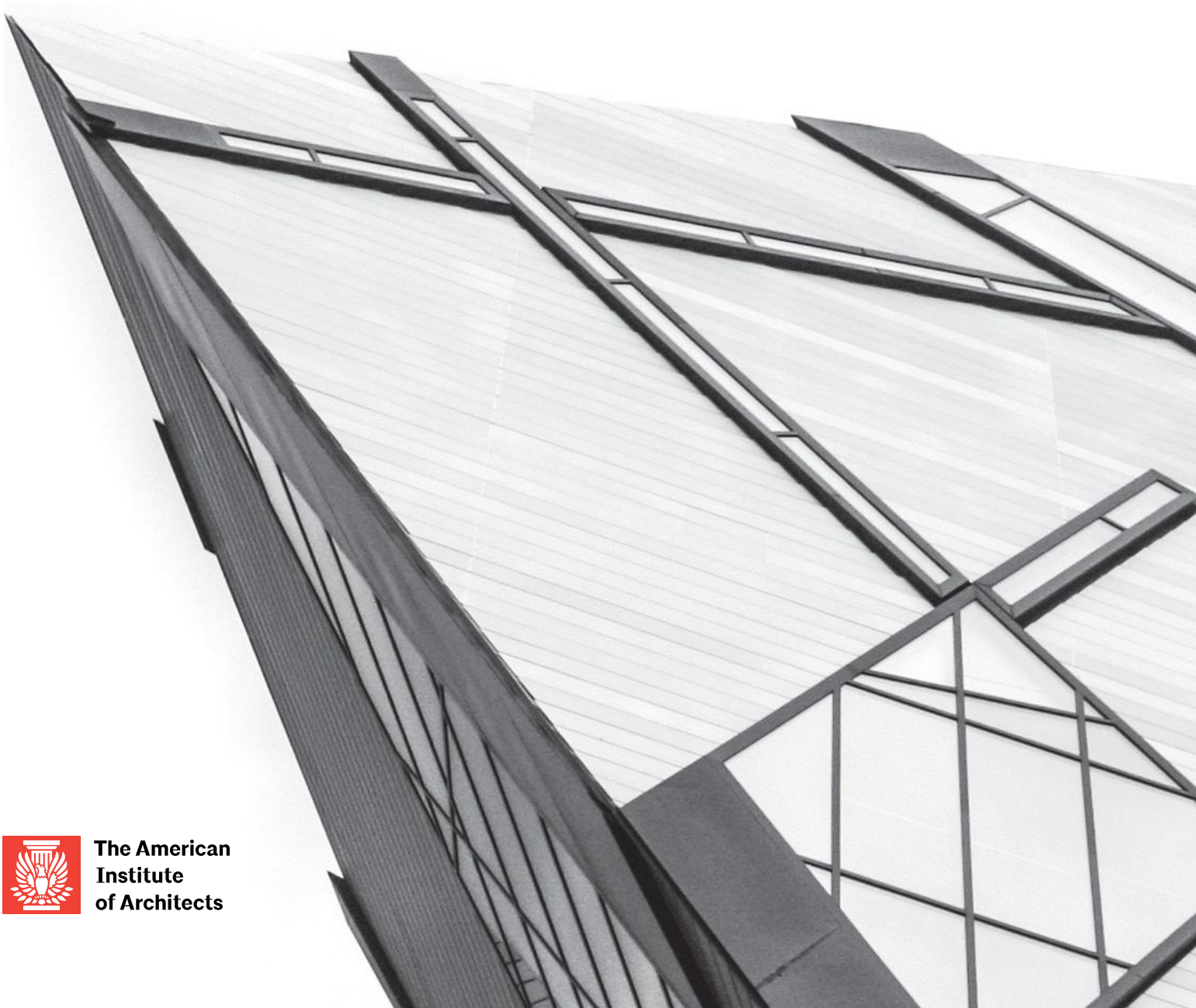

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PHOTOGRAPHY: BRANDON SHIGETA

A 2011 street view of Bloom, which displayed the many scales of hyperbolic paraboloids for lightweight strength.

Mixed Innovation

Blending engineering and architecture through an art installation and an AIA research grant.

Can the success of a piece of architecture be gauged by the number of car accidents it may cause? When the work is a sculptural expression of how new building materials can interact to compose a more sustainable and responsive skin—as was the case in the thermobimetals-centric "Bloom" installation from Doris Sung, AIA—the answer might be yes.

"Bloom" was the built manifestation of Sung's inquiry into how newly developed smart materials can be utilized as self-shading and self-ventilating building components to create a whole. Sung, the founder of Los Angeles–based DO|SU Studio Architecture, completed the fabrication and installation of the hyperbolic paraboloid structure in 2011—in collaboration with design consultant Ingalill Wahlroos-Ritter, AIA, and structural engineer Matthew Melnyk—in the outdoor gallery space of Materials & Applications (M&A), a nonprofit dedicated to building a public culture of experimental architecture in Los Angeles.

The work was instigated by research presented in Sung's "Smart Sun-Shading: A Demonstration of Smart Thermobimetals as a Building Skin," the 2010 recipient of an AIA Upjohn Research Initiative grant. The grant provides material support up to $30,000 for projects that "enhance the value of design and professional practice knowledge."

Understanding thermobimetals is to understand responsive movement. Two alloys of metal are laminated together and then react to temperature changes in a delicate dance of different rates of expansion. Fluctuations in temperature act as the catalyst to morph the form of the material and inform the design of the larger project. An objective of Sung's Upjohn research was to demonstrate the responsive nature of bimetals as they "curl when heated and return to their original shape when cooled."

"When I was searching for new materials to work with," Sung says, "I asked the question, 'Why can't materials and architecture respond to changes in the environment?'" The "Bloom" project made that thought tangible. "There were so many different alloys of metal to choose from," she says. "I worked with a manufacturer to find metals that would react in the range of 80 to 100 degrees [F]" to complement the outdoor installation in Los Angeles' temperate climate.

Sung approached M&A with the proposal to build "Bloom." "It was the perfect fit," Sung says, referencing not only the overlapping beliefs between the organization and her intentions but also that M&A's outdoor gallery space provided the perfect testing ground to gauge the performance of thermobimetals in action.

The process of building "Bloom" inverted the typical fabrication process, as the structure was built in nine layers from the top down, with a monocoque structural system integrated into the lightweight surface panel to provide added strength. The exhibit was displayed in the M&A courtyard from November 2011 through March 2013.

The "Smart Sun-Shading" report was Sung's first Upjohn-recognized and -supported project. In 2015, she was awarded an additional Upjohn grant for her "Auto-Shading Windows: Smart Thermobimetal Solar Blinds," a research project exploring the application of composite alloys that, when fused, expand at different rates in self-shading curtainwall systems that require no electrical energy and no computer controls. They respond smartly to the movement of the sun and will reduce energy usage during hot summer months. Sung is vocal about the role that the AIA Upjohn grant had on her individual research and eventual capacity to move beyond the theoretical. "The Upjohn funding had incredible impact on my research in both financial support and validation to secure other funding," she says.

Sung believes the Upjohn can potentially be used to break down silos between the worlds of art and technology, revealing to engineers how architects can design with material solutions. "There are not many funders pushing innovation in architectural research," she says. "The Upjohn is one of the only ones blending

AIAFuture

CONTINUED

architecture, science, and art together."

Thinking back on "Bloom," Sung recalls how the project provoked a variety of responses. Within architectural circles, the exhibit served as an illustration of "programming materials," she says. "We can 'program' certain types of behavior into individual pieces by the specific geometry we cut. And, by use of complex computation, we can make the aggregation of those pieces perform in complex ways, similar to biological movements."

The large, unusually shaped structure also proved a draw for those simply passing by. On the day of the opening, rubbernecking drivers caused several car accidents. "Clearly, that was not the intention," Sung says. "The hope was to impact the way people think about architecture." And indeed she has. AIA

Ben Schulman

The shade in the occupiable space under Bloom's canopy changes throughout the day in reaction to the moving sun.

AIAPerspective

PHOTOGRAPHY: CARL BOWER

Urban Security Precincts

To thwart violent attacks, design matters.

Urban security precincts—zones designed expressly to control access and to facilitate security surveillance—can help to protect urban public places, which are now, sadly, the front line in the fight against violent extremism.

Attacks in New York, Boston, Brussels, Paris, and London—to name only a few—make it clear: New measures are needed elevate levels of scrutiny and protection—and especially to thwart attacks on crowded places by people using trucks and cars. Unlike airport-style security, urban security zones can apply access controls and enhanced vigilance to large areas—including parks, promenades, riversides, shops, streets, museums, government buildings, and more. With the security of public places now a public responsibility, architects and urban designers can step up, helping to design enclaves and precincts, with new variations on old methods.

London's "ring of steel," created in the aftermath of the devastating Bishopsgate truck bomb, increased security for a large urban area. This approach will soon be extended even more widely. All entering vehicles must pass through one of a small number of portals, each one surveilled closely with the aid of new technologies that help to detect contraband and anomalies.

Vehicles are also well separated from pedestrians, with roadways reinforced along their edges to prevent cars and trucks from breaching the defined paths. Operable vehicle barriers, fixed and demountable bollards, integrated planters, and other measures serve to restrict vehicle movements and to limit access. Both public and private security officers use new software and new methods to assess people, inspect vehicles, monitor movements, and watch crowds.

These steps increase security and elevate vigilance for an entire urban area. Similar steps are in place in lower Manhattan, seeking to limit vulnerabilities to vehicle attacks in the vicinity of the rebuilt World Trade Center. Such control zones also exist around the White House in Washington, D.C., and the Elysée Palace in Paris.

Security challenges are now everyone's business. No event, community, or place is immune. Even everyday crowded places are targets—busy sidewalk cafés on a warm evening, and bustling city streets and parks. So this has become a challenge and a mission for urban design.

Architects are well-equipped to help. We have long advocated measures to enhance urban quality. Now they can also serve security purposes. Vehicle-free pedestrian zones are more pleasant—and, as it turns out, they can also help defeat vehicle attacks. Architects can help to meet these urban security challenges—lives may depend upon it. AIA

Thomas Vonier, FAIA, 2017 AIA President

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“TIGER encouraged cities to restore train stations, implement bike sharing, and build light rail, transforming the country one modest project at a time.”

The Uncertain Fate of TIGER by Karrie Jacobs

"Town Branch is literally underneath where we are now," landscape architect Kate Orff tells me as we walk along Vine Street, a fast-moving three-lane thoroughfare also known as U.S. 25, that slices through downtown Lexington, Ky. All around us are beige 1970s office towers, the fruit of a 1960s urban renewal scheme that tried, but failed, to erase the historic fabric of the state's second largest city (population 318,449). Orff and I are tracing the path of Town Branch, a long-forgotten creek that was entombed in concrete in the 1930s. If I want to see it, she suggests, I should "look in the storm sewer."

The creek will soon become the centerpiece of a 3.3-mile-long amalgam of pedestrian and bike trails, parks, and public spaces, a project that is being spearheaded by Orff's New York–based firm, Scape, and that will, in places, return the waterway to the surface. Town Branch is the creek "upon whose banks Lexington was established in 1779," according to a historical marker along the course of the invisible waterway. The text on the marker explains that merchandise once floated down the Ohio River and onto the creek, which also was home to a steamboat—until Town Branch was banished as a flood control measure, like so many other urban waterways. Now it's having a renaissance as part of a strategy to correct Lexington's urban planning mistakes of the 20th century (the beige office towers, a dysfunctional convention center, an unappealing streetscape) and turn the Vine Street corridor into a greenway with breathing room for pedestrians and bicyclists.

Town Branch Commons site plan

One of the significant funders of Town Branch Commons, as the project is called, is the U.S. Department of Transportation, which awarded it a $14.1 million TIGER grant last year. An acronym for Transportation Investment Generating Economic Recovery, the TIGER program was launched during the first year of the Obama administration and has distributed $4.6 billion to "multimodal" transportation projects in cities (and some rural areas) around the country. It has been a dangling carrot that motivates local officials to think about transportation in more complex ways—in other words, not just cars.

Back in 2009, it seemed like Obama might champion a nationwide high-speed rail system or a sophisticated new power grid. Ultimately, his administration took a largely piecemeal approach to advancing a progressive urban vision. TIGER encouraged cities like Hartford, Conn.; Akron, Ohio; and Sacramento, Calif., to restore disused train stations, implement bike sharing, and build light-rail or bus rapid transit lines, transforming the country one modest project at a time. "I think the TIGER program has been very successful," says Shelley Poticha, a former Obama administration official who is now the director of urban solutions for the Natural Resources Defense Council. "It really prioritized investments in local communities and it has empowered [them] to actually use the funds and deliver the projects in a holistic way. It's probably the only transportation program where the money goes directly to the city."

Under the new administration, however, TIGER grants are slated to disappear. The 2018 budget released by the White House in May includes over $16 billion in cuts to the Department of Transportation. The TIGER program, which costs about $500 million each year, appears destined for a premature death.

Lexington's Pedestrian Push

To discover what might be lost, I traveled to Lexington in late June to learn more about Town Branch Commons, which is exactly the kind of quirky, forward-looking project that the TIGER program encourages. During the urban renewal decades, Lexington managed to avoid having an interstate highway rammed through its center, and much of its historic Main Street remains intact. Downtown, a hulking Richardsonian courthouse is currently being remodeled into a visitors' center (bourbon tours!) and the former slave market has been recast as the site of a weekly farmers market. The city's dining and bar scene is enlivened by two colleges, the University of Kentucky and the tiny, oddly named Transylvania University that, founded in 1780, was the first college west of the Allegheny Mountains.

In 1958, demonstrating considerable foresight, Lexington created an urban growth boundary around the city, so there's very little suburban sprawl. Leafy residential neighborhoods that ring the downtown quickly give way to horse farms. What's conspicuously missing, however, is the sort of exalted bicycle and

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pedestrian infrastructure that has become the hallmark of the 21st-century city. Also MIA: the creek that was Lexington's original raison d'être.

Which is how I found myself standing with Orff in the parking lot behind the 1976 Lexington Center, an oddly disjointed assemblage of glassy cylinders in front and corrugated concrete in the rear, which incorporates a hotel, shopping mall, convention center, and Rupp Arena, home to the University of Kentucky's basketball team. The parking lot will eventually be transformed into Town Branch Park, a 10-acre privately funded green space with lawns, performance spaces, and a creek-inspired splash pad—a tantalizing destination for bikers and walkers along the new greenway.

Right now, the site is nothing more than a sheet of asphalt facing the sorry underside of the center. The stream runs under the blacktop. "Where you see the drains," Orff says pointing to a line of sewer grates, "is the Town Branch culvert." Beyond the edge of the parking lot, which is pretty much the downtown's western limit, and beyond a metal highway barrier that gives way to an expanse of grass, the waterway itself reappears, a perfectly pleasant little stream.

Town Branch Commons is exactly the sort of undertaking for which Orff is building a reputation. The founder of Scape, and the director of Columbia University's graduate Urban Design Program, Orff is at the forefront of a movement in which a deep understanding of the natural world informs the design of the manmade one. Scape won the project in a 2013 design competition sponsored by Lexington's Downtown Development Authority, and construction is scheduled to begin later this year.

The Idea of a City on the Water

About two decades ago, a local architect named Van Meter Pettit, AIA, figured out exactly what Town Branch meant to Lexington. His family happened to own a McKim, Mead & White building downtown (now the 21C Hotel), whose basement required nonstop pumping and that clued him in to the creek's existence. Familiar with the Delaware and Raritan canal towpath in central New Jersey and Austin, Texas' Town Lake trails, he could envision the lost stream's potential. In 1998, Pettit founded an organization called Town Branch Trail, with a mission to "connect the city with its world-famous countryside and reorient the cityscape to its founding along the creek."

In 2010, Jim Gray, a local contractor, was elected mayor, and he set up a task force to update and improve the convention center area. According to planner Stanford Harvey, a principal at Lord Aeck Sargent and a long-standing participant in the project,

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Rendering of the project along Midland Avenue

the new mayor "saw a waste and an opportunity, that the city owned 46 acres right in the middle of downtown that was mostly surface parking lots."

The task force hired architect Gary Bates from Oslo, Norway–based Space Group. "Gary got it immediately to an extent that kind of amazed me," Pettit recalls. "He made Town Branch the centerpiece of his schematic plans."

As Harvey explains it: "I think there's two things that resonated. One is this idea of a city on the water, the idea that they thought we somehow are going to bring water back.

"And the second thing is," Harvey continues, "Lexington is pretty much defined by the horse farms, so this idea of a green ribbon coming through downtown that is somehow about the farms and what Lexington means ... people really liked that idea too. Particularly if it's a trail that connected out to those farms as well."

"The arena project was shelved," says Pettit, "but the Town Branch concept was promoted as a stand-alone design competition."

In the ensuing proposals, most of the firms did the obvious thing, according to Gena Wirth, a design principal at Scape: They daylit the length of Town Branch through downtown, liberating it from its culvert, and made it into a riverwalk, like the one in San Antonio, even though Town Branch is a far less substantial waterway. Scape, on the other hand, immersed itself in the natural environment of the bluegrass region, in particular the way a porous limestone called karst has shaped the local economy and ecology. Apparently, the limestone nourishes the grass, thereby strengthening the bones of the horses that graze on it; it also infuses the bourbon for which the state is famous. And it causes water to behave in unusual ways, which influenced Orff's design. In her 2016 book, *Toward an Urban Ecology*, she wrote: "Underground waterways travel through permeable limestone layers and surface into pools, disappear into sinks, and dramatically resurface where least expected. Rather than express Town Branch as

a linear channel, the project aims to reveal a karst identity through a network of water windows, pools, pockets, fountains, and filter gardens that evoke and expose the underground stream."

Scape's idea is clever: Town Branch Commons will be a linear park squeezed into space created by narrowing the traffic lanes on Vine and repurposing some of downtown's many surface parking lots. The park will be continuous, but the actual creek will not. Sometimes it will be evoked with pools, stormwater-cleansing filtration gardens, and a variety of other water features. The distinctive karst walls, made from diagonal slabs of stone, common in the surrounding countryside, will be a recurrent motif in the project, used as the inspiration for benches, barriers, and paving patterns.

The Department of Transportation, in awarding Town Branch Commons the grant, saw the project as a "multimodal greenway" and was especially swayed by the idea that the section it was funding would link to 20 additional miles of rural trails. The project's overall budget, just shy of $40 million, also came from other federal sources, plus city and state transportation and environmental budgets. The two largest park areas are being paid for separately, by private donations. But it was the TIGER grant that made the project feel like a done deal, according to Harvey: "People were taken aback: They actually raised all of the money to do this. This is actually going to happen."

Mayor Gray discusses Town Branch Commons the way his 1970s predecessor likely spoke of the convention center: "I'm saying it's essential, essential in the competitive landscape today," he told me. "Having a compelling, inviting, welcoming urban space through it is a big part of maintaining competitive advantage in an economic sense."

Gray's director of project management, Jonathan Hollinger, put it this way: "We see this as 21st-century infrastructure. What we've done over the last 50 years is built infrastructure for cars." No matter how technology changes the city's future needs, he argues, "I can say with great certainty that we'll always be able to walk."

What Losing TIGER Would Mean

The revitalization of American cities that has occurred over the past decade can be attributed, in part, to the way the federal government has rewarded urban centers that took the needs of their walkers, bicyclists, and transit riders seriously. This hasn't prevented the Trump administration from targeting TIGER grants in its budget. In

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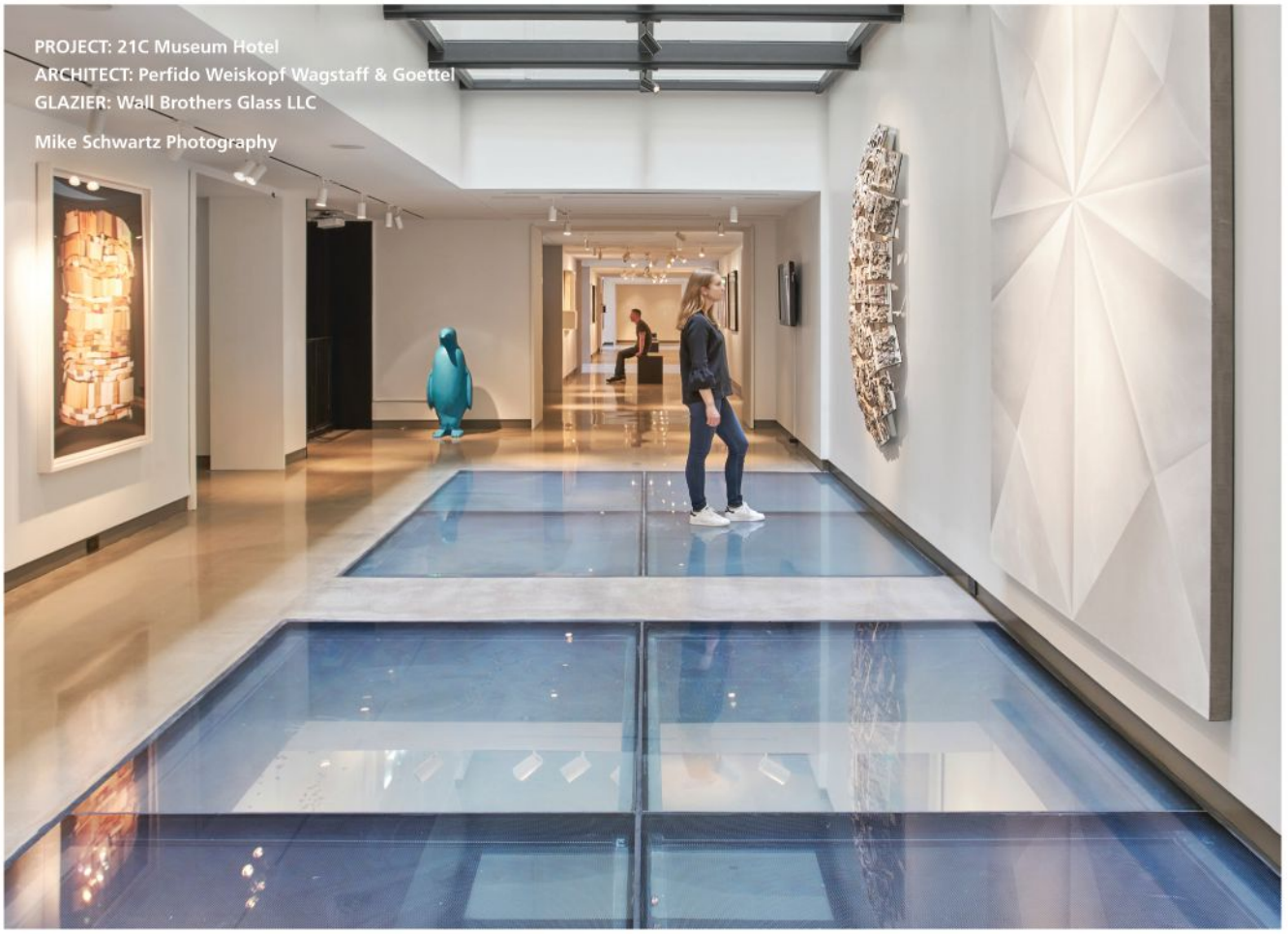

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Rendering of what is now the convention center parking lot

theory, the Town Branch project should appeal to politicians on both sides of the aisle. In fact, Lexington officials rallied support for the TIGER grant from Sen. Mitch McConnell (R). When I recently spoke to Shaun Donovan, the former secretary of the U.S. Department of Housing and Urban Development, he emphasized that encouraging and funding innovation at a local level should be a bipartisan effort: "In some ways, it's very consistent with the federalist view of the Republicans that the federal government ought to be a supporter of local communities rather than dictating to local communities."

Although light on specifics, the Trump administration's approach to infrastructure appears mainly to be about injecting money into big-ticket projects like highways and airports by privatizing them. There doesn't seem to be a lot of interest in mass transit and other less carbon-intensive forms of transportation. As Poticha told me: "The message I'm getting from the Trump administration is that they're only really interested in these big projects that private equity investors can see a return of investment on."

In other words, this is not an administration that appears intent on embracing the kind of progressive urban thinking that is one of Orff's strong suits. She describes her approach to incorporating the local ecology into built works as a "revival," which she defines as "a creative, forward-looking act, not driven by nostalgia for the past."

Indeed, much of our 21st-century infrastructure has been aimed at repairing the damage done by monumental 20th-century infrastructure. TIGER supports projects that accomplish these aims in a way that isn't always photogenic or sexy, that may not have the appeal of a cathedral-like airport terminal or a soaring bridge. If Trump's cuts to TIGER are included in the budget that Congress is slated to pass this fall, what will be lost is a program that prioritizes the layer upon layer of interlocking systems that are frequently unglamorous and boring, and sometimes, like that lost creek in Kentucky, entirely hidden from view.

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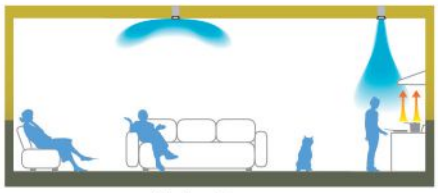

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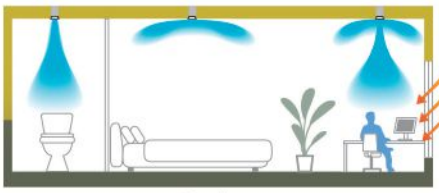

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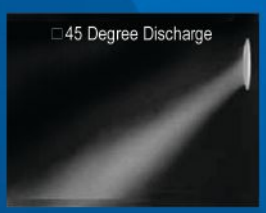

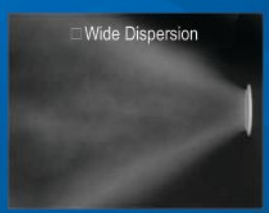

Model: **BS**
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“There’s a new medium. Instead of paper and the drawing as the primary mode of architectural ideas, the screen is the medium.”

UIC’s Instagrammable Moment by Zach Mortice

The piñatas that hang over a wide, terraced stairwell are distinctly biomorphic but don't resemble any earthly species of fauna. There are bulbous limbs and neon colors, but these David Cronenbergian monstrosities are rendered in papier-maché. Antonio Torres, the architecture professor whose studio created them, says the project was about "articulating bellies and using appendages to protect the most succulent parts of these bodies." Which is another way of saying, good luck to the stick-wielding children trying to score some candy.

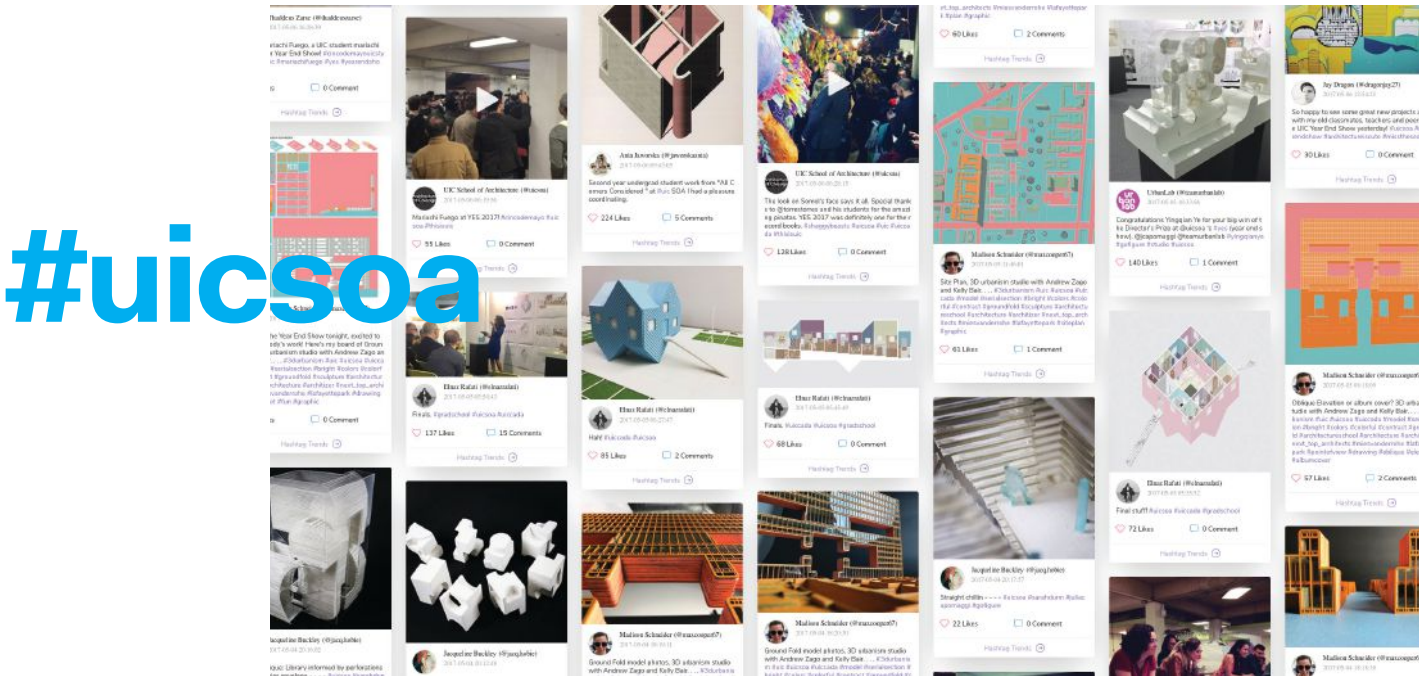
Welcome to Cinco de Mayo at the College of Architecture, Design, and the Arts at the University of Illinois at Chicago (UIC), which also happens to be hosting the reception for its year-end show on the same day: a triumphant roundup of the students' best work. A mariachi band in black jackets and red ties marches through the school's Art and Architecture building, a singular species of split-level béton-brut designed by legendary Skidmore, Owings & Merrill partner Walter Netsch. Small children suddenly materialize from the standard-issue thin-tie-wearing design crowd; most of them are the offspring of the faculty. There are shrieks and squeals as the piñatas in the end prove no match for the kids, who batter them open with wood rods, raining down neon crepe paper on the stairs.

Not for nothing has UIC developed a reputation for its playful and transgressive approach. The school has emerged as a hotbed for exploring how the rise of the internet and rapidly shifting visual media are shaping ideas about buildings. "There's a new medium," says assistant professor Stewart Hicks. "Instead of paper and the drawing as the primary mode of architectural ideas, the screen is the medium."

Or, as graduate student Tyler Ohnmeis puts it: "We're making architecture specifically to be posted on Instagram."

For the year-end show, the students haven't fashioned speculative projects for clients so much as they've envisioned speculative ways of seeing the world. Undergraduate Julia Lobdell's project, for instance, repositions going to the bathroom as a provocatively semi-public act, elevating fuzzy pink rectangular bathroom enclosures on a stage-like platform. "Since everyone can kind of see you—your head and your feet—you're kind of performing," she says.

Robert Somol, the school's director, "has made [UIC] into a place unlike anywhere else in the country," says Mark Lee, principal of Johnston Marklee. As curators of the 2017 Chicago Architecture Biennial, Lee and his partner Sharon Johnston, FAIA, selected 10 UIC faculty members to participate: about the same number as from the Harvard Graduate School of Design. UIC, which has just 40 faculty and gained accreditation in 1969, is wielding its influence beyond Chicago. Last year, Ania Jaworska, a visiting assistant professor, was a finalist for MoMA PS1's Young Architects Program; another professor, Kelly Bair, participated in the 2016 Venice Architecture Biennale.



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Jimenez Lai, Somol's most successful apostle, taught at UIC for six years before leaving for UCLA in 2014. Lai believes his former boss will soon occupy an exalted position in Chicago architecture: "The first and second decade of the 21st century will probably have a face, and I think that face is Bob Somol."

The Reign of Somol

Somol has a long history at the school. In the 1990s, he taught there when Stanley Tigerman was director. In 2007, he returned to assume the lead role, with the goal of re-establishing the intellectual and disciplinary rigor that had characterized Tigerman's tenure. Somol has a degree from Harvard Law School, a Ph.D. from the University of Chicago in the history of culture, and no architecture degree. "My interest in architecture is really the fallout of my interest in art and politics," Somol says. "To think about the aesthetic and the political for me, a perfect halfway-house was architecture."

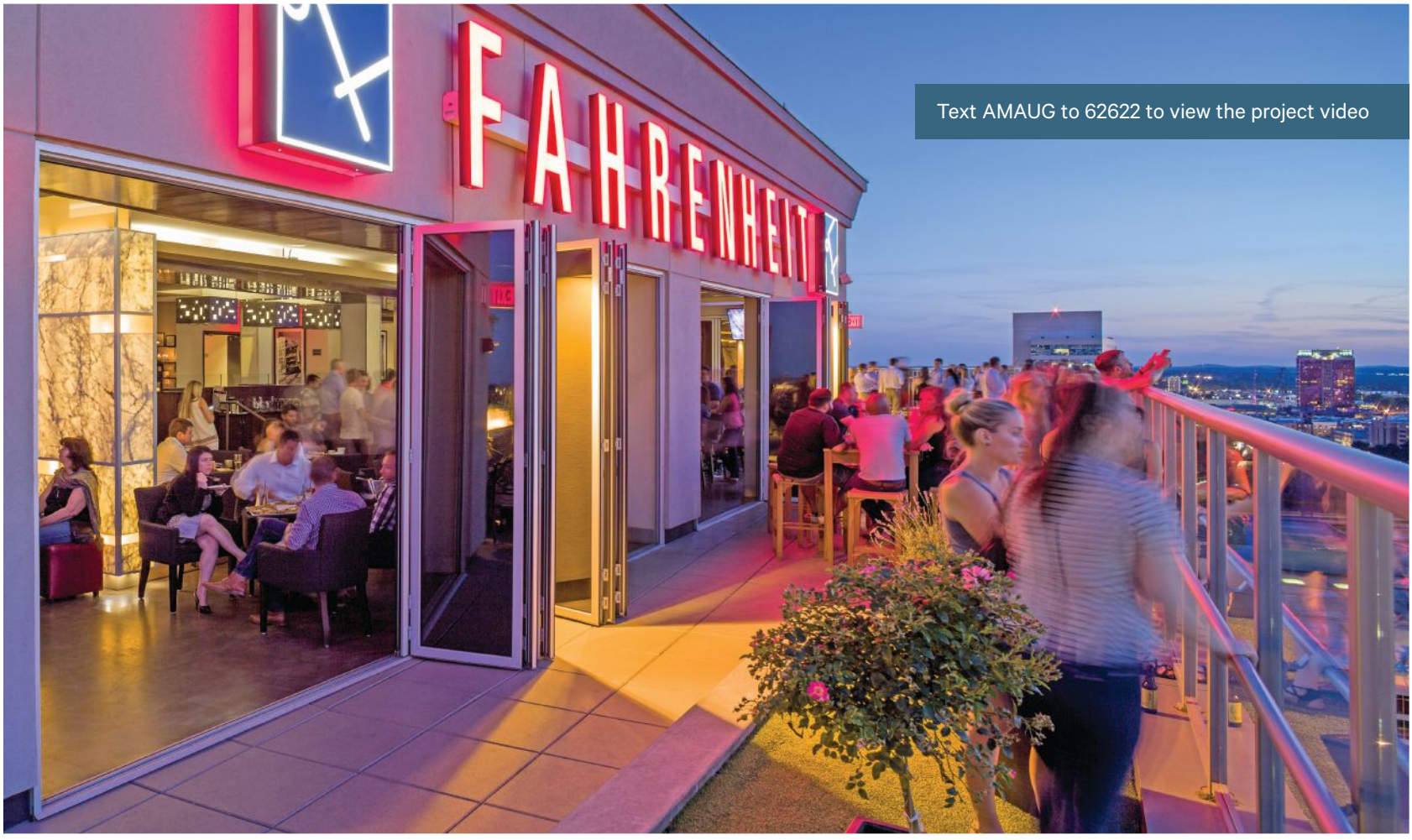
Something resembling Somol's manifesto appears in the first issue of *Flat Out*, a magazine of architectural criticism edited by his wife, UIC associate professor Penelope Dean: "Architecture is a plastic practice, exactly positioned to enact alternatives: to produce holes in the world, stage breakouts, and release the virtuality captured in the real. The world as it is never constitutes a sufficient condition for architecture."

The embrace of outsider aesthetics at UIC can be viewed as a response to how some faculty see the previous generation as having sold out. Ben Van Berkel is designing shopping malls. Rem Koolhaas counts China Central Television as a client. "The most successful firms that came out of that period tended to end up just becoming market-oriented architects. A lot of the cultural ambitions to the work just didn't seem to be there," says professor Grant Gibson, AIA. It's time for a new architecture, he says, one that isn't "easily co-opted by corporate capital forces."

Hence UIC's embrace of the internet, which is ideal for ripping things out of their context and reorienting them, obscuring sole authorship in ways architecture has long resisted. The school has adopted many of the composition techniques on the internet—aggregation, remixing, collage—often in a flat, graphic presentation. One studio run by Jaworska consisted entirely of a deep deconstruction of the corner as a concept, a series of virtual essays scaled to appear on an iPhone screen: rectilinear, curvilinear, tied in knots, sliced in section and plan, rendered in black and white.

If the school's body of work is fragmented, it can also be warm and inviting. Hicks' firm Design With Company has been among the most successful of the young faculty enterprises, and is transitioning from

Question Conventional Boundaries



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A Grant Gibson Instagram post of Jiminez Lai's 2016 Coachella installation

gallery exhibitions to pavilion-scale installations. The firm designed a temporary performance stage at Ragdale, an artist's retreat in the Chicago suburbs, by cobbling together abstracted building forms from different historic structures on the site (pitched roofs, lintels, columns). The project was a jubilant package of formal minimalism and graphic maximalism, infused with childlike wonder.

UIC's interest in aggregation and collage may be based on principles similar to those that gave rise to Chippendale Skyscraper tops and flattened ornament. But no one at the school refers to Michael Graves with hushed reverence; no one is interested in reviving the postmodern canon. Instead, there's a recognition that approaching design in a more broadly postmodern way (fragmented, eclectic, neither bound by tradition nor repelled by it) is a door that once opened, cannot be shut. "There've been so many dead ends and forgotten things that [make] history a great repository to do things differently," Somol says. "To use the archive inappropriately is one of our techniques."

Take, for instance, the 2015 Chicago Biennial, when Norman Kelley, a firm co-founded by UIC assistant professor Thomas Kelley, installed a series of vinyl stickers on the Chicago Cultural Center's windows illustrating historical window types and treatments. They included "greatest hits" (Chicago School windows), "b-sides" (Metabolist porthole windows), and, most importantly, "really banal things" (pleated curtains), Kelley says.

"A Solution in Search of a Problem"

Not everyone has been charmed by UIC's approach. "Bob values the play of ideas, and I think that's laudable," says *Chicago Tribune* architecture critic Blair Kamin. "But architecture isn't a sandbox." During the 2015 Chicago biennial, Kamin took aim at "The Big Shift," a proposal by UIC professor Andrew Moddrell, AIA, to fill in Lake Michigan east of Lake Shore Drive with a new skyscraper district. It was a radical violation

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A LEED AP since 2002, Leonard was elevated to a LEED Fellow in 2015. Today the licensed architect advises leading design teams and owners on LEED v4 best practice through the Nashville-based consultancy, greenSTUDIO | a division of Hastings Architecture Associates, where he serves as managing principal.

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The drive to push sustainability throughout *PPG Paints* brand is a continuous, ever-evolving process. Professionals looking to partner with a global coatings leader that goes far beyond the expected should give the *PPG Paints* brand their most serious consideration.

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USGBC LEED v4: usgbc.org/leed-v4

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WELL Building Standard: wellcertified.com

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of the city's foundational injunction to keep the lakefront "forever open, clear, and free," and Somol's support "revealed a sensibility that celebrated big ideas at the expense of granular human reality," Kamin says. It was a "solution in search of a problem."

The emphasis on speculative bombast might also seem misguided given the school's diverse student body. Of the 312 undergraduates enrolled in fall 2016, 41 percent were Hispanic and 9 percent African-American. Which raises the question: Wouldn't some students be better served with a more pragmatic education that would help them serve their local communities?

Kevin Meyer, a 2012 UIC graduate, doesn't think so. Meyer now works at Juan Gabriel Moreno Architects (JGMA), one of Chicago's most progressive young firms, where eight employees—about half the staff—are UIC graduates. He believes you can learn how to work in a firm when you work in a firm; what young architects need, he says, is "visionary exploration."

For Gibson, UIC's outsider status is itself a way to cultivate diversity in design. "Everyone is new here, and the work is strange to everyone, regardless of their background. That common 'otherness' that's inherent to the work allows a common ground for all sorts of different backgrounds to engage one another."

Moving on to the Next Thing

A decade, which is the length of Somol's tenure so far, is a short time in the history of a school. "When you look back on programs that had any historical weight, you see people like John Hejduk at the Cooper Union for 30-plus years," says Lee. "Slowly, we're beginning to feel the resonance of the young people Bob plucked from nowhere."

But how long will the current moment last? "Somol is having his day today," says Tigerman, now 80. "[His] time is now, and God bless him, he deserves it. But it isn't the future."

Somol doesn't disagree. As engaged as UIC has been with the mutating whirlpools of pop culture, he remains wary that today's look is tomorrow's fad. When Somol taught at UIC in the '90s, Tigerman warned the faculty of "clipping coupons on yourself"; that is, always going for the easy win, the value purchase. That's what Somol wants to avoid now: "Our job has to be to move onto the next thing, now that [the current thing] been a little bit co-opted. In a way, we're better as an incubator of new ideas, and not necessarily as a marketer of them."

It's an academic ethos that reflects the architecture the school produces: Make no assumptions about how the world looks or functions. And, more importantly, remember that everything is plastic and mutable, even your own hard-earned success.

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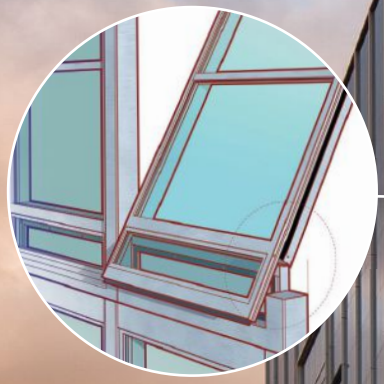

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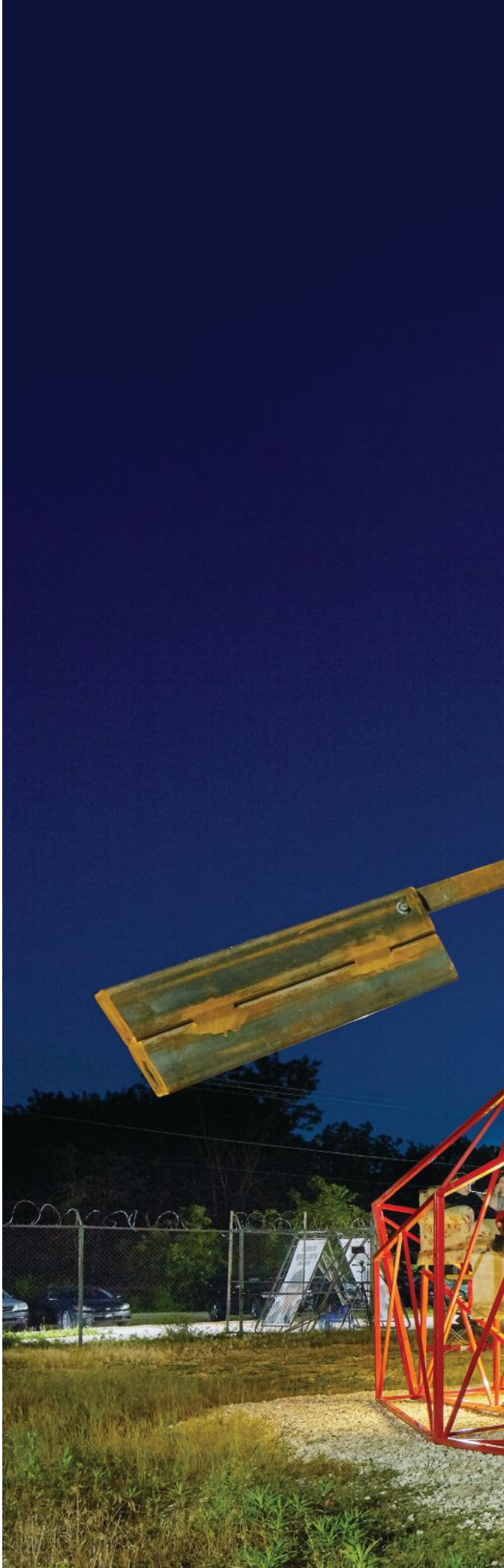
TIMOTHY HURSLEY

Fayetteville Outdoor Theater
Fayetteville, Ark.
University of Arkansas Fay Jones School of Architecture and Design

An outdoor theater designed and built by students blends high-tech fabrication with a venerable technique of assemblage.

TEXT BY CAIA HAGEL
PHOTOS BY TIMOTHY HURSLEY



The Fayetteville Outdoor Theater is the brainchild of a studio at the University of Arkansas (UA) Fay Jones School of Architecture and Design. Twelve students were led by visiting professor William Massie—on his way from his tenure as head of the architecture department at the Cranbrook Academy of Art to a new role as director of design technology at the University of Kentucky College of Design—and Angela Carpenter, his former student and now the fabrication labs manager at UA.

As a leader in the DigiFab movement and a connoisseur of laser-cut tube steel, Massie says that he "challenged the students to build something with technology that has never been built and has a cultural agenda." A Google search led to Central Tube and Bar, just two hours from campus in Conway, Ark., which serendipitously houses one of the few state-of-the art, $4 million tube-cutting machines in North America. Paired with a rigorous study of early Japanese joinery—both for its subtractive complexity and its beauty—this machine allowed students to laser-cut tube steel the way that 16th-century Japanese carpenters joined wood.

"This is the first time the technology to cut steel tube was both cheap enough for us to use and had the precision to change the whole model of how we join things together," Massie says. "Out of all the digital fabrication technologies that exist, this might be the workhorse. I think laser-cut tube will be the technology that will be utilized more than any other in the future." The students spent weeks developing joints, then started thinking about what they could build.

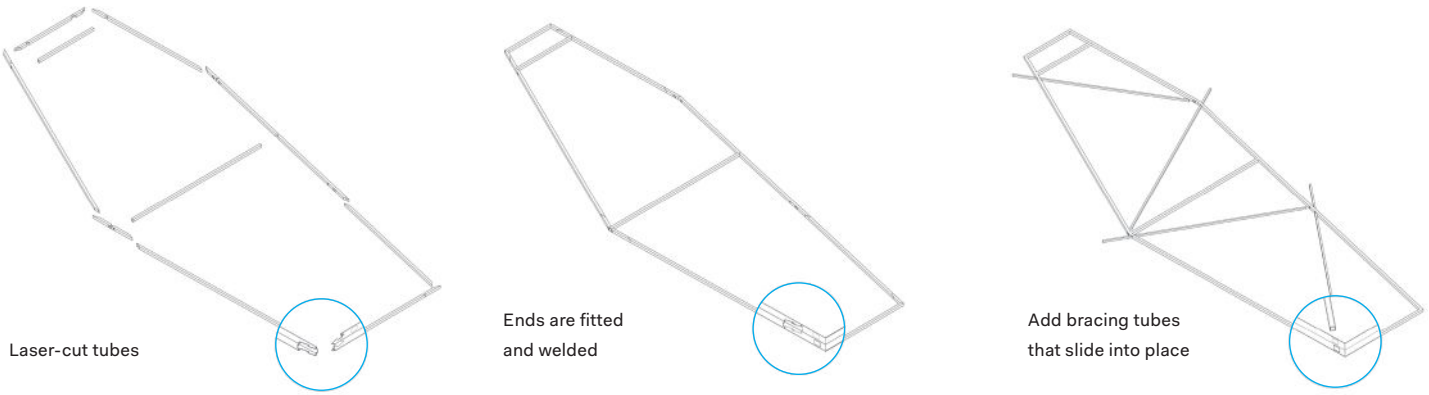
When class discussions drifted to the way millennials watch movies on phones, the students decided that their design/build project would be a communal theater with an extended screen that mimics the selfie stick—a subtle critique of the antisocial aspects of social media, and an open invitation to participate in public life.

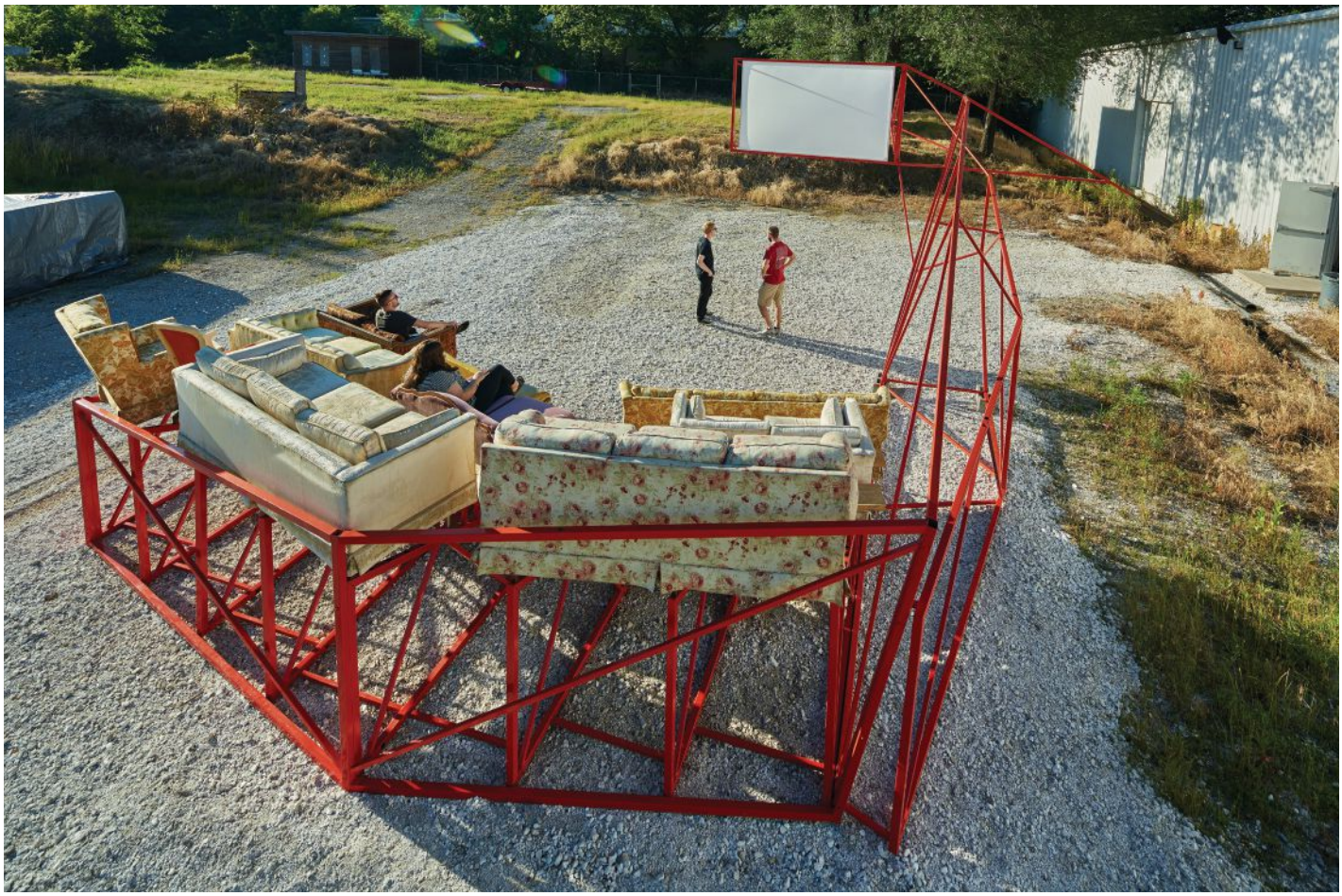
"We had a lot of conversations about what happens in the margins at theaters—like the possibility that going into a space that is safe because it's communal decreases inhibition," Massie says. "If we're not including awareness of social conditions in our discussions, students don't hunger for that later when they're making buildings that can impact the world."

The resulting 45- by 20-foot structure only uses two types of joints (a birdsmouth joint at the corners and a mortise scarf joint for areas where the steel needed to extend) and two sizes of 16-gauge tube steel (2 inches square and 1.25 inches square). The only other materials are the projection screen, its counterweight, and thrift-store couches.

With Massie headed to Kentucky, Carpenter plans to continue researching the joint techniques and to experiment with a skin and using a cheaper, plasma laser cutter so UA students can continue the exploration.

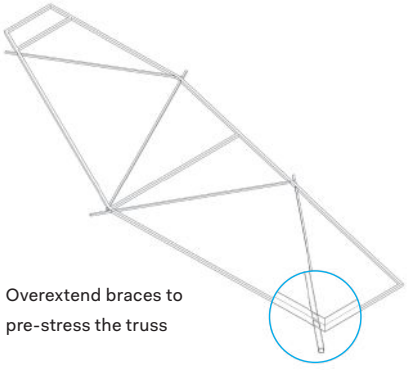
Screen Arm Fabrication Diagram



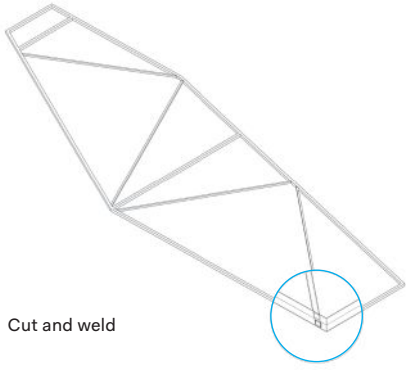


Previous Spread: View from behind projection screen

Above: The structure, as installed outside the school's fabrication lab, made from 565 linear feet of tube steel



Overextend braces to pre-stress the truss



Cut and weld

Project Credits
Project: Fayetteville Outdoor Theater, Fayetteville, Ark.
Client: University of Arkansas
Designer: University of Arkansas, Fay Jones School of Architecture, Fayetteville · William Massie, Angela Carpenter (professors); Austin Autrey, Christian Campbell, Nathan Clark, John Collamore, Molly Evans, Chelsea Garrison, Alexandria Glass, Derek Hukill, Evan Hursley, Scott Kervin, Rafael Segura, Christine Wass (student project team)
Fabricator: Central Tube and Bar
Size: 1,000 square feet
Cost: $2,000 (materials)

Meeting Center in Grândola
Grândola, Portugal
Aires Mateus

A new community building lends a mysterious presence to a small town in southern Portugal.

TEXT BY CLAY RISEN
PHOTOS BY NELSON GARRIDO

Over the last three decades, Aires Mateus, a Lisbon, Portugal–based firm led by brothers Manuel and Francisco Aires Mateus, has built a reputation for designing quietly powerful structures that hide rich complexity behind simple, yet imposing, forms. Corners are carved out. Perfectly placed windows frame unexpected views. Serendipitous joy is found in the unlikeliest places.

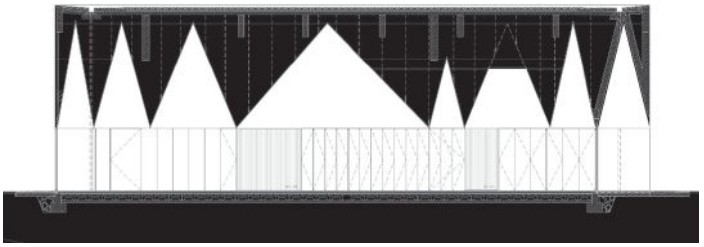
One of the duo's most recent projects, a small meeting venue in Grândola, a town about an hour's drive south of Lisbon, is a case in point. Nestled among one- and two-story historic buildings, the 7,212-square-foot center appears, at first, like a plain concrete block—with no exterior signage and no decoration to hint at what's inside. Adjacent to and sponsored by the local offices of Santa Casa da Misericórdia—the oldest charity in the world—the building seems to reflect the client's plainspoken, humble approach to the world.

But then you notice subtle, telling gestures: the irregular, deep incisions made along each side, inside of which nestle windows and doors. The sharp-angled cuts both echo the pitched tile roofs around the center and offer hints of what waits on the interior. The building seems square, but one side is slightly off-kilter, making the building look larger but also reflecting the traditional, handmade irregularities of its neighbors. It is a monolith that both sits outside its context and is deeply embedded within it.

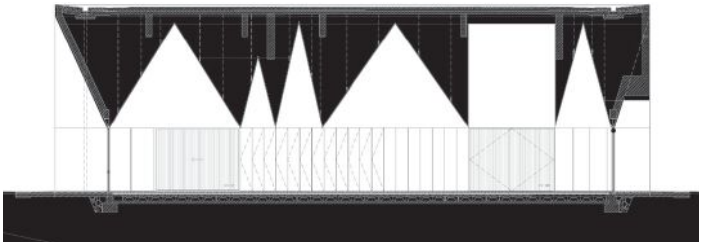
The interior is no less austere—a single, white, open room, lined with storage and utility closets. But stand inside for a minute, and details begin to pop. The windows offer views back onto the fabric of Grândola, framing colorful doors and walls across the way. Above, in place of a conventional flat ceiling, is a matrix of vaulted recesses, some with pinhole skylights. Those light wells in turn articulate the divisibility of the meeting room: curtains on tracks run along the lower edges of the vaults. As a result, the space can be broken down into discrete rooms to accommodate both large meetings and smaller sessions, and move between the two with ease.

What seems like a mysterious void at the center of town becomes, in its articulation, a jewel-box gift to Grândola. At night, light pours out of the windows and doors, flooding the streets with a warm glow. The entrances aren't merely doors; massive glazed panels pivot on a vertical central axis, opening whole walls to the community. All the while, the whitewashed walls speak to the sunbaked vernacular of southern Portugal—updated, of course, for the 21st century.

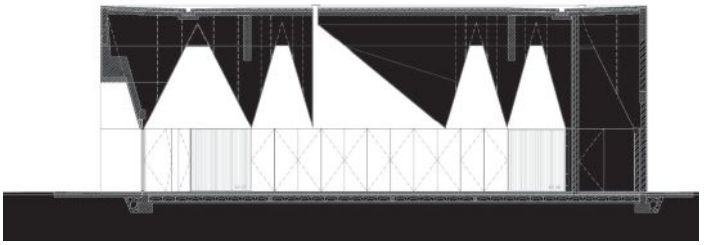
Section A–A₁



Section B–B₁



Section C–C₁



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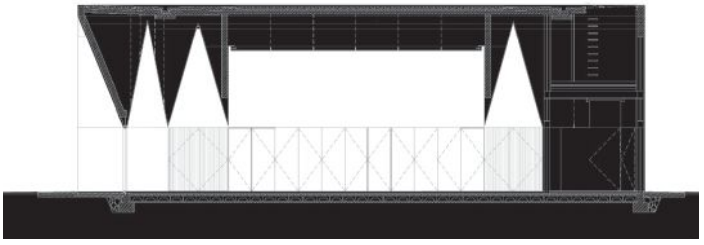
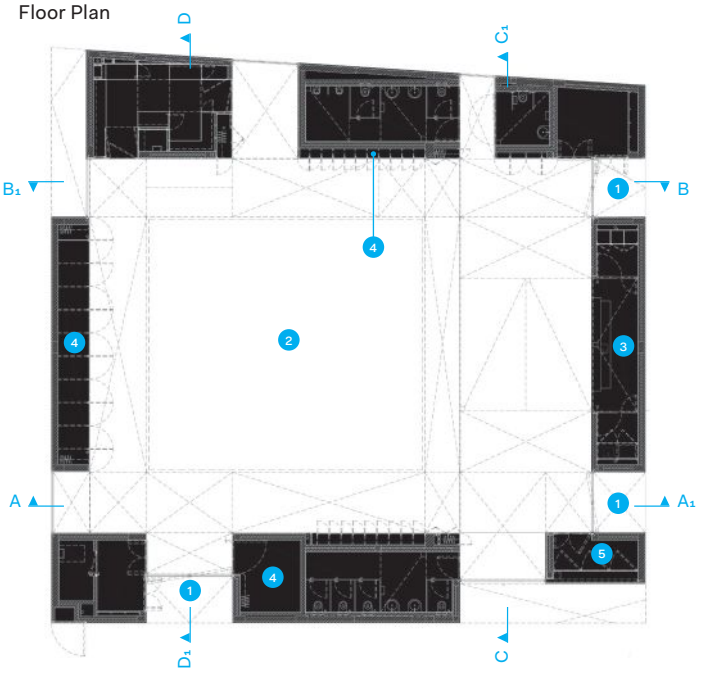


Floor Plan



Previous Spread: View from the southeast

Opposite: Meeting room interior

1. Entrance
2. Meeting room
3. Bar
4. Storage
5. Utilities

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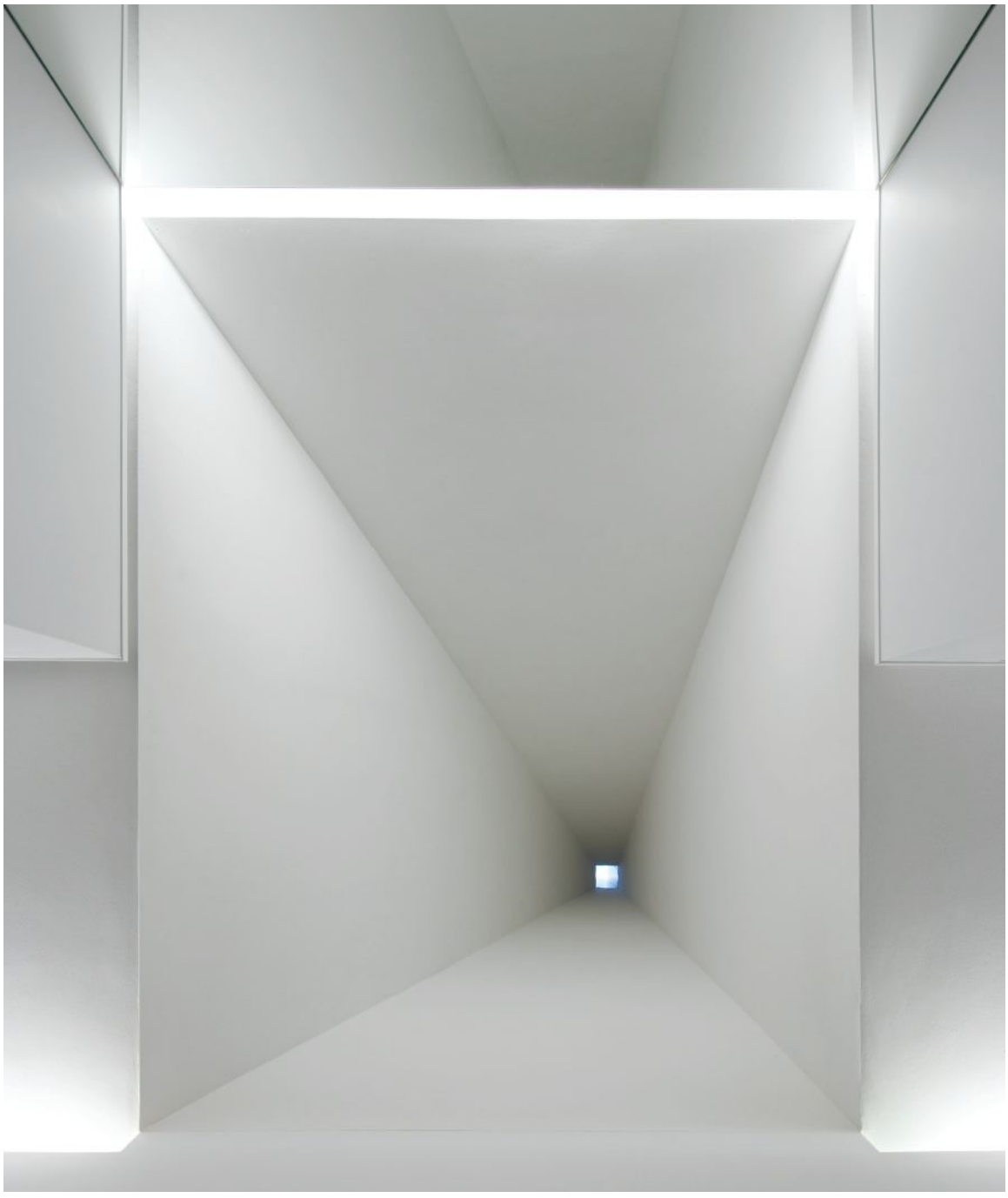
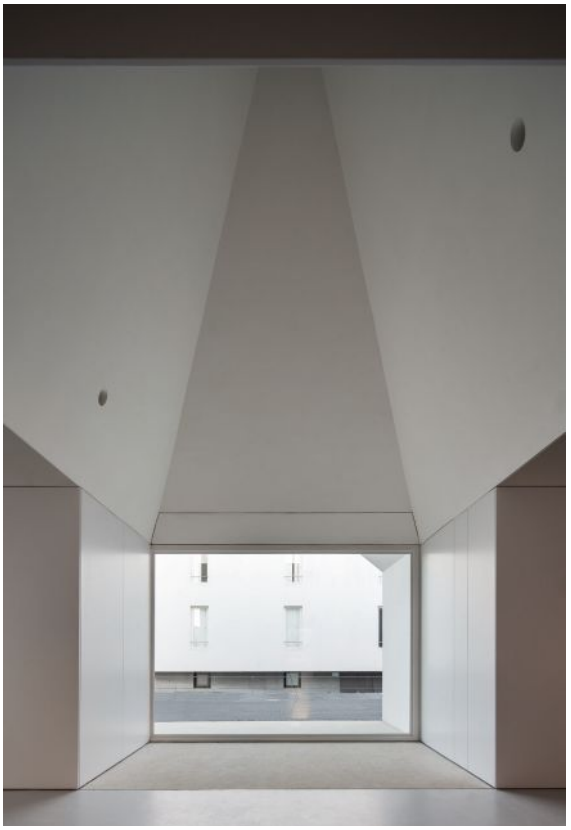
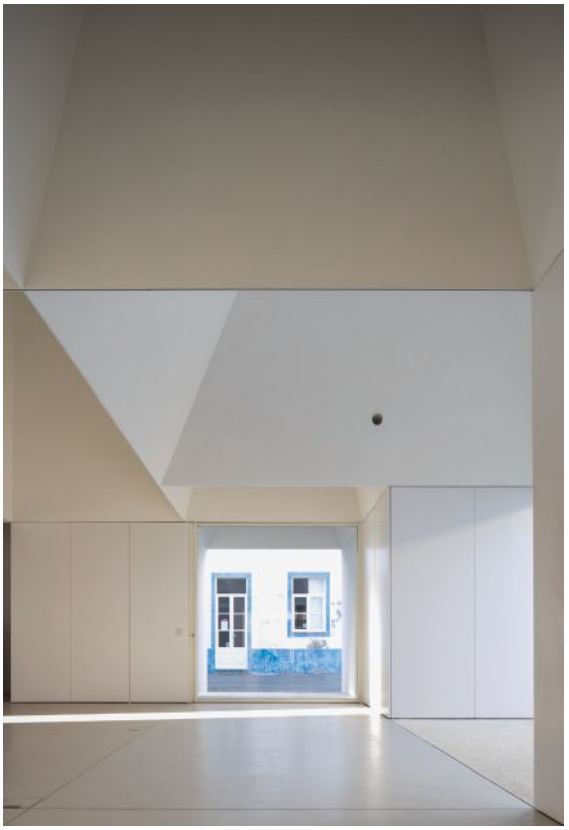


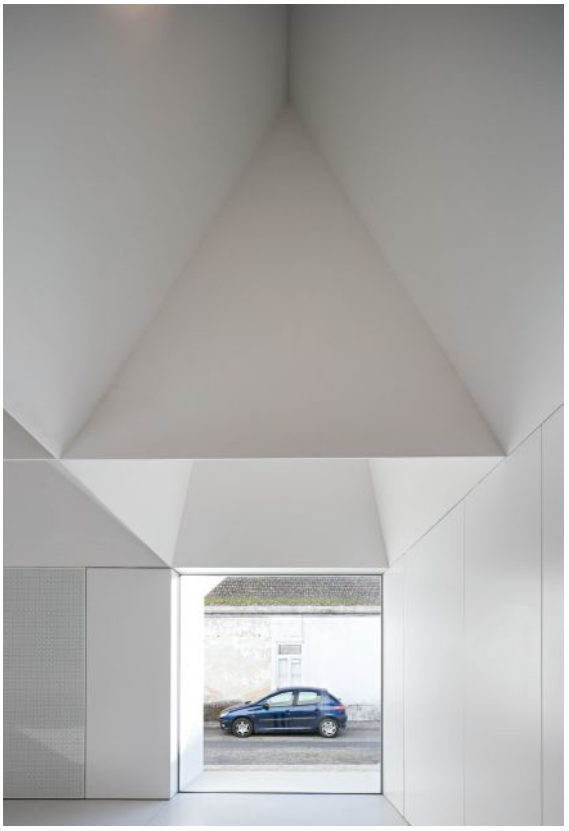
Above: View into ceiling vault

Opposite: Curated views of Grândola through meeting center windows

Project Credits
Project: Meeting Center in Grândola, Grândola, Portugal
Client: Santa Casa da Misericórdia de Grândola
Design Architect: Aires Mateus, Lisbon, Portugal · Manuel Aires Mateus, Francisco Aires Mateus (principals); Jorge P. Silva (project leader)
Collaborators: Marco Campolongo, Matteo Foresti, Előd Golicza
Engineering: Axial; Três Cês
Contractor: Manuel Mateus Frazão
Size: 670 square meters (7,212 square feet)
Cost: Withheld







Vespertine
Culver City, Calif.
Eric Owen Moss Architects

At the hottest new restaurant in Los Angeles, architecture and food are equally integral to the dining experience.

TEXT BY IAN VOLNER
PHOTOS BY TOM BONNER

Previous Spread: View from southeast

This Image: View of entry and landscaped courtyard to the west

Jordan Kahn, 33, is a much-wagged-about upstart chef in Los Angeles' foodie scene. Eric Owen Moss, FAIA, now 73, has been a mainstay of the city's design community for more than four decades. Sitting down in Moss' office in Culver City, Calif., they pick up threads of a discussion they've been having for some time.

"There's not a frame of reference for food. So for me it's a completely different discussion than your frame of reference," Moss says to Kahn. "The whole thing for me, it kind of had nothing to do with eating."

"We didn't create the experience for the guests as such," Kahn says. "How you enter and exit and move through is largely based on what the building wanted."

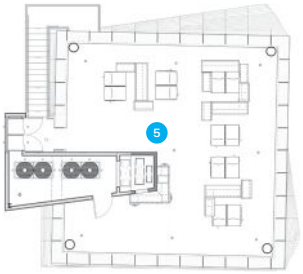
One gathers, by the by, that the unlikely pair has recently opened a new restaurant nearby, Vespertine, in one of the many extraordinary buildings with which Moss has populated the neighborhood known as the Hayden Tract. This one is affectionately nicknamed the Waffle, owing to its reticulated, red steel façade.

Dating back to his earliest residential projects, Moss has favored a vigorously projective approach, one founded on an almost religious conviction that architecture makes its own reasons, and that formal invention has the power to engender new realities, both conceptual and practical. A poet's son, Moss has always been at home with lyrical mystery; lucky for him, Kahn has embraced that view, and the quality of the dining experience at Vespertine is almost as abstract as the building. "To give you a sense in advance would be antithetical to the approach," Kahn says.

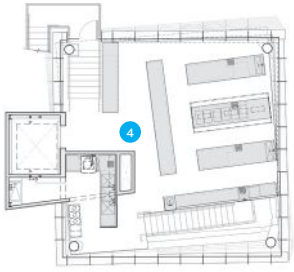
Would it be bootless, then, amid all this suggestive elusiveness, to describe the multistage dining process that carries visitors from one floor of the Waffle to the other—through a stacked dining room, kitchen, and patio—before depositing them back outside in a landscaped garden? What about the detailing of the blocky wooden worktables, or the pitcher that doesn't stand upright, both of which Moss designed, along with the rest of the furniture and fixtures? It's most unusual to think of a restaurant as being so much more than the sum of its architectural parts as to be cheapened by prosaic description. And yet that's what Moss and Kahn appear to be going for.

More surprising still, that's sort of what they've achieved. Photos are as close as you're likely to get, since snagging a reservation is all but impossible. The rest is silence. But this is an accomplishment: Even the most talented restaurant designers are usually obliged to rely on narrative and atmospherics as their primary devices. No one should have expected Moss to design a restaurant that way, and he hasn't. There's no saying quite what he's done instead, and while that may be a peril of Moss' approach, it is also its pleasure.

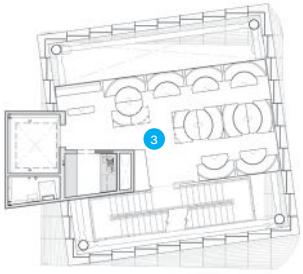
Roof-Terrace Plan



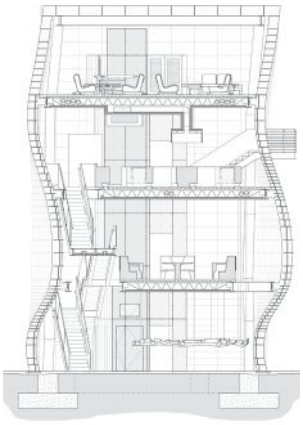
Third-Floor Plan



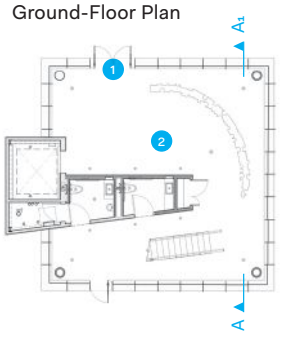
Second-Floor Plan



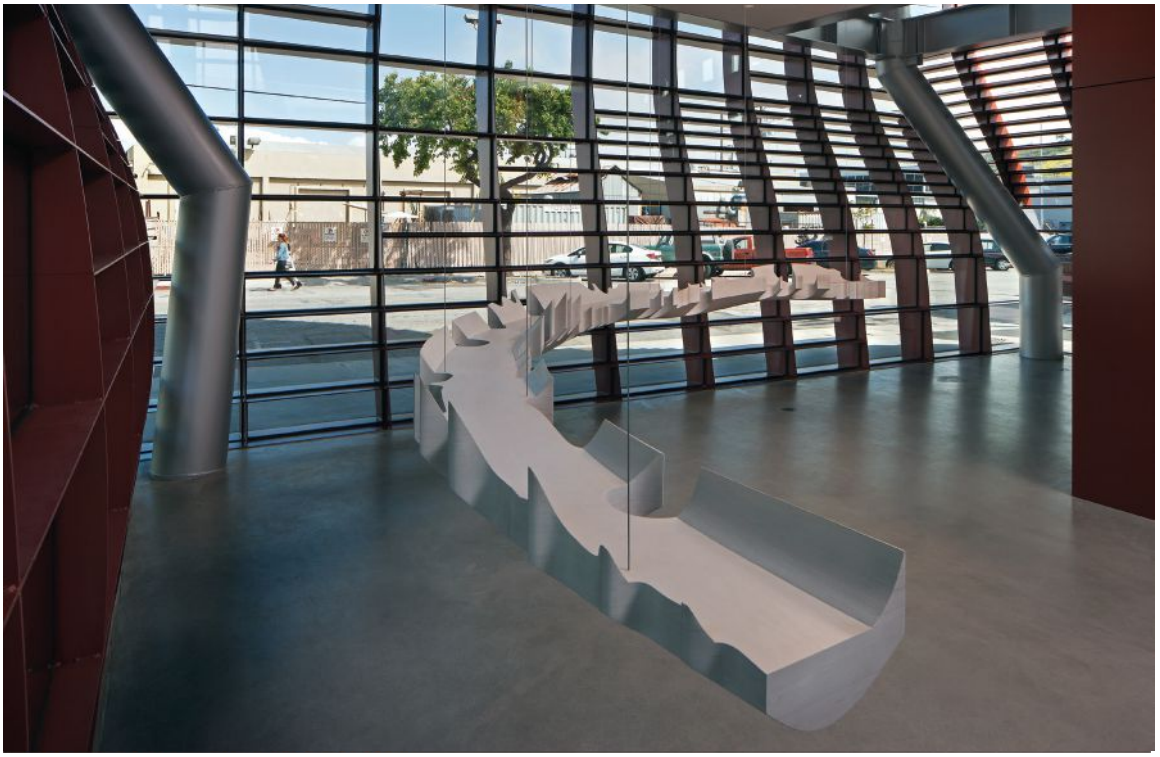
Section A–A₁



Ground-Floor Plan

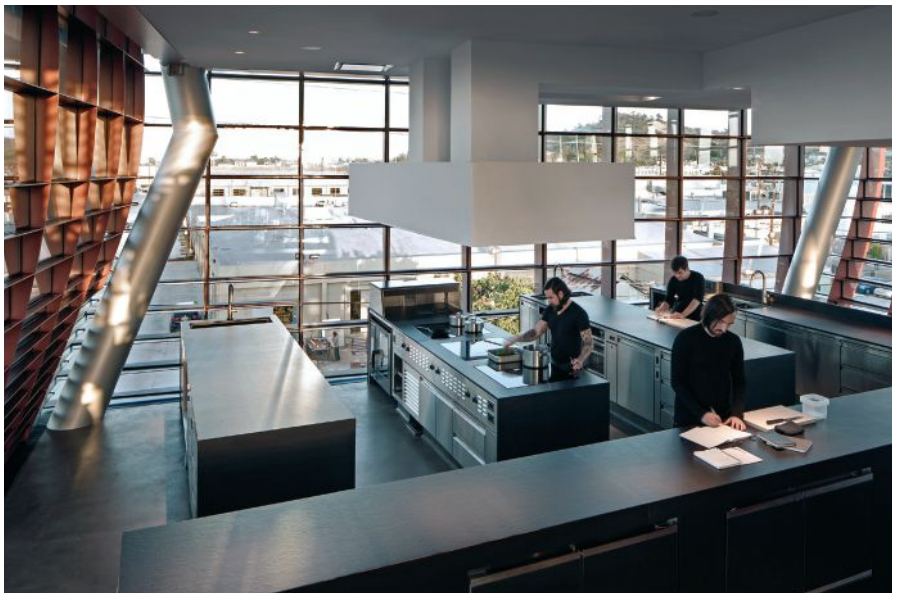


1. Entrance
2. Reception
3. Dining room
4. Open kitchen
5. Roof terrace



Top: Dining room interior on second level, with view of furniture designed by the architect

Above: Reception area interior, with sculpture designed by the architect to hold gifts for departing guests

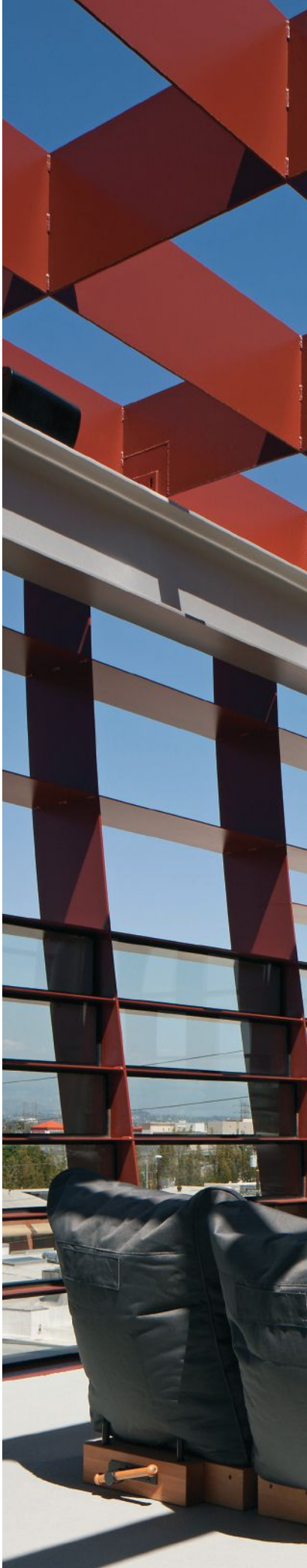


Above: Open kitchen on third level

Opposite: Roof terrace, with view of reticulated steel canopy

Project Credits

Project: Vespertine, Culver City, Calif.
Client: Jordan Kahn; Frederick and Laurie Samitaur Smith
Architect: Eric Owen Moss Architects, Culver City, Calif. · Eric Owen Moss, FAIA (principal and lead designer); Dolan Daggett, Eric McNevin (project directors), Hugo Ventura, Vanessa Jauregui, Andrew Wright, Emmanuel Osorno (project designers), Cayetana Lopez, Daniel Hapton, Fausto Nunes, Zarmine Nigohos, Kyoung Kim (project team)
Structural Engineer: NAST Enterprises
Mechanical/Plumbing Engineer: Nibecker & Associates (BSC), Project MEP (TI)
Electrical Engineer: Moses & Associates (BSC); Project MEP (TI)
Civil Engineer: Paller-Roberts Engineering
General Contractor: Samitaur Constructs (BSC); Howard CDM (TI)
Surveyor: J.O. Nelson Consulting Land Surveyors
Landscape Architect: Land Images
Kitchen Equipment: Kitchen Restaurant + Bar Specialists; SML Stainless Steel Group
A/V: eAuthority
Custom Steel Furniture Fabrication: Tom Farrage & Co.
Custom Wood Furniture Fabrication: John Ford
Size: 5,500 square feet
Cost: Withheld



Tenri Station Plaza CoFuFun
Tenri, Japan
Nendo

A revamped public transit plaza brings playfulness and civic engagement to a town in Japan's Nara prefecture.

TEXT BY KATIE GERFEN
PHOTOS BY TAKUMI OTA

In 2014, the rail station in Tenri, Japan, was, urbanistically speaking, dead. Peak times were busy as commuters from the town of nearly 70,000 made their way to or from work in nearby Osaka, but the rest of the day, "the space in front of the station had become a place that people just passed by," says Oki Sato, chief designer and founder of Nendo.

The mayor decided it was time for a change, and held a design competition to enliven the site. Nendo won, and with the victory took on one of its largest architectural commissions to date. The Tokyo- and Milan-based firm is known for its extensive portfolio of retail interiors, branding, and industrial design, and it brings every bit of that varied expertise to bear in the recently opened refresh of the space. And as for the size and scale of the 64,583-square-foot project, Sato says that his team wasn't daunted, and in fact "tried to design huge furniture, instead of an architecture piece."

Tenri Station Plaza CoFuFun, as Nendo dubbed its scheme, is a supergraphic set of stepped conical pavilions, some upright, some inverted, like retro spinning tops on display. One holds a café, one is an observation deck and stage, and another a play area. Every surface—roof included—is meant to be engaged.

The pavilions' forms were inspired by *kofun*, ancient keyhole-shaped imperial tombs made from mounded earth that can be found throughout the area. The circular twist was pure function: "We wanted to make the space accessible from anywhere," Sato says.

Each structure is made from 36 pieces of precast concrete, which were craned into place on site. Sato chose precast not only for its precision forming and ability to create columnless interiors, but also for its thrift: The formwork was reused multiple times, with the components deployed in different configurations.

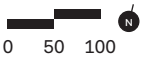
Ask Sato the intention behind the ubiquitous steps, and he replies that the singular form serves multiple purposes, from retail displays, to seating, to fences that contain children at play. "This variety creates an environment that encourages visitors to explore and spend time in different spaces within the plaza," he says. "It's an ambiguous space that's a café, a playground, and a piece of furniture, all at once."

And that empty plaza that spurred the competition in the first place? It's now full. After the opening, Sato says, "I heard that when citizens see so many gather at the plaza for weekend events, they are surprised to find out that so many other people live in Tenri."

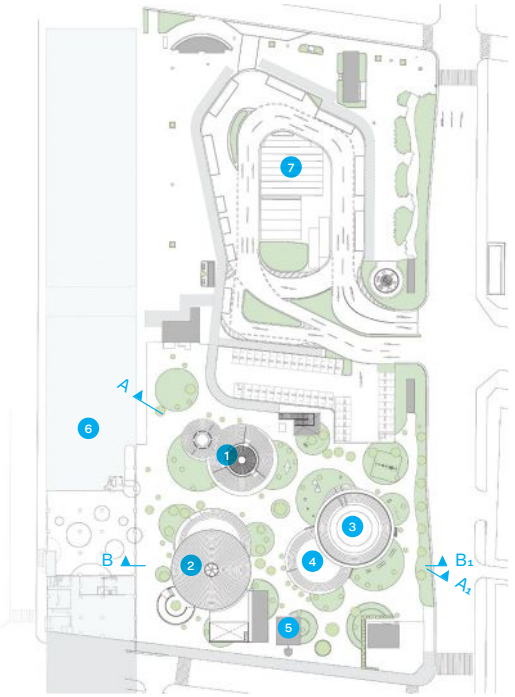
Site Section A–A₁

Site Section B–B₁

1. Children's pavilion
2. Café
3. Observation deck
4. Outdoor stage
5. Public restrooms
6. Station
7. Bus/taxi pickup



Site Plan



Previous Spread: View from the south at grade, looking toward sunken outdoor stage and observation deck

Top: Aerial view of plaza from the southeast, with view toward Tenri Station

Above: View from children's pavilion, looking to café beyond

BOTTOM: DAICI ANO

Café interior

Project Credits
Project: Tenri Station Plaza CoFuFun, Tenri, Japan
Client: Tenri City
Design: Nendo
Construction Administration: Iwataya Architects
Meeting Area Interior Design: Kokuyo
Signage, Website, and Digital Signage Design: Nippon Design Center Irobe Design Institute
Lighting Design: Izumi Okayasu Lighting Design
Landscape Design: Studio Mons
Size: 6,000 square meters (64,583 square feet)
Cost: Withheld

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TK CREDIT / BYLINE – SM PARAGRAPH STYLE

The Chrysalis
Columbia, Md.
Marc Fornes/TheVeryMany and Living Design Lab

A band shell defies formal convention, while serving as an unexpectedly sturdy and versatile performance venue.

TEXT BY AMANDA KOLSON HURLEY
PHOTOS BY JEFFREY TOTARO

Architectural follies can be whimsical, bold, or inventive, but rarely are they as hardworking as the Chrysalis, a new electric-green band shell in the 1960s planned community of Columbia, Md. Designed by Marc Fornes/TheVeryMany and Baltimore-based Living Design Lab, the pavilion torques and billows like a sail. Contrary to its airy appearance, the structure is robust enough to shoulder concert rigging—up to 58,000 pounds of it, and it can host performances that range from small local groups to orchestras.

The Chrysalis began to emerge in 2014, when the nonprofit Inner Arbor Trust was established to plan the future of Symphony Woods, a public park in downtown Columbia, and was granted a perpetual easement to develop an arts and culture park. For its first phase, the Trust's then-president, Michael McCall, wanted a design that harmonized with its woodland setting while asserting its own presence. "It needed to be of nature, but obviously not nature," McCall says.

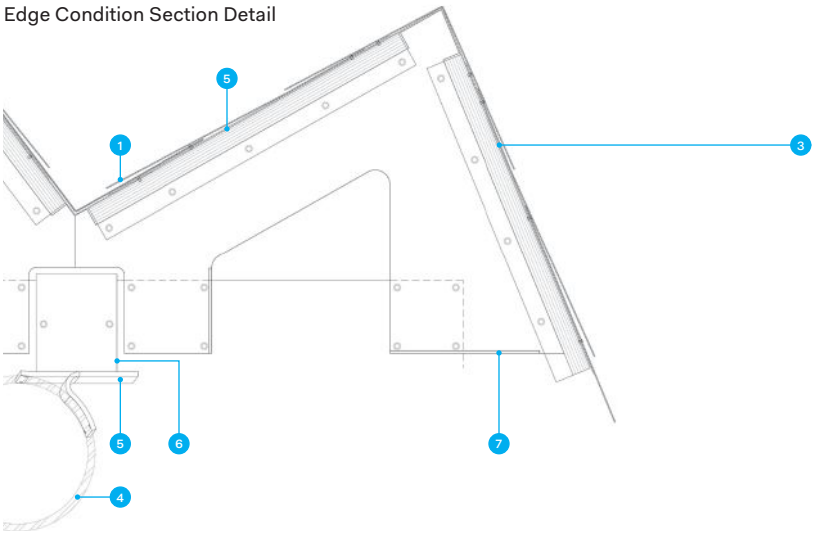
Enter Marc Fornes of New York–based Marc Fornes/TheVeryMany, who specializes in structures that defy orthogonal geometry. To generate the Chrysalis' form, Fornes—using Rhino 3D and custom protocols written in Python—drew a flat digital mesh, programmed its segments as spring systems, then inflated it, adding pleats for structural depth. "The building's form was entirely generated through code," Fornes says.

Fornes then worked with Living Design Lab principals Davin Hong, AIA, and Kevin Day, AIA, as well as collaborators at Arup and Zahner, to devise a structural system that would be an integral part of the architecture. "It was intended that the structure would be fully exposed," Hong says. But the reality "required an unprecedented level of collaboration and coordination between all the different disciplines."

The solution, arrived at by team members passing around the complex 3D model, was a skeleton of steel tubes married to Zahner's ZEPPS prefabricated panel system. Arup helped ensure the Chrysalis would be a multifunctional venue, devising an invisible theatrical box large enough for different types of performances. It also considered lighting, acoustics, thermal comfort, and fire safety. On the outside, Chrysalis is clad in 4,000 aluminum shingles, in four shades of green that form a barely perceptible gradient.

For those who explore it from the inside as an urban-scale sculpture, the brawny steel exoskeleton, warm ipe wood, and framed views through the arches combine to create a powerful impression. "People do not react to it as a building," McCall says. "It feels like it's animate."

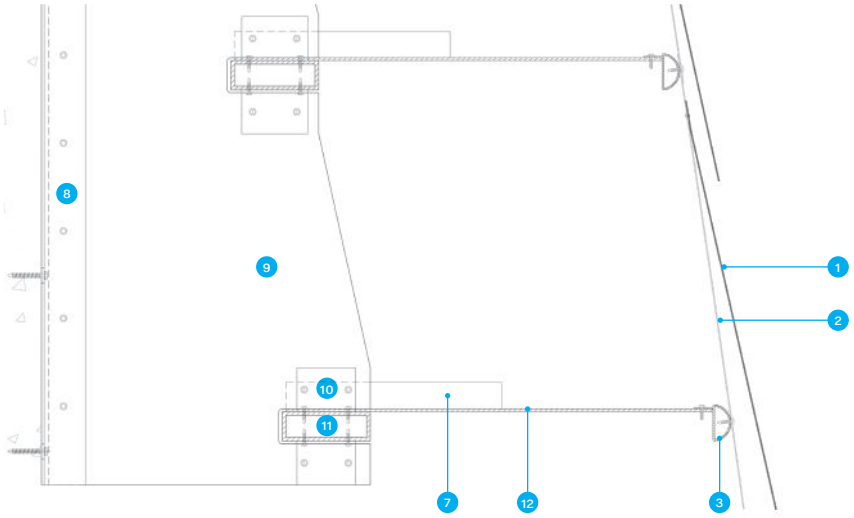
Edge Condition Section Detail



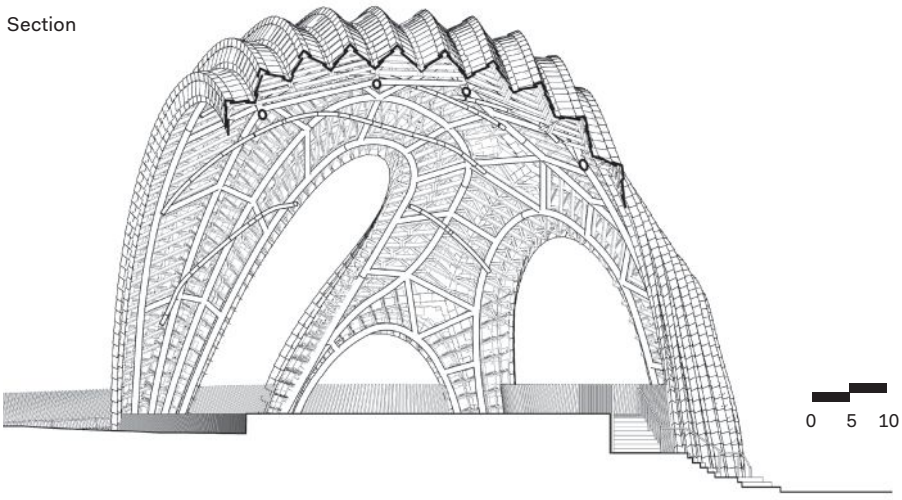
1. Aluminum skin panel
2. Sub skin panel
3. Aluminum extrusion
4. Steel structure
5. Aluminum shelf anchor
6. Aluminum collar anchor
7. 2" brake leg
8. Continuous 3"×3" angle
9. Vertical sheet metal fin
10. 3"×3" clip angle
11. 2"×6" aluminum tube
12. Aluminum chevron fin

0 0.5 1

Base Condition Section Detail



Section



0 5 10

Previous Spread: View from the west

Opposite: View from the southeast

Steel arches support the roof canopy

Project Credits
Project: The Chrysalis, Columbia, Md.
Client: Inner Arbor Trust
Designer: Marc Fornes/TheVeryMany, New York
Architect of Record: Living Design Lab, Baltimore · Kevin Day, AIA, Davin Hong, AIA (principals)
Structural/M/E/P Engineer: Arup
Lighting Design: Arup
Civil Engineer: Gutschick, Little and Weber
Geotechnical Engineer: Robert B. Balter
Construction Manager: Whiting-Turner Contracting
Landscape Architect: Mahan Rykiel Associates
Computational Design Consultant: David Eaton
Specialty Fabrication: Zahner
Size: 5,977 square feet
Cost: $6.6 million

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IWAN BAAN

Richard Rogers' Wimbledon House Restored for Harvard Program

TEXT BY ASHLEIGH POPERA

In the 1960s, Richard Rogers, HON. FAIA, and then-wife Su Brumwell designed a 2,766-square-foot house and pottery studio for his parents in London's Wimbledon district. The two-building scheme entails a steel structure with movable partitions, neoprene and plastic-coated aluminum accents, and floor-to-ceiling windows. A solution ahead of its time, the residence provided hints of Rogers' radical architecture to come.

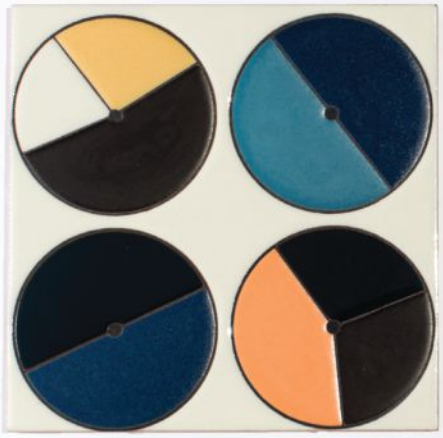
Rogers, who today is a senior partner at London-based Rogers Stirk Harbour + Partners, and his current wife, Ruth, donated the Grade II*-listed residence to the Harvard Graduate School of Design (GSD) in 2015. In June, the school unveiled the house's restoration, completed by the London-based team of Gumuchdjian Architects and landscape architect Todd Longstaffe-Gowan. While preserving the house's character, the restoration included roof replacement, asbestos remediation, removal of later additions, refurbishment of furniture, and redesign of the gardens.

The Wimbledon House will host the recipients of Harvard's new Richard Rogers Fellowship, which aims to support research examining alternative and sustainable urban design. The first six fellows, divided into three terms over the course of this year, will each receive a $10,000 stipend and travel expenses to and from London. What's more, they'll get to live in this newly restored icon for their three-month term.

> *Read more about the Wimbledon House restoration at bit.ly/GSDWimbledonHouse.*

Elemental Tiles: Earth, Air, Fire, and Water

TEXT BY SELIN ASHABOGLU



1. Agrarian Collection, Fireclay Tile
Inspired by aerial photos of cropland, this collection of 8"-square tiles is made of recycled materials that include scrap porcelain and post-industrial granite dust. Geometric shapes on the 0.31"-thick tiles take their Technicolor forms through glaze trailing, a precise technique that applies paint through the thin tip of a bottle. The collection offers eight patterns in warm, cool, or white palettes. *fireclaytile.com*

2. Stardust, Walker Zanger
Made of lava stone, this collection of retro tiles pays homage to the late David Bowie's iconic Ziggy Stardust. A traditional European glazing technique used for lava-stone countertops is applied to these smaller-scale tiles, suitable for wall and floor applications. Available in seven patterns. *walkerzanger.com*

3. Tides, Clé Tile
A new addition to the company's Watermark Collection, and designed by artist-in-residence Luca Osburn, these 4"-by-8" porcelain tiles are an interpretation of waves in the Pacific Ocean. In four colors, including Kelly's cove and jetty (both shown). *cletile.com*

4. Cloud, Ann Sacks
The subtle patterns on these unglazed, slip-cast pigmented porcelain tiles are created using *neriage*, an ancient Japanese technique of layering and slicing clays of various colors atop one another. The 5.5"-square tiles are offered in five patterns, in 10 colors, and four colorways. *annsacks.com*

APRIL GREER

> *To discover more tiles visit bit.ly/ElemenTilesOfNature.*

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The Vitra Design Museum Brings Together Models of Communal Housing from Across the Globe

TEXT BY AYDA AYOUBI

Innovative communal housing projects—from Michael Maltzan Architecture's Star Apartments in Los Angeles to Einszueins Architektur's Wohnprojekt Wien in Vienna—are architectural responses to social unrest, high real-estate values, and housing shortages. A new exhibition, "Together! The New Architecture of the Collective," at the Vitra Design Museum in Weil am Rhein, Germany, examines this break from traditional single- and multifamily housing typologies with a display of 21 models of built or commissioned experiments plucked from cities such as Berlin and Tokyo. The show runs through Sept. 10.

MARK NIEDERMANN

> *Read more about "Together! The New Architecture of the Collective" at bit.ly/CollectiveExhibition.*

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JENN-AIR® EXPANDS CONNECTED WALL OVEN CAPABILITIES WITH AMAZON ECHO

NEW VOICE CONTROL FEATURE MAKES COOKING HANDS-FREE

Jenn-Air has just announced a new user-friendly, voice command feature for its Connected Wall Oven. Activated by Amazon Echo, Jenn-Air's "Skill" app can be downloaded easily. Now simple voice commands are available for everything from preheating and setting timers to changing temperatures and cooking modes. Imagine that while hands are busy prepping and mixing ingredients, preheating the oven to a desired temperature can be initiated simply by saying "Alexa, tell Jenn-Air to preheat the oven to 400 degrees." It's brilliant.

MADE POSSIBLE BY JENN-AIR MOBILE APP AND COLLABORATION WITH NEST

Jenn-Air's innovative Connected Wall Ovens come equipped with WiFi connectivity, making this new collaboration with Amazon Echo possible. Its fully functioning mobile app allows cooks to set or start the oven remotely, monitor the cooking progress, and receive customizable notifications. The Connected Wall Oven app is available for both IOS and Android devices and gives users control over the oven's functions and performance from both smartphones and tablets, including cooking innovations unique to Jenn-Air.

Jenn-Air's collaboration with home automation innovator NEST Labs, greatly enhances Jenn-Air's mobile app to achieve a new level of functionality. The Works with NEST update (available in the App store) provides two key benefits—peace of mind and comfort. NEST can detect when you leave your home and will automatically turn off your Connected Wall Oven if you leave it on accidentally. It will also adjust the temperature of the kitchen automatically even while the units are operating so friends and family will always be comfortable while entertaining. Finally, a Remote Diagnostic feature can identify a problem with the oven, suggest the part needed and potentially fix it from afar. That's brilliance at its best.

Jenn-Air is consistently on the cutting edge of technology innovation and has made its reputation as a design trendsetter.

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Ghost Wash House
Paradise Valley, Ariz.
Architecture-Infrastructure-Research

TEXT BY AARON BETSKY
PHOTOS BY BILL TIMMERMAN

With the design of the Ghost Wash House in Paradise Valley—a wealthy Phoenix community on the north side of Camelback Mountain—architect Darren Petrucci, AIA, wants to bring what he calls "amenity infrastructure" from the urban to the domestic scale. The house forms a "third wash" between two existing desert dry streambeds that accept seasonal runoff from the mountain. It also channels the rainwater from infrequent storms via a butterfly roof—which Petrucci compares to a "nurse tree" that shades smaller plants and cacti—to the house's strip of courtyards, lawns, and living spaces. These cool and protected spaces, which run in sequence from north to south, are buttressed on both sides by stretches of bedrooms and service areas that offer a layer of protection from the harshness of the morning and afternoon sun.

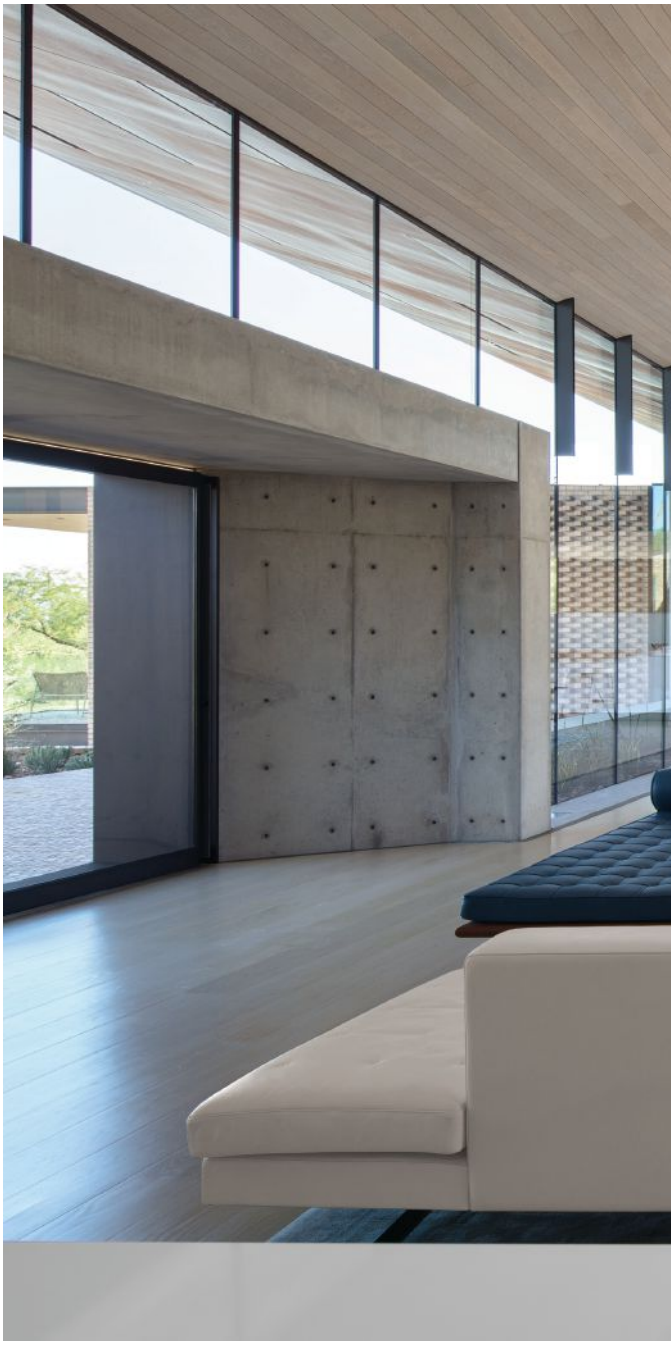
"Ever since I was in architecture school, I have been interested in the notion that infrastructure elements can be used for recreation and open space," Petrucci says. "One of the first places to do so, back in the 1990s, was the Hayden Wash in Scottsdale, Ariz., which is the site of a miles-long ribbon of parks and open spaces. When I saw this house's site, I thought I could apply the same thinking here."

Petrucci met client Eric Termansen when the latter was still a bachelor, and in fact introduced him to his wife Lauri. Petrucci remodeled the couple's first house, and, when they found this "lot in the valley's sweet spot, in the shadow of Camelback," as he puts it, he was happy to design the 8,500-square-foot house for them and their nine-year-old daughter.

The central volume consists of one large 16-foot-tall living space, its 100- by 60-foot ceiling held above wraparound clerestory windows by four corner posts. Looking up to the mountain and across the North Valley, it presents the Sonoran Desert as a place of beauty and refuge. Reflections in the house's clear insulated glass and in the dark glass of the 1,000-square-foot pool house further down the site multiply reflections of the mountain and desert scene, bringing that far landscape into frame.

On either side of this artificial oasis, Petrucci designed the bedroom wing to the west and the kitchen and service areas to the east to appear as monolithic blocks, covered in brick of different shades that mimic the colors of the nearby rocks. Windows open out to small courtyards sheltered from direct sun.

"Most modernist houses in the valley are beautifully tuned boxes standing in the landscape," Petrucci says. "I wanted to make a house that was more of the landscape." For all the grandeur of the Ghost Wash House, the architect has succeeded in making it both a mirror and a microcosm of its site.

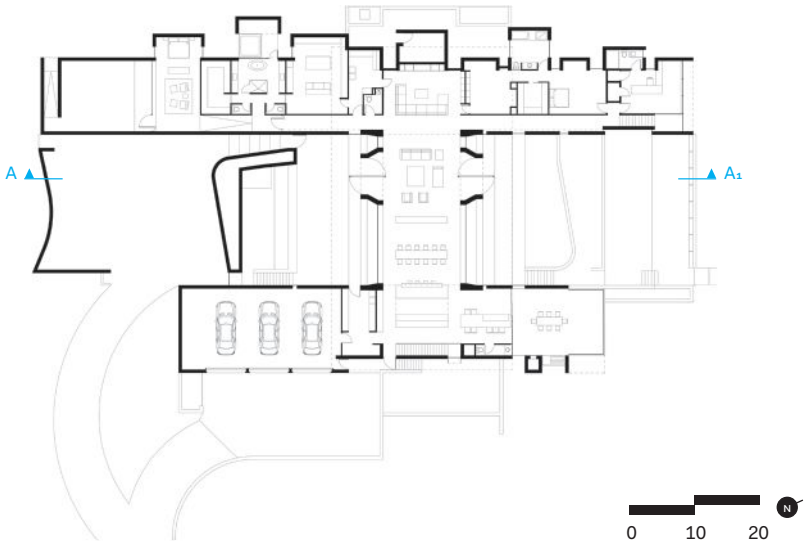


Previous Page: As seen in the entry court, brick from Pacific Clay Manufacturers was used for the walls and sitework.

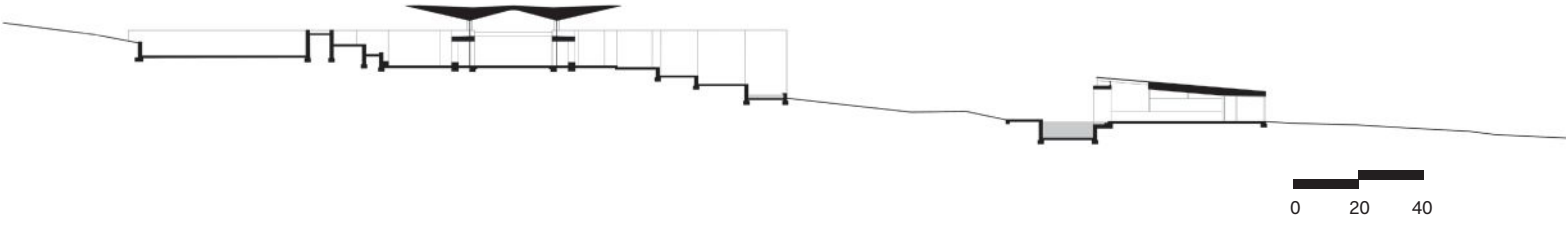
Above: Custom windows from Metalworks line the open living area.

Lower-Level Plan

Ground-Floor Plan



Section A–A₁



Opposite: Pioneer Masonry was responsible for installing the brickwork that lines outdoor areas from the main house down to the pool house.

Above: In the pool house, the light wood ceiling and Viracon glazing contrast with a poured-in-place-concrete entrance canopy executed by Concrete Works.

The terracing of the site, which is filled with native plantings, is evident in this view from the pool house. The wings for the bedroom and services, as well as the expansive roof on the main house, sheathed in pre-weathered Cor-Ten steel panels by Metal Man, provide shade.

Project Credits
Project: Ghost Wash House, Paradise Valley, Ariz.
Client: Eric and Lauri Termansen
Architect: Architecture-Infrastructure-Research (A-I-R), Scottsdale, Ariz. · Darren Petrucci, AIA (lead designer, principal); Phil Horton, ASSOC. AIA, Joe Pritchard, AIA (project assistants)
Interior Design: Darren Petrucci, AIA
Mechanical Engineer: Kunka Engineering
Structural Engineer: JT Engineering
Electrical Engineer: Woodward Engineering
Civil Engineer: Fleet-Fisher Civil Engineering
Construction Manager: Mark Allen
General Contractor: Build Inc.
Landscape Architect: Colwell/Shelor Landscape Architects
Lighting Designer: Creative Designs in Lighting
Size: 8,500 square feet (main house), 1,000 square feet (pool house)
Cost: Withheld

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GREY BEOLA 9218CM

Editorial: Architecture and Globalization

I remember precisely when the significance of globalization hit home. It was in Istanbul, six years ago this month—on my 40th birthday, as it happens. As a present, my partner had scored a reservation at a hot restaurant. Seated next to us was a party of 30- and 40-something locals who, it turns out, were celebrating a birthday as well. When candle-topped desserts arrived almost simultaneously at both tables, the coincidence broke the ice, and we started chatting.

We were all speaking American English, wearing sneakers designed in Bavaria or Oregon, taking pictures on late-model iPhones, and in general conforming to the behavioral expectations for international exchange established at the Bretton Woods Conference in 1944 and upheld by institutions such as the World Bank, CNN, and Art Basel.

Had architecture come up in the conversation, I'm sure we would have uncovered a mutual admiration for the work of Zaha Hadid or Bjarke Ingels. And had any of our new acquaintances worked in the field, chances are we could have played a fruitful game of six degrees: "Oh my God! You went to the ETH? When were you there? Did you know … ?"

Walking back to our boutique hotel in a gentrifying historic neighborhood, past the modest storefront workshops of carpenters and appliance repairmen, it occurred to me that we and those well-heeled Turks might have more in common with each other than with working-class people of our own respective countries. To say so even 20 years ago would have stretched belief. Yet that dinner encounter exemplified a contemporary reality: the cosmopolitan tribalism of 21st-century technocrats, a social group akin to the transnational aristocracies of pre–World War I Europe, but even more far-flung and rarefied.

Architecture itself, as a business, product, and ideology, seems to have evolved in tandem. The profession now operates at such a planetary scale that one can follow trends like the folded floor plate or bar code window pattern from, say, inception at a graduate studio in Boston, across a corporate desktop in Los Angeles or San Francisco, to implementation at a construction site in China. (One can just as easily track the extraction, production, and installation of structural steel in the opposite geographic direction.)

Two summers later, protests broke out near the hotel where we had stayed, in Istanbul's Taksim Square, in opposition to a government plan to raze an adjacent park and build a shopping mall on the site. Within days, millions had risen up around the country, protesting not just a single high-profile instance of privatization, but the injustice it epitomized. It was one in a sequence of tumultuous, headline-grabbing events—from the Arab Spring of 2010 to Brexit and the 2016 U.S. presidential election—occurring in reaction to globalization.

Both at home and abroad, the architecture profession is embedded in the systems of globalized power. Functionally, the condition is probably unavoidable, but it doesn't necessarily have to result in political upheavals. The trick, whether planning a new city, designing a corporate headquarters, iterating a retail prototype, or specifying house wrap, is to remember that the decisions architects make every day can have broad consequences. Simply act accordingly.

STEPHEN VOSS

CHARRETTE

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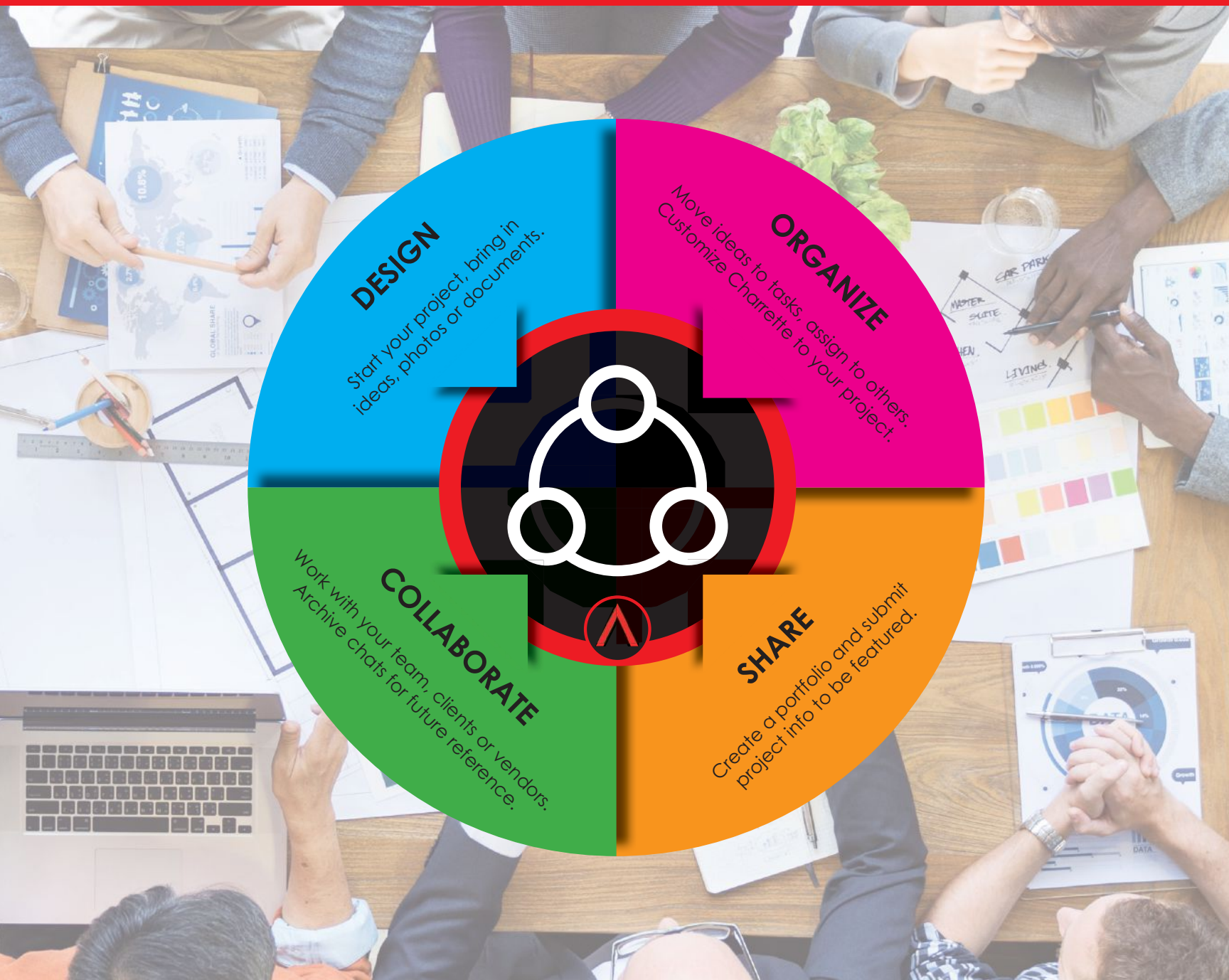

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